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The Relationship Between Physical Fitness and Academic Achievement in Sixth Grade Students

Shannon Usco Shook
Walden University

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Shannon Shook

has been found to be complete and satisfactory in all respects,
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Walden University
2016

Abstract

The Relationship Between Physical Fitness and Academic Achievement in Sixth Grade

Students

by

Shannon U. Shook

MA, Troy University, 2005

BS, Georgia Southern University, 1999

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

April 2016

Abstract

Researchers have reported on the relationship between academic achievement and physical fitness levels. At one rural middle school, 25% of the students enrolled were either overweight or obese and failing at least one course. Educators at the local site were seeking methods to improve the academic achievement of their students. The purpose of this quantitative study was to examine the relationship between academic achievement and physical fitness of middle school students at the study site. Framed by the theoretical connection between improved physical fitness levels and academic achievement, the research questions examined the relationship between physical fitness levels of 6th grade students ($N = 216$) as measured by their Presidential Youth Fitness Test (PYFT) and the state-mandated Criterion Referenced Competency Test (CRCT) scores in the areas of mathematics and reading. Findings from correlational analyses indicated small, significant positive relationships between students' CRCT in mathematics and reading and their PYFT levels. The link between personal fitness and academic achievement should be further explored; researchers should also consider potential moderating variables related to demographics, motivation levels, and educational and community support. Based on the findings of the study, physical educators at the local site should advocate for physical fitness and promote the connection between physical fitness and academic achievement. The implications for positive social change include providing local research findings to the school leadership that may have a positive effect on academic achievement.

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Table of Contents

| | |
|--|----|
| List of Tables | iv |
| List of Figures | v |
| Section 1: Introduction to the Study | 1 |
| Problem Statement | 2 |
| Nature of the Study | 6 |
| Research Questions and Hypotheses | 6 |
| Purpose of the Study | 8 |
| Theoretical Framework | 9 |
| Definition of Terms | 11 |
| Scope and Delimitations | 11 |
| Assumptions and Limitations | 12 |
| Significance of the Study | 12 |
| Summary | 13 |
| Section 2: Literature Review | 15 |
| Introduction | 15 |
| Historical Trends | 15 |
| Decline of Physical Education Programs | 20 |
| Fitness and Student Achievement | 23 |
| Brain Research | 24 |
| Fitness Studies | 25 |
| The Michigan State Study | 27 |

| | |
|---|----|
| Skeptics Question the Links Between Physical Fitness and Academic Achievement | 31 |
| Conclusion | 32 |
| Section 3: Research Method | 33 |
| Introduction..... | 33 |
| Research Questions and Hypotheses | 33 |
| Research Design and Approach | 34 |
| Correlational Analysis | 35 |
| Setting and Sample | 37 |
| Testing Instruments..... | 38 |
| PYFT..... | 38 |
| CRCT..... | 40 |
| Data Collection and Analysis..... | 41 |
| IRB Approval..... | 42 |
| Participants’ Rights..... | 43 |
| Section 4: Results..... | 44 |
| Introduction..... | 44 |
| Description of Sample..... | 44 |
| Research Questions and Hypothesis | 45 |
| Data Collection | 47 |
| Analysis and Outcomes..... | 47 |
| Summary..... | 54 |
| Section 5: Discussion, Conclusions, and Recommendations..... | 56 |

| | |
|--|----|
| Introduction..... | 56 |
| Interpretations of Findings..... | 57 |
| Implications for Social Change..... | 60 |
| Recommendations for Action..... | 61 |
| Recommendations for Further Study..... | 62 |
| References..... | 65 |

List of Tables

| | |
|---|----|
| Table 1. Tests of Normality | 37 |
| Table 2. Sixth Graders' PYFT Scores..... | 49 |
| Table 3. Sixth Graders' CRCT Reading and Math Scores | 51 |
| Table 4. Correlational Analysis of Sixth Graders' PYFT and CRCT Reading and CRCT Math Scores | 52 |

List of Figures

| | |
|---|----|
| Figure 1. Scatterplot diagram of math and fitness scores | 36 |
| Figure 2. Scatterplot diagram of reading and fitness scores | 36 |
| Figure 3. Racial categories for sixth grade study population, 2013-2014 | 45 |
| Figure 4. Gender categories for sixth grade study population, 2013-2014..... | 45 |

Section 1: Introduction to the Study

Childhood obesity is occurring in the United States at an epidemic rate.

According to the National Center for Health Statistics (2012), the number of overweight children in the United States has increased by more than 50%, and the number of extremely overweight children has nearly doubled. The American Heart Association (AHA, 2013) concluded that the rise in childhood obesity has led to an alarming number of children being diagnosed with Type II diabetes (which is considered adult onset diabetes), sleep apnea, liver problems, orthopedic problems, and asthma. In addition, obese children are more prone to low self-esteem, negative body image, and depression (AHA 2013). Students are at an ever increasing risk of serious health issues which will impact their physical and emotional well-being. Former Surgeon General Richard Carmona (AHA, 2013) stated, “Because of the increasing rates of obesity, unhealthy eating habits, and physical inactivity, we may see the first generation that will be less healthy and have a shorter life expectancy than their parents” (p. 1). Both medical and educational leaders see the possible implications for a generation of adults who will be negatively impacted by these risk factors.

Middle school students are no exception to the rule. Problems exist with the physical fitness levels of middle school students in Southeast Georgia (Owsley & Williams, 2014). Physical educators observed poor fitness levels on a daily basis among these students (Owsley & Williams, 2014). These students struggled with cardiovascular and muscular endurance activities such as running, jogging, pull-ups, sit-ups, and push-ups. These students were less likely to participate in cooperative group sports that were

offered during physical education classes or in school sponsored extracurricular team sports.

Increased pressure is being applied by federal, state, and local boards of education to improve students' academic achievement regardless of socioeconomic background, ethnicity, and school settings. The renewed focus on educational performances in the United States has driven accountability issues into the limelight with educators seeking the most effective methods for improving student achievement. According to school test data, many Georgia students do not meet minimum standards in terms of academics and standardized tests scores (State Longitudinal Data System, 2013).

According to researchers, raising students' physical fitness levels can improve their academic achievement. Raine et al. (2013) and Chomitz et al. (2009) found that physical activity and movement improve such cognitive functions such as memory, spatial orientation, attention, language, and decision making, and that most of the brain is activated during physical activity.

Problem Statement

On a daily basis, I teach physical education classes at a middle school in southeast Georgia. Fellow physical education teachers (Owsley & Williams, 2014) at the school have found from daily interactions and observations that 25% of students enrolled in the physical education program are either overweight or obese. My peers have also observed that overweight and obese students perform poorly in class activities such as sprints, form running, endurance exercises, and flexibility (Owsley & Williams, 2014). Based on their

experience, the majority of these students are more likely to fail physical education due to lack of participation in the planned activities.

Students at my school closely follow the physical profile of other students in Georgia schools. The Georgia Department of Public Health (GDPH, 2010) reported that only five in nine (56%) middle school students in Georgia meet Centers for Disease Control and Prevention (CDC) requirements for recommended physical activity. Also, 12% of Georgia middle school students are overweight, and 15% of middle school students are obese (GDPH, 2010).

Other researchers report that middle school students' poor participation in physical education programs is due to being self-consciousness about their body image and poor physical fitness condition (Eveland-Sayers, Farley, Fuller, Morgan, & Caputo, 2009). These factors combined to place these students at high risk for potential physical and mental health conditions that will negatively affect their current and future well-being (Eveland-Sayers et al., 2009).

The trend for Georgia students of being overweight or obese begins in early elementary school. According to Smith of the Georgia Department of Human Resources (2009), 19% of Georgia's third graders were overweight, and 24% were obese. The percentage of Georgia students who are obese is five times greater than the national percentage (5%) of obese third graders in the United States (Smith, 2009). Smith also found that African American students in Georgia were more likely to be obese (27%) than Caucasian children (21%). Currently, Georgia exceeds the Healthy People 2010 national goal of 5%-11% obesity for children and youth in every age, sex, race, and

ethnic group. The Healthy People 2010 initiative was established to delineate goals and objectives for prevention and control of childhood obesity (Holler et al., 2010). The five general goals are increasing physical fitness activity among children, reducing the amount of time that kids spend watching television, video games, and the Internet, decreasing the consumption of high-sugar and high-fat foods, increasing the consumption of nutritious foods, and creating social, monetary, and policy-driven incentives that reinforce long term changes in environment and behavior (Holler et al., 2010). Efforts are underway to combat and reduce the rates of obesity and poor health among our nation's children and adolescents.

Decreased fitness levels are beginning to negatively affect the health of children in my home state. Obesity-related hospitalization of children in Georgia costs \$2.1 million a year and continues to rise (Zizza, Herring, Stevens, & Popkins, 2004). The estimated average hospital length of stay for obese children is 60% longer than that of normal-weight children nationwide (Zizza et al., 2004). Because of their low level of physical activity and poor nutrition, Georgia children and adolescents are at an increased risk for hypertension, sleep apnea, diabetes, asthma, and low self-esteem (GDPH, 2010). As adults these children have a greater chance of developing cardiovascular disease, stroke, hypertension, gall bladder disease, osteoarthritis, and some cancers (GDPH, 2010). Dr. Stuart Brown, Director of Georgia's Division of Public Health, said, "If we continue on this same path, Georgia's children run the risk of being the first generation to live sicker and die younger than their parents" (Dunkin, 2006, p.1).

To address the high rates of overweight and obese students in Georgia schools, Smith (2009) of the Georgia Department of Human Resources has suggested that physical education programs should increase the level and intensity of physical activity for Georgia students. Currently, physical education teachers at my school teach cardiovascular fitness and team sports without emphasizing proper diet and nutrition. Physical educators should broaden their programs in the areas of teaching the importance of proper diet in conjunction with a daily exercise routine (Smith, 2009). These modifications could bring about significant improvement in the health and well-being of children (Eveland-Sayers et al., 2009).

Researchers propose that there is a positive correlation between physical fitness levels and academic achievement levels of students. As schools explore all avenues to improve student academic success, researchers believe that it is important that one not overlook the positive impact of physical fitness on academic test scores. Pica (2004a) demonstrated that students participating in 5 hours of vigorous physical activity a week had stronger academic performances in math, English, and science than do students who participate in only 2 hours of fitness activity a week. She also argued that movement teaches children about prepositions, adverbs, and communication skills and those students are more likely to retain their learning by being active. Grissom (2005) indicated a consistent positive relationship between academic achievement and overall fitness levels. There is a need for further study to strengthen these research findings because of the continuing cuts in physical education programs in many schools and because of the lasting impact on children's future well-being.

Nature of the Study

To explore the association between academic achievement and physical fitness, I conducted a correlational analysis of the Criterion Reference Competency Test (CRCT) and Presidential Youth Fitness Test (PPFT) scores of 216 sixth grade students at a middle school in southeast Georgia. The students had been previously organized into six classes of approximately 40 students each; I did not randomly assign students to groups. PYFP, which was established in 1966, is a nationally recognized physical fitness program (PYFP, 2014). Students were evaluated on their level of physical fitness in five areas: sit-ups, shuttle run, endurance run/walk, sit and reach, and pull-ups. Students were compared to a national standard based on age and gender.

I compared students' PYFT scores to their respective CRCT scores. I sought to determine if there were positive or negative correlations between students' level of physical fitness and subsequent achievement on the state-mandated standards test in the areas of reading and math. Scores were obtained from the school's CRCT report. In addition, I compared subgroups based on gender and ethnicity. The students' identities were kept confidential through the use of assigned numbers in lieu of their names in reported data.

Research Questions and Hypotheses

Both at the local and national levels, educators, parents, and others are concerned about the academic achievement of students in U.S. schools. In addition, they are concerned about high rates of overweight and obesity in children and adolescents. Budget concerns and reduction in school personnel have created an environment where physical

education programs are being eliminated or cut back (McCullick, 2012). I explored the following research questions and hypotheses in order to investigate the relationship between physical fitness levels and academic achievement among middle-school students. I used students' fitness levels as measured by the PYFT and students' scores in reading and math on the CRCT to assess my key variables of physical fitness and academic achievement.

RQ1. Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's physical education program as measured by the PYFT and student scores on the state-mandated CRCT in the area of math? (In order to meet the minimum standard on the CRCT, a student must score 800 or above.)

RQ2. Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's physical education program as measured by the PYFT and student scores on the state-mandated CRCT in the area of reading? (In order to meet the minimum standard on the CRCT, a student must score 800 or above.)

H₀1: There is no significant relationship between the physical fitness and academic achievement levels of sixth grade students enrolled in a middle school physical education program as measured by the PYFT and student math scores on the state-mandated CRCT.

H_a1: There is a significant relationship between physical fitness levels and academic achievement levels among sixth grade students enrolled in a middle school

physical education program as measured by the PYFT and student math scores on the state mandated CRCT.

H₀2: There is no significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school physical education program as measured by the PYFT and student reading scores on the state mandated CRCT.

H_a2: There is a significant relationship between physical fitness levels and academic achievement levels among sixth grade students enrolled in a middle school physical education program as measured by the PYFT and student reading scores on the state-mandated CRCT.

Purpose of the Study

The purpose of the study was to determine if there is a relationship between physical fitness levels and academic achievement among sixth grade students at a middle school located in southeast Georgia. The goal of social change is to educate and motivate students to change their eating habits and increase their physical activity levels. In order to improve long-term prognosis for good health, students must be instructed in proper physical fitness regimens and individual instruction given those students who already exhibit problems with being overweight or obese. In addition, students need to receive instruction on the positive consequences of proper diet and physical fitness so they can make educated decisions about their current lifestyles and practices. Although in many school systems health education is routinely offered, my school does not provide health classes that teach proper nutrition and healthy lifestyles. Students should be educated on

the negative effects of improper diet and lack of exercise and how these choices can alter their quality of life in later adult years. It has also been shown that proper physical fitness and nutrition benefit students in classroom achievement (Donnelly & Lambourne, 2011). The ultimate goal is for students to learn behaviors and activities that will greatly enhance the pursuit of a lifetime of physical fitness and mental well-being.

Theoretical Framework

In exploring and researching the topic, there has been one continuous thread that is underlying the theoretical framework for the study being undertaken by the researcher. Pica (2004b) and Grissom (2005) proposed that increasing physical activity levels and improving the personal fitness of children/adolescents leads to better academic achievement. Indeed concerns about childhood obesity levels are being voiced at national, state and local levels. Researchers were consistently discovering that American youth were edging closely to a crisis state as far as physical fitness was concerned (Grissom 2005; Pica 2004b).

I have also observed a similar state of decline in students' physical fitness levels during the 17 years I have taught physical education in elementary, middle school, and high school settings. Based on observations by the researcher's counterparts in the middle school level (Owsley & Williams, 2013), nearly one-half of their students were overweight or obese and in poor physical condition. The students were observed as having difficulty participating in team sports activities, exercises, and aerobic activities such as walking or running. These facts were alarming when research by the American Heart Association (AHA) in 2014 reported that an inactive lifestyle can lead to increased

risks for heart disease, diabetes, orthopedic problems, high blood pressure, strokes, and some forms of cancer. Furthermore, according to Carmona (2009) these students often suffer from social discrimination, poor self-esteem, and depression. Indeed many of the students at the researcher's school face a bleak future unless changes in lifestyles and physical fitness levels occur.

Another crucial element being considered by researchers and part of the theoretical framework of the study was the link between physical fitness levels and academic achievement. Students are being asked to increase their academic performance in the classroom and teachers are seeking ways to help them achieve as well. Jensen (2001) has conducted brain research that shows a positive correlation between physical activity levels and brain development. Donnelly et al. (2009) and Chomitz et al. (2009) also found that time allotted to being physically active did not hurt achievement and in most cases, was shown to be beneficial. This correlation needs to be further explored to determine if it also applies to a wide variety of students from varying socioeconomic backgrounds and ethnic groups. The researcher's school and study group displayed a broad spectrum of different youth from a variety of social, ethnic, and gender group. The researcher was trying to determine if there was a positive or negative correlation between academic achievements in math and reading as measured by the state standardized test and the personal fitness levels of students in sixth grade as measured by their fitness scores on the PYFT.

Definition of Terms

Criterion Referenced Competency Test (CRCT): A standards-based assessment of academic achievement in the areas of math, reading, social studies, science, and language arts; was adopted by the State of Georgia to comply with the Elementary and Secondary Education Act (U.S. Department of Education, 2013).

Presidential Youth Fitness Program (PYFP): This program was established in 1966. This program helps assess the current fitness level of youth ages 6 to 17 and offers awards to encourage them to stay active. The program includes five events that measure muscular strength/endurance, cardio respiratory endurance, speed, agility, and flexibility (The President's Challenge, 2012).

Presidential Physical Fitness Test (PPFT): As part of the PPFT, students are evaluated on their level of physical fitness in six areas: sit-ups, shuttle run, endurance run/walk, sit and reach, and pull-ups. Students are compared to a national standard based on age and gender (The President's Challenge, 2012).

Scope and Delimitations

The study will be limited to the population of 216 sixth grade students attending a public middle school in rural southeast Georgia. The school enrollment is approximately 2000 students in grades sixth, seventh, and eighth. The demographic breakdown of the sixth grade student population is: Caucasian (53%), African Americans (30%), Hispanic (12%), Multi-racial (3%), and Other (3%) (Public Schools K12, 2014). In addition, this study focused on the standardized test results received on the state's CRCT in the areas of

math and reading. The researcher used the fitness results from the Presidential Physical Fitness Test.

Assumptions and Limitations

Assumptions associated with this study included, but were not limited to the following. All students were required to take physical education for at least one 9-week period per school year. Sixth grade students were accustomed to having regular physical education classes daily due to elementary schools having daily physical education classes. Teachers who were highly qualified physical education teachers who have met state standards for physical education certification conducted all physical education assessments. All research was conducted in a non-partial manner with fidelity to the assessment instrument.

Limitations associated with this study included the following issues. Many of the students come from poor socioeconomic backgrounds/single parent households and may be dealing with issues such as poor nutrition and family instability and mental well-being at the time of test administration. Some of the students may be older due to retentions. Students that have been classified as having specific learning disabilities or mental intellectual disabilities are also served in the regular physical education setting with accommodations as needed because the school encourages full inclusion of students in regular education whenever possible.

Significance of the Study

I was seeking to corroborate the findings of past researchers and contribute to the body of research currently being offered in the study of the possible positive link between

personal fitness and academic achievement. Implications for social changes would be that the research could encourage administrators, teachers, and students to understand the importance of physical fitness for the students' personal health and their personal academic achievement. There is also potential for constructive change in the manner in which physical education is currently offered at the high school level with students only being required to take one-half Carnegie unit of personal fitness. If a positive correlation can be established, then the researcher can supply evidence that personal fitness can improve academic performance on standardized tests.

Summary

Further research is clearly indicated in determining definitively whether or not a student's physical fitness level has a positive correlation on his or her academic performance and achievement. National leaders in the areas of health, education and economics are expressing a deep concern for the future well-being of today's youth. In 2005, Surgeon General Richard Carmona expressed his belief that many of today's youth would have a shorter life expectancy than their parents and that this would be the first generation to not live longer than the previous generation (Carmona, 2009). The State Commissioner of the Georgia Department of Public Health, Dr. Barbara Fitzgerald (2014), also expressed her concerns that the youth in Georgia were in crisis and were facing significant health issues due to the increase in childhood and adolescent obesity.

Further cuts in education funding have brought about decreases in the amount of physical education being offered in the schools, particularly at the middle and high school levels (McCullick, 2012). In addition, there is increased pressure to improve standardized

test scores and educators are seeking methods to facilitate improved student learning and achievement. Researchers such as Jensen (2010) and Pica (2004) have proposed that physical fitness does have a positive impact on brain development and student achievement. In addition, research by Dwyer, Sallis, Blizzard, Lazarus, and Dean (2001) has shown that children who participate in daily physical fitness activities have improved motor fitness, academic performance, and a more positive attitude toward school than those students who do not participate in daily physical activity. Quality physical education programs in the schools can serve as the basis for helping improve both physical fitness levels (and an improved quality of life) and academic achievement in children and adolescents.

Section 2: Literature Review

Introduction

In developing my study, I drew on current research on the nature of physical fitness. The study was based on previously published research and online resources to explore the hypothesis that there was a relationship between physical fitness levels and academic achievement. Previous researchers (Grissom, 2005; Jenson, 2010; Pica, 2004) have demonstrated a positive relationship between physical fitness levels and student achievement. In this chapter, I explore relevant concepts, theories, and research findings from others' research in this area. Dedicated efforts were given to thoroughly review and discuss studies that carefully examined this question, whether it was pro or con on the subject.

Historical Trends

The review of the literature shows that concern about the problems of childhood obesity and poor physical fitness is a nationwide issue in the United States. This tendency towards being overweight and/or obese was noted with concern as early as the 1980s, when researchers found that fitness levels of U.S. children and youth had declined (Ross & Gilbert, 1985). According to the 1984 National Children and Youth Fitness Study (NCYFS), which was published by the U.S. Office of Disease Prevention and Health Promotion of the Public Health Service, a third of U.S. children aged 10-18 were not physically fit (Ross & Gilbert, 1985). According to results from a follow-up national study, NCYFS II found that children aged 6-9 were also not physically fit (McGinnis, 1987).

Numerous other studies found similar results. In another youth fitness study released by the President's Council on Physical Fitness and Sports (PCPFS), Murphy (1986) found that U.S. youths were in poor physical condition. Updyke and Willett (1989) corroborated Murphy's finding. They measured the physical fitness levels of U.S. youth during a ten year period during the 1980's and found a decline of 10% in the aerobic fitness levels of both boys and girls. Using data from NCYFS II, Pate and Shephard (1989) emphasized that U.S. children had a higher amount of fat as measured by skin folds when compared to children of other countries. Researchers have consistently reported obesity and poor health among U.S. children.

The literature also indicated that the lifestyles of U.S. children were leading to a nation of overweight and unfit youth. Groves (1988) found that U.S. children aged 2-11 spent an average of 23-25 hours per week watching television. The American Academy of Pediatrics (1987) stressed that in the late 80's up to 50% of U.S. children were not getting enough exercise to develop healthy hearts and lungs. Hinkle (1987) suggested that lack of physical activity in U.S. youth accounted for the increase in a host of diseases including hypertension, diabetes, impaired tolerance for heat, and various psychological disorders. The American Heart Association (AHA) reported that an inactive lifestyle is now regarded as an independent risk factor for coronary heart diseases (Fletcher et al., 1992). Diseases and ailments that once were considered to be problems for adults now are occurring in alarming numbers among children.

Poor physical fitness and obesity- related disorders have not decreased among U.S. youth; instead, they have continued to increase (Carmona 2009). When he

designated 2005 as “The Year of the Healthy Child,” former U.S. Surgeon General, Vice Admiral Richard H. Carmona (2009), prompted a “call to action to prevent and decrease overweight children and adults and the epidemic of obesity” (p.1).

In his report, Carmona (2009) noted that the prevalence of obesity among U.S. adolescents had nearly tripled in the past two decades (Carmona 2009). The increase in obesity rates has been accompanied by an increase in diagnoses of Type 2 diabetes, heart disease, and some forms of cancer among adolescents (Carmona, 2009). Additional consequences of obesity are social discrimination, poor self-esteem, and depression (Carmona, 2009). Research shows that the problem of overweight and obese children can lead to a multitude of problems that are life threatening and affect future quality of life.

Poverty levels have a noticeable effect on obesity rates in children and teenagers. Ogden, Lamb, Carroll, and Flegal (2010) reported that in 2007-2008 almost 17 percent of children and adolescents aged 2-19 were obese and that obesity is greater among individuals with a low income. Among both girls and boys, the prevalence of obesity decreases as income increases, but this relationship is not consistent across race and ethnicity groups. The prevalence of obesity among boys living in households with incomes at or above 350% of the poverty level (which is \$23,850 for a family of four (Ogden et al., 2010) is 11.9%, while 21.1 percent of those below 130% of the poverty level are obese. Among girls, 12% of those living in households with incomes at or above 350% of the poverty level are obese while 19.3% of those living in households with income below 130% of the poverty level are obese (Ogden et al., 2010).

Obesity levels are occurring at a disturbing rate among many specific demographical groups. The relationship between income and obesity is significant among nonHispanic white boys, 10.2% of those living in households with income at or above 350% of the poverty level are obese compared with 20.7% of those in households below 130% of the poverty level. Among nonHispanic white girls, 10.6% of those living at or above 350% of the poverty level are obese, and 18.3% of those living below 130% of the poverty level are obese. Of the approximately 12 million children and adolescents who are obese, 24% (almost 3 million) live in households with income at or above 350% of the poverty level; 38% (approximately 4.5 million) have incomes between 130% and 350% of the poverty level; and 38% (approximately 4.5 million) live below 130% of the poverty level. The majority of obese nonHispanic white children and adolescents (4.4 out of 6 million) live in households with income at or above 130% of the poverty level (Ogden et al., 2010). Special attention should be given to ethnic groups who are at particular risk due to socioeconomic backgrounds.

The prevalence of childhood obesity decreases as the education of the head of the household increases (Ogden et al., 2010), but the relationship is not consistent across race and ethnicity groups. Overall, a significant inverse relationship was present between the prevalence of obesity and the level of education of the household head. Among boys, 11.8 % of those living in households where the household head has at least a college degree are obese compared with 21.1% of those living in households where the head of the household has less than a high school degree (Ogden et al., 2010). Among girls, 8.3 % of children and adolescents living in households where the household head has at least

a college degree are obese compared to 20.4% who live in households headed by individuals with less than a high school degree (Ogden et al., 2010). Significantly, during 2007-2008, the percentage of U.S. children and adolescents who are obese increased for all income and education levels (Ogden et al., 2010).

According to statewide longitudinal data on obesity in Georgia (GDPH, 2010), the prevalence of obesity among boys increased from 14% in 1999-2000 to 18.6 % in 2009-2010. No significant change existed among girls with the prevalence being 13% in 1999-2000 and 15.0 percent in 2009-2010. No significant change in obesity was prevalent from 2007-2008 to 2009-2010 overall or among boys or girls (GDPH, 2010).

CDC investigators (2011) have also found evidence of increased obesity and related health problems among U.S. youth. Over the past two decades, the number of overweight children has increased by more than 50% and the number of extremely overweight children has nearly doubled (National Center for Health Statistics, 2012). As a result, obese children have shown an alarming increase in the incidence of Type 2 diabetes, which is also known as adult-onset diabetes (Hart, 2003).

Additional problems that are appearing in alarming numbers are sleep apnea, which has been linked to problems with learning and memory, liver problems, orthopedic problems and asthma (Hart, 2003). Sleep apnea has also been shown to impair a child's ability to concentrate and stay alert during the day, which could have a negative impact on school performance (Drucker, 2004). Eveland-Sayers, Farley, Fuller, Morgan, and Caputo (2009) also reported being physically fit reduces the risk of cardiovascular disease, colon cancer, diabetes, dying prematurely, and obesity. Also, elevated levels of

physical activity and fitness improve bone and musculoskeletal function and help alleviate or relieve depression, anxiety and stress (Eveland-Sayers et al., 2009).

Decline of Physical Education Programs

To further complicate this growing epidemic, many physical education programs have been cut or eliminated from the schools. According to a study by University of Georgia kinesiology professor Bryan McCullick (2012), there are currently six states that mandate the appropriate guidelines for elementary school physical education, which is 150 minutes per week, while only two states mandate appropriate amounts for middle school students, which is 225 minutes. None of the six states require adequate physical education at the high school level, which is also 225 minutes. The National Association of Sport and Physical Education (NASPE) set guidelines for the amount of school-based physical education instructional time. Another factor not often noted is that parents frequently drive their children to school because of safety issues or long distances, which again decreases the amount of physical activity through walking (Drucker, 2004). Changes in society and technology have created a generation of children who are much less active than previous generations with alarming consequences.

Due to the severity of the problem of obesity in the United States, the U.S. Department of Health and Human Services (USDHHS) (2011) has begun the Childhood Overweight and Obesity Prevention Initiative. The purpose of the initiative is to target obesity prevention and promotion of healthy weight for children (USDHHS, 2011). This initiative was undertaken due to the newest statistics released by the Centers for Disease Control and Prevention (CDC, 2011). Data from the National Health and Nutrition

Examination Survey (NHANES), 1999-2004 and the NHANES National Youth Fitness Survey, 2012 showed that about 42% of U.S. Youth aged 12-15 years had adequate levels of cardiorespiratory fitness (Gahche et al., 2014). Also, the percentage of youth who had adequate levels of cardiorespiratory fitness did not differ by race and Hispanic origin, or by family income-to-poverty ratio (Gahche et al., 2014). In addition, the percentage of youth who had adequate levels of cardiorespiratory fitness decreased as weight status increased. Finally, the percentage of youth aged 12-15 who had adequate levels of cardiorespiratory fitness decreased from 52.4% in 1999-2000 to 42.2% in 2012 (Gahche et al., 2014). As a result of these findings, the program will work closely with the CDC, National Institute of Health (NIH), Food and Drug Administration (FDA), and the President's Council on Physical Fitness and Sport National Fitness Challenge to encourage schools and industries to promote healthy eating and physical fitness habits at an early age (Gahche et al., 2014).

Students at the researcher's school fit the physical profile of other students in schools in Georgia. A report from D.J. Smith of the Georgia Department of Human Resources (2009) stated that 43% of Georgia's 3rd graders were either overweight (19%) or obese (24%). One alarming statistic in the study indicated that one in four Georgia students is obese. This figure is five times the national percentage (5%) of obese third graders in the United States standard population distribution (Smith 2009). The study also found that African-American students were more likely to be obese (27%) than white children (21%) (Smith, 2009). The Department of Human Resources has suggested that physical education programs should increase the level and intensity of physical activity

(Smith, 2009). Physical educators should broaden their programs in the areas of teaching the importance of proper diet in conjunction with a daily exercise routine. These modifications could bring about significant improvement in the health and well-being of young children.

Studies of children and the relationship between physical activity, fitness and cognitive function are relatively few in number but generally show a positive association between physical activity and cognitive function. Zoeller (2010) said that regular exercise and greater aerobic fitness are associated with greater brain volume, improved neurophysiological responses to stimuli as measured by EEG (electroencephalography), and higher levels of growth factors that promote growth of brain tissue, neurogenesis, and angiogenesis. Van Dusen, Kelder, Kohl, Ranjit, and Perry (2011) also concluded from their study that fitness levels were strongly and significantly related to academic performance regardless of other socio-demographic and fitness variables and seems to peak in late middle to early high school. They recommended that policymakers consider physical education mandates in middle and high schools and that physical education times should be increased with an emphasis on cardiovascular fitness (Van Dusen et al., 2011). Wittberg, Northrup, and Cottrell (2009) and Rauner, Walters, Avery, and Wanser (2013) also found that aerobic fitness was a significant predictor of academic performance. There are some studies that do not support the theory that academic achievement and physical fitness levels are related.

Fitness and Student Achievement

With information being obtained about the poor physical fitness levels of many children there is ample reasons for concern on the part of educators about this growing epidemic in our nation. The prevalence of obesity in today's children is detrimental to the student's health and is purported to have a negative impact on student learning and achievement. Research has shown that movement and physical activity assists children in learning more effectively. Ogden, Carroll, Kit, and Flegal (2012) expressed concern about epidemiological findings that indicated that children are less active and more obese than ever before despite initiatives to combat this. According to brain research by Jensen (2001), a child's earliest learning is based on motor development. He found that there is a connection between the cerebellum (motor control part of brain) and such cognitive functions as memory, spatial orientation, attention, language, and decision making. In addition, Jensen has further confirmed that most of the brain is activated during physical activity and that sitting for more than ten minutes at a time results in reduced concentration. Jensen (2010) further reported that exercise is highly correlated with neurogenesis, the production of brain cells that is correlated with improved learning and memory. Students cannot sit still for long periods of time before the flow of blood and oxygen to their brain slows down considerably which inhibits the learning process (Gilbert, 2002). Furthermore, studies by Donnelly et al. (2009) found that time spent being physically active did not detract from education achievement and in some instances were associated with improved scholastic performance. Chomitz et al. (2009) also found a positive relationship of physical activity with academic achievement.

In Georgia, Dr. Brenda Fitzgerald (2014), Commissioner of the Georgia Department of Public Health expressed her concern about childhood obesity by stating, “The onset of obesity and unhealthy lifestyles begins in childhood, and efforts to arrest this enormous public health problem must begin during that phase of life.” She reported that Georgia has the second highest incidence of childhood obesity in the nation (Fitzgerald, 2014, p.1). She also reported that only 16 percent of children in Georgia were able to pass all five portions of the physical fitness test (Fitnessgram®) and that 20% of the children did not pass a single part. As a result of this statistic, her department has launched a pilot program in five counties called Georgia Shape to combat this problem by offering resources and suggested activities (Fitzgerald, 2014, p.1).

Brain Research

Cocke (2002) reported the regular physical activity showed improved attributes such as increased brain function and nourishment, higher energy/concentration levels, changes in body build affecting self-esteem, increased self-esteem and better behavior which may all support cognitive function. Shepard (1997) also stated that consistent physical activity led to increased cerebral blood flow, changes in hormone levels, enhanced nutrient intake and greater arousal in brain functioning. Hillman, Buck, Themanson, Pontifex, and Castelli (2009) have indicated similar findings that showed that physical fitness in children assisted with action monitoring (response to stimuli).

Additionally, Chaddock et al. (2010) reported that specific regions of the basal ganglia of the brain, which support cognitive control, are enlarged in physically fit children. Furthermore, physically fit children displayed superior performance in

behavioral activities that required executive control. Further studies by Chaddock et al. (2011) demonstrated that physically fit children performed better on relational memory tasks. Pontifex et al. (2011) also found that physically fit children displayed faster cognitive processing speed that indicated that these children had greater attentional ability and faster processing of the stimulus being presented. Reed et al. (2010) completed a study that demonstrated that children who were physically active showed improvement on fluid intelligence tests (measures ability to reason quickly and to think abstractly). The students also received higher scores on state mandated achievement tests in English/language arts, math and science. Social studies test scores were significantly higher. Clearly, movement and physical activity can positively affect the development of a child.

Fitness Studies

A study conducted in a Canadian school demonstrated that students participating in 5 hours vigorous physical activity a week had stronger academic performance in math, English and science than students with only two hours of fitness activity per week (Pica, 2004b). Pica (2004b) argues that movement teaches children concepts such as prepositions, adjectives, adverbs, and communication skills and this understanding is concrete and more fully retained. For example, when children move over, under, around, beside, and near objects such as a slide or monkey bars these words take on deeper meaning to them. In addition, learning is more fun.

As schools explore all avenues to improve student academic success, researchers believe that it is important that one not overlook the positive impact of physical fitness on

academic test scores. A study conducted by the California Department of Education (2005) showed a significant relationship between the physical fitness and academic achievement of California's public school children. The study compared scores from the spring 2001 Stanford Achievement Test with the results of the state mandated physical fitness known as the Fitness Gram for students in Grade 5 (353,000 students), Grade 7 (322,000 students), and Grade 9 (279,000 students).

Key findings of the California study were that higher achievement was associated with higher levels of fitness at each of the three grade levels measured. In addition, students who met minimum fitness levels in three or more fitness components showed the greatest gains in academic achievement at all three grade levels. Furthermore, females demonstrated higher achievement than males, particularly at higher fitness levels. Finally, the relationship between academic achievement and fitness was greater in mathematics than in reading, particularly at higher fitness levels (California Department of Education, 2005).

Further research based on children from the United States, the United Kingdom, Hong Kong, and Australia by Trost (2009) proposed that designating time for daily physical education did not hurt academic performance and that students tended to perform better in the classroom. The study also found that children who are more physically fit tend to perform better in the classroom and have better school attendance and fewer discipline problems (Trost, 2009). Roberts, Freed, and McCarty (2014) reported that a study on fifth, seventh, and ninth graders in California showed that students whose mile run/walk were lower than California Fitness gram standards or

whose Body Mass Index (BMI) exceeded Center for Disease Control's sex and age specific body weight standards scored lower on California standardized math, reading, and language tests than students with desirable BMI status or fitness levels. Another two-year study by Hollar et al. (2010) examined the results of implementing a physical fitness intervention among elementary age students. The findings were that the improvement of students' physical fitness also showed a positive correlation in improvement of math scores and to a lesser extent, reading scores. In addition, a recent study by Coe, Pivarnik, Womack, Reeves, and Malina (2012) on 312 middle school students revealed the following: Health-related fitness was related to academic achievement in children; students with the highest fitness level performed better on standardized tests, and students with the lowest fitness levels performed lower in class grades. Finally, in a report presented at the American Heart Association's 2010 Conference on Nutrition, Physical Activity and Metabolism, researchers said that physical fitness is associated with academic performance in young people and the presenter, Dr. Lesley Cottrell said that "The take-home message from this study is that we want our kids to be fit as long as possible and it will show in their academic performance" (Wittberg, Northrup, & Cottrell, 2010).

The Michigan State Study

Research by Michigan State University has been geared to target the correlation between physical fitness levels and academic performance of middle school aged students (Michigan State University 2006). In the study, researchers tracked over 200 six graders. For one semester half of the students took the school's physical education class,

while the other half did not participate in a P.E. program. Half way through the school year, the results of the study showed that students taking the physical education course did no better or worse in their academic classes. However, they also discovered that students who participated in more vigorous physical activities such as organized sports (soccer or football), or non-organized after school activities such as skateboarding did approximately ten percent better in core classes such as English, science, math, and social studies. The researchers concluded that the students who performed better academically in this study were the most physically active (Michigan State University 2006). Finally, Pivarnik stated that this is noteworthy because many schools do not feel that they can afford the time out of the academics to schedule for P.E. Pivarnik further stated that if kids have P.E. everyday it will not hurt grades but if the intensity level of P.E. was increased it might make a positive difference in academic achievement (Michigan State University 2006).

University of Illinois researchers have also been studying the health benefits of exercise on cognitive functioning. Their study focused on comparing school-aged students with control groups of adults. The study looked at the relationship from both a behavioral and neuroelectric perspective, which is the subject's ability to recognize, respond to, and discriminate between different visual stimuli. When the researchers measured brain activity, they found that fit children allocated more resources towards identifying the stimuli and were also able to process the stimuli faster. Behaviorally, the children made fewer errors than their less fit peers. Although the results of the finding need to be replicated, the scientists believed that the study showed that physical fitness

has a positive correlation with intellectual development (“Strong Relationship”, 2004).

In addition, research points to other benefits for children such as improved concentration and classroom achievement with improved physical fitness levels (McCracken, 2002).

The physical fitness level of school-aged children and its possible link to improved academic achievement has become a worldwide concern. Dwyer et al. (2001) conducted a study on 7,961 Australian school children aged seven to fifteen. The researchers used a questionnaire/fitness test to measure physical activity and fitness and a five-point scale to show academic performance. The questionnaire requested information on students’ involvement in sports including frequency, time, and intensity. In addition, the students were questioned about their means of transportation to and from school as well as any other physical activities. The fitness test was administered by a trained testing team and consisted of outdoor and indoor tests. The students’ academic performance was measured by a five-point scale (excellent, above average, average, below average, or poor ratings) that was administered by a school representative. After analyzing the data, Dwyer et al. (2001) concluded that consistently across age and sex group, the academic ratings were significantly correlated with questionnaire measures of physical activity and with performances on six physical fitness measures. In conclusion, the researchers suggested that instead of decreasing physical activity in the schools, the administrators should consider developing more vigorous physical activity programs.

Bausch (2011) also reviewed current literature and found that a large proportion of youth are not physically active. Estimates of population-wide levels of physical activity show that Hispanic and African American youth are less physically active than

their white counterparts, with significant differences evident among females. In addition, many of these students had the lowest levels of physical activity and the least access to school-based physical activities and resources. It was noted that physical activity is highly recommended by the Task Force on Community Preventive Services as a means to improve emotional stability, physical health, motivation and ability to learn.

As a national area of concern, the CDC (2010) also reported several significant findings based on 23 years of research that included all 50 states. First, they found that student physical activity may help improve academic performance (grades, standardized tests scores, etc.), academic behavior (e.g. on task behaviors, attendance), and factors that can positively influence academic achievement (e.g., concentration, attention, improved classroom behavior). Second, the majority of students in the review reported that physical activity was positively related to academic performances. Third, adding time during day for physical activity does not appear to take time away from academic performance. Last, schools should continue to offer and/or increase time for student physical activity. Again, these findings summarize what is being found by numerous studies and researchers.

Grissom (2005) conducted a study that indicated a consistent positive relationship between academic achievement and overall fitness levels. The relationship between fitness and achievement appeared to be greater for girls than boys and enhanced more for higher socioeconomic status students than for lower socioeconomic status students. However, Grissom questions that physical fitness alone can be linked to academic achievement and alleges that other factors such as diet, home environment, genetics,

social networks, and physical environments might also have an impact on student performance. Grissom believes that the link between physical fitness levels and improved student achievement still have not been proven conclusively to be connected.

Skeptics Question the Links Between Physical Fitness and Academic Achievement

Researchers caution regarding absolutely linking physical fitness levels and improved academic achievement and cognitive functioning. Miller, Taler, Davidson, and Messier (2012) expressed skepticism that physical exercise is responsible for changes in cognitive functioning. Instead they purported that increased exercise caused changes in depression and social/cognitive stimulation, which resulted in improved cognitive functioning. Additionally, Duncan, Duncan, Strycker, and Chaumeton (2002) and Mezzacappa (2004) proposed that the possible influence of sociocultural values, and especially poverty, need to be carefully examined for a connection to fitness and cognitive function.

Castelli, Hillman, Buck, and Erwin (2007) proposed that current studies on physical fitness and academic achievement are too general and that more precise study is needed. Determination of which component of fitness (aerobic, muscular, and body composition) has the most influence on improving cognitive functioning. Currently this determination has not been established. In addition, both the CDC (2010) and Datar and Sturm (2006) stated that further studies are necessary to examine the longitudinal effect of increased physical activity on academic performance before definitive statements can be published as proven research. Further, a study by Trost (2009) could not show causality between physical fitness scores based on the PYFT and academic performance

of fourth and fifth graders at the participating research study school. Finally a study by Aktop (2010), also cautioned that the direction of causality could not be established in his study of the association between indicators of health-related physical fitness and academic performance in Texas schools. Clearly researchers are not united in positively affirming that improved physical fitness can improve academic achievement and cognitive functioning.

Conclusion

Preliminary research of the links between physical fitness and academic achievement are very promising. This research further reiterates the urgency of taking a proactive approach to combat the very real threat to our nation's youth. The prospect of future generations not enjoying a better quality of life or shorter life expectancy than their parents is a frightening outlook. Steps are being taken by many government and private agencies to fight this epidemic. In addition, the decreased levels of cognitive functions will have a negative impact on the nation's productivity and creativity. Parents and educators must work together to reduce the number of students who are overweight and/or obese. If the problem is ignored, future generations will pay the price.

Section 3: Research Method

Introduction

In Section 3, I will present the research design used to study the relationship between physical fitness levels and academic achievement in reading and math among my study population. I will include a description of the design, sample, procedures, instrumentation, and data analysis related to the study. The data collection and analysis will also be examined. The analysis of the collected data will be used to answer the research questions.

Research Questions and Hypotheses

I used the following research questions and hypotheses to guide my examination of the relationship between students' physical fitness and academic achievement:

RQ1. Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's physical education program as measured by the PYFT and student scores on the state-mandated CRCT in the area of math? (In order to meet the minimum standard on the CRCT, a student must score 800 or above.)

RQ2. Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's physical education program as measured by the PYFT and student scores on the state-mandated CRCT in the area of reading? In order to meet the minimum standard on the CRCT, a student must score 800 or above.)

H₀₁: There is no significant relationship between the physical fitness and academic achievement levels of sixth grade students enrolled in a middle school physical education program as measured by the PYFT and student math scores on the state-mandated CRCT.

H_{a1}: There is a significant relationship between physical fitness levels and academic achievement levels among sixth grade students enrolled in a middle school physical education program as measured by the PYFT and student math scores on the state mandated CRCT.

H₀₂: There is no significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school physical education program as measured by the PYFT and student reading scores on the state mandated CRCT.

H_{a2}: There is a significant relationship between physical fitness levels and academic achievement levels among sixth grade students enrolled in a middle school physical education program as measured by the PYFT and student reading scores on the state-mandated CRCT.

Research Design and Approach

I quantitatively assessed the relationship between variables using correlational analysis. As Creswell (2002) noted, investigators use this type of statistical technique to describe and measure the degree of relationship between sets of data. My focus was on examining the relationship of three variables (math competency, reading competency, and physical fitness); it was not on testing an intervention. I used a single step sample. I did not assign students to groups, and I did not provide an intervention to the study group.

My study population consisted of 216 sixth grade students who participated in a physical education class lasting 55 minutes for 5 days during each school week. After obtaining permission from the local school board and from school administrators, I collected quantitative data from a test data bank containing students' overall physical fitness scores on the PYFT and their math and reading scores from the CRCT for the 2013-2014 school year. (School personnel administer the CRCT and the PYFT on an annual basis.) I also collected demographic information (specifically, students' gender and ethnicity) in order to assess potential impacts on the relationship between students' physical fitness levels and academic achievement levels. I did not conduct any student testing (PYFT or CRCT).

Correlational Analysis

Pearson correlation was first used to measure the relationship between physical fitness levels and academic achievement in the areas of reading and math because the relationship between variables was linear. Linearity was determined by placing the two variables on a scatterplot diagram. The researcher visually inspected the graph's shape and determined that the relationship was linear.

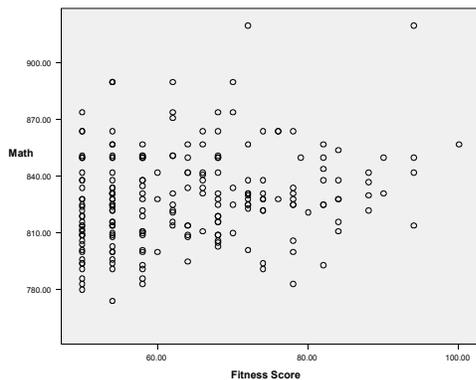


Figure 1. Scatterplot diagram of sixth grade students' math and fitness scores.

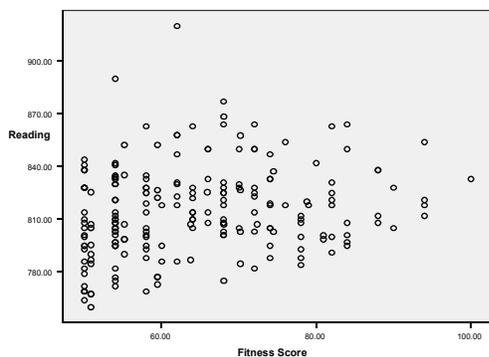


Figure 2. Scatterplot diagram of sixth grade students' reading and fitness scores.

However, it was necessary to establish if the data collected were normally distributed. To ascertain if this situation has occurred, the Kolmogorv-Smirnov and Shapiro-Wilk Test of Normality were used. If the significance of the Shapiro-Wilk is greater than 0.05, then the data are normally distributed. If it is below 0.05, the data significantly deviate from a normal distribution. When looking at Table 1, the results indicated that the data were not normally distributed. Because the test of normality was

less than 0.05, the Pearson correlation could not be used. Instead a nonparametric test such as the Spearman Rho correlation had to be used in the research analysis.

Table 1

Tests of Normality

| | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|--------------|---------------------------------|-----|------|--------------|-----|------|
| | Statistic | Df | Sig. | Statistic | Df | Sig. |
| Math | .096 | 216 | .000 | .971 | 216 | .000 |
| Reading | .057 | 216 | .089 | .980 | 216 | .004 |
| Fitness test | .165 | 216 | .000 | .910 | 216 | .000 |

^aLilliefors Significance Correction

Statistical Packages for Social Science (SPSS 14.0) was used to measure and evaluate the relationship to ascertain if statistical differences were present. Raw data were arranged in such a way to allow easy data entry into the SPSS program.

Due to increased pressure on administrators and teachers to improve CRCT scores, this information will be shared to help determine if physical fitness levels have a correlation with academic achievement. When budgetary cuts on physical education classes are considered, this information could be a crucial element in deciding if such cuts should occur or if physical education instruction should be mandatory and/or increased. Quantitative scores from the CRCT in the areas of reading and math and scores from the PYFT were collected from the data saved during the school year 2013-2014.

Setting and Sample

The study was limited to the population of 216 sixth grade students attending a public middle school in rural southeast Georgia. The school enrollment is approximately

2000 students in Grades sixth, seventh, and eighth. The demographic breakdown of the 2013-2014 sixth grade student population was: Caucasian (53%), African American (30%), Hispanic (12%), Multi-racial (3%) and Other (3%) (Public Schools K12, 2014). The school has 129 full time instructional and support staff.

The students for the study were taken from the existing testing data bank and who were participants in a sixth grade physical education class in the 2013-2014 school year, who were randomly assigned to classes by the sixth grade school counselor. The group would be considered a convenience sample. Students were assigned to one of four general education classrooms located in the school's gymnasium. The only students who were excluded were the special needs students who qualified for adapted physical education based on documented needs based on their individual education plans (IEP). The number was determined by the class size guidelines established by the local board of education, which currently allows no more than forty students per class. The classes consisted of both male and female students who participated in coed physical fitness classes. Students were grouped together with no consideration given to ethnicity, socioeconomic level, or age. No special or extra physical education program was implemented other than the general physical education program based on the state physical education curriculum.

Testing Instruments

PYFT

The Presidential Youth Fitness Program, which was established in 1966, is a nationally recognized physical fitness program. Students were evaluated on their level of

physical fitness in five areas: sit-ups, shuttle run, endurance run/walk, sit and reach, and pull-ups. The shuttle run was used even though it is a skill related fitness measurement while the four remaining tests are considered to be health-related (Fitness Zone Online, 2014). Students were compared to a national standard based on age and gender. The PYFT is a commonly used physical fitness assessment among school-aged children (Presidential Youth Fitness Program, 2014). This assessment demonstrates accepted reliability and validity based on nearly fifty years of implementation in schools nationwide. The test is comprised of the following assessment elements: curl-ups measure abdominal strength/endurance by maximum number of curl-ups performed in one minute, shuttle-run measures speed and agility, endurance run/walk measure heart/lung endurance by fastest time to cover a one mile distance, pull-up measure upper body strength/endurance by maximum number of pull-ups completed, and v-sit and reach measure flexibility of lower back and hamstrings (Presidential Youth Fitness Program, 2014). The Presidential Youth Fitness Test (PYFT) was conducted by certified physical education teachers who are highly qualified based on state certification requirements. The test data were entered into a test data bank. Participants can achieve three possible levels in the PYFT. At the highest level, (Presidential Physical Fitness Award), students must achieve at least the 85th percentile in all five events. The second level (The National Physical Fitness Award), the students must achieve at the 50th percentile in all five events. In the third level, (The Participant Physical Fitness Award), the students attempt all five events but have one or more scores below the 50th percentile. Students who fall into this third level (The Participant Physical Fitness Award) will be deemed as not being

physically fit. These standards are based on the 1985 National School Population Fitness Survey and validated in 1998, by means of comparison with a large nation-wide sample collected in 1994 (The President's Challenge 2012). The President's Challenge has demonstrated acceptable reliability and validity based on both instructor scores and student scores (Killman & Barfield 2008).

CRCT

Student scores in reading and math from the state mandated assessment instrument, Criterion Referenced Competency Test (CRCT), were collected from the test data bank for the 2013-2014 school term. The CRCT is designed to assess how well students acquire the knowledge and skills described in the state-mandated content standards in reading, English/language arts, mathematics, science, and social studies (Georgia Department of Education, 2014). This information is used to diagnose individual student strength and weaknesses as related to the instruction of the state standard. Criterion referenced test, such as the CRCT, is different from a norm-referenced test such as the Iowa Test of Basic Skills (ITBS) in that it is designed to measure how well students acquire, learn, and accomplish the knowledge and skills set forth in a specific area of instruction (Georgia Department of Education, 2014). In order to meet minimum standards, students must receive a score of 800 or higher. Students who score 850 or higher exceed the minimum standard while students who score below 800 do not meet minimum standards for that content area (Georgia Department of Education, 2014). The CRCT was administered by highly qualified certified teachers who have been trained to administer the test according to rigorous administration directions and timed

sessions. Teachers signed a document stating they have been trained and understand the professional and ethical implications of not strictly adhering to test protocols (Georgia Department of Education, 2014). Although the CRCT assesses English/language arts, social studies, and science, only CRCT scores for math and reading were retrieved.

The Presidential Youth Fitness Test (PYFP, 2014) scores of all groups was compared to their CRCT scores to determine if there was a correlation between the students' level of physical fitness and subsequent achievement on the state mandated standards test in the areas of reading and math.

Data Collection and Analysis

The teachers who administered the PYFT were highly qualified and state certified in physical education. The teachers are experienced with working with a wide variety of students from diverse backgrounds. When overseeing the administration of the PYFT, the teachers ensured that students were aware of expectations and no undue pressure was placed upon the students to perform beyond their capabilities. All teachers were required to attend a testing procedures and protocol training yearly to ensure the validity and reliability of the test administration. Elements of the fitness test such as the mile run, curl-ups, shuttle-run, and pull-ups are part of the physical education curriculum and were emphasized daily. The sit and reach aspect was implemented daily with a stretching routine that emphasizes flexibility. The teachers explained to students the different levels of achievement on the PYFT and were encouraged to set personal goals. Correlation analyses were used to determine if relationships exist between physical fitness levels and CRCT scores in reading and math.

The study examined the physical fitness results of 216 sixth grade students who were enrolled in physical education classes 5 days per week, during the 2013-2014 school year. Demographic information was collected on each student, specifically gender and ethnicity. In addition, the results from the PYFT was collected and compiled from the PYFT test bank. CRCT scores for reading and math were obtained from the school CRCT test data bank on each student enrolled in the physical education classes. The goal of the study was to determine if there was a relationship between physical fitness levels and math and reading scores on the CRCT. The PYFT determines physical fitness levels based on gender and age, which helped prevent gender/age bias in the scores.

The Statistical Package for Social Sciences (SPSS 14.0) was used to measure and assess the data collected from the PYFT, CRCT, and demographics (gender and ethnicity). Correlational analyses were used to determine if statistical differences were present in the whole study group and study subgroups. After the analysis was completed, information was available to assist in making determinations about and justifications for continued daily physical education for all students as a means to improving academic achievement.

IRB Approval

The Institutional Review Board (IRB) confirmed on July 2, 2015, that the study met Walden University's ethical standards. IRB records indicated that the study analyzed data provided to the researcher by the participating school system as collected under its oversight. The IRB approval number for the study is 07-02-15-0037451.

Participants' Rights

Students at my school were already familiar with the PYFT and CRCT as both are administered on a yearly basis at the elementary schools. These tests were part of their normal school routine and should not have caused more pressure than normally expected. Students' privacy was protected by the use of numerical referencing. Once all data (CRCT, PYFT and demographics) had been collected for the student, all names were deleted and replaced with numerals. All students in physical education classes were assessed except for students who were eligible for adaptive physical education and students who did not have test scores due to absences or medical conditions. All data were entered in the SPSS data program with no names attached. All data collected from the PYFT and CRCT test data bank were kept in a secure location and were shredded once the data were entered.

Section 4: Results

Introduction

In Section 4, I will give a description of the sample, discuss the research questions, identify how data were collected, and present analyses of data. My purpose in carrying out this quantitative study was to explore the relationship between the physical fitness levels of sixth grade physical education students and their academic achievement levels as measured by their math and reading scores on the state-mandated standards test, the CRCT. I collected students' scores on the CRCT and on the PYFT from my study school's 2013-2014 test data bank. The SPSS 14.0 program was used to conduct a Spearman rho correlational analysis on test scores.

Description of Sample

The study examined assessment data for 216 sixth grade students enrolled in physical education classes in 2013-2014. All 216 students were assessed in math and reading using the CRCT. All students participated in the PYFT and received scores in each area assessed. Sixth grade students in this study had physical education 5 days per week and were randomly assigned to a particular time segment designated for connection (nonacademic electives) classes. Student participants ranged in age from 11-14 years old. These age variances were taken into account when scoring the PYFT. The sixth grade study population, as seen in Figure 3, included Caucasian (50%), African American (35.6%), Hispanic (12%), Multiracial (1.9%), and Asian (0.5%) students.

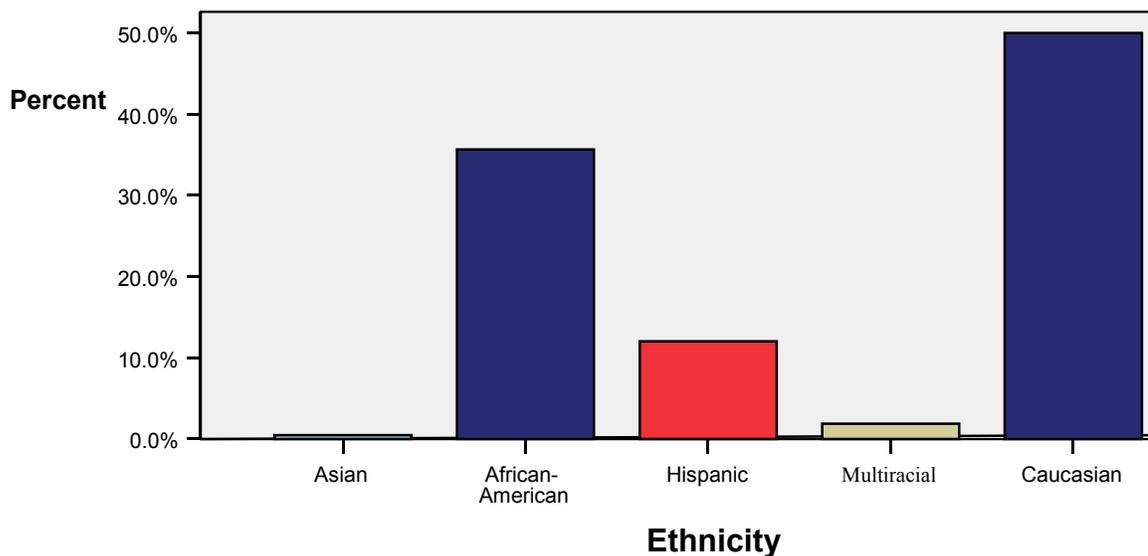


Figure 3. Racial categories for sixth grade study population, 2013-2014.

The sixth grade population consisted of 116 female students (53.7%) and 100 male students (46.3%) as shown in Figure 4.

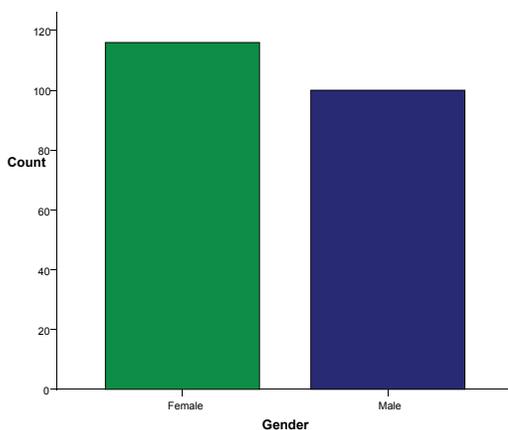


Figure 4. Gender categories for sixth grade study population, 2013-2014.

Research Questions and Hypothesis

RQ1. Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's

physical education program as measured by the PYFT and student scores on the state-mandated CRCT in the area of math? (In order to meet the minimum standard on the CRCT, a student must score 800 or above.)

RQ2. Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's physical education program as measured by the PYFT and student scores on the state-mandated CRCT in the area of reading? (In order to meet the minimum standard on the CRCT, a student must score 800 or above.)

H₀1: There is no significant relationship between the physical fitness and academic achievement levels of sixth grade students enrolled in a middle school physical education program as measured by the PYFT and student math scores on the state-mandated CRCT.

H_a1: There is a significant relationship between physical fitness levels and academic achievement levels among sixth grade students enrolled in a middle school physical education program as measured by the PYFT and student math scores on the state-mandated CRCT.

H₀2: There is no significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school physical education program as measured by the PYFT and student reading scores on the state-mandated CRCT.

H_a2: There is a significant relationship between physical fitness levels and academic achievement levels among sixth grade students enrolled in a middle school

physical education program as measured by the PYFT and student reading scores on the state-mandated CRCT.

Data Collection

The study examined the physical fitness results of 216 sixth grade students who were enrolled in physical education classes 5 days per week, during the 2013-2014 school year. Demographic information was collected on each student, specifically gender and ethnicity. In addition, the results from the PYFT were collected and compiled from the PYFT test bank. CRCT scores for reading and math were obtained from the school CRCT test data bank on each student enrolled in the physical education classes. The goal of the study was to determine if there was a relationship between physical fitness levels and math and reading scores on the CRCT. The PYFT determines physical fitness levels based on gender and age, which helped prevent gender/age bias in the scores.

Analysis and Outcomes

I used the statistical software SPSS 14.0 to assess PYFT, CRCT, and gender and ethnicity data. I used the Spearman rho correlation test and set my alpha level at 0.01. The alpha level was determined as the probability that reflected the maximum risk the researcher was willing to take that any observed differences were due to chance. The alpha level is typically set at 0.01, which means that, one out of 100 times, the sample statistic will be due to chance. This means that one out of one hundred times an extremely low probability value will actually be observed if the null hypothesis is true. PYFT test scores and the CRCT math and reading scores were examined and analyzed using the Spearman rho correlation statistics test.

PYFT is a commonly used physical fitness assessment among school-aged children (Presidential Youth Fitness Program, 2014). This assessment demonstrates accepted reliability and validity based on nearly 50 years of implementation in U.S. schools (PYFP, 2014). Students taking the PYFT are evaluated on their level of physical fitness in five areas: sit-ups, shuttle run, endurance run/walk, sit and reach, and pull-ups (Presidential Youth Fitness Program, 2014). The test is comprised of the following assessment elements: sit-ups, which measures abdominal strength/endurance by maximum number of curl-ups performed in one minute; shuttle-run which measures speed and agility; endurance run/walk, which measures heart/lung endurance by fastest time to cover a one mile distance; pull-ups, which measure upper body strength/endurance by maximum number of pull-ups completed; and v-sit and reach measure flexibility of lower back and hamstrings (Presidential Youth Fitness Program, 2014). The shuttle run is a skill-related fitness measurement; the four other tests are considered health-related measurements (Fitness Zone Online, 2014).

Students were compared to a national standard based on age and gender. A norm-referenced test such as the PYFT is designed to report whether test takers perform better or worse than a hypothetical average student. This is determined by comparing scores against the performance results of a statistically selected group of test takers, typically of the same age and grade level, who have already taken the exam (Georgia Department of Education, 2014).

In Table 2, I present descriptive statistics for my sixth grade participants' PYFT scores during 2013-2014 school year. Student participants had a mean PYFT score of

63.63; the standard deviation was 11.9. The PYFT does include percentile scores with percentiles falling above the 85th percentile qualifying for the Presidential Physical Fitness Award, which is the highest honor. Students obtaining a percentile rank of at or above the 50th percentile, but who fall below the 85th percentile are eligible for the National Physical Fitness Award. Those students whose scores fall below the 50th percentile on one or more events receive the Participant Physical Fitness Award (Presidential Youth Fitness Program, 2014). The majority of student participants obtained the National Physical Fitness Award, which is awarded to students scoring below the 85th percentile but above the 50th percentile (Presidential Youth Fitness Program, 2014). The maximum score that the 216 participants achieved was 100, and the lowest score was 50.

Table 2

Sixth Graders' PYFT Scores

| | N | Minimum | Maximum | Mean | Std. deviation |
|---------------------|-----|---------|---------|-------|----------------|
| Fitness score | 216 | 50 | 100 | 63.63 | 11.89 |
| Valid n (list wise) | 216 | | | | |

Student scores from the state mandated assessment instrument, Criterion Referenced Competency Test (CRCT), in the areas of reading and math were collected from the test data bank for the 2013-2014 school term. The CRCT is designed to assess how well students acquire the knowledge and skills described in the state-mandated content standards in reading, English/language arts, mathematics, science, and social studies (Georgia Department of Education, 2014). This information is used to diagnose

individual student strengths and weaknesses as related to the instruction of the state standard. Criterion referenced test, such as the CRCT, is different from a norm-referenced test such as the Iowa Test of Basic Skills (ITBS) in that it is designed to measure how well students acquire, learn, and accomplish the knowledge and skills set forth in a specific area of instruction (Georgia Department of Education, 2014).

The following descriptive statistics are from the CRCT scores in reading and math for sixth grade physical education students during 2013-2014 school year. The CRCT reading mean was 816.75 and a standard deviation of 24.36. The range of the scores for reading was 156 with a high score of 920.00 and a low score of 764.00. Analysis of the raw data collected showed that the highest overall score on the CRCT (920) was obtained by a White 11 year-old female. The highest score for the male subgroup was 873 and this was scored by a 12 year-old White male. This analysis showed that the female had the higher score on the reading portion of the CRCT. When examining the female subgroup, the lowest overall score (764) was received by a 12 year-old White female. The lowest reading score (769) for the male subgroup was obtained by an 11 year-old White male and a 13 year-old multi-racial male. Further analysis of the data showed that the mode for reading was 828, which were obtained by 6 percent of the sample.

The CRCT math mean was $M=829.17$ and a standard deviation of 24.70. The range of scores for math was 146 with a high score of 920.00 and a low score of 774.00. Analysis of the raw data collected showed that the highest overall scores on the CRCT math (920) were obtained by two 12 year-old White females. The highest score for the male subgroup was 890 and this was scored by two White 12 year-old males and one 11

year-old Hispanic male. This analysis showed that the female student had the higher overall score on the math portion of the CRCT. The lowest overall math score (774) was obtained by a 12 year-old African American male. When examining the female subgroup, the lowest score (780) was received by a 12 year-old White female. Further analysis of the data showed that the mode for math was 831 and 850, which were both obtained by 6.9 percent of the sample.

The math mean of the CRCT was higher than the reading mean but the standard deviation was very similar. A student must achieve a score of 800-849 to achieve minimum standards while any score 850 or above is considered to be exceeding the standards. Scores below 800 do not meet the minimum standards. The descriptive statistics are shown in Table 3.

Table 3

Sixth Graders' CRCT Reading and Math Scores

| | N | Minimum | Maximum | Mean | Std. deviation |
|---------------------|-----|---------|---------|--------|----------------|
| Math | 216 | 774 | 920 | 829.17 | 24.70 |
| Reading | 216 | 764 | 920 | 816.75 | 24.36 |
| Valid n (list wise) | 216 | | | | |

In addition to determining the descriptive statistics scores, I also performed Spearman rho correlation analyses on the PYFT scores and CRCT math and reading

scores. Table 4 shows the Spearman rho correlation results for the CRCT scores in the areas of math and reading in conjunction with the total score on the PYFT.

Table 4

Correlational Analysis of Sixth Graders' PYFT and CRCT Reading and Math Scores

| | | Math | Reading | Fitness score | |
|----------------|------------------|-----------------|---------|------------------|--------|
| Spearman's rho | Math | Correlation | 1.000 | .534** | .203** |
| | | Coefficient | | | |
| | | Sig. (2-tailed) | . | .000 | .003 |
| | | N | 216 | 216 | 216 |
| | Reading | Correlation | .534** | 1.000 | .220** |
| | | Coefficient | | | |
| | | Sig. (2-tailed) | .000 | . | .001 |
| | | N | 216 | 216 | 216 |
| | Fitness Score | Correlation | .203** | .220** | 1.000 |
| | | Coefficient | | | |
| | | Sig. (2-tailed) | .003 | .001 | . |
| | | N | 216 | 216 | 216 |

**Correlation is significant at the 0.01 level (2-tailed).

Table 4 shows the analysis of data using the Spearman rho correlation for the PYFT and CRCT math scores. This analysis indicated $r_s(216) = 0.203, p = 0.003$.

Research Question 1: Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's physical education program as measured by the Presidential Youth Fitness Test and student scores on the state mandated Criterion Referenced Competency Test in the area

of math (to meet the minimum standard on the CRCT, a student must score 800 or above)? Analysis of the data using Spearman rho correlation led to a rejection of Null Hypothesis 1- There is no statistical significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school physical education program as measured by the Presidential Youth Fitness Test and student math scores on the state mandated Criterion Referenced Competency Test. The correlation coefficient [$r_s(216) = 0.203$] shows that a small, statistically significant positive relationship exists between PYFT scores and CRCT scores in the area of math. If the correlation coefficient had been zero then no significant relationship would have existed between the two variables.

Table 4 also showed the Spearman rho correlations derived from the PYFT and CRCT reading scores, $r_s(216) = 0.220, p = 0.001$. Research Question 2: Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's physical education program as measured by the Presidential Youth Fitness Test and student scores on the state mandated Criterion Referenced Competency Test in the area of reading (to meet the minimum standard on the CRCT, a student must score 800 or above)? Analysis of the data using Spearman rho correlation led to a rejection of Null Hypothesis 2- There is no statistical significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school physical education program as measured by the Presidential Youth Fitness Test and student reading scores on the state mandated Criterion Referenced Competency Test. The correlation coefficient [$r_s(216) =$

0.220] shows that a small, statistically significant positive relationship exists between PYFT scores and CRCT scores in the area of reading. When considering the correlation scores between the PYFT and CRCT reading and math scores, there were small and significant positive correlations. Therefore, the null hypothesis of no relationship could be excluded for both research questions.

Another interesting finding of the correlational analyses of the CRCT reading and math scores showed $r_s(216) = 0.534$ which indicated that a very strong positive relationship existed between math and reading scores. This means that students who performed well on the math portion of the CRCT also performed well on the reading section of the CRCT.

Summary

This correlational study was seeking to determine if there was a relationship between physical fitness and academic achievement. Findings obtained from the Spearman rho correlations indicated that there is a positive correlation between physical fitness scores and student achievement as measured by CRCT scores in reading and math. In addition, the researcher was able to find the answer to the research questions:

1. Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's physical education program as measured by the Presidential Youth Fitness Test and student scores on the state mandated Criterion Referenced Competency Test in the area of math (to meet the minimum standard on the CRCT, a student must score 800 or above)?

Spearman rho correlation analysis revealed $r_s(216) = .203, p = .003$. These analyses led

to the decision to reject the Null Hypothesis: There is no statistical significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school physical education program as measured by the Presidential Youth Fitness Test and student math scores on the state mandated Criterion Referenced Competency Test.

2. Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's physical education program as measured by the Presidential Youth Fitness Test and student scores on the state mandated Criterion Referenced Competency Test in the area of reading (to meet the minimum standard on the CRCT, a student must score 800 or above)? Spearman rho correlation analysis revealed $r_s(216) = .220, p = .001$. The analyses of the data using Spearman rho correlation led to a decision to reject the Null Hypothesis: There is no statistical significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school physical education program as measured by the Presidential Youth Fitness Test and student reading scores on the state mandated Criterion Referenced Competency Test.

The final analysis of the data for this study showed a small, but significant positive relationship between physical fitness levels and CRCT math and reading scores. The statistics gathered from the data gave confirmation to reject the Null Hypotheses for both research questions. Additional information gained from the analyses showed a strong positive relationship between CRCT math and reading scores.

Section 5: Discussion, Conclusions, and Recommendations

Introduction

Prominent in educational news are concerns about academic achievement of students being served in both public and private school settings. Accountability measures enacted by federal, state and local educational entities have increased pressure on educators to achieve in all areas. In addition, physical fitness levels have also garnered much attention as students are becoming less healthy and more prone to a myriad of diseases with significant impacts on longevity and productivity of young adults. In my state, the Commissioner of the Georgia Department of Public Health has expressed deep misgivings about the increase in childhood and adolescent obesity among state residents and potential health issues they face (Fitzgerald, 2014).

Initiatives have been implemented to address these issues, and physical fitness improvement programs are being encouraged at various levels by educators and other concerned agencies (McCullick, 2012). However, cuts in educational funding have led to decreases and even elimination of physical education being offered in schools, especially at the middle and high school levels (McCullick, 2012). The purpose of the study was to examine the physical fitness levels of middle school students and seek to determine if higher fitness levels could be linked to improved academic achievement. Findings of the research could lend support for the move to offer consistent physical education instruction in all schools. I sought to add to others' research examining the relationships between physical fitness and academic achievement (see Aktop, 2010; California Department of Education, 2005; Castelli et al., 2007; Chomitz et al., 2009; Coe et al.,

2012; Donnelly & Lambourne, 2011; Eveland-Sayers et al., 2009; Jensen, 2010; McCullick, 2012; Michigan State University, 2006).

The study I used is a quantitative research design and is intended to seek answers to the research question, which is whether or not physical fitness levels have a positive effect on academic performance of middle school students. I examined whether the PYFT scores of study participants were correlated with their CRCT reading and math scores. I based the study on previous research that has looked at with the intentions to add to the current research involving this area of national concern.

Interpretations of Findings

Students' PYFT scores and CRCT reading and math scores were compared using Spearman rho correlations. The following results were obtained: CRCT math scores, $r_s(216) = .203, p = .003$ and CRCT reading scores, $r_s(216) = .220, p = .001$. Based on the findings of the Spearman rho analysis, I determined that a small, but significant positive relationship existed between the physical fitness levels and academic achievement in the areas of math and reading. *Research Question 1* - Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's physical education program as measured by the Presidential Youth Fitness Test and student scores on the state mandated Criterion Referenced Competency Test in the area of math (to meet the minimum standard on the CRCT, a student must score 800 or above)? The findings show small, significant relationships between physical fitness scores and academic achievement on CRCT math tests, $r_s(216) = .203, p = .003$.

Research Question 2 - Is there a significant relationship between physical fitness levels and academic achievement levels of sixth grade students enrolled in a middle school's physical education program as measured by the Presidential Youth Fitness Test and student scores on the state mandated Criterion Referenced Competency Test in the area of reading (to meet the minimum standard on the CRCT, a student must score 800 or above)? Regarding RQ2, the findings show small, significant relationships between physical fitness scores and academic achievement on CRCT reading tests, $r_s(216) = .220, p = .001$.

The findings support the premise that physical fitness levels are an important part of the equation for improving academic achievement in reading and math. My findings support the encouragement of personal fitness among middle-school students. Advocates and experts contend that students who are more physically active will have higher academic performance and better quality of life.

I have found studies that support the supposition that physical levels have an impact on academic achievement. Trost (2009) suggested that daily physical education was beneficial for students in that they tended to perform better in the classroom. In addition, Trost (2009) found that students who are more physically fit perform better in the classroom, have better school attendance, and fewer discipline problems. A 2-year study by Holler et al. (2010) found a positive correlation occurred when students improved their physical fitness, their math and reading scores also improved. Coe, Pivarnik, Womack, Reeves, and Malina (2012) also found that students with the highest fitness levels performed better on standardized tests and students with the lowest fitness

levels performed lower in class grades. Statistical analysis of the PYFT and the CRCT math and reading scores did show small, significant positive relationships.

The research sample ($N = 216$ students) was relatively small. It is entirely possible that a larger sample such as the study conducted by California Department of Education (2005), which included 954,000 students in grades five, seven, and nine, may show more significant positive results. Also, I only assessed data for one school year, 2013-14. I would be interested in analyzing the data from several consecutive years for the PYFT and CRCT math and reading scores to see whether the same trend occurred. I believe that one strength of the population sample was the ethnic diversity that consisted of Caucasian (50%), African-American (35.6%), Hispanic (12%), Multiracial (1.9%), and Asian (0.5%).

In addition, several factors may account for my study findings. The current physical education curriculum for the State of Georgia is very broad. It includes the skill areas assessed but does not focus entirely on the assessed skills. Lifetime sports are an integral part of the curriculum, and many students choose these activities instead of the fitness based classes offered in the State of Georgia such as personal fitness and weight training. Other factors that might have impacted the results of the study were students' socioeconomic status, parental involvement, student motivation, and genetic predisposition. Further research should consider these influences and how these factors might affect the relationship between physical fitness levels and academic achievement.

Implications for Social Change

The findings of my study are significant because students' future health and possible careers could be impacted by their personal fitness habits and choices of educational and career paths. Health agencies and many educators have supported an increased in physical education emphasizing personal fitness (Fitzgerald, 2014; McCullick, 2012). Their advocacy of such an increase comes amid cutbacks in physical education classes (McCullick, 2012). This is particularly true at the middle school and the secondary levels where students begin to make informed decisions related to their health and academics.

Jenson (2010) and Pica (2004) advocated the importance of physical fitness on brain development and the impact of physical fitness on academic achievement. Additionally, Dwyer, Sallis, Blizzard, Lazarus, and Dean (2001) found that children who are involved in daily physical activities exhibit improved motor fitness, academic performance, and a more positive attitude towards school than students who do not participate in daily physical activity. In a study of students in several countries, Trost (2009) further proposed that daily physical education does not hurt academic performance; instead, he found that students tended to perform better in the classroom and had fewer discipline problems and better attendance.

Researchers support the notion that physical fitness will impact students' careers, longevity, and overall success. Even though a small and significant positive correlation existed in my study, the link between personal fitness and academic achievement should continue to be researched with special attention to factors that may affect the results such

as demographics, motivation levels, and educational and community support. These factors should be considered when making decisions that affect educational programs within a school system. It should be noted that the benefits of a good physical education curriculum is not just health-related but can also positively affect student academic achievement.

Recommendations for Action

When considering the future of U.S. students, educators often do not get a second chance to do things right. Educators must carefully consider the choices that are made concerning educational programs. Because of budget concerns, communities and school government agencies have proposed cuts in educational programs. Physical educators have an immense responsibility to their students to be vocal and prominent in the fight to keep physical fitness programs in the schools. To do this effectively, physical education personnel must be informed on the current research that shows that personal fitness is an important facet of students' education. Educators must be willing to speak out and be advocates for effective physical education programs. Finally, we must demonstrate our resolve to make a difference by fully implementing a successful physical education program. In this way we can support academic achievement by preparing our students to be physically and mentally fit and ready for any challenges that they may face them.

The study will be shared with the middle school administration as well as the local board of education because the research did show a small but significant positive relationship between physical fitness levels and academic achievement. The research gathered in this study overwhelmingly supports the importance of physical education and

personal fitness on academic success. Further dissemination of the study's results would include research by Jenson (2010), which shows that most of the brain is activated during physical activity and that sitting for more than 10 minutes results in reduced concentration. This information should be shared with administrators and classroom teachers at all grade levels. In addition, Van Dusen, Kelder, Kohl, Ranjit, and Perry (2011) found that fitness levels were significantly related to academic performance regardless of other socio-demographic and fitness variables and they highly recommended that physical education times should be increased. Obviously, research fully supports the importance of effective physical education programs on the academic achievement of today's students.

Recommendations for Further Study

My study focused on the relationship between physical fitness and academic achievement in the areas of reading and math as measured by the state standardized test. I used data collected from 216 sixth grade students over a one-year period. Research could be further extended by examining multiple years, additional grade levels, and a larger student sample. Longitudinal studies could occur using the fitness test results that are administered from kindergarten to twelfth grade. In addition, student math and reading scores from the state longitudinal data system could be gathered. It would be informative to track student fitness levels and academic achievement over an extended period of time to see if a correlation does exist. In addition, research into whether or not the amount and intensity of physical education programs have a positive impact on academic achievement should be examined. For instance, are physical education programs that

emphasize team sports as effective in improving physical fitness as programs that are geared to physical fitness skills such as running or push-ups? Does curriculum that includes more units of required physical education help to improve academic achievement levels? Finally, administrators and pertinent personnel should be informed of current research about the importance of physical education programs on the well-being and education levels of school-aged students.

Since test scores for physical fitness and state mandated tests in reading and math are readily available, the Georgia Department of Education could also conduct a state-wide study to determine if there is a relationship between physical fitness and academic achievement. The results could be shared with the state board of education as well as local boards of education. The expectations and pressure to improve standardized test scores has frequently led to reductions and in some cases, eliminations of physical education programs. This has occurred even though numerous research studies have shown a positive correlation between physical fitness levels and academic achievement levels (Aktop, 2010; California Department of Education, 2005; Castelli et al., 2007; Chomitz et al., 2009; Coe et al., 2012; Donnelly & Lambourne, 2011; Eveland-Sayers et al., 2009; Jensen, 2010; McCullick, 2012; Michigan State University, 2006). Physical educators must become advocates for physical fitness and can increase their credibility by showing the connection between physical fitness and academic achievement. In addition, physical educators must be diligent in encouraging their students to be active and informed of the benefits gained from a healthy lifestyle. If significant changes are not implemented, former Surgeon General Richard Carmona (American Heart Association,

2013) has stated, “Because of the increasing rates of obesity, unhealthy eating habits, and physical inactivity, we may see the first generation that will be less healthy and have a shorter life expectancy than their parents,” (p. 1). As physical educators we have a moral obligation to seek a better life for our students and to strive to find ways to improve the grim picture painted for our students’ future. We want a future scenario where students are prepared both physically and academically to meet the challenges and opportunities afforded them in the 21st century.

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