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The Relationship Between Physical Fitness and School Performance in Middle School Girls

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Walden University
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Abstract

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BA, Mount Holyoke College, 2003

Dissertation Submitted in Partial Fulfillment

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Abstract

Past research has indicated a significant relationship between physical fitness and standardized test scores; however, the relationship between physical fitness and other aspects of school performance has yet to be empirically examined in a population specifically composed of middle school girls. This study examined several factors that contribute to school success, such as classroom behavior, attendance, and grades, in relation to physical fitness among a group of adolescent girls. It was specifically designed to examine the statistical relationship between physical fitness, as measured by the Fitnessgram, and quantitative data on school performance including grades, standardized test scores, school behavior, and attendance among 280 middle school girls. The biopsychosocial theory was used as the basis of this study, with the biological factors of fitness levels and BMI, psychological factors of grades and test scores, and social factors of attendance and behavior. A 1-way between-subjects multivariate analysis of variance demonstrated that the psychological and social factors of school performance were significantly affected by the biological factor of physical fitness. A significant correlation was also found between BMI, grades, and attendance. Positive social change implications include informing school administrators on the importance of increasing the emphasis on physical activity instead of replacing physical activity with additional time in core academic subjects. In addition, the results demonstrate the important relationship between school performance and physical fitness in middle school girls and underscore the importance of fostering physical fitness within this distinct group of middle school-aged girls.

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Dedication

This dissertation is dedicated to everyone who has been with me through this journey, both on Earth and in the heavens. There are so many people that I cannot even begin to mention them here. Specifically, I want to dedicate this to my late grandmother, Mary, who always believed in the abilities I possess and encouraged me to utilize the intelligence God blessed me with; to my late father, James, who gave me an ego the size of Texas, who instilled in me a confidence that there was nothing I could not do; and to my mom, Anne, who has been asking me for years when I will be done with this, but never doubted I would eventually finish this journey. As I write this, my journey through academia is not ending with the finalization of this dissertation, but beginning, as I begin my new life as Dr. Donnelly.

Acknowledgments

Here is where I can mention more of those people who have been here on my journey. First, I want to thank Dr. Patti Barrows, my chair, who has seen me through the most difficult times in my dissertation writing and has shown great patience when things are taking much longer than they should. Another thanks goes to Dr. Tony Napoli, my methods genius committee member, who has been a tremendous help in navigating the world of MANOVA and other statistical methods with the help of all of Andy Fields' books. In addition, I want to acknowledge my former principal, the brilliant Dr. Susan Keller. Without her, I would probably still be sitting here trying to determine how to combine all of my interests into one dissertation topic. A big thank you goes out to my "dissertation buddies" who I have leaned on for support. Finally, to my friends and family who have been so patient with me, as my life has been stuck in dissertation mode for so long now. They have all been tremendous support to me in so many ways, that I can't even begin to express my gratitude.

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Chapter 1: Introduction to the Study

Introduction

Children's overall health status significantly affects their school performance and future success (Story, Nanney, & Schwartz, 2009). When children are not healthy, it is difficult for them to focus or attend school. Therefore, it is important to identify ways to keep children in good physical health using methods such as fitness habits and nutrition, so that they perform to their highest capacity in school. In this study, I explored the relationship between physical fitness and school performance in middle school girls in the United States. This chapter outlines the importance of studying these factors and explains what factors contribute to a student's overall success and what questions were answered through this research.

Background

Children's health tends to decline due to the increasing rates of childhood obesity (Hollar et al., 2010). Obesity contributes to rising rates of cardiovascular disease, diabetes, cancer, respiratory disorders, elevated blood pressure, and high cholesterol in the United States (Cecchini et al., 2010). These diseases are responsible for 60% of deaths worldwide, and are somewhat preventable with lifestyle activities such as healthy eating and physical activity (Cecchini et al., 2010). With numbers of obese children tripling in the past 30 years (Lytle, 2012), children are experiencing significant illnesses related to that obesity. Children's lifetime risk for developing Type 2 diabetes in the United States, for example, is 30-40% (Lytle, 2012).

In addition to health risks, obesity and overweight status can cause social risks such as bullying, social isolation, and low self-esteem. Robinson (2006) discovered a strong connection between obesity in adolescence and low self-esteem, poor psychosocial adjustment, depression, and suicide. Overweight or obese children are more likely to engage in risky behaviors, including substance abuse for girls and violence for boys (Farhat, Iannotti, & Simons-Morton, 2010). The gender differences can be explained by stress factors and coping strategies (Farhat, Iannotti, & Simons-Morton, 2010). Girls who are classified as overweight or obese suffer more social isolation and discrimination than the boys (Farhat, Iannotti, & Simons-Morton, 2010). These results suggest that keeping children at a healthy weight can prevent some of the risky behaviors engaged in by overweight or obese children.

School success is integral for children's overall success and is impacted by factors such as grades, attendance, behavior, and academic achievement scores. Childhood obesity has been negatively associated with academic achievement, while physical fitness has been positively associated with academic achievement, as measured by standardized test scores (London & Castrechini, 2011). Edwards, Mauch, and Winkelman (2011) also found that good nutritional practices, increased physical activity, and high levels of physical fitness were associated with high standardized math scores, while high standardized reading scores were associated with nutritional practices and increased physical activity in a sample of sixth graders. Similarly, Chomitz et al.'s (2009) examination of the relationship between Massachusetts Comprehensive Assessment System (MCAS) test scores and physical fitness found that the odds of passing the

MCAS math and English tests increased with the number of fitness tests (out of 5) that were also passed, yielding a positive relationship between fitness performance and standardized test scores. These results suggest that engaging in physical activities increases academic performance.

It is important to take into account the differences between boys and girls when designing interventions to assist girls in their transition to middle school. In general, girls' anxiety symptoms during middle school last longer than the anxiety symptoms experienced by boys, whose anxiety decreases through the middle school years (Grills-Taquechel, Norton, & Ollendick, 2010). The pre- and post-transition to middle school raises more concerns for females than males (Rice, Frederickson, & Seymour, 2011). In addition, girls are more impacted academically and emotionally by social issues than boys are, even though girls have a more positive attitude to school (Rueger & Jenkins, 2014). These findings show that is important for researchers to examine all factors that can help make the middle school experience more positive for girls.

Adolescents are generally self-conscious, a mental state that contributes to academic difficulties upon the middle school years. The transition through the middle school years tends to be more difficult on girls than on boys (Grills-Taquechel, Norton, & Ollendick, 2010; Rice, Frederickson, & Seymour, 2011). Therefore, it is not surprising that London and Castrechini (2011) found larger disparities on both math and language arts test scores in girls than in boys when examining their fitness trajectories; this longitudinal study was designed to discover the relationship between obesity, fitness, and academic achievement in middle school students utilizing standardized test scores.

London and Castrechini (2011) found that there is a positive relationship between physical fitness and academic performance. However, while the rates of academics are consistent overtime between fit and unfit students, there is a discrepancy between them at the initial measurement. Additionally, the "differences in initial test scores for those who go on to be persistently fit and unfit are particularly pronounced for girls…(London & Castrechini, 2011, 24)." These results indicate that while there is a positive relationship between fitness and academics, any differences are more pronounced for girls than for boys.

Gender differences being considered an important factor in school success, Carlson et al. (2008) found that elementary school girls are academically impacted to a more significant degree than elementary school boys by greater levels of physical activity. A child's physical status can impact one's overall life experience, including school performance. In a qualitative study of 11-17 year olds who are obese, Curtis (2008) sought to discover the experience of young people with obesity in secondary school, as school is the place where adolescents have the most peer interaction. One major issue faced by obese adolescents is in physical education class, which is the class that is most beneficial to curtailing weight issues. Curtis (2008) found that obese adolescents were self-conscious about changing in front of others and wearing shorts, and about having their athletic ability scrutinized by peers. By physical education class being an uncomfortable situation, some students who may need the physical activity provided may not take full advantage of the opportunity.

Intervention centered on adolescents' physical activity and sedentary behavior (ICAPS) is a preventative measure designed to target personal, social, and environmental factors contributing to childhood obesity by increasing physical activity. Simon et al. (2008) found that when ICAPS is integrated as part of the school curriculum, the 6th graders who participated in the intervention had a lower increase in body mass index. Utilizing interventions as part of the school day make it more likely that students will be participating, and therefore, benefiting from the advantages of more physical activity. In addition, Simon et al. (2008) found that more students who were involved in the intervention continued out of school physical activity, leading to a healthier outlook than those who did not participate. Participating in out of school physical activity can lead to continuing and future benefits of that activity.

One method of measuring physical fitness uses the healthy fitness zones (HFZ) on the Fitnessgram assessment (Human Kinetics, 2012). The HFZ is a criterion-referenced standard used to assess whether or not a student's performance on various Fitnessgram measures are within a healthy range for their age and gender (Edwards, Mauch, & Winkelman, 2011). The HFZ measure was established by the Fitnessgram Scientific Advisory Board utilizing research in the field of fitness and physical activity (Human Kinetics, 2012). Sallis and Glanz (2009) cite several studies which have found that designing schools to support physical activity, either by providing equipment, providing adult supervision, or putting schools in close proximity to students' neighborhoods, increases children and adolescents' physical activity .

Schools have the ability to support physical activity by their students, as school is where students spend the majority of their time during the week. The structure of the class period or school day should have mandatory physical activity time, school announcements can have a minute to do a brief exercise, recess should be reinstated in schools, and wellness programs would add additional physical activity opportunities through programs and infrastructure. Increasing motivation and excitement surrounding physical activity can lead to better long-term outcomes for the social, physical, and academic wellness of students (Llargues et al., 2011). While previous studies (Blom, Alvarez, Zhang, & Kolbo, 2011; Hollar et al.,2010; Robert Wood Johnson Foundation, 2011; Van Dusen, Kelder, Kohl, Ranjit, & Perry, 2011; Wittberg, Cottrell, Davis, and Northrup, 2010; Wittberg, Northrup, & Cottrell, 2012) have examined the relationships between fitness levels and standardized test scores, they have failed to assess the relationship between fitness levels and other factors related to school performance, such as grade point average (GPA), conduct grades/office discipline referrals, and attendance as measured by percentage of days present in school versus absent from school. Conduct grades are rated by the teachers, utilizing a scale of *unsatisfactory*, *needs improvement*, *satisfactory*, and *excellent.*

Problem Statement

The transition to middle school is a difficult time for adolescents (Lyons & Woods, 2012), especially girls. Middle school-age girls tend to have higher levels of anxiety than boys at this age, notably in terms of social anxiety (Grills-Taquechel, Norton, & Ollendick, 2010). Anxiety levels are also elevated for girls who are poor or

living in urban areas (Burgess, Johnston, Key, Propper, & Wilson, 2008). Therefore, it is integral to investigate factors that may assist in easing that transition and reduce the anxiety levels of these girls going to middle school and throughout their school years.

Several factors contribute to the difficulties girls face; however, there are also other components that will help alleviate some of the troubles that girls experience. In general, girls have a more difficult time with transition to middle school than boys (Grills-Taquechel, Norton, & Ollendick, 2010; Rice, Frederickson, & Seymour, 2011); however, girls and boys also have different adolescence experiences in other realms. Relational aggression, a form of bullying, occurs more in females than males, especially in groups of "friends" (Rueger & Jenkins, 2014; Zimmer-Gembeck, Pronk, Goodwin, Mastro, & Crick, 2013). While boys are victimized more physically and verbally, girls experience greater levels of academic maladjustment than boys in response to their peer victimization (Rueger & Jenkins, 2014).

Girls generally have a more positive attitude to school than boys, but correlations between victimization and anxiety, attendance, and grade point average are significantly higher than those for boys. In addition, Rueger and Jenkins (2014) found that the girls in their study had higher depression and anxiety, and lower self-esteem than the boys. Makinen, Puukko-Viertomies, Lindberg, Siimes, and Aalberg (2012) also found girls to have a lower self-esteem and lower body satisfaction than boys in the years transitioning from early adolescence to midadolescence – the same years that this age group is attending middle school. Physical activity and physical fitness levels are found to have a positive impact on self-esteem (Association for Applied Sport Psychology, 2011; Staiano

& Calvert, 2011). Adolescent girls do not get the recommended amount of physical activity for physical and emotional health.

Girls tend to decrease their amounts of moderate to vigorous physical activity throughout their adolescent years (Camhi, Phillips, & Young, 2011; Wilkinson, Brown, Graser, & Pennington, 2012). Wilkinson et al. (2012) cited girls' less positive experiences in physical education class as the rationale for studying their preferences in cardiovascular testing in physical education in order to make the class a more positive experience for adolescent girls. The current dissertation study was designed to take into account how girls experience adolescence differently than boys, and to therefore study this gender separately. The current study specifically focused on the relationships between physical fitness and girls' school performance because of the above-mentioned difficulties were more significant in girls than in boys.

The current study was designed to investigate how physical fitness relates to school performance in middle school girls, so as to provide schools with another method in helping girls get through middle school successfully. If a positive relationship exists between physical fitness and school performance, it can be said that physical fitness can be an area to address within the school setting to help girls be successful in middle school. The results can also contribute to the research that finds that physical activity has a significant, positive relationship to standardized test scores, by providing further information about how it helps middle school girls in other areas of school success. The importance of physical fitness would suggest that physical education should not be one of the first areas to be cut in middle schools when budget cuts occur.

While previous studies have examined the relationship between academic performance, via standardized test scores, and physical fitness across age levels, a more comprehensive investigation of the relationship between physical fitness and overall school performance among adolescent girls prior to this dissertation study. School performance comprises more than just test scores, and includes school behavior, attendance, and grades/grade point average based on the current study. In this study, I assessed the statistical relationship between physical fitness levels utilizing the Fitnessgram test battery (Meredith & Welk, 2005) and school performance indicators that contribute to a female student's success in middle school. These indicators included grades, conduct grades/office discipline referrals attendance, and standardized test scores. Conduct grades were rated by the teachers, utilizing a scale of *unsatisfactory*, *needs improvement*, *satisfactory*, and *excellent.* Since physical fitness can benefit a student physically, socially, and academically, the current study results can guide schools to deduce that physical activity can also be used as an intervention in easing the difficult transition to middle school for female students.

Purpose of the Study

The purpose of this study was to examine the statistical relationship between levels of physical fitness as measured by the Fitnessgram and school performance, utilizing quantitative data derived from grades, standardized test scores, school behavior, and attendance in middle school girls. Exploring the relationship between those factors that relate to girls' success and physical fitness provides insight as to what schools can do to increase physical fitness in girls and encourage living an active lifestyle, possibly

leading to better school performance. Research has already found a positive, significant relationship between physical fitness and standardized test scores; therefore, I looked beyond the comparison between physical fitness and standardized test scores and examined other factors that may contribute to a student's success in school. Standardized test scores give an academic snapshot of a student on one day of the school year, while the other data summarizes what the student does in the academic setting on a daily basis. A student may score high on standardized tests, but continue to fail classes or not come to school. This study fills in the gap of the existing literature by exploring factors other than standardized test scores and look to the other factors contributing to student success.

Research Questions and Hypotheses

This study used five research questions and related hypotheses that were derived from a review of existing literature in the area of physical fitness and school performance.

Research Question #1 (RQ1): Do middle school girls classified in the above healthy fitness zone or healthy fitness zone have significantly higher grade point averages (GPA) than those in the needs improvement fitness zone?

Directional Hypothesis #1 (DH1): Middle school girls who exhibit higher levels of physical fitness will have significantly higher GPAs than those in the needs improvement fitness zone.

Research Question #2 (RQ2): Do middle school girls classified in the above healthy fitness zone or healthy fitness zone have significantly higher standardized test scores, as measured by the FCAT, than those in the needs improvement fitness zone?

Directional Hypothesis #2 (DH2): Middle school girls who exhibit higher levels of physical fitness will perform significantly better on both reading and math standardized tests.

Research Questions #3 (RQ3): Do middle school girls classified in the above healthy fitness zone or healthy fitness zone have significantly better attendance than those in the needs improvement fitness zone?

Directional Hypothesis #3 (DH3): Middle school girls who exhibit higher levels of physical fitness will attend school significantly more regularly than those with lower levels of physical fitness.

Research Question #4 (RQ4): Do middle school girls classified in the above healthy fitness zone or healthy fitness zone have significantly better behavior, as measured by conduct grades and discipline referrals, than those in the needs improvement fitness zone?

Directional Hypothesis #4 (DH4): Middle school girls who exhibit higher levels of physical fitness will have significantly fewer school behavior issues than those with lower levels of physical fitness.

Research Question #5 (RQ5): Do middle school girls who are at a healthy weight (as measured by body mass index [BMI]) have better overall school performance (as measured by GPA, attendance, behavior, and standardized test scores) than those who are in the overweight/obese range (as measured by BMI)?

Directional Hypothesis #5 (DH5): Middle school girls who are at a healthy weight, as measured by BMI, will demonstrate a better school performance, as measured

by GPA, attendance, behavior, and standardized test scores, than those who are in the overweight/obese range as measured by BMI.

Theoretical Framework

The theoretical foundation of this study is based upon the biopsychosocial model, which states that health (mental and physical) is an interaction between biological forces, psychological forces, and social forces (Pilgrim, 2002; Suls & Rothman, 2004). The need for a new medical model led to the biopsychosocial model, as the biomedical model of the 1970s did not account for social, psychological, and behavioral factors in illness (Engel, 1977/2012). Engel (1977/2012), in proposing a new model, made the comparison between diabetes and schizophrenia, and how there is a psychosocial and somatic component to each illness, and both are dependent on medication and medical professionalism in order to treat the disease. In the field of childhood obesity, the original biomedical model has been ruled out as the most appropriate and effective way of treatment modalities. Factors contributing to youth obesity involve more than mere medical conditions. Without incorporating psychological, social, familial, and societal components, the disease of obesity cannot be fully explored. Therefore, Goetz and Caron (1999) proposed the family-collaborative ecosystemic model (FEM), which they define as "a view of obesity grounded in family systems theory, ecosystems theory and biopsychosocial theory, integrated with Eastern and Western philosophical views of health" (p.S58). Goetz and Caron propose the FEM to utilize various theories and components in order to obtain a more holistic view of a child to intervene in youth obesity.

Additional physical activity will not only improve a student's medical condition, but can also contribute to an improvement in psychological and social conditions. According to the Association for Applied Sport Psychology (2011), the following psychological benefits are evident from physical activity: improved mood, self-esteem, body image, and confidence in physical abilities; reduced stress and the ability to cope with stress; pride in physical accomplishments and satisfaction with self; increased feelings of energy; and decreased depressive symptoms. As people improve their mental well-being through exercise, they are more likely to continue exercising for added physical benefits. Improving the health of students through physical education can impact their mental health and their social well-being, translating to school performance. In addition to being well psychologically and socially, executive functioning skills, such as attention, planning, and organizing, are also tools essential to school success. Davis et al. (2011) cites several studies that find that children who engage in physical activity get better grades due to an improvement in executive functioning skills. They sought to explore the hypothesis that overweight children would improve their executive functioning skills with exercise, and found that these skills do improve, and therefore, improve academic functioning of children.

Petrie, Greenleaf, and Martin (2010) examined middle school students' body satisfaction utilizing biopsychosocial and physical factors to determine how they influence body satisfaction in adolescent males and females. The researchers found that while only 20% of the variance of body satisfaction in boys was related to the biopsychosocial and physical factors, 50% of the variance in girls was related. Girls'

body satisfaction is more directly related to physical and biopsychosocial factors than boys' body satisfaction. Therefore, examining body satisfaction of females needs to entail intervening on a physical, social, and psychological level. Likewise Goldenson (2011) utilized the biopsychosocial model to determine appropriate mental health services and interventions for troubled students who were educated in an alternative setting or expelled. Addressing biological, social, and psychological risk factors would allow for more appropriate assessments and interventions for these high risk students (Goldenson, 2011).

Through the biopsychosocial model, the relation of these areas of functioning is prevalent. The biological, social, and psychological factors all interact and have an impact on each other. This model translates to school performance, where physical, psychological, and social, interact with each other and all impact the way a student performs in school academically, socially, and behaviorally. By examining the relationships between school performance and physical fitness, the social and psychological factors associated with school performance will be linked to the physical aspect of what makes a student ready to perform in the school setting. The measures of physical fitness will assess some of the biological factors of a student, as strength, flexibility, and cardiovascular fitness are all biologically based. Attendance and behavior are constructs that examine the psychological and social factors of a student, while academic achievement and standardized test scores incorporate all three factors in the biopsychosocial model. While all three, biological, social, and psychological, are

supposed to interact and impact one another, in this study I examined the same construct and its relationship to school performance in middle school girls.

Nature of the Study

A quantitative correlational approach was used to examine the nature of possible relationships between physical fitness and school performance. Data used from the Fitnessgram evaluation (categorized into fitness zones: above healthy fitness zone, healthy fitness zone, and needs improvement zone), and school performance data, including grades, test scores, school behavior, and attendance were used. I collected Fitnessgram data from middle school girls in a southeastern middle school as part of their physical education class, by the physical education teacher. School performance data was collected utilizing the school district's Portal/FOCUS program, which includes report cards documenting grades and grade point average, daily attendance, behavior grades, and standardized test scores. All the data was provided by the Research and Accountability department to this researcher through an application process in the school district. It was analyzed in the SPSS program utilizing MANOVA analysis. MANOVA will be used, as the predictor variable, physical fitness, is a categorical, non-continuous variable, while there are multiple, correlated outcome variables. MANOVA takes into account the relationships between outcome variables and has the power to detect significant relationships between the predictor variable and the outcome variables. Since physical fitness, the predictor variable, is a nominal, categorical variable, it does not meet the assumption of Pearson's *r.* A secondary correlational analysis was conducted to

explore the relationship between body mass index (BMI) and school performance measures.

Operational Definitions

The following terms are used in the study:

Attendance is measured by the percentage of days in attendance and the total number of absences and tardies (Finn, 2012; Lucio et al., 2011).

School Behavior is measured by conduct grades as rated by the teachers, utilizing a scale of *unsatisfactory*, *needs improvement*, *satisfactory*, and *excellent*. Teachers administer these grades, along with academic performance grades, each of the six marking periods in order to communicate to the parents or guardians how the students' behavior is in that particular class (Pinellas County School Policy Manual, 2010).

Fitnessgram measures are a series of assessments that measure physical fitness levels using the following designations: needs improvement, healthy fitness zone, or above healthy fitness zone; areas measured include aerobic capacity, body composition, muscular strength and endurance, and flexibility (Plowman et al., 2006).

Grade Point Average (GPA) is an accumulation of the students' grades on a scale of 0.0 (F) - 4.0 (A), unweighted (Lucio et al., 2011).

Middle school girl is a girl in the 6th through 8th grades (Petrie, Greenleaf, & Martin, 2010).

Number of suspensions is the total number of incidents leading to an out-of-school suspension as measured by the school district's database (Pinellas County Schools Policy Manual, 2010).

Obesity is extremely overweight and having too much body fat (National Institute of Health, 2014), which is defined as a body mass index (BMI) of 30 and above for adults (CDC, 2014). For children, obesity is age and gender specific (CDC, 2014).

Office Discipline Referrals are forms filled out by teachers and staff for specific infractions the student engaged in (Wyman et al., 2010). The consequence as a result of the office discipline referral is at the discretion of the administrator (Pinellas County Schools Policy Manual, 2010).

Physical fitness includes measures of strength, flexibility, and cardiovascular performance, as measured by the Fitnessgram, categorized into above healthy fitness zone, healthy fitness zone, and needs improvement zone (Chomitz et al., 2009; Petrie, Greenleaf, & Martin, 2010; Edwards, Mauch, & Winkelman, 2011; Plowman et al., 2006).

School performance includes attendance (Finn, 2012; Lucio et al., 2011), number of suspensions (Finn, 2012), grade point average as a measure of academic achievement (Jeynes, 2009; Lucio et al., 2011), and office discipline referrals (Wyman et al., 2010).

Standardized test scores are reading and math scores on the Florida Comprehensive Assessment Test (FCAT) testing administered to all students grades

3-10, and in this study, was based on the middle school girls' previous year's FCAT testing (Florida Department of Education, n.d.).

Weight status is the division of BMI into three categories: underweight, healthy weight, and overweight/obese. In children, these categories are age and gender specific (CDC, 2014).

Significance

This study will advance the knowledge of the role of physical fitness for middle school girls in the school setting. While it has been found that physical fitness has a positive correlation with standardized test scores (Chomitz et al., 2009; Edwards, Mauch, & Winkelman, 2011; London & Castrechini, 2011), this study examines its relationship to other areas of school performance, thereby discovering another factor that can help improve the educational experience of middle school girls, who tend to have a difficult transition through middle childhood/early adolescence. The research already has determined the relationship between physical fitness levels and standardized test scores, specifically reading and math. However, the research has not explored the relationships between other factors impacting school success, such as behavior, attendance, and grades. As middle school is a difficult time of transition for all students, finding factors that may contribute to school success is essential.

Implications for Positive Social Change

The findings can contribute to positive social change by increasing knowledge in the school, school district, and community to emphasize the importance of physical

activity for female students' school success. Females impacted by an increase in physical activity may continue to be active out of the school setting if they are made aware of the results of this study demonstrating the relationship between their physical fitness and school performance. Schools can improve their wellness programs offered to females and put greater emphasis on the importance of physical activity within the school curriculum. The results can also be shared with parents, who may take the information and encourage their children to lead a more active lifestyle. Decreasing childhood obesity through fitness can also lead to positive social change in health care costs on society and healthier females all around (Cecchini et al., 2010). Implementing healthy habits at a young age may contribute to healthier habits as adults, leading to a decrease in obesity among adults, as well.

Assumptions

In the course of this study, I made certain assumptions concerning data collection, test score results, and student performance. It was assumed that the data collected will be data that truly represents an accurate measure of the student's physical fitness levels. People other than the researcher will be gathering the data from the participants; therefore, the assumption had to be made that all will be administering the assessment following the guidelines appropriately. The assumption was made that all of the students put forth effort on the Fitnessgram test and performed at their best. A very specific sample, middle school girls from one middle school, was studied. This may limit the generalizability of the results, as it may not be representative of all middle school girls.

This study is a correlational study, and is not of experimental design. Therefore, while relationships can be determined, causation cannot be assessed. The correlational design also limits the research with regards to direction of the relationships. For this reason, MANOVA analysis will be used to determine prediction. However, for the purpose of this study, the correlational design is best to answer the question of relationships between multiple variables. Potential weaknesses to the study are the limited number and diversity of participants. All participants are from one middle school in the southeastern United States. There is also no control group or comparison group, as data will only be collected from middle school females. The accuracy of the administration of the Fitnessgram assessment was be verified for each of the participants, therefore, it is assumed that the experienced physical education teachers administer the Fitnessgram with fidelity. There were a total of three physical education teachers who administered the Fitnessgram assessment. Their methods, while following protocol, may be different from one another.

Limitations

There was sampling bias in this study, as the sample came from one middle school and is not representative of all middle school girls. Using all available subjects limits the researcher bias. Response bias could arise if some students refused to participate in the Fitnessgram assessment. While it is a required part of the physical education curriculum, there may be students who are defiant and will refuse to participate or who are chronically absent and are not in attendance the days that the assessment is being conducted. This may skew my data when it comes to whether fitness levels are

related to attendance and behavior. However, most students do participate in the assessment and it is not known to this researcher who did not and for what reasons. Confounding variables, such as diet and gender, are also limitations. The students' diets cannot be controlled in this study, and it is not clear what their diets consist of. In addition, the study is limited to females, which limits generalizability to male students.

Delimitations

The study was limited to the number of middle school girls at one specific middle school in the southeastern United States. In addition, the study was limited to data that the researcher has access to without direct student contact. The measure of physical fitness will be conducted by the physical education teacher, as per standard procedure in the physical education class. The other data collected (i.e. school performance data for the students) will be gathered from a district-wide database. Only the Fitnessgram measure will be used to measure physical fitness.

Summary

The importance of addressing physical fitness in schools is crucial in the physical and mental well-being of students. Therefore, determining the relationship between fitness levels and factors of school success may help students meet more academic success in middle school. Physical fitness has already been found to have a positive correlation to standardized test scores (Chomitz et al., 2009; Edwards, Mauch, & Winkelman, 2011; London & Castrechini, 2011). Exploring other factors contributing to school success, such as grades, school behavior, and attendance, can enhance the belief

that physical fitness is a beneficial aspect in determining female students' success in middle school.

Using the biopsychosocial model, school performance factors, including physical, psychological, and social, interact with each other and all impact the way a student performs in school academically, socially, and behaviorally. The levels of physical fitness, determined by the Fitnessgram measure, address the physical/biological factor, while the psychological and social factors are addressed through school behavior, attendance, and grades/academic aptitude. Many psychological benefits, such as improved mood, self-esteem, and reduced stress are associated with increased physical activity (Association for Applied Sport Psychology, 2011). In addition, executive functioning skills, such as planning and attention, are improved when children engage in physical activity. This improvement also leads to better school grades (Davis et al., 2011). These benefits impact the psychological and social factors of school success, while the biological factors, strength, flexibility, and cardiovascular fitness, will be assessed through the Fitnessgram testing. Those scores were compared to the factors of school performance to determine if relationships exist. This quantitative study explored those relationships and determined if physical fitness is a dynamic in a middle school girl's school success.

The following chapters will address the recent literature in the field of physical fitness and school performance, in addition to the experiences of middle school females. In addition, chapter 3 will address how the current study was conducted, the variables explored, and the methodology of the research, including statistical analyses used to

determine the relationship between variables and to address the hypotheses derived earlier in this chapter.

Chapter 2: Literature Review

Introduction

There are many factors, both internal and external, that impact middle school students' performance in school. The focus of the current study was to examine how physical fitness impacts a middle school girl's school experience, a phase that is important because girls in this age group are attempting to find a level of comfort in the transformation of their bodies (Brown & Witherspoon, 2002). I assessed the relationships between physical fitness, as measured by the Fitnessgram assessment, and school performance, as measured by standardized test scores, grade point averages, school behavior, and attendance.

Seventeen percent of children and adolescents in the United States are obese, causing them to develop adult diseases such as heart disease, diabetes, and high cholesterol while still in childhood, in addition to cancer and respiratory disorders (CDC, 2014; Cecchini, Sassi, Laure, Lee, Guajardo-Barron, & Chisholm, 2010). These illnesses contribute to the majority of deaths worldwide and can often be prevented with lifestyle changes (Cecchini et al., 2010). However, the effects of obesity on children go beyond the physical diseases that can develop from being obese. For example, obesity has significant social consequences such as bullying, social isolation, and low self-esteem that result from the child's weight. There is a documented connection between obesity in adolescence and low self-esteem, with higher incidences of poor psychosocial adjustment, depression, and suicide (Robinson, 2006). Because of these factors, obese

adolescents are more likely than non-obese peers to be victims of teasing and bullying by peers.

The consequences of obesity extend to the behaviors of obese children. When obese adolescents are victims of constant bullying and teasing, such as weight-based victimization, an increase in psychosocial issues develops (Robinson, 2006). Overweight or obese children are more likely to engage in risky behaviors, including substance abuse for girls and violence for boys (Farhat, Iannotti, & Simons-Morton, 2010). Obese girls report high levels of relational victimization and social marginalization, while obese boys report higher levels of overt victimization, in the form of pushing, hitting, and other acts of aggression; the heavier the adolescent, the more they are victimized (Robinson, 2006). Girls tend to be teased for how they look, while boys are often teased for how they act (Raffaele Mendez et al., 2006). These consequences have long-term implications; adolescent females who are obese are more likely to demonstrate future depressive symptoms as they become adults (Boutelle, Hanna, Fulkerson, Crow, & Stice, 2010).

The social, psychological, and medical consequences of obesity make it an important topic to address with children and adolescents. Home, school, and community can work together to combat obesity. However, collaboration is important so children and adolescents receive the same messages no matter where they are. Schools are responsible for educating children on a variety of topics, include health and wellness (Raffaele Mendez et al., 2006). Therefore, schools are a good place to start, especially when the lessons are not being taught at home.

Another reason schools are integral in addressing childhood obesity is that overweight status has been found to predict poor school performance (Krukowski, 2009). In a qualitative study of 11-17 year olds who are obese, Curtis (2008) sought to discover the experience of young people with obesity in secondary school. One major issue faced by obese adolescents is in physical education class, which is the class that may be most beneficial to curtailing weight issues and increasing physical fitness. Obese adolescents were self-conscious about changing in front of others and wearing shorts. In addition, they were also concerned with their athletic ability being scrutinized by peers (Curtis, 2008). When students are uncomfortable in their educational setting, they may be absent more frequently, act out, or avoid schoolwork, which may lead to a decrease in academic performance. However, prevention efforts can be made in order to curb youth obesity, including interventions in the home, school, and community.

In this study, I focused on academic performance and physical fitness, determining if higher levels of physical fitness lead to better school performance, specifically in middle school girls. I also examined other related factors that can be influenced by physical activity in the schools. Girls benefit from a high exposure to physical education, which benefits reducing obesity and grants other additional health benefits (Carlson et al., 2008). In this chapter, I examine previous research that has been conducted in the area of physical activity in middle school students, factors that impact physical activity, students' transition to middle school, and how fitness levels impact academic achievement. This literature lead to the current study, in which I examined the relationship between physical fitness, as measured by the Fitnessgram assessment, and

school performance, as measured by standardized test scores, grade point averages, school behavior, and attendance.

Literature Search Strategies

I conducted the research component of this literature review using the resources of Walden University's library system. I specifically used multidisciplinary databases such as Academic Search Complete and subject specific databases such as PsycInfo, ERIC, SAGE, and MedLine. I also utilized the National Institute of Health to find systematic reviews of studies, in which I found several other articles. In addition, I reviewed articles found in these databases and examined literature listed in those articles' reference sections. Key terms searched included, but were not limited to the following: *physical activity*, *middle school*, *middle school transition*, *middle school female*, *fitness*, *fitness* AND *school*, *school performance*, *academic achievement*, *school behavior*, *attendance*, *Fitnessgram*, and *obesity*. I limited the search to current peer reviewed literature from no earlier than 2005, allowing for a full 10-year search of the literature.

Theoretical Framework

The theoretical foundation of the current study was based on the biopsychosocial model. This model states that three forces, biological, psychological, and social, all interact to form the construct of health, which includes both physical and mental aspects (Pilgrim, 2002; Suls & Rothman, 2004). This model was created in response for a need in biomedicine to have a medical model that incorporated social, psychological, and behavioral factors with physical health (Engel, 1977/2012). It was necessary to create a model that incorporated other realms besides mental health so that mental health would

not be treated as an *other* in the field of medicine, and because the leading causes of death no longer included infectious diseases (Johnson, 2013).

The biopsychosocial model is "predicated on the notion that individuals are comprised of interconnecting biological, psychological, and social factors that influence the human experience" (Furman, Jackson, Downey, & Seiz, 2004, p. 131). . Understanding individuals through the biopsychosocial perspective can assist in a holistic consideration of each student. In the school setting, collaboration among professionals by working with students in various capacities is important in order to help each student reach their full potential. This collaboration may include teachers, administrators, social workers, nurses, and psychologists.

Health behaviors lead to diseases which are preventable with proper care and attention. Obesity and nutritional practices are two areas in which physical health is influenced by the behaviors of the individual, leading to the need for patient-centered care (Johnson, 2013). The concept that behaviors are intertwined in health, and that people's actions can impact their overall well-being is integral in the biopsychosocial model. Exploring the interconnectedness of physical fitness and academic achievement, one can see how health behaviors of children can have an impact on their school performance.

Obesity is a social construct that has been explored through the biopsychosocial model. Goetz and Caron (1999) proposed using the family-collaborative ecosystemic model (FEM) to explain, understand, and intervene in childhood obesity. FEM incorporates psychological, social, familial, and societal factors that contribute to obesity

in youth, as childhood obesity is not solely a medical problem. When explored through a medical, or biological realm, obesity is assessed through statistics such as body mass index and waist circumference. Socially, obesity can be seen as an isolator, that individuals with obesity may not be able to do what their normal-weight peers can do (Forhan, 2009). The biopsychosocial model explains obesity through both of those realms and leads to the description that obesity is the interaction between both internal and external factors. In order for the International Classification of Functioning (ICF) to classify obesity as a disability, the entire experience of the person, viewing all factors contributing to the obesity, must be considered (Forhan, 2009). Only through a comprehensive review of an individual, examining the biological, psychological, and social facets of that individual, can he/she receive treatment to help lead a more productive life.

Body satisfaction among children can also be explained through the biopsychosocial model. Petrie, Greenleaf, and Martin (2010) sought to discover how biopsychosocial factors and physical factors influence body satisfaction in adolescents. These factors included body composition, pubertal status, sociocultural pressures, internalization of societal messages about bodies, social body comparison, physical self-concept, cardiorespiratory fitness, general self-esteem, and depression. Petrie, Greenleaf, and Martin discovered that 50% of the variance of body satisfaction in girls was related to these factors, while only 20% of variance in boys was related to these biopsychosocial factors. Variables from biological, social, psychological, and physical factors contribute a significant amount to how adolescents perceive themselves, especially females.

Ricciardelli, McCabe, Lillis, and Thomas (2006) used the biopsychosocial model to look at boys' weight and muscle concerns and their body satisfaction. Social factors, such as family members and media, were the primary reason for their wanting to change their bodies, followed by their current body mass index. However, in this particular study, self-esteem and negative affect were not significant in body satisfaction among the preadolescent boys (Ricciardelli, McCabe, Lillis, & Thomas, 2006). Body satisfaction, influenced by biopsychosocial factors, can also impact their overall well-being and functioning. When children and adolescents feel good about themselves and how they look, they are more likely to feel good about other aspects of their lives. Self-esteem issues can lead to other psychological and social issues, such as depression, anxiety, bullying, that may follow the child through home, school, and community. Influenced by societal messages, children begin to internalize perceptions and take them on as goals, which may be unrealistic. Addressing body satisfaction through healthy lifestyles, both with nutrition and fitness, can help prevent some of these concerns.

The biopsychosocial theoretical framework can likewise be applied to students as they function physically, socially, and psychologically in the school setting. Goldenson (2011) outlined risk factors for high-risk students in order to develop purposeful interventions for school success. Kishore and Shaji (2012) explored reasons that students drop out of school in a particular village in India. They found that physical disorders and cognitive disorders were the main reasons that students left school. However, the likelihood that students would stay in school or drop out was influenced by those biological factors in addition to societal factors (need to work; family issues) and

psychological factors (lack of motivation; lack of interest). Biologically, many students suffer from learning disabilities, attention-deficit/hyperactivity disorder (ADHD), and intellectual deficits (Goldenson, 2011). Sometimes these are caused by factors such as fetal alcohol syndrome (FAS) or other drug exposure during pregnancy. While these factors are out of the students' control, they do impact their school performance on a daily basis, sometimes putting those students at high risk of academic failure.

Behavioral problems or social problems also may emerge during this time. Social risk factors for high-risk youth include living situations, family constellations, and community influence (Goldenson, 2011). Attention Deficit Hyperactivity Disorder (ADHD) is one of the more common learning/behavioral problems found with students in schools. While ADHD is a biological condition, the social aspect of it becomes apparent in the school setting (Cooper, 2008). The school environment needs to be conducive to learning for these students with ADHD, while also addressing the biological/medical aspect. When looking at students with ADHD, one should take a biopsychosocial approach, as it takes environmental alterations, psychological intervention, and possible biological intervention to help ensure student academic success (Cooper, 2008). Behavioral intervention plans are developed using a biopsychosocial framework, where environment, physical conditions, and mental health conditions are considered to implement the most appropriate interventions for student success (Levine, 2001). Cooper (2008) explained, "a biopsychosocial perspective enables medical diagnoses, such as ADHD, to be used to inform psychosocial and educational interventions that may preclude the need for medical intervention" (p.469). In the current study, I will be using

the biopsychosocial perspective to determine the relationship between fitness and school success, which may be used to inform interventions to assist middle school girls.

According to Wadell, Offord, Shepherd, Hua, and McEwan, many high risk students have a mental health disorder, with up to as many as 15% of youth exhibiting emotional and mental health difficulties (as cited in Goldenson, 2011). The mental illnesses of these students may manifest themselves in behavioral, academic, or social malfunctions in the school environment. However, all of these internal factors are out of the control of those who work in the school setting. Mental health services are integral to the support of students educationally, as students receive the majority of their interventions at school (NASP, 2008). Unfortunately, the need is often greater than the resources available (Hill, Ohmstede, & Mims, 2012). Therefore, school-based interventions are crucial to assisting a greater number of students compensate for these internal factors. By integrating the interventions into the curriculum, more students will have access and school performance may increase despite the internal factors. Through the biopsychosocial method, understanding that there is a connection between biological, psychological, and social factors, schools can utilize resources, such as physical education and health, that may not have been used prior to help students be successful at school.

Physical activity can have not only biological benefits, but also psychological and social benefits as well. The Association for Applied Sport Psychology (2011) reports that physical activity can lead to the following psychological benefits: improved mood, self-esteem, body image, and confidence in physical abilities; reduced stress and the ability to

cope with stress; pride in physical accomplishments and satisfaction with self; increased feelings of energy; and decreased depressive symptoms. In addition, physical activity when combined with psychological or psychoeducational therapies, can help change a person's thought patterns in a positive way (Parker et al., 2011). Improving the health of students through physical education can impact their mental health and their social well-being, translating to better school performance by increasing their desire to do well socially and academically.

Physical activity can be disguised as fun entertainment. Exergames used for physical activity are videogames with an active component (Staiano & Calvert, 2011). These games can access biological factors in youth by increasing exercise, thereby increasing fitness levels. In addition, social interaction, whether with other live players or computer players, is increased through these games. Psychological benefits to exergaming include an increase in motivation mood, self-esteem, self-efficacy, and an increase in certain cognitive skills (Staiano & Calvert, 2011). When playing these exergames, they may perceive it as a video game rather than a chance to increase their physical activity and fitness levels. If a student knew that going to physical education class meant they could play video games, he/she may be less reluctant to participate. Therefore, increasing physical activity in schools, and finding creative ways to incorporate it into the academic curriculum, may help students physically, socially, and psychologically, and may provide benefits that will be evident through academic performance.

Satisfactory school performance can be assessed through academic skills, social skills, behavioral skills, and overall psychological well-being. One set of skills integral to school success is executive functioning skills, such as attention, planning, and organizing. These are skills that are often lacking in students considered in the "at-risk" categories described previously. Davis et al. (2011) cite several studies linking physical activity and executive functioning skills. Those who engaged in more physical activity improved their executive functioning skills and achieved better grades in school. The current study will go beyond grades to determine a student's overall school performance compared to their levels of physical fitness.

Increasing exercise among overweight students also improved their executive functioning skills, and therefore, their academic performance (Davis et al., 2011) as is also observed in studies of children of any weight status (Staiano & Calvert, 2011). In addition, physical activity can lead to enhanced executive processing and other cognitive functions in children with disabilities (Ploughman, 2008). Engaging in physical activity can have a positive impact on cognitive functions, including executive functioning skills, which can lead to better performance in school. While some school systems already incorporate physical activity in the academic curriculum, many do not. By determining the relationship between physical fitness and school performance, schools may consider incorporating physical activity throughout the academic curriculum.

Biological, social, and psychological factors all interact and have an impact on a student's performance academically, socially, and behaviorally. Psychological and social factors not only impact a student's physical fitness, but all three influence the student's

readiness to learn and perform in school. In this study, I gathered data on biologically based factors, such as strength, flexibility, and cardiovascular fitness through the Fitnessgram assessment and using that data to compare students on measures such as attendance and behavior (psychological and social factors), and academic achievement and standardized test scores. While all factors in the biopsychosocial model interact with each other, this study explored the same construct and its relationship to school performance in middle school girls.

Transition to Middle School

Transitioning to middle school, where more independence is granted and developmental changes are occurring, is very difficult for students who previously had more support and structure in elementary school (Grills-Taquechel, Norton, & Ollendick, 2010; Jindal-Snape & Miller, 2008; Jordan, McRorie, & Ewing, 2010; Lyons & Woods, 2012; Rice, Frederickson, & Seymour, 2011). Good coping skills would lead to less anxiety and assist them in that transition, as low anxiety correlated with low achievement; cognitively able students had higher anxiety, and therefore would be able to access coping strategies in times of stress (Jordan, McRorie, & Ewing, 2010). The students' concerns lie in an increase in academic demands, bullying, remembering materials needed for class, school size, and changing of classes (Rice, Frederickson, & Seymour, 2011). This is also the time of onset for several psychiatric disorders, including anxiety (Kessler et al., 2005), especially in girls, who report higher anxiety symptoms during this time than boys (Grills-Taquechel, Norton, & Ollendick, 2010). This is explained through various avenues including gender differences in body image (Grills-Taquechel, Norton,

& Ollendick, 2010; Raffaele Mendez et al., 2006), coping, and self-esteem (Grills-Taquechel, Norton, & Ollendick, 2010; Jindal-Snape & Miller, 2008). While students have both internal and external factors to adjust to at this time in their lives, they are still expected to perform well academically.

At times, academics are not always a priority for middle school girls while trying to navigate this newest stage in life. Raffaele Mendez, Young, Mihalas, Cusumano, and Hoffman (2006) cited that middle school girls feel less competent in subjects such as math, and in sports, and have a feeling of not being safe, as they have been harassed in school. With an underrepresentation of females in STEM fields (Science, Technology, Engineering, and Math), girls may not be encouraged to pursue higher level classes in math and science, which add to their feelings of incompetence in those areas. Their hesitance also appears as a lack of ability in those subject areas. Overall, girls tend to express more concerns about the transition to middle school than do their male peers (Rice, Frederickson, & Seymour, 2011). These studies demonstrate the significance of making the middle school transition more comfortable for girls.

While the majority of students transition without much difficulty (Grills-Taquechel, Norton, & Ollendick, 2010) or their concerns subside after they have become accustomed to middle school (Rice, Frederickson, & Seymour, 2011), it is more difficult for some populations and is evident in specific realms of functioning. For example, the transition to middle school and early adolescence is more difficult socially and academically for poorer students (Burgess, Johnston, Key, Propper, & Wilson, 2008) and those who are considered from a marginalized group (Sassen, Spencer, & Curtin, 2005).

Students from these groups tend to have social circles that are more damaged and also tend to be assigned to lower performing schools (Burgess et al., 2008). Additional stressors for both genders contribute to an increase in anxiety, social issues, academic issues, and psychological issues as students move from childhood to adolescents, coinciding with the transition to middle school. Finding appropriate support in the school setting is difficult as they attempt to navigate their new surroundings.

Relationships with peers, teachers, and parents, are important to students in this time of transition (Grills-Taquechel, Norton, & Ollendick, 2010; Jindal-Snape & Miller, 2008). Since relationships are so important, one stressor that girls face is relational aggression, a social form of bullying (Raffaele Mendez et al., 2006). This can impact their emotional functioning, leading to poorer school performance. Shy and withdrawn students struggle significantly, as they are already lacking relationships to help them with the transition or skills to form those relationships once they are in middle school (Lyons & Woods, 2012).

Interventions in the school setting assist middle school students in forming relationships and develop necessary skills. Lyons and Woods (2012) reviewed the Transition Pyramid Club intervention, which helps these students find a place in middle school, and develop social skills, self-esteem, and resilience, starting at a young age, leading up to the transition to middle school. The researchers found that it was an effective intervention in developing positive social adjustment. This includes a decrease in measures of total difficulties, emotional difficulties, conduct problems, hyperactivity/inattention, peer relationships, and prosocial behaviors based on the

Strengths and Difficulties Questionnaire (SDQ, Lyons & Woods, 2012). Teaching students to form relationships appropriately, maintain social relationships, and possibly develop new friendships can be integral in keeping students engaged in middle school. Positive social adjustment can lead to positive adjustment in other areas of their lives, leading to further success as the students go through their middle school years.

While some programs exist to intervene with some students, there is a significant lack of mental health services in U.S. schools that would promote social, emotional, and academic wellness among all students (Goldenson, 2011). Sassen, Spencer, and Curtin (2005) discussed the idea of art combined with group psychotherapy for middle school girls to foster relationships, self-esteem, and connections with other girls. Their program, Art from the Heart, follows the tenets of relational-cultural theory (RCT), and focuses on low-income, ethnically diverse girls to enhance relationships and peer interactions. Through creative arts and group RCT, the group participates in activities such as designing name tags for each other, creating group adhesiveness, working together to write stories or act out plays, or making body tracings to work on self-esteem and self-image. The goal of these activities is to find fun and creative ways to develop interpersonal and intrapersonal skills in at-risk, middle school girls. Just as the Pyramid Club works on social relationships, Art from the Heart also increases social skills in students in fun and creative ways. When the activities are fun and appear less like "counseling," students may be more inclined to participate in these group activities while learning prosocial skills. Socialization is important to adolescents and by teaching them

how to interact appropriately and utilize good social skills, transition to middle school can turn into an easier task.

Teacher support is crucial for students experiencing difficulty in the transitional period from elementary to middle school (Grills-Taquechel, Norton, & Ollendick, 2010; Jindal-Snape & Miller, 2008; Raffaele Mendez et al., 2006). Teachers can specifically teach to the stressors affecting transitioning middle school girls. They can discuss body image issues; media portrayals; teach wellness skills; encourage girls to pursue typical "boy" subjects such as those in the science, technology, engineering, and mathematics (STEM) fields; express their lack of tolerance for bullying or sexual harassment; and lessons directed towards prosocial behaviors (Raffaele Mendez et al., 2006). According to Jordan, McRorie, and Ewing (2010), adaptability, the ability to adjust to situations, is significantly related to academic achievement, even more so than intrapersonal ability.

Teachers can teach interpersonal skills, coping skills, adaptability, and social-emotional learning in order to help the transition from elementary to middle school, enabling the students to cope with the social and emotional demands of middle school. This instruction lends itself to being better prepared for the increase in academic demands (Jordan, McRorie, & Ewing, 2010). The stressors faced by girls transitioning to middle school are often not directly related to academics, but can impact their school performance and their experience in middle school and beyond (Raffaele Mendez et al., 2006). Interestingly, stress management and academic achievement are positively correlated among lower functioning students, as the "anxiety exceeds cognitive resources" (Jordan et al., 2010, p.43). The main goal for school is for students to be

ready to learn, with all barriers being addressed. The stressors faced by students often interfere with their ability to perform at their highest ability level. By addressing these stressors in creative and fun ways, students may be better able to find success in school. In the following pages, I will present the correlates between academic success and physical activity.

Transitioning to middle school from elementary school is difficult; however, the process can be made easier when skills for success are taught in the school setting. These skills include interpersonal skills, self-awareness and self-esteem, adaptability, prosocial behaviors, and social-emotional learning. By increasing wellness, both physical and mental, girls can also improve the skills necessary for middle school success, both socially and academically.

Physical Activity and Cognitive Functioning

In studies conducted on both animals and humans, researchers have found that memory and learning is augmented by physical activity. Physical activity can have a positive effect on cognitive functioning (Ganzer & Zauderer, 2011), with more physical activity leading to less cognitive decline over time (Horowitz, 2006). In elderly individuals, more aerobic activity has been found to improve memory and executive functioning skills (Albinet, Boucard, Bouquet, & Audiffren, 2010; Varela, Ayan, Cancela, & Martin, 2011). This finding has also been concluded in studies conducted on children with physical disabilities, and in addition, has been found to increase reading skills (Ploughman, 2008). Cardiovascular fitness has been associated with higher cognitive functioning in children as well (Van Dusen, Kelder, Kohl, Ranjit, & Perry,

2011). While the current study will focus on children and their school performance, research conducted with older adults demonstrates that cognitive functioning, a factor in a child's school performance, can be impacted by physical activity. With the increase in physical activity comes an increase in fitness levels, and therefore, may be related to cognitive functioning in individuals of any age.

Exergames, videogames with exercise components such as Wii, Dance Dance Revolution, and EyeToy, have been shown to increase physical activity in youth and are also being used as part of the physical education curriculum in some school districts (Staiano & Calvert, 2011). Exergames increase visual-spatial awareness, attention, planning abilities, perceptual speed, and executive control skills, which in turn, has the tendency to increase academic performance. Staiano and Calvert (2011) cited a study by Etnier, Nowell, Landers, and Sibley stating "A meta-analysis documented that physical activity enhanced cognitive performance among adolescents, including improved perceptual skills, intelligence quotient, achievement scores, verbal tests, mathematics tests, and developmental level, and academic readiness" (p.96). Further, they cited the same study and stated, "These improvements are predicted to occur because aerobic fitness leads to physiological changes that improve cognitive performance via increased cerebral circulation, increased neurotransmitter availability, and enhanced physiological and neurological mechanisms that occur during physical activity" (Staiano & Calvert, 2011, p. 96). Physical activity can, through various modalities, increase cognitive skills among adolescents, leading to better performance in school, especially on test scores (Van Dusen et al., 2011). However, these exergames enhance the increase in cognitive

skills by tapping into specific skills needed for gaming, while engaging in physical activity. Exergames are a creative and fun way to work on cognitive skills that will be critical to school success.

While there are biological bases to the impact of physical activity on cognition, the main focus is to increase physical activity in children and adolescents in order to gain all the benefits of increased fitness including executive functioning skills, memory, visual-spatial planning, and attention. The carry-over of cognitive skills to school performance is uncontested. In addition, physical activity has other positive impacts on youth through the biopsychosocial model, which describes how physical, psychological, and social benefits can be attained through an increase in physical activity.

Factors that Impact Physical Activity

The closer families live to recreational areas, the more physically active children tend to be due to the opportunities afforded to them (Sallis & Glanz, 2009). Walkable cities, those in which residential areas are in close proximity to stores and services, lead to more physically active residents (Sallis & Glanz, 2009). Active travel is a mode of transportation that would encourage children to be more physically active by walking or biking to school or parks (Pont, Ziviani, Wadley, & Abbott, 2010), which would be more feasible in a walkable city, where businesses, schools, parks, and stores are close to the residential neighborhoods. While boys self-report being more active than girls, both engage in active commuting equally (Page, Cooper, Griew, & Jago, 2010). Changing the method in which a child travels to school from a passive mode of transportation (i.e. bus

riding, car riding) to active travel has been found to increase overall minutes per day in moderate to vigorous physical activity (Smith et al., 2012).

However, there are more factors than environment alone that contribute to children's active travel. Pont et al. (2010) developed the Model of Children's Active Travel (M-CAT) to investigate these factors. One set of factors that the M-CAT proposes are the objective demographics of the child, such as age, gender, ethnicity, etc. Parental characteristics and perceptions of active travel were also examined. School administrators also have opinions regarding active travel, and express concern about safety of crossing the streets, the number of sidewalks, distance to school, traffic, neighborhoods, and parent and child attitudes (Price, Pluto, Ogoussan, & Banda, 2011). In addition, the more independent children feel towards being able to go places in the local community alone, the more likely they were to walk or cycle to school (Page, Cooper, Griew, & Jago, 2010). In Victoria, Australia, the Ride2School program is used to encourage active travel to and from school, and is based at several schools. Crawford and Garrard (2013) evaluated the use of this program in schools and found that the location and demographics of the school influenced the use of the Ride2School program, as the school that was not as easily accessible to the neighborhoods saw fewer students using active travel. The school that did increase its use of the program is located in an area with more walking and biking among its residents. While schools can help to increase active travel, cities and towns play a role in ensuring the safety and convenience of being able to walk or ride to school.

A qualitative study of individuals with experience in public policy, nutrition, or physical activity was conducted to explore interventions and policies to increase and support physical activity for the residents of Australia (Shill et al., 2012). They found that urban planning and infrastructure to increase active travel and discouraging the use of motorized vehicles can help create an environment that may increase physical activity among the citizens (Shill et al., 2012). Safety is important in creating that type of environment, as is accessibility and ease of use. Schools can also design their recreational areas and their environment such that children would be more likely to engage in physical activity, such as designs on the playground, basketball hoops, and other equipment accessible to students (Sallis & Glanz, 2009). Unfortunately, there are barriers to policy change regarding environmental interventions to increase physical activity in an entire community. Lobbyists, cost, and planning system were all identified as barriers in the Australian study by Shill et al. (2012). Increasing physical activity is an effort that takes cooperation from homes, schools, communities, policy makers, and other stakeholders. While schools and parents can encourage children to increase their activity levels and decrease their sedentary activity time, it takes communities to work towards a similar goal. The importance of an increase in physical activity among residents needs to be clearly stated and proven to policy makers in order to make these environmental/community changes.

Following the biopsychosocial model, physical illness can also contribute to a lack of physical activity in young people. Williams, Powell, Hoskins, and Neville (2008) reviewed physical activity participation in children with asthma and found that those

children are usually less active than those without asthma. One reason is that the children with asthma believe that they cannot participate in certain physical activities because of their illness, or they feel their performance may be less than that of their peers. In addition, parents may contribute to those beliefs, often enabling their child with asthma to not attempt certain physical activities. Children with asthma need a certain amount of physical activity in order to help control their disease, and many schools, teachers, or parents may not understand that need (Williams et al., 2008). Therefore, the authors recommend health care professionals do better at encouraging physical activity and teaching children and families about what is realistic and what the real restrictions should be.

However, when dealing with adolescents, health care professionals need to consider the population they are working with. Pollak et al. (2009) studied interactions and discussions between physicians and teenagers to determine the physicians' way of speaking to teenagers about weight and obesity. The doctors that used motivational interviewing (MI) techniques had a better end result, with their patients exercising more, losing weight, and reducing sedentary behaviors. Adolescents are more likely to abide by medical advice if it is not presented in lecture form. Therefore, training health care professionals to work effectively with adolescents can help to improve physical well-being of children and teenagers, leading to better outcomes when trying to encourage physical activity and weight loss in those with physical illness.

Sometimes school climate, social support, and overall enjoyment of physical activity impact whether or not students are physically active (Grieser et al., 2008). In a

study of adolescent girls in the 6th grade, Grieser et al. found racial differences between the variables mentioned. Black and Hispanic girls perceived less teacher support and less support from male peers for physical activity than white girls. Black girls enjoyed physical education class more than white girls. Nonetheless, the sample of 6th grade girls overall felt supported in their efforts of physical activity from teachers and male peers, family, and friends. When examining activities most beneficial to increasing moderate to vigorous physical activity in overweight Latina and African-American girls aged 8-14 years old, Olvera, Graham, McLeod, Kellam, and Butte (2010) found that traditional fitness sessions including step aerobics, spinning/circuit, circuit training, and kickboxing, led to the highest amount of time in moderate to vigorous physical activity. This traditional fitness model had better results than dancing and games, sports skills, and flexibility training. When people do not feel supported in their endeavors, they are less likely to stick with a specific program. This concept of needed support is no different in adolescents. However, perceived support and enjoyment of activities varies among students. Gender and race are both factors that may influence support and enjoyment, however, each person is an individual, and each individual is different in what they enjoy and how they perceive the climate of their surroundings.

Constantinou et al. (2009) conducted a qualitative study in which they interviewed 7th and 8th grade girls about their experience in physical education classes. The girls described the atmosphere of physical education class as positive, and that they often enjoyed the competitive atmosphere with the boys in the class. Their negative attitudes from physical education class derived from their peers' behavior in class,

especially if peers became aggressive or overly competitive (Constantinou et al., 2009). Similarly, Jago et al. (2009) conducted a qualitative study on a group of 113 students aged 10-11 year old regarding the role of their social groups in their level of physical activity. The researchers found that friendship groups greatly influence whether a student begins to engage in physical activity, and whether or not the child continues the activity. Jago et al. (2011) discovered that keeping girls in an after-school dance intervention was easier when they enjoyed the activity and they had opportunities to socialize with their friends. Therefore, advertising should focus on enjoyment and socialization in order to recruit and retain girls in programs promoting physical activity.

Examining physical activity from the standpoint of nature versus nurture can also be important in developing interventions. A twin study examining physical activity across twin pairs found that the majority of the variance in physical activity could be accounted for by a shared environment, as opposed to heritable traits (Fisher, van Jaarsveld, Llewellyn, & Wardle, 2010). Interventions to increase physical activity in schools should take into consideration the support students receive at home in addition to the support they receive from their teachers and peers. It is important to create a climate of support for physical activity within the school to help all students feel supported in their efforts to increase physical activity in their lives.

Parental support for physical activity is also very important for young people to become and remain active in their everyday lives. Bentley et al. (2012) found that parents need support in knowing how much physical activity their children need, ways to go about increasing physical activity, and knowledge of the benefits of physical activity

in children. Parents often believed their children were active or very active and did not need any more physical activity in their lives because they had presumably enough energy and were of "normal" weight. In addition, parents found several excuses for not working in more physical activity by mentioning available time, convenience, transportation, weather, and safety. Bentley et al. (2012) recommended interventions for parents to increase their children's physical activity levels, such as improving understanding of how much physical activity is needed, ideas and skills to motivate their children, developing intrinsic motivation, and increasing parent confidence in their children's physical activity.

Children who engage in more "active play," meaning, they engage in unstructured playing in their free time, have overall higher physical activity levels than those who engage in less "active play" (Brockman, Jago, & Fox, 2010). In addition, the more time spent using media, such as television, computer, and videos, the less committed children were to physical activity (Racine, DeBate, Gabriel, & High, 2011). By encouraging active play in the children's free time and less sedentary activities, parents can encourage their children to be more active overall. School recess is an opportunity to provide children with "active play" time. Playspace and equipment may help to increase moderate and vigorous activity among children at recess (Ridgers, Fairclough, & Stratton, 2010) and after-school programs focused on physical activity rather than sedentary activities may increase self-esteem and commitment to physical activity (Racine, DeBate, Gabriel, & High, 2011).

In some cases, children and adolescents do not enjoy physical activity as it has been presented to them. Physical education class may not always be a positive experience, nor were organized sports for some. However, Schneider and Cooper (2011) found that when a school-based physical activity intervention was used on adolescent girls, there was a greater increase in physical activity among those girls who, at the beginning, had low levels of enjoyment from physical activity, than with the girls who had high levels of enjoyment. The specific intervention targeted those girls with low levels of enjoyment by exempting them from the timed mile run, excusing them from uniforms, changing activities often, allowing student input into choosing activities, and modified activities based on fitness levels (Schneider & Cooper, 2011). By decreasing certain limitations and allowing student input into the program, the girls had more reason to enjoy the activities in which they were participating. Allowing physical education to be fun and less strict may help to increase physical activity levels in students, both in and out of school.

In order to increase physical activity in children and adolescents, interventions must take place on several levels. School-based interventions are integral, as that is where many children spend the majority of their time, and where their social lives exist. In addition, family and community are important places to encourage physical activity in order to generalize to lifelong habits (van Sluijs, McMinn, & Griffin, 2007).

School-Based Interventions

Story, Nanney, and Schwartz (2009) found that schools are making progress in implementing interventions for healthier lifestyles. It comes down to policies to enforce

healthier eating and the increase of physical activity in the school setting. Schools are integral in teaching these life skills, such as nutrition and exercise, and may be the only source of exercise for some students (Willette, 2007). The Florida House Bill CS/CS/HB 967 in 2007 mandated 150 minutes per week of physical education for elementary school children (as cited in Hollar et al., 2010). Physical education in school does not have a negative effect on math or reading scores and may actually lead to an increase in academic achievement among elementary school girls (Carlson et al., 2008).

National standards on physical education in school have seen changes in the curriculum focused on motivation to pursue and enjoy physical activity during and after the school years (Chen & Ennis, 2004). Education about physical activity and overall healthy lifestyles are facets of the new Physical Education curriculum across the country. The Intervention Centered on Adolescents' Physical Activity and Sedentary Behavior (ICAPS) program was created to increase physical activity in youth both within the school environment and outside the school environment. Simon et al. (2008) utilized ICAPS to increase physical activity in sixth grade students, and therefore, slow the increase of body mass index (BMI) in these youth. After four years of the program, 79% of those who participated in the intervention engaged in a physical activity outside of school, compared to 47% of those who did not participate in ICAPS. While the intervention was primarily presented through the school, it led to an out of school increase in physical activity among students who participated.

Another intervention which has been successful is the Healthier Options for Public Schoolchildren (HOPS) obesity prevention intervention (Hollar, Messiah, Lopez-

Mitnik, Hollar, Almon, and Agatston, 2010). Low-income students participating in the HOPS program decreased body mass index and increased academic performance over two years across 6 elementary schools. Using only students who qualified for free or reduced lunch, and therefore considered from low-income families, they measured body mass index percentiles and scores on state testing. Those in the intervention schools had an increase in physical activity and better nutrition options. Math scores improved in the intervention group and body mass index percentiles decreased in the intervention group (Hollar et al., 2010). Reading scores were also higher for those who received the HOPS intervention. School-based interventions improve the well-being of students, and may supplement any physical activity and nutrition information they are receiving at home. However, since the majority of their day is spent in school, primary information often comes from school-based personnel. Schools can also train parents and families to follow similar methods in order to have consistency across settings.

Nutrition and physical activity are the two main contributors to a healthy lifestyle. Blom-Hoffman, Wilcox, Dunn, Leff, and Power (2008) implemented a program in four elementary schools to increase fruit and vegetable consumption among students, increasing the home-school collaboration. The schools already had a program to increase physical activity, Athletes in Service. Blom-Hoffman et al. used interactive children's books to teach the parents what the students learned at school, and to enhance the knowledge the students had. This intervention increased parents' knowledge about eating 5 fruits and vegetables per day, but the difference in consumption of fruits and vegetables was not significant. The students did increase their consumption of fruits and vegetables

more than the control group; however, it was not a statistically significant increase. As previously mentioned, home-school collaboration helps keep consistency across settings, and allows children to get the same message wherever they go. Parent training also helps when parents may not know how to incorporate good nutrition or physical activity into their days. Communication between parent and child is also enhanced through these interventions, by allowing the children to discuss with their parents what they learned in school, while the home portion of the intervention can be carried out.

Middle school students, as they go through puberty, need to develop healthy lifestyles for long-term wellness. The Get Moving! Intervention was designed to use classroom media to increase physical activity in Latina middle school females (Spruijt-Metz, Nguyen-Michel, Goran, Chou, & Huang, 2008). Students developed Public Service Announcements (PSAs) advertising the decrease in sedentary behaviors, therefore, an increase in physical activity using intrinsic motivation tactics. In addition, the intervention included fact sheets, physical activity questionnaire, video, presentations, and handouts. Ultimately, Spruijt-Metz et al. found that the classroom media intervention reduced sedentary behavior, however, no increase in physical activity was found. Therefore, more focus needs to be placed on what to do to increase physical activity, while continuing to promote decreasing sedentary behaviors, such as TV watching, computer use, and video games. This multimedia approach taps into the interest of many adolescent girls. Instead of eliminating these activities, utilizing active video games can decrease sedentary behaviors while increasing physical activity. Both

are important in promoting overall wellness in adolescent girls, especially in the middle school years.

A school-based intervention focused on increasing physical activity in first and fifth grade added two physical education lessons to the already three that existed in the week, 3-5 short activity breaks of 2-5 minutes each were added during academic lessons, and a ten minute physical activity homework assignment was given (Kriemler et al., 2010). When compared to a control group, which solely had the three 45 minute physical education lessons per week, students in the intervention group showed a decrease in body fat, decrease in body mass index, and an increase in aerobic fitness. However, there was no significant difference between the intervention and control groups regarding quality of life. Other interventions have led to an improvement in psychological wellness. The benefits of the added physical activity were significant in that body composition and performance improved. Unfortunately, policy makers do not put a great emphasis on physical education, and school districts often decrease time to make room for more academics in the daily curriculum. The physical benefits, in addition to other benefits that will be mentioned, are enough for decision-makers to increase physical activity in the school setting.

In order to prevent future diseases such as osteoporosis, it is important for girls to be physically active in their adolescent years, which is the reason for the Incorporating More Physical Activity and Calcium in Teens (IMPACT) study. Jones, Hoelscher, Kelder, Hergenroeder, and Sharma (2008) found that school interventions can be beneficial in increasing physical activity and decreasing sedentary behaviors. The

interventions included a health curriculum, a physical education program, and food service's increase in calcium-rich foods. In the intervention schools, sedentary behaviors decreased, out of school minutes of physical activity increased, and vigorous physical activity increased, compared to the control schools in the study. Well designed, school-based interventions can be influential in the physical activity levels of populations of students, which in turn, can impact overall physical health (Jones et al., 2008). The Health in Adolescents (HEIA) study also explored adolescents' physical activity, in addition to their weight status (Grydeland et al., 2013). This study sought to combine biopsychosocial factors to impact weight status, diet, and physical activity in 6th grade students. Classroom lessons, posters, fruit and vegetable breaks, physical activity breaks, sports equipment during recess, active commuting campaigns, pedometers, and computer advice were all components to this intervention. In addition, parents were provided information as well. Grydeland et al. (2013) found an intervention effect on overall physical activity, however, especially among girls, and those in the low-activity group prior to the start of the intervention. It is important to examine gender differences, as girls may often engage in less physical activity than boys outside of the school day (Brockman, Jago, & Fox, 2010; Jago et al., 2011) and during school recess, girls engaged in more sedentary activity than boys (Ridgers, Fairclough, & Stratton, 2010). Therefore, girls may benefit significantly from school-based interventions.

School-based interventions should begin at a young age to help develop lifelong habits. An intervention implemented over two years with 5-6 year old students promoted healthy eating habits and increasing physical activity (Llargues et al., 2011). These

lessons were included in the regular school curriculum, and monthly healthy recipes and information about parks and walking paths were distributed to parents and families to generalize these habits to home. Llargues et al. (2011) found that the students in the intervention group ate more fruit and increased after-school physical activity. By introducing these lessons at a young age in the school setting, and including a home component, school-based interventions can help to develop life-long healthy habits in young children.

Schools are places where most children spend a majority of their day for 9-10 months out of the year. Interventions in the school setting, including a home component, are best set to reach the students in their daily lives, especially when it is a necessary part of their school day. While many schools want to limit physical education time during the school day to focus on core academic subjects, they should instead be looking at ways to increase opportunities for physical activity during their school day for the biological, social, and psychological benefits that can be gained.

Physical Fitness and School Performance

With all the research touting the benefits of physical fitness on adolescence, and the research outlining the factors that contribute to a student's success in middle school, it would be wise to explore the impact of physical fitness on school performance, especially in relation to an adolescent's transition to middle school. Physical fitness has been shown to improve body image, self-esteem, memory, executive functioning skills, and cognition in individuals. Interventions to improve school performance by lowering obesity and increasing nutrition and physical activity have proven to be beneficial. In a study by

Edwards, Mauch, and Winkelman (2011), 800 sixth grade, Midwestern students, completed surveys about nutrition and physical activity and the Fitnessgram assessment to determine levels of physical fitness. The results of those surveys were compared to their measures of academic progress (MAP) in both reading and math. The MAP was measured by the Northwest Evaluation Association MAP tests used to examine instructional levels and academic progress in students. In the area of math, higher academic scores were found in those who had better nutritional practices and increased physical activity. Likewise, in the area of reading, higher academic scores correlated to higher levels of physical activity and better nutritional practices. The researchers suggested that schools examine the time they dedicate to physical activity and nutrition in order to increase academic performance, through wellness policies and increased opportunities (Edwards, Mauch, & Winkelman, 2011).

Also examining standardized test scores, Chomitz et al. (2009) used state achievement test scores to determine the relationship between physical fitness and academic achievement. In Massachusetts, the Massachusetts Comprehensive Assessment System (MCAS) is the state-wide standardized test that measures students' abilities in math and English. Chomitz et al. compared MCAS scores in fourth, sixth, and eighth grades to physical fitness levels, measured by the number of Fitnessgram and Amateur Athletic Union (AAU) fitness tests passed by the individual student. These tests included a cardiovascular test, abdominal strength test, flexibility test, upper body strength test, and agility test. Chomitz et al. found that for every fitness test passed, the chance of passing the math MCAS increased 38% and 24% for the English MCAS. The researchers

concluded that there is a positive, significant relationship between MCAS scores and physical fitness, generalizing to academic achievement and fitness levels. They relay this relationship to motivation, physical health status, increase in concentration, and improvements in self-esteem and mental health.

Similarly, Wittberg, Northrup, and Cottrell (2009) compared academic achievement to each specific test of the Fitnessgram to determine which tests had a more significant relationship with each area of academic achievement. They found that aerobic capacity and abdominal strength were significantly related to overall achievement scores. In addition, students with high abilities in upper body strength performed better in math, while children high in flexibility performed better in math and science. No differences were found for those students performing at high levels for trunk lift. Aerobic fitness had the most impact on academic achievement. While not all areas of fitness were significant factors in academic achievement, enough were significant to be able to promote the effects of fitness on academics. Overall fitness levels have a positive impact on academic scores.

Cognitive functioning may also contribute to the relationship between academic achievement and physical fitness (Chomitz et al., 2009; Van Dusen, Kelder, Kohl, Ranjit, & Perry, 2011). Hollar et al. (2010) increased physical activity through their HOPS intervention, and subsequently saw an improvement in math scores and higher reading scores among those students who received the intervention when compared to those in a control group. Wittberg, Cottrell, Davis, and Northrup (2010) examined fitness thresholds and their relationship to academic achievement in a sample of fifth graders.

They found positive correlations between girls' Pacer results and standardized test scores, and boys' mile run results and standardized test scores. Wittberg, Cottrell, Davis, and Northrup (2010) further explain the need for schools to increase opportunities for physical activity during school, not only for an increase in academic achievement, but for a decrease in health factors, specifically obesity.

This relationship between academic achievement and physical activity begins at an early age. A study using the Early Childhood Longitudinal Study found that there was a positive relationship between time spent in physical education and academic achievement in girls from kindergarten through fifth grade (Carlson et al., 2008). The researchers examined data from five different time points beginning in the fall of kindergarten and ending in the spring of fifth grade. They compared the number of minutes spent in physical education per week and reading and mathematics tests. However, despite the positive relationship in girls, there was no relationship between physical education minutes and academic achievement in boys. Carlson et al. concludes that while some may say that decreasing physical education may increase academics, the opposite may be true, or at least, physical education does not have a negative impact on academic achievement. When starting early, such as lower elementary school grades, physical activity should become a habit. Also throughout the years, students may find activity that they are interested in, feel successful with, and that are fun to them. Those three factors may help students continue engaging in physical activity as they enter middle school and high school.

In Texas, due to the obesity epidemic in that state, all students in grades kindergarten through 8 must be provided physical activity and have fitness levels tested in grades 3 through 12 (Robert Wood Johnson Foundation, 2011). Van Dusen, Kelder, Kohl, Ranjit, and Perry (2011) compared fitness levels using the Fitnessgram test to standardized academic testing measured by the Texas Assessment of Knowledge and Skills (TAKS) in students in grades 3-11. They found a strong, significant relationship between test scores and fitness levels, especially in late middle to early high school students. Body mass index did not significantly relate to academics. The most significant relationship was between academics and cardiovascular fitness. Van Dusen et al. (2011) recommend physical education mandates in those early adolescent years to enhance physical fitness, and therefore, enhance academic test scores in students. Also in Texas, the Robert Wood Johnson Foundation (2011) reported results from the Texas Youth Fitness Study which found that there were some correlations between fitness, academic achievement, and attendance.

Seeing a need for a longitudinal study on fitness levels and academic achievement, Wittberg, Northrup, and Cottrell (2012) examined 1725 students over a two year period. These students were assessed using the Fitnessgram in fifth grade and were reassessed in seventh grade. Wittberg, Northrup, and Cottrell (2012) looked at whether the students remained in the healthy fitness zone (HFZ), the needs improvement zone (NIZ), or went back and forth between the two. Once these students were grouped into four categories, their scores on the West Virginia Educational Standards Test (WESTEST) were analyzed. The researchers found that those students who remained in

the HFZ from 5th to 7th grade had significantly higher WESTEST scores than those who remained in the NIZ from 5th to 7th grade. Those students who gained or lost fitness levels did not significantly increase or decrease their WESTEST scores. The results of this study are consistent with previous studies that show a positive correlation between fitness levels and academic achievement based on standardized achievement tests.

Moving a step further, Blom, Alvarez, Zhang, and Kolbo (2011) examined factors beyond standardized tests in a study of 2992 students in grades 3-8 in Mississippi. They also found a positive correlation between physical fitness levels as measured by the Fitnessgram and academic achievement scores as measured by the Mississippi state testing. In addition, they found that absences decreased as physical fitness levels increased. However, Blom, Alvarez, Zhang, and Kolbo (2011) did not find a relationship between physical fitness levels and the number of disciplinary actions a student had in school. Their findings on attendance show that another factor of school success can be impacted by physical fitness levels. While several studies have shown the positive correlation between physical fitness and academic achievement, few have examined the factor of attendance, which is important to a student's success.

Previous research has used regression analyses to find the relationship between physical fitness and academic performance (Chomitz et al., 2009; Edwards, Mauch, & Winkelman, 2011). Similarly, Wittberg, Northrup, and Cottrell (2009) used a quantitative methodology, comparing academic achievement to physical fitness using an ANOVA analysis. Since I will be classifying levels of physical fitness into categories (needs improvement, healthy fitness zone, or above healthy fitness zone), MANOVA will

allow me to compare multiple dependent variables against the three categorical levels of physical fitness.

Summary and Conclusions

School performance is dependent on many factors, both internal and external to the individual student. The biopsychosocial model explores a whole being from the viewpoint of biological functioning, psychological functioning, and social functioning. This model can be used to examine the relationship between school performance and physical fitness through the lens of the three viewpoints that impact an individual student.

Transitioning to middle school is a difficult time for students, with new social demands, physical changes, and psychological responses to these changes. When students are struggling with one area of their lives, it may impact the other areas; therefore, school performance may suffer in middle school due to the difficulties a student is having in the biological, psychological, or social aspects of their lives. Girls tend to struggle a bit more than boys (Rice, Frederickson, & Seymour, 2011). By exploring various factors that contribute to girls' difficulties in middle school, and factors that may help ease the transition, schools can implement effective interventions to help girls become better adjusted, and therefore, demonstrate school success.

One of those factors that impact school success is physical activity. The benefits of physical activity can positively alter one's experiences. Physical activity can help weight status, which can ward off social difficulties and physical ailments related to obesity (Association for Applied Sport Psychology, 2011; Williams et al., 2008). Physical activity can also improve cognitive functioning, allowing students to focus in

school and perform at their peak (Davis et al., 2011; Staiano & Calvert, 2011; Ploughman, 2008; Van Dusen, Kelder, Kohl, Ranjit, & Perry, 2011). Several interventions have been studied and found that increasing physical activity in schools can improve the well-being of the students. In addition, increasing physical activity can improve academic performance. Many studies (Blom, Alvarez, Zhang, & Kolbo, 2011; Hollar et al.,2010; Robert Wood Johnson Foundation, 2011; Van Dusen, Kelder, Kohl, Ranjit, & Perry, 2011; Wittberg, Cottrell, Davis, and Northrup, 2010; Wittberg, Northrup, & Cottrell, 2012) have proven a link between fitness levels (which are increased through physical activity) and performance on standardized tests. The more physically active the student is, the better they perform in the areas of math and reading on state mandated tests. This data has led to the basis for this study in which various measures of school performance will be examined to determine if physical fitness is related to those as well. In addition to the standardized test scores, other data will be used, such as school behavior, attendance, and grades. While a student may perform well on standardized tests, he/she may not do well in school due to the other factors to school success. The current study will determine if there is a positive relationship between physical fitness and the other factors related to school success, which can help develop interventions for students using physical activity. Specifically, middle school girls will be studied, as this is a group that may have school difficulties, especially in the first year of middle school.

Using data from the Fitnessgram, as previous studies have done, the current study examined physical fitness levels. Each student was grouped into three categories: above healthy fitness zone, healthy fitness zone, and needs improvement zone. This information

was compared to students' grades, attendance, school behavior, and test scores to determine if a relationship exists between factors, since standardized test scores do not give a full story of how a student performs in school. Chapter 3 will describe the methods and procedures used to perform the current study using the above mentioned variables. The description of subjects studied, methods of collecting data, research design, and statistical methods to be used will be outlined.

Chapter 3: Research Method

Introduction

The purpose of this study was to examine the statistical relationship between physical fitness levels and school performance in middle school girls. With many children, especially girls, transitioning to middle school is a difficult time socially, psychologically, and physically. Finding various factors to inform interventions designed to ease this transition was imperative. I explored a specific factor, physical fitness, which can be used to create those interventions, such as increasing physical activity in the school day or encouraging students to participate in physical activity before and after school.

While several prior studies have established a relationship between physical fitness and standardized test scores (Carlson et al., 2008; Chomitz et al., 2009; Edwards, Mauch, & Winkelman, 2011; Hollar et al., 2010; Van Dusen et al., 2011), the current study was designed to look beyond standardized test scores to examine other factors that may contribute to a student's success in school. The current study specifically used academic grades, school behavior (measured by behavior grades and discipline referrals), and attendance, in addition to standardized test scores, to generate a better, overall picture of how the students perform. Through exploring this relationship between physical fitness and school performance, schools may gain a better idea of what may help their girls be successful in the classroom, while improving the girls' social, psychological, and physical well-being.

This chapter includes a description of this study's design, sample, instrumentation, data analysis, and ethical considerations. An overview of the study's design includes a rationale for selecting this particular research design. I present the sample characteristics and a description of the instrumentation. I also discuss the data collection and analysis process.

Research Design and Rationale

In this study, I sought to understand how levels of physical fitness relate to a student's success in middle school. I used Multivariate Analysis of Variance (MANOVA) to analyze the study data, which allowed me to investigate the extent to which levels of physical fitness, as measured by the Fitnessgram, predict a middle school female's school performance. I specifically examined the relationship between levels of physical fitness and school performance through grades, school behavior, attendance, and standardized testing. A separate correlational analysis was used to investigate obesity's relationship to school performance, using body mass index and the same measure of school performance. The MANOVA analysis accounted for the relationship between the outcome variables, which would have been lost if using several ANOVA analyses (Field, 2009).

The MANOVA analysis was appropriate for this study because I collected and compared participants' Fitnessgram levels and school data. I did not randomly assign participants to a particular group where variables were manipulated; instead, I gathered scores objectively and compared them to find the extent of the relationships between variables. Prior studies measuring similar constructs utilized various statistical methods.

For example, Chomitz et al. (2009) used bivariate and multivariate regression analysis to explore the relationship between standardized test scores and fitness levels. The researchers were able to determine the strength of the association between variables, while Edwards, Mauch, and Winkelman (2011) used stepwise multiple regression to compare mean achievement scores with various measures of nutritional and physical behaviors. Using a combination of correlational analysis and MANOVA analysis, I determined if a relationship exists, and if levels of physical fitness do predict a middle school girl's school performance. I used these analyses to answer the following research questions:

Research Question #1 (RQ1): Do middle school girls classified in the above healthy fitness zone or healthy fitness zone have significantly higher grade point averages (GPA) than those in the needs improvement fitness zone?

Directional Hypothesis #1 (DH1): Middle school girls who exhibit higher levels of physical fitness will have significantly higher GPAs than those in the needs improvement fitness zone.

Research Question #2 (RQ2): Do middle school girls classified in the above healthy fitness zone or healthy fitness zone have significantly higher standardized test scores, as measured by the FCAT, than those in the needs improvement fitness zone?

Directional Hypothesis #2 (DH2): Middle school girls who exhibit higher levels of physical fitness will perform significantly better on both reading and math standardized tests.

Research Questions #3 (RQ3): Do middle school girls classified in the above healthy fitness zone or healthy fitness zone have significantly better attendance than those in the needs improvement fitness zone?

Directional Hypothesis #3 (DH3): Middle school girls who exhibit higher levels of physical fitness will attend school significantly more regularly than those with lower levels of physical fitness.

Research Question #4 (RQ4): Do middle school girls classified in the above healthy fitness zone or healthy fitness zone have significantly better behavior, as measured by conduct grades and discipline referrals, than those in the needs improvement fitness zone?

Directional Hypothesis #4 (DH4): Middle school girls who exhibit higher levels of physical fitness will have significantly fewer school behavior issues than those with lower levels of physical fitness.

Research Question #5 (RQ5): Do middle school girls who are at a healthy weight (as measured by body mass index [BMI]) have better overall school performance (as measured by GPA, attendance, behavior, and standardized test scores) than those who are in the overweight/obese range (as measured by BMI)?

Directional Hypothesis #5 (DH5): Middle school girls who are at a healthy weight, as measured by BMI, will demonstrate a better school performance, as measured by GPA, attendance, behavior, and standardized test scores, than those who are in the overweight/obese range as measured by BMI.

Methodology

Population

The participants of this study consisted of a convenience sample of female public middle school students from a school in Florida. At the time of this study, this school had approximately 1,079 students (50% female and 50% males), of which 42.72% received free/reduced lunch, 10.01% were eligible for special education services, and 2.04% were speakers of other languages. The principal of the school granted preliminary permission to conduct the study.

Sampling and Sampling Procedures

I completed a formal request to the district per the guidelines for research with the school district. In addition, I selected participants for the following reasons: (a) they were an accessible population, (b) they were expected to complete the Fitnessgram assessments during their physical education class, (c) they comprised a diverse population, and (d) were current middle school students.

I conducted an a priori power analysis using GPower 3.1.7 (Faul, Erdfelder, Lang, & Buchner, 2007) to determine an appropriate sample size. Grissom (2005) found a positive relationship between fitness measured by the Fitnessgram and academic achievement as measured by the SAT9 and found an r^2 of .04, which guided parameters of effect size in the current study Using the F test family, exploring MANOVA global effects, I used the parameters of an alpha set at .05, an effect size of .04 (f^2=.04; small effect), and power of .80, meaning finding a real relationship between variables 80% of the time. The results of the power analysis showed that the study required a sample of at

least 192 participants; my use of 280 subjects, the number of subjects whose data I had access to, ensured reliability by significantly exceeding the minimum sample size. By using all available subjects, I was able to avoid bias that comes from random sampling; however, some sampling bias existed due to my use of a convenience sample.

Procedures for Recruitment, Participation, and Data Collection

Since I used archival data, informed consent from the individual participants was not necessary. I obtained the Fitnessgram data and school performance data through the school district's Research and Accountability department. The students were not engaged in anything different than what they would normally have done during the course of their general curriculums.

I obtained approval from Walden University's Institutional Review Board (IRB) through the application process. There are specific sections on the IRB application that were required for my study to use archival data. These sections included providing project information, general description of the proposed research, community research stakeholders and partners, potential risks and benefits, data integrity and confidentiality, potential conflicts of interest, and a final checklist with electronic signatures. I also followed the Assessment, Accountability, and Research office of the school district's application process in order to conduct research within the district (see Appendix). The first step was obtaining preliminary approval. This approval was granted after a review of the completed application and required documents, and after the research was deemed acceptable to the school district. The application reviewed all aspects of the proposed research, ethical considerations, and confidentiality. The Preliminary Approval allowed

me to contact the school to obtain agreement from the principal to participate in the study. The second step of approval was the Final Approval. To obtain Final Approval, I submitted the signed School Principal Agreement form and Walden University's IRB approval to the school district. I followed this process; the completed form is included as the Appendix.

With permission, I will post the results of the study on the host school's website, when available, for parents and students to access.

Instrumentation and Operationalization of Constructs

Demographics. I used the demographic information to assess basic information regarding the participants' age, gender, and grade. I received this information from Research and Accountability.

Fitnessgram. The Fitnessgram was created by The Cooper Institute for Aerobics Research (CIAR/IAR) and is a series of assessments that measure physical fitness levels. It specifically measures four different designations: needs improvement, healthy fitness zone, or above healthy fitness zone. It has been revised many times since its creation in 1981, leading to the current assessment. Areas measured include aerobic capacity, body composition, muscular strength and endurance, and flexibility (Plowman et al., 2006).

The reliability data and validity data for the Fitnessgram was assessed through various studies. This information can be found in the Fitnessgram Reference Guide (The Cooper Institute, n.d.). Since the Fitnessgram is a series of tests, each test has its own validity and reliability data. Both reliability and validity are high and acceptable for all tests. Previous tests assessing aerobic capacity yielded reliability coefficients from .60-

.90 (Boileau et al., 1977; Cureton, 1976; Safrit, 1990), with the most reliable results from children over the age of 10 years old. Validity for tests of aerobic capacity range from .60-.84 (The Cooper Institute, n.d.). These are considered acceptable levels of validity. One study found that the test of abdominal strength had an interclass reliability of .97 (Buxton, 1957), while more recent studies have found reliability to be .98 in college students (Jackson, 1996), .70 in students aged 6-10 years old (Anderson, 1997), or ranging from .64-.89 in 11-14 year old females (Safrit, 1987), most fitting to the current study. The Fitnessgram Reference Guide (The Cooper Institute, n.d.) stated that it has been difficult to evaluate validity for measures of abdominal strength. All of the studies cited had low to medium validity. However, all the studies cited were conducted on college students and adults, not fitting to the current study.

The trunk extension test, the test that measures flexibility, had a high reliability (.99) in a study of 14-18 year olds (Hannibal, 2006), and high criterion validity of .62-.82 (Hannibal, 2006). Measures of upper body strength revealed high reliability. In a study of elementary school students, reliability ranged from .72-.95 (Cotton, 1990). Validity in the same measures varied, as with the abdominal strength tests.

More recent studies have led researchers to further examine the psychometric properties of the Fitnessgram, based on data collected by teachers in a typical school setting. The Texas Youth Evaluation Project researchers gathered the psychometric information, by allowing physical education teachers across the state of Texas to administer and accumulate the data from their students (Morrow, Martin, & Jackson, 2010). The researchers examined interrater reliability between pairs of teachers

(teacher/teacher reliability) and between pairs of experts of the Fitnessgram (expert/expert reliability). Teacher/teacher reliability was highest for measures of body mass index (>.90), reliable for cardiorespiratory fitness (>.80), and less reliable for musculoskeletal fitness (>.70). The expert/expert reliability measures yielded similar results. In response to measures of validity, teacher/teacher validity was similar to expert/expert validity. In addition, result patterns were similar with body mass index, and cardiorespiratory fitness validities were higher than musculoskeletal measures (Morrow, Martin, & Jackson, 2010). With high reliability and validity data, and comparable data between teacher/teacher pairs and expert/expert pairs, the teachers can be reliable sources for assessing fitness levels using the Fitnessgram for the use of school-wide studies.

Overall, reliability for the various Fitnessgram tests is high, while validity varies across tests. The Fitnessgram Reference Guide states that assessing validity is difficult in many cases, and needs to be studied further. However, having teachers assess the students does not impact the reliability or validity of the data, and can be considered an appropriate source of information when gathering data from this instrument.

School Performance Data. School performance data includes school grades, attendance, school behavior, and standardized test scores. This data was provided to me through Research and Accountability. All of the data used had no identifying characteristics in the course of study, as each student was assigned a number and any printed information will be shredded.

Operationalization of Constructs

I use the following terms throughout the study:

Attendance is measured by the percentage of days in attendance and the total number of absences and tardies (Finn, 2012; Lucio et al., 2011).

School Behavior is measured by conduct grades as rated by the teachers, utilizing a scale of *unsatisfactory*, *needs improvement*, *satisfactory*, and *excellent*. Teachers administer these grades, along with academic performance grades, each of the six marking periods in order to communicate to the parents or guardians how the students' behavior is in that particular class (Pinellas County School Policy Manual, 2010).

Fitnessgram measures are a series of assessments that measure physical fitness levels using the following designations: needs improvement, healthy fitness zone, or above healthy fitness zone; areas measured include aerobic capacity, body composition, muscular strength and endurance, and flexibility (Plowman et al., 2006).

Grade Point Average (GPA) is an accumulation of the students' grades on a scale of 0.0 (F) - 4.0 (A), unweighted (Lucio et al., 2011).

Middle school girls are girls between the 6th and 8th grades (Petrie, Greenleaf, & Martin, 2010).

Number of suspensions is the total number of incidents leading to an out-of-school suspension as measured by the school district's database (Pinellas County Schools Policy Manual, 2010).

Obesity is extremely overweight and having too much body fat (National Institute of Health, 2014), which is defined as a body mass index (BMI) of 30 and above for adults (CDC, 2014). For children, obesity is age and gender specific (CDC, 2014).

Office Discipline Referrals are forms filled out by teachers and staff for specific infractions the student engaged in (Wyman et al., 2010). The consequence as a result of the office discipline referral is at the discretion of the administrator (Pinellas County Schools Policy Manual, 2010).

Physical fitness includes measures of strength, flexibility, and cardiovascular performance, as measured by the Fitnessgram, categorized into above healthy fitness zone, healthy fitness zone, and needs improvement zone (Chomitz et al., 2009; Edwards, Mauch, & Winkelman, 2011; Petrie, Greenleaf, & Martin, 2010; Plowman et al., 2006).

School performance includes attendance (Finn, 2012; Lucio et al., 2011), number of suspensions (Finn, 2012), grade point average as a measure of academic achievement (Jeynes, 2009; Lucio et al., 2011), and office discipline referrals (Wyman et al., 2010).

Standardized test scores are reading and math scores on the Florida Comprehensive Assessment Test (FCAT) testing administered to all students grades 3-10, and in this study, will be based on the middle school girls' previous year's FCAT testing (Florida Department of Education, n.d.).

Weight status is the division of BMI into three categories: underweight, healthy weight, and overweight/obese. In children, these categories are age and gender specific (CDC, 2014).

Data Analysis Plan

This study employed a quantitative research design using MANOVA analysis in order to find the relationship between variables, but also to predict one variable from another. I sought to determine the statistical positive relationship between physical

fitness, as measured by the Fitnessgram, and school performance. The criterion variables are the fitness levels on the Fitnessgram, needs improvement zone, healthy fitness zone, and above healthy fitness zone. The outcome measures are school grades, school attendance, school behavior, and standardized test scores (FCAT). The measures of the variables in this study allow for the data to be analyzed through MANOVA. The research questions and the hypotheses reflect this type of analysis. I used MANOVA analyses to determine if there are relationships between categorical criterion variables and multiple, correlated outcome measures and to determine if the various levels of physical fitness can predict school performance. I received the data from Research and Accountability and transferred it into a data sheet. For data analysis purposes, I utilized the Statistical Package for Social Sciences (IBM SPSS 21).

Using SPSS, I ran separate analyses for each measure of school performance compared to the fitness level as measured by the Fitnessgram tests. The analyses determined if a significant relationship exists, and the nature of that relationship. I conducted MANOVA analyses to predict the students' school performance [academic grades, behavior grades, discipline referrals, attendance (number of days absent), and FCAT scores] based on their levels of physical fitness.

Threats to Validity

I needed to consider threats to validity when planning this study. I did not manipulate any variables nor did I make experimental arrangements in this study. The physical education teachers administered the Fitnessgram at the same time in the semester and students were not in experimental or control groups. There was no random

sampling, as I used all available subjects at the site. A threat to internal validity was the assumption that all students will be participating in the assessment that are supposed to. There could be response bias if certain students did not participate due to disciplinary actions or attendance, two of the dependent variables I explored, however, that information was not known to the researcher. In addition, any confounding variables would be discovered through a correlational analysis of dependent variables prior to the MANOVA analysis. A threat to external validity was the use of convenience sampling. By using convenience sampling, the generalizability was limited. The main concern with validity is the administration of the Fitnessgram assessment. The research has to rely on the three physical education teachers to administer the assessment instead of one person. However, all three teachers have extensive experience in administering the Fitnessgram. In addition, the study by Morrow, Martin, and Jackson (2010) examined this concern and concluded that Fitnessgram data collected by trained teachers is just as reliable and valid as that collected by experts.

Ethical Procedures

When planning this study, I gave careful consideration to the nature of this study and its possible effects on the participants. The participants did not engage in anything different than what they participate in during the normal course of middle school. I maintained all information with confidentiality, used student ID numbers instead of names in the data sheet, and I did not use identifying characteristics for any specific student. Records were confidential and only I had access to those records. I kept all student data on my personal computer and personal flashdrive. In addition, I will shred

any print-outs of data after it is coded in SPSS. There are no physical or psychological risks to having data as part of this study.

Since I used data from my own work site, I considered possible conflicts of interest and the boundary between work time and research time. The time needed to contact Research and Accountability was outside of my work hours at that site.

Summary

I conducted this study on a sample of middle school females from a public school in Florida. I utilized data that is part of the normal course curriculum and therefore did not cause any physical or psychological harm to participants. I kept all information confidential. Through my analyses, I examined the relationship between fitness levels measured by the Fitnessgram tests and school performance data. I used further MANOVA analyses to determine the ability to predict one variable from another. The Fitnessgram tests have high reliability and varying validity. However, it is a widely used test to determine fitness levels in school-aged children.

Chapter 3 provided an in-depth examination of the research methods which I used to determine to what extent physical fitness relates to school performance in middle school girls. The research questions and hypotheses were reviewed and an explanation of MANOVA analysis was outlined. Threats to validity were explored and ethical considerations were explained to help guide the study moving forward. Chapter 4 will review the results of the quantitative MANOVA analysis of this study. The analysis of data will answer the research questions as to the relationship of physical fitness to school performance.

Chapter 4: Results

Introduction

The purpose of this study was to examine the statistical relationship between levels of physical fitness as measured by the Fitnessgram and school performance. It was specifically designed to examine this relationship utilizing quantitative data derived from grades, standardized test scores, school behavior, and attendance in a study population of middle school girls. Five formal directional hypotheses and one exploratory hypothesis were tested using a variety of statistical techniques. This chapter summarizes the results of these analyses and also provides a description of the participants sampled in this study.

Data Collection

Sample Demographics

The participants of this study consisted of a convenience sample of female public middle school students from a school in Florida, hereafter referred to as Florida Middle School (FMS; pseudonym). At the time of this study, FMS had approximately 1,079 students (50% female and 50% males), of which 42.72% receive free/reduced lunch, 10.01% are eligible for special education services, and 2.04% are speakers of other languages. The principal of FMS and the parent school district's department of research and accountability granted permission to conduct the study (see Appendix). The study included data from all 280 female students who participated in the Fitnessgram assessment through their physical education class in the 2013-2014 school year. The students' ages ranged from 12 to 16 years' old, with a mean age of 13.12 years old. The

students ranged from 6th to 8th grade, with 46.5% in 6th grade, 31.3% in 7th grade, and 22.2% in 8th grade.

Results

I conducted a one-way between-subjects multivariate analysis of variance (MANOVA) to assess the effects of three fitness zones on school performance. This employed six dependent variables (DVs) that measured various aspects of school performance (FCAT reading scores, FCAT math scores, absences, grade point average, discipline referrals, and conduct grade average). The overall means, standard deviations, and intercorrelation for the six DVs are presented in Tables 1 and 2. Since the inter-correlations between the DVs were statistically significant ($p < .05$), the use of MANOVA to reduce the Type-I error rate was justified. Table 3 presents the means and standard deviations for the DVs, broken down by fitness zone.

Table 1

Means and Standard Deviations for Dependent Variables

School Performance Measure	*M*	*SD*
Absences	9.26	7.86
Grade Point Average	3.33	0.68
Conduct Grade Average	2.64	0.39
FCAT Reading Score	3.08	1.20
FCAT Math Score	2.63	1.16
Referrals	1.15	3.64

Table 2

Intercorrelations of Dependent Variables

School Performance Measure	(2)	(3)	(4)	(5)	(6)
(1)Absences	-.305**	-.162**	-.132**	-.182**	.225**
(2)Grade Point Average		.603**	.552**	.629**	-.483**
(3)Conduct Grade Average			.387**	.405**	-.569**
(4)FCAT Reading Score				.715**	-.247**
(5)FCAT Math Score					-.253**
(6)Referrals					

* $p < .05$, ** $p < .01$

Table 3

School Performance Measure Means and Standard Errors by Fitness Zone

		Attendance	GPA	Conduct	FCAT Read	FCAT Math	Referrals
AHFZ	*M*	6.96	3.70	2.75	3.60	3.16	.20
	SE	1.48	.13	.07	.24	.23	.72
HFZ	*M*	7.75	3.43	2.67	3.15	2.74	1.03
	SE	.56	.05	.03	.09	.09	.27
NIZ	*M*	12.63	3.04	2.58	2.81	2.24	1.44
	SE	.83	.07	.04	.13	.13	.40

AHFZ= Above Healthy Fitness Zone; HFZ= Healthy Fitness Zone; NIZ= Needs Improvement Zone; GPA=Grade Point Average; FCAT= Florida Comprehensive Achievement Test

MANOVA was used for the analyses. Using the Wilks' criterion, the combined DVs were significantly affected by fitness zone, Wilks $\Lambda = .019$, $F(6, 272) = 2282$, $p < .001$. The results indicated a strong association between fitness zone and the combined DVs measuring school performance, and accounted for approximately 98% of the variability in the combined DVs ($1- \Lambda = .98$). Univariate ANOVAs for the effects of fitness zone on grade point average [$F(2, 277) = 14.6$, $p < .001$, $\eta_p^2 = .095$]; FCAT reading [$F(2, 277) = 4.7$, $p < .01$, $\eta_p^2 = .033$]; FCAT math [$F(2, 277) = 8.3$, $p < .001$, $\eta_p^2 = .056$]; and absences [$F(2, 277) = 12.96$, $p < .001$, $\eta_p^2 = .09$] revealed some significance.

Discipline referrals [$F(2, 277) = 1.2$, $p = .314$, $\eta_p^2 = .008$] and conduct grade average [$F(2, 277) = 2.5$, $p = .085$, $\eta_p^2 = .018$] were not significant. Using Bonferroni's adjustment to determine alpha level, significance was reached at $p = .008$. Grade point average ($M = 3.33$, 95% $CI = 3.25$-3.41); FCAT math ($M = 2.63$, 95% $CI = 2.49$-2.76); and absences ($M = 9.26$, 95% $CI = 8.36$-10.15) were all significant at the .008 alpha level. FCAT reading ($M = 3.08$, 95% $CI = 2.94$-3.22, $p = .01$) was just below the significance level. Conduct grade average ($M = 2.64$, 95% $CI = 2.59$-2.68, $p = .085$) and discipline referrals ($M = 1.15$, 95% $CI = .74$-1.57, $p = .314$) were not significant. These results can be found in Table 4.

Post hoc mean comparison tests (Bonferroni) for the measures of school performance showed that absences in the needs improvement zone (NIZ) ($M = 12.63$) were significantly higher than those in the healthy fitness zone (HFZ) ($M = 7.75$) and those in the above healthy fitness zone (AHFZ) ($M = 6.96$). Grade Point Averages in the NIZ ($M = 3.04$) were significantly lower than those in the HFZ ($M = 3.43$) and those in the AHFZ ($M = 3.70$). FCAT Math scores in the NIZ ($M = 2.24$) were significantly lower than those in the HFZ ($M = 2.74$) and those in the AHFZ ($M = 3.16$). FCAT Reading scores in the NIZ ($M = 2.81$) were significantly lower than those in the AHFZ ($M = 3.60$). No significant results were found for conduct grades or discipline referrals. Results of the post hoc test are shown in Table 5.

Table 4

Univariate ANOVAs for the Effects of Fitness Zone

Variable	*df*	*F*	*p*	η_p^2
Attendance	2	12.96	<.001	.09
GPA	2	14.6	<.001	.095
Conduct	2	2.5	.085	.018
FCAT read	2	4.7	<.01	.033
FCAT math	2	8.3	<.001	.056
Referrals	2	1.2	.314	.008

Table 5

Bonferroni Post-Hoc Comparisons

DV	(I)Zone	(J)Zone	Mean Diff.	Std. Err.	Sig.
Absences	NIZ	HFZ	4.871	1.001	<.001
		AHFZ	5.665	1.699	.003
	HFZ	NIZ	-4.871	1.001	<.001
		AHFZ	.794	1.586	1.000
GPA	NIZ	HFZ	-.390	.086	<.001
		AHFZ	-.663	.146	<.001
	HFZ	NIZ	.390	.086	<.001
		AHFZ	-.273	.137	.140
Conduct	NIZ	HFZ	-.085	.050	.265
		AHFZ	-.169	.084	.139
	HFZ	NIZ	.085	.050	.265
		AHFZ	-.084	.079	.865
FCAT read	NIZ	HFZ	-.342	.160	.102
		AHFZ	-.788	.272	.012
	HFZ	NIZ	.342	.160	.102
		AHFZ	-.446	.254	.241
FCAT math	NIZ	HFZ	-.500	.153	.004
		AHFZ	-.923	.260	.001
	HFZ	NIZ	.500	.153	.004
		AHFZ	-.423	.243	.249
Referrals	NIZ	HFZ	.41	.485	1.00
		AHFZ	1.24	.823	.402
	HFZ	NIZ	-.41	.485	1.00
		AHFZ	.83	.768	.845

AHFZ= Above Healthy Fitness Zone; HFZ= Healthy Fitness Zone; NIZ= Needs Improvement Zone; GPA=Grade Point Average; FCAT= Florida Comprehensive Achievement Test

Hypotheses

The following hypotheses were tested:

Directional Hypothesis #1 (DH1): Middle school girls who exhibit higher levels of physical fitness will have significantly higher GPAs than those in the needs improvement fitness zone.

Directional Hypothesis #2 (DH2): Middle school girls who exhibit higher levels of physical fitness will perform significantly better on both reading and math standardized tests.

Directional Hypothesis #3 (DH3): Middle school girls who exhibit higher levels of physical fitness will attend school significantly more regularly than those with lower levels of physical fitness.

Directional Hypothesis #4 (DH4): Middle school girls who exhibit higher levels of physical fitness will have significantly fewer school behavior issues than those with lower levels of physical fitness.

Directional Hypothesis #5 (DH5): Middle school girls who are at a healthy weight, as measured by BMI, will demonstrate a better school performance, as measured by GPA, attendance, behavior, and standardized test scores, than those who are in the overweight/obese range as measured by BMI.

The MANOVA analyses supported DH1, DH2, and DH3. DH4 was not supported. Correlational analyses were conducted to test DH5. Students with a healthy BMI demonstrated better grades ($r = .207$; $p < .01$) and attendance ($r = -.121$; $p = .046$)

than those with a higher BMI. There was no significant correlation between BMI and behavior or standardized test scores.

Summary of Findings

The results of this analysis showed that the combined dependent variables, the measures of school performance, were significantly affected by fitness zone. Specifically, attendance, grade point average, FCAT reading, and FCAT math were all affected by fitness zone. Conduct grade average and discipline referrals were not significantly affected. Further, there was a significant difference in scores between the needs improvement zone and the above healthy fitness zone in all dependent variables except conduct and discipline. In addition, attendance, grade point average, and FCAT math showed significant differences between needs improvement zone and healthy fitness zone. A significant correlation was also found between a student's BMI and grades and attendance. These results showed that a student's fitness zone impacts their school performance in the areas of attendance, grades, and standardized test scores.

The following chapter will summarize the study and present conclusions about the findings. Chapter 5 will also discuss the social change implications of these findings, the limitations of this study, and future recommendations for continued research in this area.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this study was to examine the statistical relationship between levels of physical fitness as measured by the Fitnessgram and school performance, utilizing quantitative data derived from grades, standardized test scores, school behavior, and attendance within a sample of 280 middle school girls. Exploring the relationship between factors that relate to girls' success and physical fitness provides insight about how schools could increase physical fitness in girls and encourage an active lifestyle, possibly leading to better school performance. The study identified a significant relationship between the combined variables of school performance and physical fitness.

This study's findings specifically demonstrated a significant association between fitness levels and grades, standardized test scores, and attendance. There was no significant relationship between fitness levels and behavior measured using conduct grades and discipline referrals. Also, a significant negative correlation was found between BMI and school performance. In combination, these findings suggest that physical fitness is an important factor in middle school girls' transition into and throughout middle school, as there is an overall, positive relationship between fitness levels and school performance.

Interpretation of the Findings

The findings of this study confirmed the results of several previously conducted studies (Carlson et al., 2008; Chomitz et al., 2009; Edwards, Mauch, & Winkelman, 2011; Hollar et al., 2010; Van Dusen et al., 2011). Students in the healthy fitness zone and above healthy fitness zone had higher scores on the FCAT math tests than those in

the needs improvement zone. Those students who scored in the above healthy fitness zone had significantly higher FCAT reading scores than those in the needs improvement zone. An emphasis on physical activity and physical fitness in the school setting can help to improve middle school girls' academic skills in the areas of reading and math as measured by standardized test scores. The students who demonstrate higher levels of physical fitness tend to outperform their peers with lower levels of physical fitness. At the individual and school level, the students with higher test scores tend to do better academically as they progress through their school career.

The results of this study aligned with several previous studies. For example, Bass, Brown, Laurson, and Coleman (2013) also found significant relationships between physical fitness and reading and math scores for both middle school girls and boys. In Bass et al. (2013), boys and girls in the healthy fitness zone were more likely to pass math and reading exams, as measured by the Illinois Standards Achievement Test (ISAT). Bass et al. specifically found that, when examining aerobic fitness and muscular endurance, these relationships were consistent even when controlling for socioeconomic status. Further research by Srinkanth, Petrie, Greenleaf, and Martin (2015) compared boys to girls and found no differences. Srinkanth et al. (2015) found that cardiorespiratory fitness levels were positively related to state math and reading scores in both girls and boys in middle school. Students' self-reports of physical activity were related directly to higher levels of cardiorespiratory fitness (Srikanth et al., 2015). Future studies can examine the relationships of school performance and physical fitness in both genders, comparing the results for boys and girls.

Contrary to other studies, van der Niet, Hartman, Smith, and Visscher (2014) did not find a significant relationship between academic achievement measured by a Dutch academic assessment and fitness as measured by the European physical fitness test battery. Further variables were necessary for significance to be found. The van der Niet et al. study did identify an indirect relationship between the academic assessment and fitness level when considering executive functioning. Executive functioning mediates the relationship between academic achievement and physical fitness. Cognitive functioning has been an important factor in several studies examining the impact of physical fitness on academic achievement; however, it was not explored during the current study.

Other prior studies have explored areas of cognitive functioning as an additional variable relating physical fitness to academic achievement. Tomporowski, Davis, Miller, and Naglieri's (2008) meta-analysis showed relationships between exercise and intelligence, cognition, and academic achievement; however, the findings described in this research were contradictory. Tomporowski et al. found a consistent positive association between executive functioning and exercise. Coe, Peterson, Blair, Schutten, and Peddie (2013) identified the relationship between fitness and academics as starting in middle school; there was not a significant relationship in third grade students. Further, this study also revealed significant association between physical fitness based on PACER scores from the Fitnessgram assessment and academic achievement measured using the MEAP for middle and high school students. In addition, other studies have found significant relationships between physical fitness and standardized test scores (Chomitz,

et al., 2009; Edwards, Mauch, & Winkelman, 2011; VanDusen, et al., 2011) consistent with the current study.

However, previous studies did not consider other factors of school performance such as attendance and behavior that were investigated in this dissertation study. In contrast, the present study found that physical fitness levels had a significant relationship with attendance; better physical fitness was associated with fewer absences. Specifically, the number of absences was significantly higher for those students in the needs improvement zone than for those in the healthy fitness zone or the above healthy fitness zone. When students are in school more often, they are more likely to perform better academically.

The participants in the current study who had higher physical fitness levels were in school more often than those with lower levels of physical fitness. While causation cannot be assumed, it is noted that a focus on physical fitness in middle school girls can lead to better school attendance, leading to better academic performance among those girls. The findings in the current study confirm results of studies by the Robert Wood Johnson Foundation (2011) and Blom et al. (2011), which found significant relationships between physical fitness and attendance. In addition, Telles, Singh, Bhardwaj, Kumar, and Balkrishna (2013) discovered that students participating in yoga or physical activity interventions were more likely to be punctual to school. High physical fitness levels and physical activity participation improve attendance and should be taken into account when schools examine ways to increase the percentage of students in school on a regular basis.

These results suggest that agencies that address poor school attendance should consider adding a physical fitness or activity component to their programs. Physical activity could complement other proven factors in improving attendance, such as parental involvement. A truancy court diversion program improved unexcused absences, unexcused tardies, and academic performance of elementary students and junior high school students (Shoenfelt & Huddleston, 2006). However, one important factor in this diversion program was parental involvement. Interventions that included parental involvement generally have had the strongest outcomes. For example, Blom-Hoffman et al. (2008) utilized parental training to increase fruit and vegetable consumption in children; this approach was similar to the Health in Adolescents study, which explored parent involvement in combination with adolescents' physical activity and weight status (Grydeland et al., 2013).

The current study revealed no significant relationship between behavior and physical fitness levels, in terms of the number of office discipline referrals and conduct grades. Whether a student was physically fit or not, their behavior remained consistent. However, there was not a lot of variation in behavior in this study. There were very few students in the sample who had discipline referrals, and even they had a very low number of referrals. This lack of variation may have caused the insignificant findings. Similar to the results of the current study, Blom et al. (2011) failed to find a relationship between physical fitness levels and number of disciplinary actions in students.

Another way prior studies have examined behavior is through the emotional aspect. A study by Telles, Singh, Bhardwaj, Kumar, and Balkrishna (2013), explored the

benefits of yoga and physical exercise among students between the ages of 8 and 13 in a primary school in India. The Telles et al. study identified that self-esteem was higher in the physical exercise group than in the yoga group. Additionally, this same study observed that teacher reported that behavior improved in both the yoga group and the physical exercise group after three months of intervention. It was significant that the Telles et al. study looked beyond behavior into the social/emotional realm of self-esteem. Perhaps future research can expand the definition of behavior to examine if physical fitness has an impact on any aspect of the social/emotional/behavioral realm of functioning.

The concept of self-belief, as set forth in the biopsychosocial model, also correlates to academic performance. Srikanth, Petrie, Greenleaf, and Martin (2015) found that individuals' self-belief in math was significantly related to math exam scores in both genders. Similarly, self-belief in reading was significantly related to reading exam scores in both genders. While behavior did not have a significant relationship with physical fitness in the current study, examining behavior through a social-emotional lens may lead to more significant results.

The current study examined academic achievement through the investigation of physical fitness levels and grade point average (GPA). GPAs for students in the needs improvement zone were significantly lower than those in the healthy fitness zone and those in the above healthy fitness zone. GPA reflects, not only ability, but the work effort a student puts in to academics on a daily basis. The findings indicate that students who are more physically fit have better GPAs, and perform better on academic work on an

everyday basis. Students who complete their work and do well on assignments and classroom assessments tend to have better physical fitness levels as well. An emphasis on physical activity and physical fitness in the school setting can help to improve middle school girls' academic skills, as measured by GPA, representing their ability and work effort. Similarly, a study of medical students and military members conducted by Stephens, Dong, and Durning (2015) found a significant correlation between measures of physical fitness and academic performance utilizing GPA.

However, physical activity and sports participation have also been found to be a factor in GPA. Utilizing a self-report of physical activity, Fox, Barr-Anderson, Neumark-Sztainer, and Wall (2010) found that physical activity and sports team participation in high school girls were associated with a higher GPA. For middle school students, positive relationship between physical activity and GPA only existed when factoring in participation on a sports team. Unfortunately, the emphasis is shifting away from physical activity in schools in order to focus on the core academic subjects that are evaluated for high-stakes testing. Also, budgetary constraints are either removing physical education class from the curriculum or having untrained, and sometimes unwilling, elementary education classroom teachers be the primary instructors of physical education (Sherman, Tran, & Alves, 2010). Taking away physical education to give more time to core academic subjects does not increase grades in the core academic subjects (Trudeau & Shephard, 2008).In addition, this study discovered that physical activity was related positively to academic performance, but not to physical fitness. Furthermore, physical

activity was related positively to concentration, memory, and classroom behavior (Trudeau & Shephard, 2008).

Few studies included GPA as a factor when assessing academic achievement or school performance in middle school students. Most studies examined achievement through standardized test scores; as GPA does not necessarily measure the ability of a student, rather ability combined with effort. Grades, which make up the students' GPA, take into account work completion, ability level, and overall effort. When measuring academic achievement, researchers may feel that standardized test scores are a more valid measure of academic ability. The current study examined GPA as it is a reflection of overall school performance, not just academic achievement which was measured by FCAT scores. Sawyer (2013) described that high school GPA may be the best predictor overall of future college academic success. GPA is still an important factor in school performance and future success for students; therefore, should be included in studies of factors, which contribute to academic success.

The current study also found significant relationship between BMI and school performance, as measured by grades and attendance; no significant relationship between BMI and behavior or standardized test scores was revealed. Students who are at a healthier weight tend to get better grades and attend school regularly. As previously mentioned, behavior does not appear to be related to physical fitness, and likewise, not related to BMI. Behavior was a limitation in the study due to lack of variability in the data. BMI is also not related to standardized test scores; academic ability remains consistent no matter what the student's weight is. Interestingly, past research found

mixed results. No significant relationship was reported between BMI and reading scores through a bivariate model; however was a positive significant predictor of reading achievement when other variables were included (Srikanth, Petrie, Greenleaf, Martin, 2015). Nevertheless, BMI can be an important factor in the mental health of adolescents. Robinson (2006) made the connection between obesity in adolescence and low self-esteem, poor psychosocial adjustment, depression, and suicide. In addition, other research has found that overweight or obese students may engage in risky behaviors more than healthy-weight students (Farhat, Iannotti, & Simons-Morton, 2010). In summary, the BMI and school performance measures relationship is an area which requires further research.

Utilizing the biopsychosocial model, the current study found that many factors of school performance can be impacted by physical fitness levels. The physical/biological aspect of a middle school female can predict how well they will perform in school, both with grades (i.e. psychological) and attendance (i.e. social). While significant results were not found for a relationship between behavior and physical fitness levels during the current study, significance may be found with a different, more diverse sample. The students in this sample tended to have very few discipline referrals and neutral to positive conduct grades. If the study was conducted at a school with higher numbers of behavioral issues, the results might have been different. A more diverse sample would be more generalizable to middle school girls.

Given the positive results, it seems obvious that the whole student should be assessed and present to achieve school success. Interventions used in the school setting

should be holistic in nature, and used throughout the school curriculum in a variety of school and academic performance areas. However, interactions between students' biological, psychological, and social factors cannot be ignored. The overall results of this study found significance in the relationship between the collective areas of school performance and fitness levels. Similarly, Shoenfelt and Huddleston (2006) discovered that a truancy court diversion program improved unexcused absences, unexcused tardies, and academic performance of both elementary students and junior high school students. Nevertheless, unexcused absences increased after termination of the program, as did unexcused tardies (Shoenfelt & Huddleston, 2006). Junior high school students' GPAs (the few that were able to be utilized due to timing of the data) increased as a result of their participation in the TCDP; importantly these students maintained this academic growth the following semester. This truancy program involved increased parental involvement. These biopsychosocial factors all interact to demonstrate improvement across disciplines to contribute to student success.

In summary, the findings from the current study reveal that there is a relationship between physical fitness and academic performance, standardized test scores, and attendance. Hence, physical activity should continue to be an integral part of school curriculums. It should not be minimized in lieu of other subject areas.

Limitations of the Study

The current study was bound by limitations. The selection of students was a very narrow sampling from a large school district. Data were used from just one school, which is considered one of the higher performing middle schools in Pinellas County Schools.

Due to the selection and sample bias utilizing a convenience sample, the generalizability to other samples of middle school girls is limited. As mentioned previously, behavior was not noted to be significant.

To mitigate these limitations, future studies might examine students from a wider variety of schools. This way students would have more variety in their grades, scores, attendance, and behavior than was identified at the school used in this study. In addition, while positive results were found for females in this study, future research may compare females to males in order to generalize to all middle school students. Another study could also examine each gender in comparison to the overall population. While the current study solely focused on females due to the research of females and their transition to middle school, studying both genders would be beneficial for overall data relating to middle school students. Based on the limited sample employed in the study, the results should not be generalized to all middle school students.

The statistical analyses employed in the study were limitations. More precisely, the study used the correlational processes with secondary data. Therefore, causation cannot be implied. Perhaps a study that utilized experimental methods in lieu of correlational analyses might provide further insight into just how strong these relationships were and whether there were other factors that might have contributed to a student's success in school.

Furthermore, data were collected during the fall and spring semesters depending on the semester the student was enrolled in physical education. In a future study, keeping time frame consistent could lead to more precise results, as students' fitness levels might

change throughout the school year. In addition, analyses were not completed on the students that did not have Fitnessgram data. There may be characterological aspects of these students that were not able to be part of the study that informed why there was no Fitnessgram data, i.e. no physical education class due to the need for intensive, remedial classes; significant attendance problems. There are several confounders that may have influenced school performance other than physical fitness. While there were significant relationships between the outcome variables, there are factors other than physical fitness impacted those variables. For example, family participation, socio-economic status, and cognitive ability are all confounders not included in this study that may have led to the desired results. These factors are further mentioned in recommendations for future research.

In sum, there are limitations to this study which could provide opportunities for future research. The current study found a relationship between fitness levels and school performance in middle school girls, which was not widely generalizable. Future research that will be discussed in the following section should focus on factors, which will assist in generalizing the results to a wider group of students.

Recommendations for Future Research

Recommendations for forthcoming research are wide-ranging. Future research could examine more students from a variety of schools and demographics. Schools with behavior and attendance challenges could be studied. Biggs, Musewe, and Harvey (2014) studied only urban students and found significance in some areas when looking at a comprehensive mentoring program. For example, socioeconomic status could be used as

a covariate in future studies. Interestingly, researchers found that socioeconomic status (SES) is a significant predictor of academic achievement as measured by the Michigan Education Assessment Program (Coe, Peterson, Blair, Schutten, & Peddie, 2013). Students across all grade levels and in the low SES range performed poorly when compared to students in the high SES range. In addition, a longitudinal study by Fradkin, Wallander, Elliott, Tortolero, Cuccaro, and Schuster (2015) examined 5th graders and 7th graders and found that SES was related to lower levels of obesity based on BMI, specifically for white and Hispanic students. There is no significant relationship between obesity and SES in African-American youth (Fradkin et al.). Expanding the demographics of a future study could provide insight about schools and communities and the specific the relationship between physical fitness and school performance. In addition, conducting a similar study in older students, as the progress towards college, may yield different results, especially in the area of GPA, when it matters more for future experiences.

Another future study may utilize experimental methods by having the researcher assess physical fitness and school performance, by conducting the physical fitness assessments and possibly measures of academic ability. Further research could compare males and females and how much physical fitness impacts school performance; specifically males and females experience different challenges when transitioning to middle school (Grills-Taquechel, Norton, & Ollendick, 2010; Jindal-Snape & Miller, 2008; Raffaele Mendez et al., 2006).

Separating analyses by grade level would be another research area; this analysis could examine the differences of younger students compared to older students. A study of this sort would further the research on the transition into middle school. Wittberg, Northrup, and Cottrell (2012) conducted a longitudinal study of students in 5th grade and again in 7th grade; the study found that a positive relationship between physical fitness and academic achievement is consistent across time, especially if the student remains in the healthy fitness zone from 5th to 7th grade. In another study, Hill and Downing (2015) examined the effect of frequent peer monitored fitness testing with goal setting in a cohort of Hispanic middle school students. Results indicated that this intervention did not have a significant impact on PACER or push-up scores for boys or girls (Hill & Downing, 2015). However, Hill and Downing did identify a significant difference between grade levels, where 6th grade boys performed significantly higher on the fitness tests than the 7th grade boys. In addition, males also outperformed higher females on the fitness tests (Hill & Downing, 2015). By separately examining grade levels and genders, Hill and Downing concluded that middle schools can concentrate their efforts towards specific grades and genders.

Cognitive skills are also associated with physical fitness and increased physical activity (Albinet, Boucard, Bouquet, & Audiffren, 2010; Varela, Ayan, Cancela, & Martin, 2011), especially to executive functioning skills (Albinet, Boucard, Bouquet, & Audiffren, 2010; Davis, et al., 2011; van der Niet, Hartman, Smith, & Visscher, 2014; Varela, Ayan, Cancela, & Martin, 2011). Therefore, future research might utilize

cognitive skills as a covariate when analyzing the relationship between school performance and physical fitness data.

Based on extensive literature reviews, more research is needed about the relationship between physical fitness and grade point average (GPA). While a student may be successful on standardized tests, it is not always evident in their academic grades. There is very little research about GPA and its influence on school performance or academic achievement. Fox, Barr-Anderson, Neumark-Sztainer, and Wall (2010) found significant results when GPA was paired with amounts of physical activity and sports participation, especially given that sports participation often requires a minimum GPA for players. Comparable relationships between GPA and physical fitness were found in a Stephens, Dong, and Durning (2015) study of medical students.

Results from the current study did not yield significance between physical fitness and behavior. Possible lack of variability in behavior data may have contributed to the lack of significance. More diverse populations may possibly demonstrate different results. However, future research may analyze physical fitness and social/emotional factors, such as self-esteem and self-belief. For example, Srikanth, Petrie, Greenleaf, and Martin (2015) learned that test scores in math and reading were impacted by self-belief about one's skills in those subjects. In addition, students between ages 8 to 13 in a primary school in India participated in a study that explored the benefits of yoga and physical exercise (Telles, Singh, Bhardwaj, Kumar, & Balkrishna, 2013). Measures of self-esteem were higher in the physical exercise group than in the yoga group (Telles et al., 2013). Further, teachers reported that behavior improved in both the yoga group and

the physical exercise group after three months of intervention (Telles et al., 2013). Additionally, Telles et al. (2013) also found that academic performance, attention, punctuality, and obedience were also improved after the 3 month intervention.

Implications for Positive Social Change

Research findings can be appreciated when findings are connected with a concept of social change, which can enlighten attitude, procedure, and practice and advocate the advancement and value of human beings. The results of the current study found significant relationships between physical fitness and school performance in middle-school girls. The positive findings can contribute to positive social change by increasing knowledge in the school, school district, and community to emphasize the importance of physical activity for female middle school students' school success. In addition, the school and district can improve their wellness programs for students, especially females, and find ways to increase emphasis on the importance of physical activity within the school curriculum. Parents can help find ways to increase physical activity in their children, knowing that in this sample of middle school girls, the benefits of physical fitness go beyond the biological advantages. Decreasing childhood obesity through fitness can also lead to positive social change in health care costs on society and healthier females all around (Cecchini et al., 2010).

Therefore, school districts should greatly recognize and appreciate the importance of physical fitness, and therefore, physical activity for our students. While schools are working to increase time in reading and math, time is frequently taken physical education; it is likely that this action is causing harm to students. Schools should

emphasize the importance of physical activity for middle school girls and encourage participation in sports or physical activities outside of school. Wellness programs that are already in schools should be viewed more favorably with an understanding that physical fitness is vital to positive school performance. Ultimately, schools' goals for each student is to reach maximum success in the school setting. This study revealed one key factor which can help students reach a positive level of success.

Conclusion

School success is important for all students. As middle school girls have more difficulty transitioning to middle school than boys (Makinen et al., 2012), it is crucial to find other factors which might contribute to middle school success. The important empirically-supported relationship between physical fitness and attendance, as well as academic achievement should be incorporated into middle school planning to ensure greater success for all, particularly girls (Blom et al., 2011; Chomitz, et al., 2009; Edwards, Mauch, & Winkelman, 2011; Robert Wood Johnson Foundation, 2011; VanDusen, et al., 2011). These results can be used to support school districts' decisions about how to help students and whether more attention should be paid to specific, core curricular areas, or to students' biopsychosocial health. Results of this research identified the important connection between the biological (i.e. physical fitness; BMI), psychological (i.e. school performance), and social (i.e. attendance) facets of students. It is clear that student success is predicated on several factors, which school systems must address.

Not only does physical fitness relate to school performance, but increased physical activity impacts other cognitive processes which can lead to improved school performance in executive functioning (Albinet, Boucard, Bouquet, & Audiffren, 2010; Varela, Ayan, Cancela, & Martin, 2011), increased reading skills (Ploughman, 2008), cognitive functioning (Ganzer & Zauderer, 2011), and lack of cognitive decline (Horowitz, 2006). Increased physical fitness has also been found to have a positive impact on overall cognitive functioning as well (Van Dusen, Kelder, Kohl, Ranjit, & Perry, 2011). While increased cognitive functioning may positively affect students' school performance, the current study found the positive relationship between physical fitness and attendance, grades, and standardized test scores.

Continuing to research these areas can help guide interventions in the school setting, and further, the community, to help children and adolescents reach their full potential. Taking into consideration the limitations of this study, specifically the generalizability of the results, recommendations are made for future research to further investigate the ability for schools to utilize physical activity and increased physical fitness to affect a student's performance in the school setting positively. With middle school being a difficult time for many children and adolescents, professionals within the school system should be finding ways to make it less difficult on all students. Adding an emphasis on physical fitness in the school setting could be that change to ease the transition for middle school girls.

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Appendix: Application to Conduct Research

APPLICATION TO CONDUCT RESEARCH IN PINELLAS COUNTY SCHOOL DISTRICT

PCS Application Number: _____ Date Received: _____
(assigned by PCS)

Application submission date:	
Proposed research start date:	Proposed research end date:
Title of proposed research:	

I. Principle Investigator		
Name:	Professional position/title:	
Organization/affiliation:	Are you a PCS employee?____ Yes ____ No	
Address:		
Email:	Phone (work):	Fax:
Previous Research in Pinellas County Schools		
Have you, the Principle Investigator, conducted or been associated with any previous research in the district?____ Yes ____ No If yes, please answer the questions below (repeat rows if needed).		
Title of research:		
Submission date:	Sponsor:	
Status of research:		

II. Sponsor* of this Research Application		
Name:	Professional position/title:	
Organization/affiliation:		
Address:		
Email:	Phone (work):	Fax:
Sponsor's association with this research:		

*A sponsor is an individual who endorses the proposed research, deems it appropriate, and believes it to be based on sound educational and research practices.

III. Contact with Pinellas County Schools	
Have you, the Principle Investigator, contacted or worked with any PCS personnel regarding this research?____ Yes ____ No If yes, please answer the questions below (repeat rows if needed).	
Name:	Professional position/title:
Name:	Professional position/title:

IV. Institutional Review Board:	
Name of Institutional Review Board (IRB):	
Address:	
IRB submission date:	What is the status of the IRB application?

V. Research Overview:

What is the purpose(s) of this research (check all that apply)? ____ Additional component to an existing PCS program _____ Grant award or _____ Funding announcement _____ Thesis or _____ Dissertation _____ Publication (please specify) _____ _____ Other (please specify) _____
Is this a single study or is a multi-year study planned or contemplated?
Brief description of this research:
Research Questions/hypotheses to be explored: 1. 2. 3.
What do you require from PCS to conduct this research? Please be specific.
List any equipment you may use for this research (PCS and/or non-PCS):

Does any of the equipment or procedures to be used constitute a potential emotional or physical hazard to the participants? ____ Yes ____ No If yes, please explain in detail.
List the source of funds for this research?

VI. Supporting Research/ Literature Review
Please reference <u>at least three</u> of the most prominent research studies, articles, or books most pertinent to this field of research when answering the following three questions (attach additional pages if necessary).
How will this research contribute to the Pinellas County Schools District?
How does this research relate to Pinellas County Schools' current research priorities, as defined in the District Strategic Plan?
How will this research contribute to the field?

VII. Research Methodology

Design:

Provide a brief summary of the research design, including statistical analysis procedures.

Sample:

Sites to be included (check all that apply).
____ Elementary schools ____ Middle schools ____ High schools ____ District offices

List each:

Are there specific grades, classes, students, or departments?____ Yes ____ No If yes, list each:

Research participants (check all that apply):	Number of participants needed:	List each research activity and the amount of time needed for each research activity:	Total time commitment for participants:	
_____Students				
_____ Parents				
_____ Staff Specify:_____				
_____ Staff Specify:_____				

Secondary Data Request:

Are you requesting existing data from PCS?____ Yes ____ No

If yes, what data will be requested (please be specific) and when will you need this data?

Primary Data Collection:

Are you requesting to collect data?____ Yes ____ No

If yes, explain the following data collection questions in detail.

What data will be collected and from whom will it be collected?

How will this data be collected?

What instruments will be used? Attach copies of all final instruments.

When will this data be collected?

Consent:

From whom will informed consent be collected (check all that apply)?

____ Parents ____ Students ____ Staff (specify):_____

How will consent forms be distributed and collected? Explain in detail.

Confidentiality:

Will the data collected have participant's personally identifiable information? ___ Yes
No If yes, explain in detail:

Will recording (video, audio, photography etc.) be used? _____ Yes No If yes, explain in detail:
Explain in detail the use, retention and disposal of confidential information?
What measures will be taken to ensure confidentiality of all participants?
Recruitment:
How will participants be recruited? Explain in detail.

Will compensation (in any form) be provided? ____ Yes
No If yes, explain in detail:

Research Relevance		
How will the data requested and/or the data collected address each of the research question/hypotheses identified on page 2 of this application (please be specific)? 1. 2. 3.		
Time Table:		

Provide a chronological sequence of research activities beginning with the Proposed Research Start Date and concluding with the Proposed Research End Date. Include the following: □ Tasks to be completed

□ Time required by students, parents, staff, and administrators

Attachments:

The following documents must be submitted with the Application to Conduct Research in Pinellas County School District:

☐ Request for School Principal Agreement to Conduct Research in School [Form A] (completed for review)

☐ Principle Investigator and Research Sponsor Assurances [Form B] (signed)

☐ Access and Use of Confidential Data [Form C] (signed)

☐ Institutional Review Board Application, including attachments

☐ Consent Form(s)

☐ Data Collection Instrument(s)

☐ Recruitment Materials

The following documents must be submitted to receive Final Approval from PCS:

☐ Request for School Principal Agreement to Conduct Research in School [Form A] (signed)

☐ Institutional Review Board Approval and any IRB modifications

☐ Proof of Background Clearance(s)

Please list any additional attachments submitted with the application:

☐ _____

☐ _____

☐ _____

☐ _____

☐ _____

☐ _____

☐ _____

pcs PINELLAS COUNTY SCHOOLS	**Request for School Principal Agreement to Conduct Research in School [Form A]**

The Department of Research and Accountability (R&A) has given Preliminary Approval to conduct research in Pinellas County Schools (PCS) to the following:

Research Title: _____

Research Applicant: _____ Date: _____

Preliminary Approval means that the research has been reviewed by PCS and has met the criteria outlined in "Procedures for Conducting Research in Pinellas County." The principal is entitled to review the complete research application on file with R&A and to contact the department to discuss the proposed research. The preliminary approval does not require schools to participate; participation is at the discretion of the principal. The Preliminary Approval letter from (R&A) is attached to this request.

Should the principal agree for the school to participate in the research, the research applicant will obtain the principal's signature below. The research will not begin at the school until the applicant has returned this form to R&A and the Final Approval has been given in writing.

The following questions pertain to the above titled research proposal:

What are you planning to do at this school?

Who will you need to work with at this school?

Who will participate in your research?

Does this research require parental consent?

How are you planning to collect the information you need?

How much time do you need?

When are you planning to start the work at this school?

When will you be done with the work at this school?

Principal Name: _____

School: _____

☐ I have reviewed the above research request, and I agree for this school to participate. I understand that the research will not begin at this school until the applicant has provided a copy of the Final Approval letter from R&A.

☐ I agree to oversee the collection of signed Parent Consent Forms at this school; to verify the parent's signature; and to assure that only students with signed, active, parental consent participate in the research.

Signature: _____ *Date:* _____
School Principal

[Please sign by typing "/s/" and then your name, such as "/s/ John Doe." By submitting this document using your email account, you acknowledge that this electronic signature serves as your valid signature under the Florida Electronic Signature Act and the federal Electronic Signatures in Global and Nation Commerce Act.]

[Form A]