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A COMPARISON OF EIGHTH GRADE ATHLETES AND NON-ATHLETES:
ACADEMIC ACHIEVEMENT, TIME SPENT ON HOMEWORK, FUTURE
EDUCATIONAL GOALS, AND SOCIOECONOMIC STATUS

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Education
in the School of Teaching, Learning, and Leadership
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ABSTRACT

This study examined the differences between eighth grade athletes and non-athletes in terms of mathematics and reading achievement based on standardized test scores from direct cognitive assessments in mathematics and reading. The data for this study came from the Early Childhood Longitudinal Study Kindergarten Class of 1998-1999 (ECLS-K). Data were collected from student and parent surveys in conjunction with direct cognitive assessments.

The research questions were as follows:

1. To what extent is there a difference in mathematics achievement between eighth grade athletes and non-athletes while controlling for self-reported future educational goals and socioeconomic status?

2. To what extent is there a difference in mathematics achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework and socioeconomic status?

3. To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-reported future educational goals and socioeconomic status?

4. To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework and socioeconomic status?

Factorial ANOVA's were used answer each research question. An additional variable, gender, was utilized to further evaluate differences in mathematics and reading scale scores. Based upon the results, no statistical significance was found in the three-way interaction effects for any of the research questions. As the two-way and main effects comparisons were evaluated, statistical significance was indicated within each question based on the multiple independent variables. Overall, the athletes did not outscore non-athletes.

There were consistent differences in mean scores in reading and mathematics based upon self-stated future educational goals where students maintained higher mean scores in reading and mathematics as their educational goals increased. In addition consistent differences in mean scores in reading and mathematics were indicated where students below the poverty level had lower mean scores than students at or above the poverty level. Finally, students' mathematics and reading achievement significantly increased as their self-reported weekly time spent on homework increased.

This study is dedicated to my wife Randi, and my two children, Brett and Alivia. They have inspired me over the years to pursue a higher education and provided me the time to step away from my role as a husband and father to achieve such an important dream. I love you all.

I am also dedicating this study to my brother, Richard L. Gobler. Without his financial support, this would have never been possible.

ACKNOWLEDGMENTS

that we, and others, continue to use our knowledge, research, and skills to increase the

quality of learning for generations to come.

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CHAPTER 1
THE PROBLEM AND ITS CLARIFYING COMPONENTS

Introduction

Educational leaders have been held accountable for student achievement on an annual basis according to the No Child Left Behind Act of 2001 (NCLB) to ensure all students receive the opportunity to a high quality education as stated in Section 1001 (1) of the act (U.S. Department of Education, 2002). Due to a congressional mandate, states have used standardized testing to compare student achievement to standards of educational proficiency since 1994 (Haretos, 2005). Under NCLB, high stakes tests have compared progress from year to year to establish adequate yearly progress (AYP) for students' individual achievement according to NCLB section 1111(b)(2). These measures became a focal point for analysis by educational leaders (Beveridge, 2010; Everson & Millsap, 2004; Haretos, 2005).

In contrast, student athletes have been recognized for their academic achievements based primarily upon grade point averages (Fox, Barr-Anderson, Neumark-Sztainer, & Wall, 2010; Fredricks & Eccles, 2006), ignoring the accountability required by NCLB. Middle school athletes participate in state assessments, but the data is not commonly used to identify the success of athletic participation. In this study middle school standardized test scores of athletes and non-athletes from a national database were analyzed. Additional analysis included (a) self-reported homework participation as a symbol of effort and (b) self-discipline and self-stated future educational goals as symbols of academic self-efficacy.

The analysis of student athletes and non-athletes was used to provide information for making data-based decisions for educational policies. The athletic culture provided the triadic reciprocality among behavior, environmental factors, and personal factors to increase academic achievement. Bandura's social cognitive theory (Bandura, 1997), of which self-efficacy is a focal point, served as the theoretical basis for this research.

Conceptual Framework

Bandura (1986) pioneered the social cognitive theory (SCT). This theory was considered a contemporary view where the focal point of the theory is centered upon the importance of learning through cognitive processes that underlie differences among individuals and observation (Bandura, 1986; 1989). Bandura's (1986; 1997) interest in the influence of the environment guided him to create the term "reciprocal determinism" (Bandura, 1997, p. 7). This term refers to the social-cognitive view in which people influence their environment in the same manner in which the environment influences individuals.

According to Bandura (1997), self-efficacy is the "belief in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Bandura's (2001) social cognitive theory provided strong support for personal self-efficacy and the future outcomes that were expected when he stated:

Efficacy beliefs play a central role in the self-regulation of motivation through goal challenges and outcome expectations. It is partly on the basis of efficacy beliefs that people choose what challenges to undertake, how much effort to expend in the endeavor, how long to persevere in the face of obstacles and failures, and whether failures are motivating or demoralizing. The likelihood that

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people will act on the outcomes they expect prospective performances to produce depends on their beliefs about whether or not they can produce those performances. . . .Efficacy beliefs also play a key role in shaping the courses lives take by influencing the types of activities and environments people choose to get into. Any factor that influences choice behavior can profoundly affect the direction of personal development. This is because the social influences operating in selected environments continue to promote certain competencies, values, and interests long after the decisional determinant has rendered its inaugurating effect. (pp. 10-11)

Bandura (1986) explained triadic reciprocal causation, displayed in Figure 1, as the relationships between three major factors: (a) behavior, (b) external environment, and (c) internal personal factors. The relationships were vital in analyzing athletics as a controlled environment which affected students' self-efficacy beliefs, efforts in homework, and academic achievement on standardized tests.
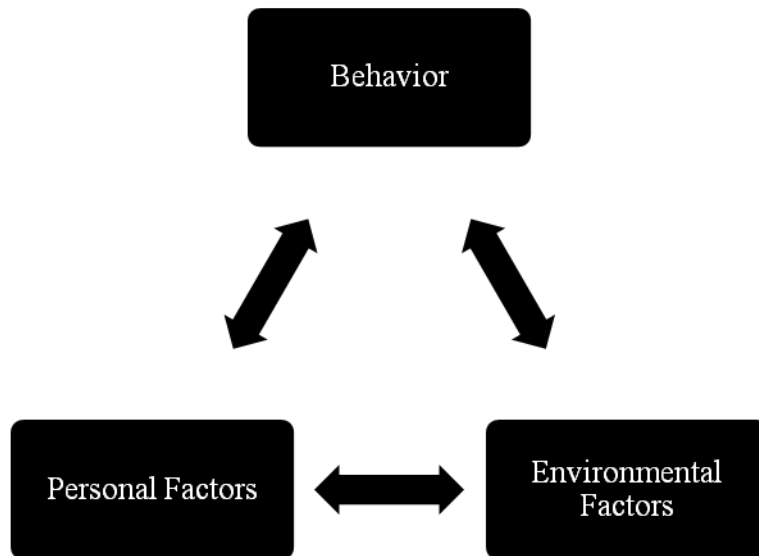
Figure 1: *Triadic Reciprocal Causation From the Social Cognitive Theory.*

Note. Social Foundations of Thought and Action: A Social Cognitive Theory *by A. Bandura, 1ˢᵗ ed.©*
1986. Reprinted by permission of Pearson Education, Inc., Upper Saddle River, NJ.

Self-efficacy

Self-efficacy beliefs were understood to be as affective thought patterns that could

aid or hinder a person (Bandura, 1989). Individual motivation level, whether increased or

decreased, was also influenced by self-efficacy beliefs (Bandura, 1989, 1997). Bandura

(1989) also explained that self-efficacy beliefs greatly affected cognitive functioning

through a combination of personal motivation and information-processing operations.

Bandura provided an excellent example of self-efficacy when he said, "To use an athletic

example, the belief that one can high-jump seven feet in an athletic contest is a self-

efficacy judgment, not an expected outcome" (p. 22).

Perceived collective efficacy was altered by Bandura (2000) from the sum of efficacy beliefs of individuals, as it was previously understood, to the emergent group-level property applicable to teamwork. Researchers investigated social systems, such as athletics (Castillo, Duda, Balaguer, & Tomás, 2009; Netz & Raviv, 2004) and educational systems (Beghetto, 2006; Peggy, Yoonjung, Min, & Schallert, 2008), with this approach and found a positive relationship in expected outcomes based on efficacy beliefs.

Additionally, Bandura (2001) observed culture as a major factor which influenced self-efficacy. When players participated in team sports, the coach was responsible for the enforcement of teamwork and leadership. The collective sense of leadership among athletes allowed female athletes to increase their efficacy beliefs in leadership more so than males (Dobosz & Beaty, 1999).

Bru (2006) found Scandinavian students' efficacy beliefs, specifically those related to cognitive competence, had a strong association with on-task orientation in the classroom. These findings suggested that the motivation for student learning was related to either the anticipation of success, or the lack of anticipation of success. The students who claimed to have lower efficacy beliefs related to cognitive competence also had a moderate association with opposition to teachers. Bru's (2006) findings held true for Bandura, Caprara, Barbaranelli, Pastorelli, and Regalia's (2001) expectations of lower achievement for students with lower goals and motivation.

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Bandura (1997; 2000; 2001) also theorized that self-regulation was the ability to regulate one's own environment to achieve the expectations according to self-efficacy. The research was an effort to connect the achievement of personal beliefs and expectations through action and external influences. The process of self-regulation was evident in areas outside the classroom, such as athletics. Bandura's previous findings were furthered by the positive impact of the coach-athlete relationship (Mageau & Vallerand, 2003). According to Mageau and Vallerand, the relationship between coaches and athletes provided a motivation for academic success and laid the groundwork for a system of respect for both teachers and students..

As students reached the transitional years of middle school, motivation and self-regulation played a major factor in academic achievement (Deci, Vallerand, Pelletier, & Ryan, 1991; Katz, Kaplan & Gueta, 2009). Deci et al. (1991) found students in middle school, as compared to those in elementary school, were less likely to complete homework due to an increase in autonomy and a decrease in teacher psychological support. The student behaviors related to decrease in homework indicated the need for psychological support and trained autonomy. Student athletes were previously provided these additional supports by athletic coaches (Mageau & Vallerand, 2003).

<center>Academic Goals</center>

Ryska and Vestal (2004) provided research on self-efficacy concerning the academic goals of ethnically diverse athletes ages 14-18, described as having task-oriented or ego-oriented styles of motivation. The results revealed no statistical

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significance for athletically motivated males regarding educational goals. However, female athletes had a statistically significant increase towards their personal academic goals (Ryska & Vestal, 2004). These findings indicated a positive relationship for females between athletics and future academic goals.

<center>Homework Efforts</center>

Van Voorhis (2003) found homework participation had become a significant reflection of student grade point average (GPA) based on many course syllabi. However, Duckworth and Seligman (2005) found homework as a measure of self-discipline. The researchers expressed their belief by stating, "We believe that many of America's children have trouble making choices that require them to sacrifice short-term pleasure for long-term gain, and that programs that build self-discipline may be the royal road to building academic achievement" (p. 944). Duckworth and Seligman's measure of homework as self-discipline also revealed a positive correlation ($r = .35$, $p < .001$) between student homework completion and overall academic achievement.

Liang (2010), in his research, also suggested there was a negative relationship between homework and standardized test scores in mathematics. The study revealed that students who spent no time on homework outscored students who spent one hour or more per day on homework in mathematics achievement. Liang hypothesized that the participation gap could stem from students who needed less time to study when compared with students who performed poorly but increased their study efforts.

Cosden, Morrison, Gutierrez, and Brown (2004) found evidence of the positive

and negative effects of homework as it relates to afterschool activities for students of all

ages. Their conclusion suggested excessive extracurricular activities, such as sports and

clubs, can interfere with homework completion and detract from academic work. On the

other hand, they promoted afterschool activities based on the benefits of positive peer

group interaction, academic motivation, parental involvement opportunities, and

supervision for working parents (Cosden et al., 2004).

<div align="center">Data Analysis</div>

Educational leaders have been consistently focused on accountability and data

analysis due to the No Child Left Behind Act of 2001 (NCLB), which was signed into

law in 2002 and has been governed by the U.S. Department of Education (U.S.

Department, 2002). The data most commonly analyzed by educational leaders to meet

adequate yearly progress (AYP) came from specific categories which Henning (2006)

found to be necessary while disaggregating the data. However, routine data analysis did

not include variables such as relationships with coaches and rigor of instruction according

to the whole student approach (Gallagher, 2009; Koffman et al., 2009). Administrators

also placed their primary focus on tested subjects in the core curriculum, predominantly

mathematics and reading (Beveridge, 2010).

The political and economic pressure for meeting AYP has caused leaders to focus

on the variables required to meet the federal requirements to maintain Title I funding.

According to Everson and Millsap (2004), age, disability, ethnicity, gender, grade,

primary language, and socioeconomic status are the most common variables used to disaggregate data. When determining budget allocations for schools, administrators have typically used data to allocate funding for special programs. Because athletics have not been listed as a subgroup for data analysis of standardized testing, funding for athletics was unlikely to have been based on test scores (George, 2008).

<div align="center">Athletics and Standardized Test Scores</div>

In conducting the review of the literature, previous research comparing standardized test scores between middle school athletes and non-athletes was scarce. Much of the research was limited to college (Petrie & Russell, 1995; Ting, 2009) and high school students (JacAngelo, 2003; Schneider & Klotz, 2000; Zwart, 2006). Lipscomb (2007) provided a national study comparing mathematics achievement between athletes and non-athletes using data from the National Educational Longitudinal Survey of 1992. In this study, athletes had a higher score in mathematics achievement than did non-athletes, and low socioeconomic students scored significantly lower than did non-low-socioeconomic students.

Coleman's (2010) dissertation analyzed the standardized test scores of eighth grade sports participants compared to non-participants. Using the Tennessee Comprehensive Assessment Program reading achievement score as the dependent variable, Coleman found no statistically significant difference in reading achievement between non-athletes and athletes while controlling for gender and socioeconomic status.

Coleman (2010) also analyzed the mathematics standardized test scores of eighth

grade athletes and non-athletes. Using the Tennessee Comprehensive Assessment

Program as the dependent variable, there was no statistical significance in mathematics

scores between athletes and non-athletes while controlling for socioeconomic status and

gender.

<div align="center">Statement of the Problem</div>

Because there has been no measure of accountability, i.e., standardized testing,

associated with participation in athletics, a lack of academic accountability has existed in

middle school athletic programs. Given the state of academic accountability, Creighton

(2007) suggested the practice of evidence-based decision making to focus on both sides

of data analysis to focus on the positive and negative aspects of any findings. According

to George (2008), funding decisions have been made to increase student academic

outcomes and have been predominantly measured in terms of standardized test scores,

thus impacting AYP. Since athletics are not held accountable by test scores, funding

measures cannot be tied to academic achievement among athletes.

According to the Florida Department of Education (FDOE), during the 2008-2009

academic year, 62% of students grades 6-8 who took the Florida Comprehensive

Assessment Test (FCAT) were proficient in reading and 67% of students were proficient

in mathematics. The FCAT measures student achievement in grades 3-10 in reading and

mathematics (Florida Department, 2010b). Students are measured on a scale of 1-5, and

are considered proficient at level 3 or higher, but have limited or little success at level 2or

<div align="center">10</div>

lower (Florida Department, 2011b). FCAT scores have been the primary factor in determining AYP in Florida's public schools (Florida Department, 2011a).

A stereotype has existed in which lower test scores have been predicted among students based on gender, race, and SES. Unfortunately, data substantiated the accuracy of the prediction for minorities and low SES students and gender results varied by subject area (Good, Aronson, & Inzlicht, 2003). This trend in lower scores for minorities as compared to whites (other than Asian and multiracial), gender variance with lower male scores in reading, and overall lower SES scores in reading and mathematics was evident in FCAT scores during the 2008-2009 school year (Florida Department, 2010b).

In states such as Florida, middle school students who transition into high school significantly impact the high school's recognition grade based upon participation in higher level course work and college entrance exams (Florida Department, 2010c). Educational leaders at the secondary level in Florida have been unable to concentrate solely on AYP measures, as high schools in Florida follow the state's differentiated accountability measures in areas such as advanced course enrollment, drop-out ratios, and post-secondary readiness tests, including Scholastic Aptitude Test scores (Florida Department, 2010c).

The Florida High School Athletic Association (FHSAA) was designated by the state as the governing body of student athletes in Florida, grades 6-12. The FHSAA has measured academic accountability for student athletes primarily by attendance, behavior, and grade point average (Florida High School, 2010). Under the Craig Dickinson Act

(F.S.A. § 1006.20), no accountability exists within the FHSAA policies for standardized test scores. A student could be retained in 8th and 10th grade for failing the FCAT but would be eligible for any sport the following year once test scores were available so long as the students' grade point average (GPA) is at or above a 2.0. At the time of this study, based on the Craig Dickinson Act, middle and high school athletes in Florida are only required to maintain a 2.0 GPA to participate in sports, unless a school or district policy is otherwise implemented.

Henning (2006) found evidence that administrators concentrated on specific variables for adequate yearly progress when analyzing student test scores. In Florida's middle schools, Florida Comprehensive Assessment Test (FCAT) scores have determined the measures for both AYP (U.S. Department, 2002) and school grades (Florida Department, 2010a). These specific variables did not include athletes as a subgroup. For academic accountability to occur within athletics, data analysis must include athletes as a subgroup. According to Everson and Millsap (2004), this was not the case.

Student behavior in the educational environment can be measured using a variety of methods. Non-athletes may not have relationships with coaches or teammates who form additional supports for student academic achievement outside the classroom (Cosden et al., 2004; Mageau & Vallerand, 2003). Teachers and parents have often provided more autonomy to middle school students, which some students interpreted as a less supportive academic environment, and which in turn led to a decrease in homework completion (Katz et al., 2009). Katz et al., in their research, revealed a significant

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decrease in homework completion between fourth and eighth grade students, which was also relevant to the respective increase in autonomy that occurs between these two grades.

Carroll (2004) provided evidence of millions of dollars flowing in from philanthropic giving to protect athletic programs in California that would have otherwise been cut in 2004. In addition, athletic programs nationwide lost significant funding as a result of the recent economic decline in the United States. Lemire (2009) discovered that nine high schools in Volusia County, Florida cancelled freshman sports, cut athletic director positions to half-day positions, reduced schedules, and restricted travel. Lemire also indicated that, in the same calendar year, Mount Vernon High School in New York was impacted by a school district decision to eliminate the athletic program. The author explained that two prominent alumni chose to provide $115,000 to help fund the Mount Vernon program, which otherwise would have been cancelled.

According to George (2008), funding decisions should be made based on three criteria: whether or not money (a) supports children's education, (b) is spent prudently, and (c) is spent equitably. There is very limited empirical evidence which indicates a positive relationship between athletic participation and academic achievement. As a result, athletic programs have been neglected or de-funded, as athletics do not meet George's (2008) first and last criteria.

Significance of the Study

According to Duffy, Giordano, Farrell, Paneque, and Crump (2008), a myopic view exists in which the core curriculum will solve all the problems of academic achievement for all students. This study was designed to seek evidence of an increase in middle school athletes' self-efficacy in regard to academic goals. Such information was designed to increase the body of knowledge concerning the impact of athletics on self-efficacy.

The study was also designed to compare findings among standardized test scores, which were applicable measures of accountability for student achievement. Homework participation was studied as a measure of preparation for a formal assessment such as standardized testing. Athletes were understood as an equally diverse population when compared to non-athletes, and athletes were a part of their own subculture (Phillips & Schafer, 1971). This provided ample opportunity to compare subgroups according to socioeconomic status within each population. This, too, was an opportunity to support measures to compare athletes and non-athletes and to add to the existing body of knowledge.

Educational leaders have become more focused on meeting AYP by using data analysis (Beveridge, 2010; Everson & Millsap, 2004). Unfortunately, analysis of AYP became fixated on the failure rather than on the progress of schools (Bracey, 2003). Mathews (2009) wrote an article regarding cutting sports funding. He stated:

> None of us read all of the 481,563 articles published last year on the early life and struggles of the soon-to-be president of the United States, but most of us know

that if Barack Obama had not discovered basketball he would not have become the leader he is today (para. 3).

This 2009 quotation reflects Mathews' perception as to how athletics changed the President's approach to both his own education and leadership. Mathews elaborated further by explaining that though mathematics skills had the highest impact on an individual's earnings, playing sports and having leadership roles in high school were also significant factors. Such awareness showed the importance athletics has played in students' overall education, serving as a catalyst for educational decision makers to create and support athletic programs for middle school students.

After an extensive review of literature, this was the first national study in which average test scores of eighth grade athletes and non-athletes in reading and mathematics—combined with homework efforts, future educational goals, and socioeconomic status—were compared. Lipscomb's (2007) national study comparing middle school athletes and non-athletes was focused solely on test scores and other researchers (Coleman, 2010; JacAngelo, 2003; Zoul, 2006) limited their research to one district or state. Adding additional variables, such as homework and future educational goals, made this study unique and will contribute to the limited body of knowledge on this topic.

<u>Purpose of the Study</u>

The purpose of the study was to use common measures of academic accountability, i.e., mathematics and reading achievement, to determine mean differences

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in these outcomes that may be based on eighth grade participation in school-sponsored sports. Several control variables were also used including self-reported educational goals, self-reported time spent on homework, and socioeconomic status.

Research Questions

5. To what extent is there a difference in mathematics achievement between eighth grade athletes and non-athletes while controlling for self-reported future educational goals and socioeconomic status?

6. To what extent is there a difference in mathematics achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework and socioeconomic status?

7. To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-reported future educational goals and socioeconomic status?

8. To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework and socioeconomic status?

Delimitations

1. The variables used were delimited to those available in the ECLS-Kindergarten Class of 1998-1999 Public Use data set.

2. The cases were delimited to students who indicated the following: (a) their enrollment in eighth grade, (b) their participation or non-participation in school-sponsored sports, (c) their self-stated future educational goals, and (d) their self-reported time spent on homework.

3. The cases were delimited to students who took the direct cognitive assessment and were graded using the IRT (item response theory) scale score in reading and mathematics.

Limitations

1. The ECLS data collection had no fidelity measures to account for inaccuracy of student reported data.

2. The seventh and final wave of the ECLS-K study in 2007 was the most recent collection of data that contained all the variables necessary to complete the study.

3. The research in the current study used an existing database. Therefore, the data were collected prior to the development and design of the current study.

Data Source

The Early Childhood Longitudinal Study (ECLS) K-8 data set was comprised of students nationwide who had been tracked from Fall 1998 to Spring 2007 (Walston, Rathbun, & Germino Hausken, 2008). This longitudinal study began with 21,260 kindergarten students and examined 11,929 students in 2006 who were part of the

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original base sample. The population was originally derived from students enrolled in kindergarten in 1998. The students in this 2006 study were comprised solely of eighth graders from the original cohort of 1998. The students in the sample were part of a national sample with diverse backgrounds according to gender, primary language, race, region, school type, and socioeconomic status. With attrition being a common problem in a longitudinal study, the population was decreased as a necessity to account for accuracy due to moving schools, mostly from elementary to middle schools. The sample accounted for 41% of the base-year respondents (Walston et al., 2008).

Table 1

Research Questions, Variables, Statistical Analyses, and Data Sources

Research Questions	Dependent Variables	Independent Variables	Statistical Analysis	Data Source
1. To what extent is there a difference in mathematics achievement between eighth grade athletes and non-athletes while controlling for self-stated future educational goals and socioeconomic status?	IRT Scale Score (Mathematics)	1. Athlete versus non-athlete 2. Future educational goals 3. Socioeconomic status	Factorial ANOVA	ECLS data set
2. To what extent is there a difference in mathematics achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework and socioeconomic status?	IRT Scale Score (Mathematics)	1. Athlete versus non-athlete 2. Future educational goals 3. Socioeconomic status	Factorial ANOVA	ECLS data set
3. To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-stated future educational goals and socioeconomic status?	IRT Scale Score (Reading)	1. Athlete versus non-athlete 2. Future educational goals 3. Socioeconomic status	Factorial ANOVA	ECLS data set
4. To what extent is there a difference in mathematics achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework, socioeconomic status and gender?	IRT Scale Score (Reading)	1. Athlete versus non-athlete 2. Future educational goals 3. Socioeconomic status	Factorial ANOVA	ECLS data set

Assumptions

1. Student respondents were truthful in their responses to survey questions.

2. Student respondents understood the concepts presented in the survey.

3. Student respondents gave their best academic effort to answer the questions provided in the direct cognitive assessment for mathematics and reading.

Operational Definitions

Adequate Yearly Progress (AYP). Adequate yearly progress is the method of accountability used by each state until 2014 under NCLB requirements. AYP determines if a district and school has met a prescribed level of growth in student achievement for all students using a measurement of annual objectives, primarily standardized testing (U.S. Department, 2002).

Athlete. For the purpose of this study, an athlete is defined by the self-reported data in the ECLS-K. More specifically, students who responded as a member or leader of a school-sponsored sports team to the variable (C7SPORTS) were deemed athletes (Walston et al., 2008).

Early Childhood Longitudinal Study (ECLS-K). This longitudinal study was conducted by the Institute of Education Sciences in cooperation with the National Center for Education Statistics (Walston et al., 2008).

Future educational goals. For the purpose of this study, future educational goals were self-reported in the ECLS-K survey. More specifically, the variable (C7HOWFAR) allowed students various options to define their future educational goals.

Gender. For the purpose of this study, gender was defined by the parent and staff-reported data in the ECLS-K survey. More specifically, the variable (GENDER) offered the options of male or female (Walston et al., 2008).

Grade Point Average. Grade point average is a mathematical average of all combined letter grades based on a point scale system in which letter grades are provided a value between zero and four (Fox et al., 2010).

Homework. Homework is work provided by teachers intended to be completed at home with and without parental assistance (Cooper, 2001).

Mathematics achievement. Student academic achievement in mathematics was defined using the Mathematics IRT scale score (C7R4MSCL) from the ECLS direct cognitive assessment.

Middle school. Middle school refers to all students enrolled in the eighth grade regardless of school configuration.

Non-athlete. For the purpose of this study, a non-athlete was defined by the self-reported data in the ECLS-K. More specifically, students who responded as not a member of a school-sponsored sports team to the variable (C7SPORTS) were deemed non-athletes (Tourangeau, Nord, Lê, Sorongon, & Najarian et al., 2009).

Reading achievement. Reading achievement was defined as student academic achievement in reading according to the Reading IRT scale score (C7R4RSCL) from the ECLS-K direct cognitive assessment (Walston et al., 2008)..

Self-efficacy. Self-efficacy was defined as the "belief in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3).

Socioeconomic status (SES). This refers to the financial status of a student's family determined by the poverty level (W8POVRTY) using two categories: below poverty level and at or above poverty level (Tourangeau et al., 2009).

Standardized test. A standardized test is a content-driven formal assessment used to determine student mastery of standards generally set at the state level. In this analysis, the ECLS-K Direct Cognitive Assessments in Mathematics and Reading were used to determine student progress according to grade level expectations in each content area (Walston et al., 2008).

Time spent on homework. For the purpose of this study, time spent on homework was defined by the self-reported data in the ECLS-K. More specifically, students responded to the variable (C7HRSWRK) by providing the total number of hours they spent per week completing homework (Tourangeau et al., 2009).

<div align="center">Summary</div>

This chapter provided an overview of the study. Included was the conceptual framework based on Bandura's triadic reciprocality including self-efficacy, academic goals, homework efforts and participation in athletics. The problem statement was summarized as a lack of academic accountability and the need for educational leaders to determine the funding for athletics based upon multiple criteria. The significance of the study rested in the ability to compare subgroups, resulting in better decisions for funding, an area which had little previous research. The purpose of the study was to determine if

athletic participation had a relationship with different mean scores on standardized test scores.

The research questions were stated, including the methodology and variables involved in the analysis. The limitations and delimitations were established according to the data. The population was described along with the assumptions and operational definitions within the study.

Chapter 2 contains a review of the literature and related research. The methodology used to conduct the study is explained in Chapter 3. Chapter 4 contains the results of the analysis of the data, and Chapter 5 provides a summary and discussion of the findings, implications for policy and practice, and recommendations for future research.

CHAPTER 2
LITERATURE REVIEW

Introduction

The review of literature provides a historical perspective of educational

accountability and athletic participation. In an effort to support the research questions,

previous literature regarding self-efficacy and homework participation has been

reviewed.

Within the literature and related research, evidence of previous comparisons

between middle school athletes and non-athletes using standardized test scores was found

to be quite limited. Evidence is presented from previous studies of middle school

students who took the National Assessment of Educational Progress (NAEP) in which

data were analyzed according to ethnicity, gender, and socioeconomic status. Finally, a

few studies in which middle school athletes and non-athletes were compared using

standardized test scores are discussed.

The research was conducted using multiple sources: (a) University of Central

Florida's libraries, including both the main and Daytona campuses; (b) the University of

Central Florida online library databases such as Wilson Web, EBSCO Host, and SPORT

Discuss; (c) on-line newspaper search engines; (d) Google on-line search engine; (e)

National Center for Educational Statistics website, nces.ed.gov, and (f) the researcher's

professional library.

In an attempt to focus the study on academic accountability in middle school

sports, exhaustive efforts were made to eliminate studies that were irrelevant to the

research questions. A tremendous amount of literature was available regarding both sports and academics in general. However, keeping the focal point of the study in mind caused thousands of studies to be eliminated and revealed a minimal number of studies regarding athletics and academic achievement related to standardized testing. Some information from studies of high school and collegiate athletes was included, but most of the literature reviewed revolved around middle school students and academic achievement as measured by standardized testing.

The literature review has been organized to provide a comprehensive overview of the historical perspective of accountability and athletic participation. Several empirical studies are reviewed comparing athletes and non-athletes at many levels. Standardized testing, homework, and self-efficacy studies, including athletic participation, are explained. Finally, empirical studies which compare mathematics and reading test scores between athletes and non-athletes are discussed.

Historical Perspectives

Accountability: Adequate Yearly Progress

Athletic participation is an unrecognized variable when analyzing academic data for AYP according to federal and state regulation of education. Therefore, it has been understood as uncommon or unlikely to be used by leaders in the areas of funding appropriations and school improvement.

According to the Florida Department of Education (FLDOE) in 2008, the four-year graduation rate for the state was 72.4%. The five-year graduation rate was 76.1%. This represented an increase of 4,766 (3.6%) students (Florida Department, 2010b). The state of Florida has chosen to place drop out ratios and higher level courses in the formula which provides annual school grades across the state. Thus, at the time of the present study (Florida Department, 2010c), the Florida public school grading system was holding high school administrators accountable for their students who drop out. Educational leaders typically focus on standards-based instruction, curriculum alignment and coherence, data-based decision-making, improving teacher skills through evaluation and professional development, family and community involvement, and other research-based initiatives for school improvement (Beech & Sweeny, 2008). Young et al. (2007) conducted a multi-state study and found that athletics was an interscholastic activity at the middle school level in 83% of the schools investigated. Given this level of activity, according to Young et al., leaders across the country should have been considering athletics as a focal point for school improvement. Coaches and players expect parent involvement in sports (Brubaker, 2007; Young et al., 2007), which is a major factor in school improvement. Yet, when educational leaders analyzed data using only the NCLB criteria, they missed the opportunity to see positive impacts of sports on the lives of students.

At the beginning of the 21st century, the "whole student" approach began being used for analyzing and evaluating student achievement (Gallagher, 2009; Koffman et al.,

2009). This process does not rely on test scores. Instead, the whole student approach relies on relationships with students and rigorous instruction to achieve academic expectations. This information does not come from the state in a sealed package. Instead, it is brought to light within the schoolhouse for athletic participation to be recognized as a factor for academic success (Gallagher, 2009).

Within the scope of the whole student approach, athletic coaches play a vital role in supporting their players both on and off the field, and participation in athletics can have an impact on many students. Good athletic coaches develop a relationship with their players (Hansen, Gilbert, & Hamel, 2003). This, in turn, motivates players' efforts in the classroom. Coaches have long been respected for their relationships (Jowett, 2009) and motivation of student athletes (Barić, & Bucik, 2009) both on and off the playing field (Gillet, Vallerand, Amoura, & Baldes, 2010). When coaches understand the learning styles of their players, they develop better athletes (Dunn, 2009). Fortunately, coaches are never required to "coach to the middle" (Baines & Stanley, 2003, p. 217) to make sure all players learn just the basics of their athletic game plan. Baines and Stanley also expressed their concerns about classroom teachers who may have begun teaching to the middle to show academic growth based on standardized test scores and to meet AYP measures.

<center>Participation in Athletics</center>

Founded in 1920, the Florida High School Athletic Association (FHSAA) was declared the official governing body for interscholastic sports, grades 6-12, by the Florida

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legislation in 1997 (F.S.A. § 1006.20). In 2010, the FHSAA had a membership of 748

schools in Florida. The organization sponsored 30 sports, and approximately 798,500

student athletes participated in school-sponsored sports in that same year (Florida High

School, 2010).

In a previous study of middle school sports opportunities, McEwin and Swaim

(2009) revealed the results from various surveys of middle schools. They found that

middle school sports were still prevalent in many schools as of 2003. In 1968, 50% of

middle schools offered interscholastic sports, increasing to 77% in 1993, and 96% in

2003.

From a global perspective, middle school female athletic participation in England

has increased over time. However, primarily the middle class continued to participate in

athletics through their high school years (Clark, 2009). Spady (1970) suggested that

participation in athletics also brings a glamour status for students among their peers.

In determining athletic participation, Bucknavage and Worrell (2005) studied two

independent cohorts of academically talented male and female students over a two-year

period from 1999 ($N = 842$) to 2000 ($N = 290$). They found athletic teams to be the most

popular form of extracurricular participation, with 63% participation the first year and

56% participation the second year among middle and high school students. Students in

seventh grade participated in an average of 2.79 (SD=1.5) activities per year, and students

in eighth grade participated in an average of 2.81 (SD=1.7) activities per year in 1999.

No statistical significance was found when comparing the cohorts of 1999 and 2000 in terms of the average number of extracurricular activities in which students participated.

Phillips and Schafer (1971) discovered athletes had higher grades than non-athletes and that lower SES athletes were more likely to excel financially, mostly due to higher educational attainment. Economic research performed by Barron, Ewing, and Waddell (2000) provided evidence that athletic participation increased wages and the number of years of education after high school. In 2010, Stevenson continued his economic research and found a relationship between the implementation of Title IX and an increase in female college attendance and labor force participation. Specifically, as female sports participation increased by 10 percentage points, female college attendance increased by 1% and female labor force participation increased by approximately 2% (Stevenson, 2010).

Sites (2007) explained the responsibility of coaches to teach improvement, citizenship, teamwork, and humility. Jordan, Gillentine, and Hunt (2004) explained the necessity for fair play in team organizations and its positive impact on the social development of children. This concept of social development is furthered by the positive impact of the coach-athlete relationship, which provides a motivation for academic success and respect among athletes (Mageau & Vallerand, 2003). Mageau and Vallerand also noted the positive impact of the coach-athlete relationship on academic achievement within the culture of athletics.

History of Accountability in Athletics

Splitt (2008) claimed overall corruption in collegiate sports showed a need for accountability. Though Splitt made claims of corruption, accountability has been in place for over 100 years (Mirel, 1982). The National Collegiate Athletic Association (NCAA) began using the term "student athlete" in the 1950s to distinguish college athletes as students first and athletes second (Staurowsky & Sack, 2005). The NCAA was created in 1906, when it began serving the purpose of incorporating sports into the educational program as a part of the student body (National Collegiate, 2010). Eventually, individual states created athletic associations to govern the sports programs within their states, primarily in grades 6 - 12 (Staurowsky & Sack, 2005).

Student governed athlete associations were started in the 1880s and later evolved into high school athletic associations. The first known athletic association overseen by a governmental entity was the Michigan High School Athletic Association in 1899 (Mirel, 1982). This began the transition from student control to institutional control, which led to academic and behavioral accountability for student athletes, who are overseen by school administration and their delegates (Mirel).

In 1990, universities receiving federal funding were required to report student athlete graduation rates separately (Laforge & Hodge, 2011). Sellers (1992) discovered that black student athletes entered college from lower socioeconomic backgrounds and were less prepared academically than their white counterparts. Due to charges of racial discrimination, the NCAA was banned from using standardized test scores for freshman

athletic eligibility in 1999 (Haworth, 1999). However, the NCAA continued to push for

academic accountability among athletes and added additional accountability measures for

athletes at the collegiate level (Laforge & Hodge, 2011).

By 2003, college athletes were required by the NCAA to be monitored for

academic progress and graduation according to the Academic Progress Rate and

Graduation Success Rate, which holds no measure of accountability for non-athletes

(Laforge & Hodge, 2011). No similar evidence has been found for academic

accountability in middle schools or high schools.

In the United Kingdom, physical education and school sport (PESS) has become a

topic of discussion, as it relates to accountability for several years (Bailey et al., 2009).

According to Bailey et al., most stakeholders are unable to decide what is measurable,

and whether the results are pedagogical, social, or cognitive. In addition, these

researchers were unable to decide what subgroups these studies would involve.

Academic Eligibility for Athletes

Florida legislators have expressed their belief that athletics makes a positive

contribution to students' development of those social and intellectual skills needed to

become a well-rounded adult. The Craig Dickinson Act (F.S.A. § 1006.20) requires

student athletes to (a) maintain a minimum GPA of 2.0, (b) establish and maintain proper

conduct, and (c) abide by regular daily attendance policies to be eligible for participation

in sports. This policy was created to hold student athletes to higher standards than non-

athletes.

Duval County (2010), as all other counties on Florida, has required middle school student athletes to maintain a 2.0 GPA to participate in athletics. This is consistent with the FHSAA (2010) requirements for students in grades 6-12. Middle school student athletes who desire to participate at the high school level had further requirements. In Florida's public schools, an eighth grade student must pass all four core subjects and maintain a 2.0 GPA to be eligible to play sports in ninth grade. Otherwise, they are considered ineligible for athletics as a high school freshman (Florida High School, 2010). Once students are eligible, schools must determine funding sources for athletics. With budgetary issues in mind, schools have been searching for ways to maintain athletic programs at the middle and high school levels (Savoye, 2001) by moving beyond such fundraisers as bake sales.

State Funding for Athletics

At the state level in Florida, athletics is not specified as a form of categorical funding (funding which is designated to a specific item, or items, within a schools budget apart from the general fund) within the overall budget of $8,072,683,948 for the 2009-2010 school year (Florida Department, 2009). The state of Florida has provided categorical funding to schools designed to enhance schools in specific areas based on the interest of legislators and district leaders.

Safe Schools funding has been designed to enhance the safe environment on public school campuses (F.S.A. § 1011.62). According to Florida's categorical funding for Safe Schools in 2009, middle schools were allowed to spend the funding on

afterschool programs. The state contributed a total of $67,260,840 for use by all Florida school districts. Each district received a minimum of $65,387 to use at the district's discretion. It was within the law to use this funding for athletics, but it was unclear how each district chose to use this funding (Florida Department, 2009).

Underfunded items, such as middle school sports, could have had a positive relationship with student achievement had the state recognized the impact of athletics on academic achievement based on previous research. Fox, Barr-Anderson, Neumark-Sztainer, and Wall (2010) and Stephens and Schaben (2002) indicated athletes held higher grade point averages than non-athletes. No data were discovered providing evidence of a significant increase or decrease in funding for middle school sports since 2003, but Lemire (2009) reported in a *Sports Illustrated* article that middle school sports have been cut in some Florida school districts. Lemire anticipated this would have been more significant for high schools without an injection of $2.7 billion from federal stimulus money in the Florida public schools funding for the 2009-2010 academic year. Also, Young et al. (2007) found in their study that only 83% of the 36 middle schools surveyed provided school-sponsored athletics. This continued the evidence of a declining funding trend since the likely peak in 2003.

Accountability for Athletic Funding

Texas is considered "fanatical about sports in general and football in particular" (Meier, Eller, Marchbanks III, Robinson, Polinard, & Wrinkle, 2004, p. 800). The researchers placed their efforts in determining the impact of athletic budgeting on

academic achievement. Their Texas study involved high school students ($N = 1924$) attending public schools with more than 1,000 students, and their findings were statistically insignificant in comparing athletic funding to student attendance. The minimally significant finding revealed a decrease of four percentage points on the Texas state examination among athletes enrolled in schools with higher athletic budgets within the state. Athletes were required to pass their standardized test to be eligible for athletics, and this increased the level of concern for lower test scores.

More significantly, student Scholastic Achievement Test (SAT) scores had a maximum reduction of 45 points in relation to athletic budgets, as well as a maximum reduction of 1.2 points for students on the American College Test (ACT). Finally, districts with larger athletic budgets had a 15% reduction in the number of students who took the SAT and a 17% reduction in the number of students who met the 1,000-plus point standard score (Meier et al., 2004). The researchers explained the culture of their statewide school athletic programs by citing a well-known phrase which said, "In some Texas school districts, it is important to have a school that the football team can be proud of" (Meier et al., p. 801). The analysis was held within the confines of the state of Texas, but it still shed a new light on the concept of over-budgeting on athletics in a large state. Overfunding in Texas had a negative impact on public opinion towards athletic funding across the nation.

According to Phillips and Schafer (1971), athletes are considered pro-school within their subculture, and tend to relay this belief to their non-athlete peers. There were

also those who felt athletes were still the "dumb jocks" (Whitley, 1999, p. 223).

Unfortunately, some talented athletes projected a negative image and lacked the ability to be role models for students (Greenwood & Kanters, 2009).

Empirical Support Examining Athletes and Non-athletes

Akarsu, Çaliskan, and Dane (2009) compared eye-hand reaction times and scores on visuospatial intelligence between athletes and non-athletes. The analysis was performed in Turkey and included students ($N = 283$) ages 15-19, which consisted of males ($n = 157$) and females ($n = 126$). Understandably, non-athletes scored higher (took longer) on visual reaction time than athletes ($r = 0.3$, $p < .001$), and athletes scored higher on visuospatial intelligence ($r = 0.3$, $p < .001$). The researchers incorporated this concept with the benefit of sport activities for mathematics and science lessons grades K-12, and found that sports increased academic achievement (Akarsu et al., 2009). Law and Hall (2009) also discovered that a majority of athletes were considered observational learners. These findings supported the overall concept that athletes increased their academic achievement through bodily-kinesthetic and visuospatial learning.

Athletes and non-athletes from multiple urban middle schools in Worcester, Massachusetts were evaluated by their physical education teachers. The students were rated as athletes ($n = 423$) if they participated in an organized sport. The categories on which they rated students included athleticism, self-esteem, peer behavior, and drug use (McHale et al, 2005). In this study, it was revealed that athletes had higher levels of self-esteem, less shyness, and lower levels of aggression. Interestingly, the male athletes

tended to acknowledge a greater tendency to engage in delinquent behaviors than did their non-athlete counterparts (McHale et al., 2005). No academic information was included in this study.

In this review, previous research in the realm of comparing athletes and non-athletes academically was quite limited, and focused primarily on student grade point averages. As athletes have been held accountable for their grades, researchers (Fox et al., 2010; Ryska, 2003; Stephens & Schaben, 2002) found evidence that athletes did, in fact, outscore non-athletes based on overall GPA. As districts and individual schools have recently been evaluated under accountability measures using standardized test scores, no evidence was found in which athletes and non-athletes were compared using this measure of academic achievement.

Standardized Testing

Since 2001, educational leaders have been creating and adapting assessments to analyze academic achievement according to state benchmarks in reading and mathematics (Zigmond & Kloo, 2009). As standardized testing became the norm due to NCLB requirements, research concerning achievement based on subgroup populations became necessary in grades K-12 (Popham, 2009). Some leaders have been using growth models to validate increased achievement over time, and others have focused on the single high-stakes test to measure academic achievement in an attempt to meet AYP (Jennings & Corcoran, 2009). According to Zigmond and Kloo (2009), none of this research is new.

Horace Mann first introduced standardized testing in Boston public schools in the mid-19th century as a measure of teaching and learning. In the 1920s, student achievement testing and student tracking followed (Gallagher, 2003). Gallagher wrote that standardized testing became more important to government researchers during both World War II and the Cold War to measure student levels of academic achievement, leadership, and management skills. Finally, Title I of the Elementary and Secondary Education Act of 1965 required schools to prove funding was justified by validating student achievement to retain federal funding in underfunded schools (Gallagher, 2003).

Although standardized testing has been in existence since the 1800s, the significant impact was established during the 1970s due to educational accountability (Longo, 2010). The impact continued to increase with the implementation of NCLB. Longo described the increasing prevalence of standardized testing in a number of states. Johnson (2006) explained that states were implementing research-based instructional methods to improve standardized test scores to provide additional evidence of accountability.

According to Ahamed et al. (2007), some educators feared that electives reduced classroom instruction time and harmed the academic progress of students. Researchers in Canada analyzed the standardized test scores of fourth and fifth grade students to evaluate academic achievement based on physical activity. The research indicated test scores were not negatively impacted by an additional 10 minutes of physical education per day.

Another fear concerning most educational leaders was related to the educational gaps among subgroups, such as ethnicity and SES, who participated in standardized testing (Ahamed et al., 2007). Gough (2001) used Florida's Comprehensive Assessment Test (FCAT) as an example in her editorial article regarding a divide in student scores. She explained that the 2001 academic year scores showed gains for minority students in both Broward and Palm Beach County. Her frustrations were evident, however, in the additional increases in white students' scores, which in turn widened the gap between whites and blacks in a single year.

Gough (2001) stated, "With time and resources and steadfast determination, educators can successfully teach to a test. But the data suggest that even excellent test-prep cannot overcome the learning problems that poverty poses for schoolchildren" (p. 486). Bracey (2002) concurred, noting (a) a significant slump in reading ability between poor and middle-class students based on previous research and (b) a significant negative regression in elementary students' reading scores based on low socioeconomic status. This led researchers to investigate standardized tests for possible bias.

In regard to NCLB, standardized testing is said to have limitations. According to Haretos (2005), (a) many standardized tests are limited to certain standards, (b) the standardized tests create negative consequences for racially diverse schools, and (c) AYP measures have been incomparable across states. Haretos claimed these unequal measures lead to a false sense of academic proficiency across the nation when comparing students in one state to another.

Haretos (2005) analyzed fourth grade student scores for reading proficiency in South Carolina and Tennessee using the National Assessment of Educational Progress (NAEP). Of the students from these two neighboring states, 26% were considered proficient in reading according to the NAEP standards. However, the state exams for reading used in Tennessee revealed an 80% proficiency rate and South Caroline revealed a 31% proficiency rate (Haretos). This provided significant evidence of state bias in levels of expectations and state-level testing inaccuracy; however, the effects have also been seen in other areas such as student placement based on test scores.

When determining track placement for high school advanced courses, eighth grade students are placed according to state test scores and GPA. In a study by Archbald, Glutting, and Xiaoyu (2009), whites outscored blacks by 36 points based on mean scores. This evidence was also reflective of a lower percentage of black students placed in advanced courses compared to white students.

According to Crain (2004), students of color and low SES have typically scored lower than whites on the SAT, creating roadblocks to the pursuit of a higher education. In contrast, Everson and Millsap (2004) disagreed with the argument that ethnicity and SES were the primary reasons students were disadvantaged on the SAT. Relevant to this study, however, was the finding that better overall schools and participation in extracurricular activities voided the disparity in overall achievement for previously determined disadvantaged students and closed the gaps between ethnicity and SES.

Empirical Support Examining Athletes and Standardized Testing

Limited research related to the central focus of this study, i.e. standardized testing specifically targeting middle school athletes, was found in this review of the literature. Sedlacek and Adams-Gaston (1992) provided a body of knowledge regarding student athletes at the freshman college level using the Scholastic Aptitude Test (SAT) and other noncognitive variables to predict grades. They found that student athletes who were labeled as nontraditional students came from a culture among athletes which included (a) consistent time together, (b) common goals, and (c) subjection to prejudice based upon stereotyping of athletes (Sowa & Gressard, 1983, as cited in Sedlacek & Adams-Gaston). The concept of nontraditional students was used in the triadic reciprocality (Bandura, 1986) category of environment for this study.

The student athletes ($N = 105$) were a minimally diverse sample from a large eastern university representing revenue and non-revenue sports. These student athletes were assessed based on their SAT scores and a Noncognitive Questionnaire (NCQ) consisting of eight subscales comprised of 29 questions. Scores from the instrument were shown to be a valid predictor of grades for nontraditional students such as minorities and international students (Sedlacek & Adams-Gaston, 1992). The findings revealed that mathematics SAT scores ($M = 520$, $SD = 84$) and verbal SAT scores ($M = 448$, $SD = 78$) combined with a grade point average ($M = 2.28$, $SD = .86$) had no significant correlation (mathematics $r = .02$, verbal $r = .05$) in predicting first semester grades. According to the

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NCQ, there were significant correlations between support relationships, community, and self-concept as predictors of first semester grades.

As Sedlacek and Adams-Gaston (1992) mentioned in their research, the small sample would make further comparisons of the selected student athletes to others difficult, because the students in the sample were already enrolled in a college and by definition had minimum SAT scores required for entrance into the university. Second, the sample was 64% male and 36% female. Of the male athletes, 15% were black, 4% were Hispanic and 80% were white. Some high school and middle school student athletes who did not pursue a college education were not evaluated. Therefore, the results were not reflective of the entire population of high school student athletes.

<div align="center">Homework</div>

The positive (Marzano, 2001) and negative (Kohn, 2006) effects of homework have been debated for decades. A scan of numerous articles revealed over 400 articles, mostly opinions, related to homework since 1900 (Wahlberg, Paschel & Weinstein, 1985). Historically, homework was designed as a practice tool for future summative assessments and a tool for increasing grades and achievement in the classroom (Van Voorhis, 2003). As researchers have indicated, homework varies from grade level and subject area. Cooper (1989) suggested three to five assignments per week, each lasting 45 to 75 minutes, for middle school students.

Homework used as an assessment tool has been considered effective for student achievement, as it provides feedback for students to determine their level of academic

gains (Cooper, 1989, 2001; Wahlberg et al., 1985). Kralovec and Buell (2001) suggested

that, because homework had become such a problem, the practice might be better

abolished. They suggested that homework was not beneficial to academic achievement

since students regularly receive too much homework. They recommended that the work

could be completed in the classroom if the curriculum used proper scaffolding. Kralovec

and Buell expressed concerns that excessive homework restricts valuable family time for

a process driven by political, not pedagogical, decisions.

In 2001, Cooper explained the positive and negative effects of homework as

follows: On the one hand, homework provides immediate achievement and learning

while also providing long-term academic and nonacademic benefits. In contrast, the

negative effects are satiation, parental interference, and cheating. Although homework

creates an opportunity for parents to be involved in the educational process, significant

differences have been shown between students from low-income and affluent homes.

Cooper (1989; 2001) suggested homework used in moderation was historically the best

method to incorporate the activity in a positive academic environment that allows

students to excel.

According to Christopher (2007), homework is one of the most valuable

formative assessments a teacher can use. It allows students to practice the content and

teachers the opportunity to diagnose student mastery. She stated, "Top-level athletes

need to practice regularly to be successful. Athletes are not given their final evaluation

on the practice field, but at the important game or race" (Christopher, p. 74). She also

commented on the benefit of homework as rehearsal before the final event, the summative assessment. As athletes and students practice, they are better prepared for the final evaluations; the game and test, respectively.

Time Spent on Homework

In a study conducted from 1976 to 1985, it was shown that high school seniors spent approximately seven hours per week completing homework (Freedman-Doan & Lipsch, 1997). According to the U.S. Department of Education (2008b), students in grades K-8 spent an average of 9.2 hours per week completing homework. Based on ethnicity, students spent various amounts of time on average per week: (a) white, 9.4 hours; (b) black, 8 hours; (c) hispanic, 8.8 hours; (d) asian, 11.1 hours per week. A comparison was made between middle school students from the United States and South Korea, which revealed significant differences in homework participation (Won & Hon, 2010). The results indicated homework was positively associated with academic achievement in South Korea, although it was negatively associated in the United States.

In a meta-analysis performed by Cooper (1989), junior high school students in grades six through nine had a significant increase in achievement based on the hours per week spent on homework. Specifically, students who spent less than one hour per week were the lowest achievers. Surprisingly, students who spent no time on homework were next and were higher achievers than those who spent less than one hour per week. Next, students who spent one to five hours per week increased their achievement significantly and were surpassed in achievement only by those spending five to ten hours per week.

Finally, students who spent 10 or more hours per week began decreasing their level of achievement with a continued cyclical effect as the amount of hours spent on homework increased (Cooper & Valentine, 2001).

Researchers studied homework for secondary students ($N = 280$), grades 6 through 10. Wagner, Schober, and Spiel (2008) surveyed male ($n = 120$) and female ($n = 160$) students to compare gender and frequency of time spent on completing homework, as well as the tasks performed during afterschool homework. Students spent an average of 11.5 hours per week performing work at home and an average of four hours involved specifically on homework. The remaining time was spent as follows: (a) preparing for exams, 5.1 hrs; (b) repeating classroom work, 1.3 hrs; and (c) preparing for projects, 1.2 hrs on average. No statistical significance in academic achievement (r = -.04) was found based on the amount of time spent on homework, and time spent specifically on homework was found to be less for males (3.4 hrs) than females (4.3 hrs) (Wagner et al., 2008).

Relationship Between Homework and Athletic Participation

Cosden et al. (2004) combined the work of previous researchers and reached conclusions regarding the positive and negative effects of homework as it related to afterschool activities for students of all ages. They concluded that excessive extracurricular activities such as sports and clubs can interfere with homework completion and detract from academic work. On the other hand, they determined that afterschool activities encouraged positive peer group interaction, served as a form of

academic motivation, provided parental involvement opportunities, and were a form of supervision for working parents (Cosden et al., 2004).

Lauver (2002) found that an urban afterschool program in Philadelphia had a significant impact on homework. Students participating in extracurricular physical activities had a 16% increase in spending one or more hours on homework in comparison to students who were not involved in the extracurricular program. Though the program was not a school-sponsored sport, a correlation was made by the researcher suggesting that physical activity promotes students' willingness to complete homework.

Homework plays a significant role in the academic eligibility of student athletes, as homework is commonly graded by teachers, and athletes are accountable to complete their homework to maintain expected levels of learning and maintain the minimum grade point average requirement. Minotti (2005) suggested that homework is considered a continuous method of formative assessment that should be assigned based on the individualized learning style of the student.

Empirical Support Examining Homework and Efficacy Beliefs

Researchers investigated the possibility of increased academic achievement in mathematics based upon efficacy beliefs and efforts in homework (Kitsantas, Cheema, and Ware, 2011). Results indicated a positive efficacy in mathematics achievement, in combination with continued efforts to complete homework, as a significant factor in academic achievement. Interestingly, as homework efforts increased, mathematics achievement decreased. In contrast, as self-efficacy increased, so did mathematics

achievement. However, in analyzing the impact of self-efficacy, all academic

achievement gaps in mathematics diminished when ethnicity and gender were considered

(Kitsantas et al., 2011). These findings revealed that the combination of effort and

efficacy had a counterproductive impact on academic outcomes. No studies were found

in the literature review that focused on athletic participation in combination with

homework and efficacy beliefs.

<center>The Impact of Self-efficacy on Student Outcomes</center>

Self-efficacy is the "belief in one's capabilities to organize and execute the

courses of action required to produce given attainments" (Bandura, 1997, p. 3).

According to Bandura and Cervone (1983), goal systems were activated and gained

power by positive self-efficacy. There is also evidence that increased skills leading to a

goal are related to higher levels of perceived self-efficacy. Therefore, attaining higher

educational goals require persistence, i.e., higher self-efficacy and increased academic

skills (Bandura, 1989; 1997; 2001).

Using Bandura's social cognitive theory on efficacy beliefs and educational

outcomes, student self-efficacy as a belief and predictor was tested in reading. Middle

school students' self-efficacy in reading had a statistically significant correlation with

achievement based upon the Stanford Achievement Test (Barkley, 2006). Barkley's

research was supportive of Bandura's social cognitive theory.

Mucherah and Yoder (2008) identified the effects of self-efficacy among middle

school students on their reading scores. They revealed significant relationships between

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self-efficacy and performance on the Indiana Statewide Testing for Educational Progress (ISTEP+) for reading. Student self-efficacy was determined by the Motivation for Reading Questionnaire (MRQ). The middle school students ($N = 388$) were drawn from two public schools and consisted of 194 sixth graders and 194 eighth graders. The population was considered diverse based upon ethnicity, gender, and socioeconomic status (Mucherah & Yoder, 2008).

Mucherah and Yoder (2008) found a moderate relationship ($r = .42$, $p < .01$) between self-efficacy and reading test scores according to the scores from the MRQ and ISTEP+. A regression analysis was performed to determine if there was a predictability of ISTEP+ performance and other identified variables. The overall analysis revealed a significant test effect among all variables. Efficacy, gender, and ethnicity were all significant indicators of ISTEP+ reading scores. Through this research, a common indicator was found that continued to provide evidence for higher reading scores for females in comparison to males (Mucherah & Yoder, 2008). These findings suggested a critical analysis of reading motivation to include measures of efficacy, enjoyment, and challenge based upon findings from the MRQ, to fully understand student motivation and academic achievement.

According to Bembenutty's (2010) comparison of learning theories, the social cognitive learning theory was set apart from many other learning theories based on the suggestion that perceived instrumentality is governed by the learners' self-efficacy and expected outcomes. Perceived instrumentality was defined by the extent to which time

on task would lead to the desired outcome. Time on task, however, was related to the personal belief of succeeding in a future outcome.

Bembenutty (2010) identified three major distinctions of social cognitive learning theory. First, self-efficacy is measured separate from performance and requires no dependency on the task value, level of expectancy, or future orientations. Self-efficacy is the driving force behind an individual's choice and pursuit of future short and long-term goals. Second, self-efficacy is situation-specific, and an individual is able to vary in levels of self-efficacy from task to task. Bembenutty provided the following example:

> A learner who is highly efficacious in math may not be as highly efficacious in English. Further, the same student who is highly efficacious in doing fractions may not be as highly efficacious in decimals. The strength of self-efficacy can vary from task to task. Thus, a learner may have high self-efficacy for a Spanish course but very low self-efficacy for an Algebra course (p. 8).

Lastly, self-efficacy is not considered a personalized characteristic or trait. Instead, it is a motivational and behavioral process by which an individual operates according to the cognitive perception of the situation and task.

Self-efficacy in Academic Goals

The analysis of student athletes and non-athletes is used to provide an increased focal point for the positive social and academic impact which sports provide for students. The athletic culture provides the triadic reciprocality among behavior, environmental factors, and personal factors to increase academic achievement. For this study, Bandura's (1986; 1989; 1997) self-efficacy was the focal point based on students' self-reported future educational goals. There was, at the time of the present study, limited

empirical evidence comparing athletes to non-athletes based on the self-efficacy of future educational goals.

In 1970, Spady indicated athletes had high expectations of their future educational goals, primarily through peer status. Their goals were not based on their personal academic abilities. These exaggerated goals eventually backfired, as the student athletes were not always academically capable of pursuing a college education. Additional research by Wesch, Law, and Hall (2007) provided evidence which revealed a positive effect on the self-efficacy among athletes who excelled in sports. These findings were of some significance to the overall theme of this study, in which athletic participation and goals in academics were compared with standardized test scores.

Empirical Support Examining Self-efficacy Bias

In 2008, Ramdass and Zimmerman studied self-efficacy bias or the overestimation of academic abilities by students. The researchers discovered a statistically significant difference in self-efficacy and self-efficacy bias, based on mathematics performance. Their study involved students ($N = 42$) from a parochial school and private afterschool program in an urban, northeastern area. The students were both males ($n = 20$) and females ($n = 22$) enrolled in fifth and sixth grade. The students were placed in two groups: (a) a trained group that was provided training on how to accurately self-regulate self-efficacy, and (b) a control group that received no training in self-regulation.

According to Randass and Zimmerman (2008), the training involved a pretest and posttest scenario in which students in the trained group were guided through a self-check and self-correct process for accuracy of the answers and on the mathematics test. The control group was not provided this training. The trained group was provided the opportunity to understand their personal capabilities regarding mathematics skills according to right and wrong answers. During the posttest, each question was shown for a brief period of time, and the self-efficacy scale was given to all students to evaluate their skills and ability to answer correctly. The test was graded, and mathematics performance was evaluated based upon the self-efficacy scores.

The results from the analysis revealed a significant main effect for the trained group and a lesser interaction between gender and grade. The trained students ($M = 7.15$) surpassed the control group ($M = 6.38$) in accurately assessing their self-efficacy, self-evaluation, and mathematics performance. In addition, self-efficacy positively correlated with mathematics performance ($r^2 = .49$) as did self-efficacy accuracy ($r^2 = .44$).

In Ramdass and Zimmerman's (2008) discussion, they explained their findings. They suggested that teachers should be aware of student self-efficacy beliefs and encourage students to self-reflect so that students do not misjudge their own capacity to perform in mathematics. They also suggested that teachers should use strategic and accuracy training to increase mathematics performance. The researchers indicated that low self-efficacy may be to blame for the avoidance of challenging courses such as mathematics. These findings were in alignment with those of Boekaerts, Otten, and

Voeten (2003), who suggested that students in middle school have pre-existing efficacy beliefs based on previous success and failure which significantly affect standardized test scores.

Empirical Support Examining Self-efficacy in Afterschool Program Participants

One afterschool program for urban youth in Philadelphia was evaluated by Lauver (2002). This extracurricular program consisted of physical activities and other non-academic activities. Lauver's findings provided no significant support for the program's having increased academic achievement. However, there was a statistically significant impact on student aspirations for education after graduating from high school. There was an 11% increase in aspirations for students who were involved in the program compared to students who were not involved in the program.

Beghetto (2006) examined the correlation of creative self-efficacy among secondary students. The students ($N = 1,322$) were selected from two middle schools and one high school, with 69% ($n = 870$) of the population being Hispanic-Latino students and 62% of the population who spoke a language other than English at home.

Students were given a paper-pencil survey to retrieve descriptive statistics and evaluate their creative self-efficacy using a five-point Likert-type scale where $1 =$ true and $5 =$ not true in three questions ($\alpha=.86$). Afterschool activities were chosen from a nominal scale according to activities the school offered. Personal academic beliefs were also measured by Beghetto (2006) using statements about future academic goals such as "I plan to go to college" (p. 450).

The results revealed a statistically significant difference between the lower 50th percentile in self-efficacy ($M = 3.87$, $SD = 1.16$) and the upper 50th percentile in self-efficacy ($M = 4.37$, $SD = 0.96$). Also, students with low and high measures of self-efficacy had statistically significant variances in areas of afterschool activities. Students with low measures of self-efficacy had lower scores ($M = 1.88$, $SD = 1.14$) in comparison to students with high measures of self-efficacy ($M = 2.04$, $SD = 1.21$). These findings suggested there was a higher level of self-efficacy in future academic goals among students, most of whom were minorities, who participated in afterschool activities.

Academic Self-efficacy Among Athletes

In 1970, Spady discovered athletic participation was strongly associated with having high status among students' peers in school. This status was further related to the intent for high status after leaving high school, which was a prime determinant for striving toward a college education. Unfortunately, extracurricular activities were not providing the skills and orientations to succeed in college (Spady, 1970). This was considered a biased goal (Ramdass & Zimmerman, 2008).

Hansen and Wänke (2009) followed up on previous findings regarding the effects of stereotyping on self-efficacy outcomes. After priming the stereotypical behavior of athletics and physical activity into non-athletes, the non-athletic participants in the study actually showed more persistence in physical activity. This suggested that activation of stereotyping, such as that associated with athletics, could affect self-efficacy beliefs,

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which in turn could affect the behaviors and motivation within a given group (Hansen &

Wänke, 2009; Phillips & Schafer, 1971).

Ryska and Vestal (2004) investigated self-efficacy as it concerned the academic

goals of ethnically diverse athletes ($N = 323$), ages 14-18. Athletes were labeled as

having task-oriented or ego-oriented styles of motivation according to the Task and Ego

Sport Motivation Questionnaire. The males ($n = 160$) and females ($n = 163$) were

analyzed using a multivariate approach. The results revealed no statistical significance

for task-oriented male athletes or ego-oriented males regarding educational goals.

However, among female athletes, the evidence suggested that both task-oriented and ego-

oriented motivation had statistically significant effects regarding personal academic goals

(Ryska & Vestal, 2004). These findings were contrary to those of Hawkins and Mulkey

(2005) who concluded that eighth grade African American male athletes aspired to

complete high school and to attend college.

Variances of National Assessment of Educational Progress (NAEP) Test Scores

The ECLS-K direct cognitive assessment is aligned with the expectations assessed

using the NAEP (Tourangeau et al., 2009; Walston, 2008). The following background

information on previous studies concerning gender and socioeconomic status is designed

for use in comparing and contrasting gaps in mathematics and reading achievement with

the results of the ECLS-K data.

Smith and Smith (2004) observed that there may have been a lack of effort due to

a lack of student motivation on the 1990 NAEP because students did not receive their

scores on the examinations and there were no consequences for the results, such as those in the SAT or ACT. Student scores may have been lower due to a lack of effort and concern over the results (Smith & Smith, 2004).

Research was conducted by Lubienski (2002) to evaluate the National Assessment of Educational Progress (NAEP) data from 1990 to 2000. Achievement gaps were discovered in black-white comparisons and in SES gaps in overall achievement. Further studies of NAEP data also provided evidence of gender as a significant influence on the overall achievement in mathematics and reading (Rampey et al., 2009).

Gender

Examples of gender gaps exist outside the academic realm through neuropsychological studies, which have produced evidence of variances in tactual measures, strength, and speech-sound perceptions between males and females (Leckliter, 1989). In contrast, one study provided no evidence of variances between males and females in executive functions when studying students with Attention Deficit Hyperactivity Disorder (Seidman et al., 2005). Within education, many researchers (Ding et al., 2006; Everson & Millsap, 2004; Marsh et al., 2005) have provided evidence of variances in mathematics and reading standardized test scores between males and females. For this study, trends in NAEP data were presented, as the ECLS direct cognitive assessment aligned with the reading and mathematical expectations of the NAEP assessment (Tourangeau et al., 2009; Walston et al., 2008).

Historic trends from 1971 to 2004 revealed significant gaps in reading achievement between males and females (Perie, Moran, & Lutkus, 2005; Sadowski, 2010). Sadowski, however, noted that the universal problem may be furthered by geographic location, as the gaps in reading differ across state lines. In 2008, the mean scores in reading for 13-year-old females and males were 264 and 256 respectively (Rampey et al., 2009). Tilley and Callison (2005) claimed the achievement gap was caused by a higher exposure to early literacy for girls.

The same study by Perie, Moran, and Lutkus (2005) revealed a minor, but notable, gap in NAEP mathematics scores between males and females from 1973 to 2004 except in 1986 when male and female mean scores were the same. Typically, males have outscored females by a narrow margin within this age group, but achievement for both genders has been equal by grade 12 (Geist & King, 2008). In Rampey et al.'s 2009 study using data from 2004 and 2008, the mean scores for 13-year-old males rose from 278 to 284 whereas female mean scores rose from 278 to 279. In the four-year period, males increased by six points, but females increased by only one point. At the middle school level, females outscored males in reading, and males outscored females in mathematics on the NAEP (Geist & King, 2008; Perie et al., 2005; Rampey et al, 2009; Sadowski, 2010).

Socioeconomic Status

Historical data have revealed that economically disadvantaged students score lower on standardized tests in mathematics and reading (Fashola & Slavin, 1997;

Johnson, 2006; Toutkoushian & Curtis, 2005) than do their less disadvantaged

counterparts. This has led to stereotypically low scores on test scores (Spencer &

Castano, 2007). Fashola and Slavin (1997) provided evidence suggesting that increases

in test scores for low SES students on the NAEP were due to interventions through Title I

funding. Their research encouraged schools to use the methods and resources that were

readily available to reach out to the economically disadvantaged.

High SES students have shown consistent increases in scores on the NAEP

mathematics assessment from 1990 to 2003 (McGraw, Lubienski, & Strutchens, 2006).

This trend was evident, and many low SES were outscored in mathematics at multiple

grade levels. A consistent increase in mean NAEP mathematics scores was found for

each SES quartile in the 2000 data. As the SES quartile increased, mean scores also

increased (Lubienski & Lubienski, 2005), but a gap remained between high and low SES

students.

The gaps between SES classes were found to be significant in other studies.

Using NAEP data, results indicated middle and upper class students outscored lower

socioeconomic class students (Godwin, Leland, Baxter, & Southworth, 2006). Godwin et

al. also identified a lack of gap closure for low SES students after school choice was

provided in Charlotte, North Carolina. The school choice intervention proved to be

unsuccessful for students based upon socioeconomic status.

Comparing Athletes and Non-athletes Using Standardized Test Scores

Literature specific to the research questions was quite limited. As has been indicated throughout the literature review, much of the research comparing athletes and non-athletes was based on GPA (Fox et al., 2010; Ryska, 2003; Stephens & Schaben, 2002) and cognitive functions (Akarsu et al., 2009). Much of the research comparing athletes and non-athletes was limited to the high school and college levels and was somewhat irrelevant to this study, as these students have reached a maturation level far beyond that of the population in this study. Following is a summary of the literature reviewed which specifically addresses the research questions comparing eighth grade athletes and non-athletes in regards to standardized test scores in mathematics and reading. Though the literature was limited, it creates a perspective from previous research in this arena.

Empirical Support Examining Reading Scores Comparing Athletes to Non-athletes

JacAngelo (2003) statistically analyzed athletes' and non-athletes' ($N = 2081$) FCAT Reading scores in the Miami-Dade school district located in south Florida. These high school students were selected at random and the population was significantly diverse based upon gender and race. The analysis included an ANCOVA, and the eighth grade FCAT Reading scores served as a control variable.

To analyze the FCAT Reading scores, the 10th grade test was the dependent variable, and the 8th grade test was the covariate. Statistical significance was determined for athletes with a minimal effect size $\eta^2 = .01$. The adjusted means with the eighth grade

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FCAT scores were 295.97 and 258.74 for athletes and non-athletes, respectively. After analyzing the data for multiple interaction effects including gender and ethnicity, the slopes were not considered homogeneous. In the end, a minimal significance was discovered in favor of athletes compared to non-athletes (JacAngelo, 2003).

Little (2009) found no statistical significance in mean reading scores between multiple ethnicities including black, hispanic and white students, among those who participated in an afterschool academic enhancement program which involved physical activity but was not considered school-sponsored sports. She also discovered a higher increase in low socioeconomic student mean reading scores compared to non-low socioeconomic student scores after involvement in the program.

Zoul (2006) analyzed the differences in reading scores between athletes and non-athletes in three middle schools in Georgia. These three middle schools had nearly identical demographics, but discrepancy existed between the number of middle school sports offered at each school. The test score data from this analysis was obtained for eighth grade students ($N = 1231$) who took the 2004 Georgia Criterion-Reference Competency Tests (CRCT).

The data were separated by three types of schools that offered (a) no sports, (b) limited sports, and (c) extensive amounts of sports. The results revealed a statistically significant difference between scores among schools that offered sports at the three various levels. The middle school that had no sports scored highest ($M = 381.94$, $SD = 39.03$), the school with limited sports was second ($M = 377.88$, $SD = 43.92$), and the

school that offered an extensive array of sports was lowest ($M =$ 371.26, $SD =$ 42.01) in achievement. These results indicated a statistically significant deficit in reading scores in comparison to schools with limited or no sports offered to their students (Zoul, 2006).

Coleman (2010) studied the standardized test scores of eighth grade sports participants compared to non-participants. Using the Tennessee Comprehensive Assessment Program exam as the dependent variable, there was no statistical significance in reading scores between athletes and non-athletes while controlling for socioeconomic status and gender. Though these findings were not based on a national study, they did contradict the findings of JacAngelo (2003) whose study involved students from a different state.

Empirical Support Examining Mathematics Scores Comparing Athletes to Non-athletes

JacAngelo (2003) analyzed athletes and non-athletes ($N =$ 2081) FCAT mathematics scores in the Miami-Dade school district. These same students were utilized in the FCAT reading analysis previously discussed. The analysis included an ANCOVA, and the eighth grade FCAT mathematics scores served as a control variable.

To analyze the FCAT mathematics test, the 10th grade test was the dependent variable and the eighth grade test was the covariate. A statistical significance was found for athletes with a minimal effect size $\eta^2 =$ .02. The estimated marginal means of the eighth grade FCAT scores were 314.65 and 305.58 for athletes and non-athletes, respectively. After analyzing for multiple interaction effects including gender and ethnicity, the test revealed that the slopes were not homogeneous and were, therefore,

insignificant. A statistical significance, at a minimal level, was evident in favor of athletes (JacAngelo, 2003).

Lipscomb (2007) used the 1992 National Educational Longitudinal Survey database to compare mathematics scores of athletes and club members of middle and high school students. The results indicated a 1.18% increase in mathematics scores for athletic participation. Athletes also increase their completion rate for obtaining a bachelor's degree by 3.5% in comparison to other students who were not participants in sports. Furthermore, an overall reduction of 0.82% was found in mathematics scores for low SES (Lipscomb, 2007). Little's (2009) findings supported the findings of Lipscomb. When comparing Lipscomb and Little, Lipscomb must be recognized with strength, as it was a national study.

Zoul (2006) analyzed the differences in mathematics scores between athletes and non-athletes in three middle schools in Georgia. These students' ($N = 1,231$) reading test scores were based on the 2004 Georgia Criterion-Reference Competency Tests (CRCT).

The results are separated by the three types of schools that offered (a) no sports, (b) limited sports, and (c) an extensive number of sports. The results revealed a statistically significant difference between scores among schools offering sports at three various levels. The middle school that had limited sports scored highest ($M = 360.63$, $SD = 39.53$), the school with no sports ranked second ($M = 354.24$, $SD = 31.34$) and the school that offered the most extensive number of sports was lowest ($M = 344.47$, $SD = 38.24$) in achievement. These findings suggested that a school providing extensive

numbers of sports had a statistically significant deficit in mathematics scores in comparison to schools with limited or no sports offered to their students (Zoul, 2006).

Coleman (2010) also studied the standardized test scores of eighth grade sports participants compared to non-participants. Using the Tennessee Comprehensive Assessment Program exam as the dependent variable, no statistical significance in mathematics scores between athletes and non-athletes was found while controlling for socioeconomic status and gender. These findings, which were not based on a national study, contradict the findings of JacAngelo (2003) in his study of another state and those of Lipscomb (2007) in his national study.

<u>Summary</u>

The literature review has provided a comprehensive overview of the historical perspective of accountability and athletic participation. As indicated in the review, there has developed a strong base of support for standardized testing in the United States. Accountability initiatives such as NCLB and AYP have become increasingly important to students at all levels, but athletics has not been subjected to these same accountability measures.

This review has included empirical studies comparing athletes and non-athletes at many levels. Standardized testing, homework, and self-efficacy studies, including athletic participation, have been discussed, and the positive impacts of future academic goals through self-efficacy and homework participation have been established.

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Finally, empirical studies, which compared mathematics and reading test scores between athletes and non-athletes, were discussed. A limited amount of previous research exists when comparing middle school athletes to non-athletes, but the available research revealed many gaps between the two groups. Trends in mathematics and reading scores in NAEP data have shown significant gaps based on gender and socioeconomic status. However, standardized test scores were noted to favor athletes compared to non-athletes. Interestingly, control variables such as gender and socioeconomic status have yielded mixed results in a number of studies comparing mathematics and reading test scores of athletes and non-athletes.

CHAPTER 3
METHODOLOGY

<u>Introduction</u>

Chapter 3 contains a description of the methods and procedures used to collect

and analyze the data used in the study. The purpose of the study was to use measures of

academic accountability to determine if participation in school-sponsored sports provided

a relationship for a mean difference in mathematics and reading achievement among

eighth grade students. The research also utilized several control variables for statistical

analysis to further validate the difference between athletes and non-athletes based on self-

stated future educational goals, self-reported weekly time spent on homework, and

socioeconomic status.

The research conducted was based on the following four questions:

1. To what extent is there a difference in mathematics achievement between

   eighth grade athletes and non-athletes while controlling for self-stated future

   educational goals and socioeconomic status?

2. To what extent is there a difference in mathematics achievement between

   eighth grade athletes and non-athletes while controlling for self-reported

   weekly time spent on homework and socioeconomic status?

3. To what extent is there a difference in reading achievement between eighth

   grade athletes and non-athletes while controlling for self-stated future

   educational goals and socioeconomic status?

4. To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework and socioeconomic status?

The chapter was organized by the following sections: (a) design, (b) data source, (c) instrumentation, (d) instrument reliability and validity, (e) research questions, (f) variables, and (g) data analysis. The chapter is concluded with an explanation of the adjustment made for the complex sampling design.

Design

This study reflects a causal comparative analysis. The comparative analysis' primary function was to compare student athletes to non-athletes with regard to student achievement in mathematics and reading. A factorial ANOVA was chosen to analyze the data for the four research questions.

Data Source

Data from this study was drawn from the Early Childhood Longitudinal Study – Kindergarten Class of 1998-1999 (ECLS-K). The data set was a public database sponsored by the National Center for Education Statistics (NCES) within the Institute of Education Sciences of the United States Department of Education. Included was a nationally representative sample of 22,782 diverse students enrolled in 944 different kindergarten programs across the country (Tourangeau et al., 2009; Walston et al., 2008).

The sample in the final wave was considered a representative sample of the original cohort (Tourangeau et al., 2009). Many kindergarten students involved in the first wave were not involved in the final wave of analysis, and this was expected. Moving from elementary to middle school was understood and anticipated when recollecting data for the final wave in 2007 (Walston et al., 2008).

According to the U.S. Department of Education (2008c), the NAEP target population for 13-year-olds in 2008 was 3,596,000 with a sample of 8,700, which provided significant equality in samples between these two studies. The ECLS final wave sample was representative of 80% of the eighth graders in the U.S. during the 2006-2007 academic year (Tourangeau et al., 2009).

The final wave of the study was conducted in the spring of 2007, and included over 9,000 students in various grade levels. This study was based on the general progression of expectations for their status as ECLS-K students in 1998-1999 to be enrolled in eighth grade, but retention and advanced progression both affected student placement in the spring of 2007 (Tourangeau et al., 2009). After the sample for the final wave was determined, trained researchers collected data from the students, families, and schools (Walston et al., 2008).

The students were also given direct cognitive assessments to determine various levels of academic achievement and a student questionnaire during a two-hour time frame overseen by a trained researcher (Tourangeau et al., 2009). In the present study, the

mathematics and reading direct cognitive assessments were the basis for analyzing

academic achievement.

The ECLS data were intended to be used for analytical and descriptive purposes.

The direct cognitive assessments and multiple parent, teacher, student, and administrative

surveys were the primary sources of data collection used throughout the longitudinal

study (Walston et al., 2008). The ECLS-K data used for this study were public use data

with no identifying information for respondents (Appendix B). Also, this research was

not defined as human research by the Institutional Review Board (IRB) of the University

of Central Florida and did not require IRB approval (Appendix C).

Instrumentation

For the purpose of this study, the ECLS-K final wave study involved multiple

surveys, field analysis, and a direct cognitive assessment. Multiple surveys were aligned

with previous research and included other areas of interest to further evaluate the

education of the original sample in 1998-1999 (Walston et al., 2008). The primary

source of data for this research study involved the results of the direct cognitive

assessments in mathematics and reading combined with results from the student survey

contained in the ECLS K-8 public use NCES data file. Secondary sources of data

included the parent survey and the field assessments by trained staff from the NCES.

Direct Cognitive Assessments

According to Tourangeau et al. (2009), the reading and mathematics IRT scores were created from direct cognitive assessments using questions from multiple disciplines. Eighth grade expectations were similar to those used in the National Assessment of Educational Progress, the National Educational Longitudinal Studies of 1998, the Educational Longitudinal Study of 2002, and the Texas Assessment of Knowledge and Skills. The direct cognitive assessments were used throughout the study for longitudinal analysis, as each content area had overlapping questions from year to year.

The assessments were administered in two stages. The paper-pencil assessment was given in two waves to create an IRT Scale Score which measured the estimated correct score (Tourangeau et al., 2009; Walston et al., 2008). The initial stage, which consisted of 10 questions, determined the level of testing a student should receive in the second stage. A two-level test, high or low, was given after the results were analyzed from the first stage of testing. The respondents were given 80 minutes to complete the assessments in mathematics and reading. For the purposes of this study, assessments in reading and mathematics were examined and are detailed in the following section.

Mathematics Achievement

Mathematics performance in grade 8 was based on the mathematics IRT scale score from the direct cognitive assessment completed in 2007 (C7R4MSCL). The mathematics IRT scale scores ranged from 66-172 and were measured according to grade level expectations. These scores were also indicative of the total estimate of the number

of questions a student would have answered correctly over time. This estimate was based

on previous right, wrong, and omitted responses, which also took into account the level

of difficulty of each question (Tourangeau et al., 2009).

The scores for mathematics were based on questions comprised of content strands

involving number sense, properties, operations, measurement, geometry, spatial sense,

data analysis, statistics, probability, pattern, algebra, and functions (Tourangeau et al.,

2009).

Reading Achievement

Reading performance in grade 8 was based on the reading IRT scale score from

the direct cognitive assessment completed in 2007 (C7R4RSCL). The reading IRT scale

scores ranged from 85-209 and were measured according to grade level expectations.

These scores were indicative of the total estimate of the number of questions a student

would have answered correctly over time. This estimate was based on previous right,

wrong, and omitted responses, which also took into account the level of difficulty of each

question (Tourangeau et al., 2009).

The scores for reading involved questions which covered four key aspects of

reading comprehension. These were (a) general understanding, (b) developing a

complete understanding of the text, (c) connections between personal knowledge and the

text, and (d) fully analyzing the author's intentions within the text (Tourangeau et al.,

2009).

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Instrument Reliability and Validity

The reliability of the IRT scale scores in reading and mathematics were .87 and

.92 respectively. The validity of the direct cognitive assessments was determined using

several methods. The assessments were created based on a prior review of state and

national standards in the content areas. The assessments were compared to national and

commercial tests, and curriculum experts provided input for the specifications of the

exam. Scope and sequence were also key specifications in the design of the assessments

(Tourangeau et al., 2009).

Student Survey

The NCES staff gave respondents a paper-and-pencil survey to understand several

aspects of their lives at the time they took the direct cognitive assessment. The questions

in the survey covered areas related to respondents': (a) school experiences, (b) personal

activities, (c) self-perception, (d) weight, (e) diet, and (f) level of exercise (Tourangeau et

al., 2009). The respondents were given 20 minutes to complete the survey, which was

based on a previous study, the National Education Longitudinal Study of 1988, and an

adaption from the Self-Description Questionnaire II (Tourangeau et al., 2009). No

evidence was found indicating the validity or reliability of the student survey.

Parent Interview

The parent interview was completed primarily by telephone, but approximately

2% of parent interviews were completed in person. The interview lasted nearly 46

minutes and covered nearly 300 questions (Tourangeau et al., 2009). The primary

interest in this section of the data was to identify changes in options for student race and

current socioeconomic status.

Research Questions

1. To what extent is there a difference in mathematics achievement between
   eighth grade athletes and non-athletes while controlling for self-stated future
   educational goals and socioeconomic status?

2. To what extent is there a difference in mathematics achievement between
   eighth grade athletes and non-athletes while controlling for self-reported
   weekly time spent on homework and socioeconomic status?

3. To what extent is there a difference in reading achievement between eighth
   grade athletes and non-athletes while controlling for self-stated future
   educational goals and socioeconomic status?

4. To what extent is there a difference in reading achievement between eighth
   grade athletes and non-athletes while controlling for self-reported weekly time
   spent on homework and socioeconomic status?

Variables

Descriptions of dependent and independent variables utilized in the study follow.

Delimiting variables are also described.

Dependent Variables

Dependent variables in this study were mathematics and reading achievement. Descriptions of the reading and mathematics outcomes utilized in this study follow.

Mathematics Achievement

Mathematics IRT scale scores were used as the dependent variable for two research questions. The data set contained the variable (C7R4MSCL), which provided the continuous scale value for each student's mathematics score from the direct cognitive assessment. The scores ranged from 66-172.

Reading Achievement

Reading IRT scale scores were used as the dependent variable for two research questions. The data set contained the variable (C7R4RSCL), which provided the continuous scale value for each student's reading score from the direct cognitive assessment. The scores ranged from 85-209.

Independent Variables

Descriptions of the variables which were utilized in this study follow. The independent variables include (a) athletic participation, (b) grade level, (c) future educational goals, (d) time spent on homework, (e) socioeconomic status, and (f) gender.

Athletic Participation (Student Athletes and Non-athletes)

Participation in athletics during 8th grade was based on a student's classification as an athlete or non-athlete as collected during the student interview and recorded as part of the student questionnaire (Tourangeau et al., 2009). As shown in Table 2, there were two categories of participation (participated or participated as officer, leader or captain) and both categories were combined for this study to reflect 'participated in athletics.' Students who selected 'did not participate' were categorized as not participating in athletics.

Table 2

Independent Variable: Athletic Participation (Student Athletes and Non-athletes)

Survey Question 10.a	Variable	Response Scale
Have you participated in the following school-sponsored activities this year? Sports	C7SPORTS	Initial Scale 1 = Did not participate 2 = Participated 3 = Participated as an officer, leader, or captain
	Athletes_Nonathletes	Revised Scale 1 = Did not participate in athletics 2 = Participated in athletics

Self-stated Future Educational Goals

During the student survey, students were questioned about their future expectations in obtaining various levels of education (Tourangeau et al., 2009). This question generated the concept of self-efficacy according to Bandura (1986; 1989; 1997)

and his formal evaluation of triadic reciprocality as a representation of personal factors within the exchange of behaviors, environmental factors, and personal factors. The adjustment, displayed in Table 3, was necessary due to a lack of sample population percentage with future educational goals below the collegiate level.

Table 3

Independent Variable: Self-stated Future Educational Goals

Survey Question 7	Variable	Response Scale
As things stand now, how far in school do you think you will get?	C7HOWFAR	Initial Scale 1 = Less than high school graduation 2 = High school graduation or GED 3 = Attend or complete two-year program in community college or vocational school 4 = Attend college, but not complete a four-year degree 5 = Graduate from a four-year college 6 = Obtain a Master's degree or equivalent 7 = Obtain a Ph.D., M.D. or other advanced degree 8 = Don't know
	Ed Goals	Revised Scale 1 = Don't know or less than a Bachelor's degree 2 = Obtain a Bachelor's degree 3 = Obtain a graduate degree

Self-reported Weekly Time Spent on Homework

The student survey posed a question based upon their time spent completing homework each week during and after school hours (Tourangeau et al., 2009). This

response was open ended and provided based on whole numbers, not in fractional or decimal increments. The revised categories displayed in Table 4 are reflective of Cooper's previous studies (Cooper, 1989; 2001; Cooper & Valentine, 2001).

Table 4

Independent Variable: Self-reported Weekly Time Spent on Homework

Question 3	Variable	Response Scale
Overall, about how many hours do you spend on homework each week, both in and out of school?	C7HRSWRK	Initial Scale 0-165 hours per week
	Homework_Hours	Revised Scale 1 = 0-5 hours per week 2 = 6-10 hours per week 3 = 11+ hours per week

Socioeconomic Status

Data from the final wave of the ECLS-K parent survey provided students' personal information regarding their current socioeconomic status (W8POVRTY). This variable, which was determined based on the household income and total number of household members, was aligned with the federal poverty level, as this was a national study (Walston et al., 2008). For the present study, below the poverty threshold was determined as Low SES. Table 5 contains the variable coding information for socioeconomic status.

Table 5

Independent Variable: Socioeconomic Status

Question PAQ.120	Variable	ECLS-K Scale
What was your total household income last year, to the nearest thousand?	W8POVRTY	1 = Below poverty threshold 2 = At or above poverty threshold

Gender

      Data from the original wave of the ECLS survey were obtained by the field management team (GENDER). If parents provided students' personal information regarding their gender which contradicted that of the data team, the parental indicator took precedence. The original options were: 1 = Male, 2 = Female, or -9 = Not Ascertained (Tourangeau et al., 2009).

Delimiting Variables

      Delimiting variables used in this study were grade level and eighth grade athletes and non-athletes. Descriptions of these variables follow.

Grade Level

      Due to previous student advancement and retention, students from the original sample were not in the same grade level. To identify eighth grade students, the variable (T7GLVL) was used to delimit the sample. School records researched by the field staff indicated the current grade level of students. Students in eighth grade were re-coded as

eighth graders and all other student in various grade levels were eliminated. After

elimination, the sample was reduced to 8,293 students.

Eighth Grade Athletes and Non-Athletes

After students were re-coded using SPSS software, grade level and sports

participation were combined to create the independent variable which was the focal point

for the study (Athletic Participation). The final variable included only eighth grade

student athletes and non-athletes ($N = 8,208$) as 85 eighth grade students did not indicate

their participation in athletics in the student survey.

Data Analysis

Factorial ANOVA was used in the data analysis. The procedures employed, using

SPSS version 19, are described for each research question.

Factorial ANOVA Models

Research Question 1

The first question posed was "To what extent is there a difference in mathematics

achievement between eighth grade athletes and non-athletes while controlling for self-

stated future educational goals and socioeconomic status?" A factorial ANOVA was

generated using the variables in combination with the design effect adjusted weight. The

dependent variable was mathematics achievement, and the independent variables were (a) athletic participation, (b) self-stated future educational goals, and (c) SES.

Research Question 2

The second question posed was "To what extent is there a difference in mathematics achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework and socioeconomic status?" A factorial ANOVA was generated using the variables in combination with the design effect adjusted weight. The dependent variable was mathematics achievement, and the independent variables were (a) athletic participation, (b) self-reported weekly time spent on homework, and (c) SES.

Research Question 3

The third question posed was "To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-stated future educational goals and socioeconomic status?" A factorial ANOVA was generated using the variables in combination with the design effect adjusted weight. The dependent variable was reading achievement, and the independent variables were (a) athletic participation, (b) self-stated future educational goals, and (c) SES.

The fourth question posed was "To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework and socioeconomic status?" A factorial ANOVA was generated using the variables in combination with the design effect adjusted weight. The dependent variable was reading achievement, and the independent variables were (a) athletic participation, (b) self-reported weekly time spent on homework, and (c) SES.

Adjustment for Complex Sampling Design

A design-based approach was used to analyze the complex data set. More specifically, a design effect adjusted weight was created and applied during the analysis. The student base weight (C7CW0) was divided by its mean to create a normalized weight. This normalized weight was then used to create a design effect adjusted weight for both mathematics and reading (Hahs-Vaughn, 2005).

The normalized weight was divided by the design effect for mathematics IRT scale score (DEFF = 3.938) to create the design effect adjusted weight for mathematics (Tourangeau et al., 2009). Likewise, the normalized weight was divided by the design effect for reading IRT scale score (DEFF = 3.512) to create the design effect adjusted weight for reading (Tourangeau et al., 2009).

These design effect adjusted weights were then applied when generating the factorial ANOVA model. Further details concerning technical issues on weighting and

design effects can be found in the ECLS-K user's manual (Tourangeau et al., 2009). For

each factorial ANOVA model, an alpha level of .05 was applied to prevent Type I errors.

Additional Analyses

The sample ($N = 8204$) for additional analyses was larger by 757 students in

mathematics achievement in comparison to the sample for research questions one and

two. The sample for additional analyses was also larger by 955 students in reading

achievement in comparison to the sample for research questions three and four. This

change was based upon a decrease in non-response from parental surveys regarding

gender as compared to student surveys regarding self-stated future educational goals and

self-reported weekly time spent on homework.

In previous studies (Coleman, 2010; JacAngelo, 2003; Lipscomb, 2007), gender

was shown to have a relationship to achievement in mathematics and reading

assessments. Therefore, gender was also analyzed by comparing the male and female

scores in mathematics and reading achievement. This permitted an analysis based on

athletic participation and gender.

The first additional factorial ANOVA was generated using mathematics

achievement as the dependent variable, and gender and athletic participation as the

independent variables. The design effect adjustment weight was applied and significance

was sought with an alpha level less than .05.

The second additional factorial ANOVA was generated using reading

achievement as the dependent variable, and gender and athletic participation as the

independent variables. The design effect adjustment weight was applied and significance was sought with an alpha level less than .05.

Summary

Chapter 3 provided an overview of the research methodology for this study. The research questions were presented in addition to the design of the study. The data source was explained in detail to include the instrument used in the ECLS data set. The dependent and independent variables were presented along with the data collection and statistical analysis models. The chapter concluded with an explanation of the adjustments for complex sampling design and the additional analysis for gender.

CHAPTER 4
DATA ANALYSIS

Introduction

This chapter contains descriptive statistics for the ECLS-K dataset and the results

of the analyses conducted for each of the research questions, which were used to guide

the study. Additional analyses for gender and a chapter summary are also included.

Descriptive Statistics for the ECLS-K Dataset

Table 6 provides a descriptive overview of the sample. While describing the

ECLS-K dataset, authors were discouraged from providing sample population numbers,

but encouraged to only use percentages (Hahs-Vaughn, 2011). The statistics were

computed applying the child base weight (C7CW0). Approximately two-thirds of the

eighth grade students in the sample indicated they participated in a school-sponsored

sport. Roughly equal percentages of students indicated they would obtain a bachelor's

degree (37%) and graduate degree (39%) while a lesser percentage were unsure or would

obtain less than a bachelor's degree (24%). Approximately one-fourth of the students

reported spending $6 - 10$ hours per week on homework (25%), and slightly more than

one-fourth reported spending 11 or more hours per week (29%), while nearly one-half

spent $0 - 5$ hours per week on homework (45%). When considering socioeconomic

status, the majority of the students in the sample were at or above the poverty level

(87%). The sample was nearly even between males (49%) and females (51%).

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Table 6

Sample Percentages for the Independent Variables

Independent Variables	Sample Percentages
Athletic Participation	
Non-athlete	37%
Athlete	63%
Total	100%
Self-stated future educational goals	
Unknown or less than a bachelor's degree	24%
Obtain a bachelor's degree	37%
Obtain a graduate degree	39%
Total	100%
Self-reported weekly time spent on homework	
0-5 hours per week	45%
6-10 hours per week	29%
11+ hours per week	25%
Total	99%
Socioeconomic status	
At or above the poverty level	87%
Below the poverty level	13%
Total	100%
Gender	
Male	49%
Female	51%
Total	100%

Interpretation of Analysis

The research design for this study was a causal comparative analysis. The four

research questions were analyzed using a factorial ANOVA.

Research Question 1

To what extent is there a difference in mathematics achievement between eighth

grade athletes and non-athletes while controlling for self-stated future educational

goals and socioeconomic status?

A factorial analysis of variance (ANOVA) was generated to evaluate the extent to

which there was a mean difference in mathematics achievement based on participation in

sports, setting future educational goals, and socioeconomic status. A design effect

adjusted weight (as described in Chapter 3) was applied to ensure the estimates

accommodated the complex sampling design.

The dependent variable was mathematics achievement, measured by the IRT scale

score from the mathematics direct cognitive assessment. The independent variables were

(a) athletic participation (student athletes and non-athletes) (b) self-stated future

educational goals, and (c) socioeconomic status.

The extent to which the assumptions of the factorial ANOVA were met is detailed

first. This is followed by the results of the factorial ANOVA.

Assumptions of the Factorial ANOVA

The assumption of normality for mathematics achievement was tested and not met

based on residuals. A review of the Kolmogorov-Smirnov test ($KS = .082$, $df = 7451$, $p = .000$) indicated evidence of non-normality. Skewness (-.862) and kurtosis (.793),

however. indicated normality was a reasonable assumption. The boxplot indicated

significant outliers with the distribution for both athletes and non-athletes. Further

review revealed the residuals for athletes and non-athletes with low SES status were the primary outliers on the low end. The histogram and Q-Q plot showed evidence of abnormal distribution among the mathematics achievement scores. According to Levene's test for homogeneity [F (11, 7439) = 22.965, p = .000], the assumption was not met. However, Lomax and Hahs-Vaughn (in press) indicated that a large sample, such as that which was present in the ECLS-K data set, may fail the Levene's test and still provide robust estimates. Scatterplots of the residuals were reviewed in comparison to the levels of each independent variable. A slightly patterned display of points around zero indicated the assumption of independence was violated; therefore, there may be an increase in the chance of Type I or Type II errors.

Results of the Factorial ANOVA

It was concluded that the three-way interaction between athletic participation, self-stated future educational goals, and SES was not statistically significant. In addition, the two-way interactions between (a) athletic participation and self-stated future educational goals, (b) athletic participation and SES, and (c) self-stated future educational goals and SES were not significant. However, there was a statistically significant difference in the two-way interaction effect for athletic participation and SES *(F = 9.589, df = 1, p = .002)* and the main effects for self-stated future educational goals (*F* = 254.739, *df* = 2, *p* = .000) and SES (*F* = 358.243, *df* = 1, *p* = .000). Effect sizes for all interaction effects and main effect sizes suggested a very small to moderate effect (ranging from < .001 to .064). These results are presented in Table 7.

Table 7

Factorial Analysis of Variance (ANOVA) of Athletic Participation, Future Educational Goals, and Socioeconomic Status: Mathematics Achievement

Source	df	SS	MS	F	p	η^2
Athletic participation (AP)	1	321.258	321.258	3.450	.063	.000
Self-stated future educational goals (Ed Goals)	2	47,444.350	23,722.175	254.739	.000	.064
Socioeconomic Status (SES)	1	33,360.811	33,360.811	358.243	.000	.046
AP * Ed Goals	2	232.045	116.022	1.246	.288	.000
AP * SES	1	893.004	893.004	9.589	.002	.001
Ed Goals * SES	2	114.710	57.375	.616	.540	.000
AP * Ed Goals * SES	2	202.635	202.635	2.176	.114	.001
Error	7,439	692,745.287	93.123			
Total	7,451					

$r^2 = .17$

Results of the Means and Standard Error Comparison

Statistically significant differences were indicated for the two-way interaction of athletic participation and SES and the main effects of self-stated future educational goals and SES. Figure 2 provides evidence of the two-way interaction between athletic participation and SES. It was noted that low SES non-athletes had higher mean scores than their athletic counterparts, while non-athletes at or above the poverty level had lower mean scores than their athletic counterparts.

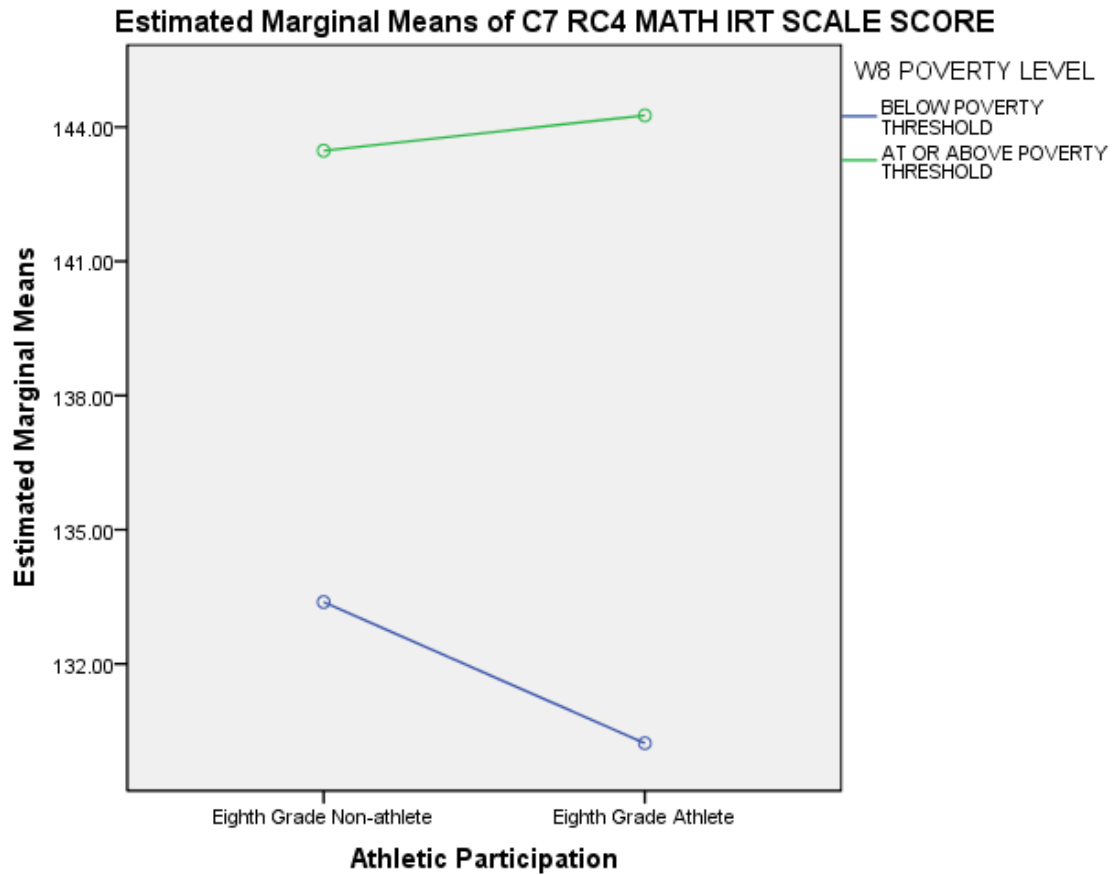Figure 2: *Two-way Interaction Between Athletic Participation and SES*

Table 8 presents the means and standard errors for Mathematics IRT scale scores based on the two-way interaction effect between athletic participation and SES. Low SES non-athletes had higher means than low SES athletes, while athletes at or above the poverty level had higher mean scores compared to non-athletes at or above the poverty level.

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Table 8

Two-way Interaction between Athletic Participation and Poverty Level: Means for
Mathematics Item Response Theory (IRT) Scale Scores

	Non-athlete		Athlete	
Poverty Level	Mean	SE	Mean	SE
Below poverty level	133.38	.84	130.23	.81
At/above poverty level	143.47	.40	144.26	.33

Further analysis revealed significant differences in mean scores among students,
based on self-stated future educational goals and SES. Tukey HSD post hoc analysis
indicated statistical significance among the three categories of self-stated future
educational goals. Students who indicated they would obtain a graduate degree (M =
145.842, SE = .604) had significantly higher scores than those who would obtain a
bachelor's degree (M = 138.809, SE = .564). and also had statistically significant higher
scores than those were unsure or who intended to obtain less than a bachelor's degree (M
= 128.857, SE = .480). Students at or above the poverty level (M = 143.866, SE = .262)
had a higher mean score than those below the poverty level (M = 131.806, SE = .581).

Research Question 2

To what extent is there a difference in mathematics achievement between eighth

grade athletes and non-athletes while controlling for self-reported weekly time

spent on homework and socioeconomic status?

A factorial ANOVA was generated to evaluate the extent to which there was a

mean difference in mathematics achievement based on participation in sports, self-

reported time spent completing homework, and socioeconomic status. A design effect

adjusted weight (as described in Chapter 3) was applied to ensure the estimates

accommodated the complex sampling design.

The dependent variable was the mathematics achievement measured by the IRT

scale score from the mathematics direct cognitive assessment. The independent variables

were (a) student athletes and non-athletes, (b) self-reported weekly time spent on

homework, and (c) socioeconomic status.

The extent to which the assumptions of the factorial ANOVA were met is detailed

first. This is followed by the results of the factorial ANOVA.

Assumptions of the Factorial ANOVA

The assumption of normality for mathematics achievement was tested and not met

based on residuals. A review of the Kolmogorov-Smirnov test ($KS = .077$, $df = 7249$, $p =$

.000) for normality indicated evidence of non-normality. However, skewness (-.891) and

kurtosis (.747) indicated normality was a reasonable assumption. The boxplot indicated

significant outliers with the distribution for both athletes and non-athletes. The histogram

and Q-Q plot showed evidence of abnormal distribution among the mathematics

achievement scores. According to Levene's test for homogeneity [$F (11,7237) = 20.463$,

$p = .000$], the assumption was not met. However, Lomax and Hahs-Vaughn (in press)

indicated that a large sample, which was present in the ECLS-K data set, may fail the

Levene's test and still provide robust estimates. Scatterplots of the residuals were

reviewed in comparison to the levels of each independent variable. A slightly patterned

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display of points around zero indicated the assumption of independence was violated; therefore, there may be an increase in the chance of Type I or Type II errors.

Results of the Factorial ANOVA

It was concluded that the three-way interaction between athletic participation, self-reported weekly time spent on homework, and SES was not statistically significant. In addition, the two-way interaction between athletic participation and self-reported weekly time spent on homework was not significant. However the two-way interaction between athletic participation and SES ($F = 9.589$, $df = 1$, p = .001), in addition to self-reported weekly time spent on homework and SES ($F = 4.727$, $df = .009$, $p = .001$), were statistically significant. There were also statistically significant main effects for self-reported time spent on homework ($F = 103.780$, $df = 2$, $p = .000$) and SES ($F = 343.305$, $df = 1$, $p = .000$). Effect sizes for all interaction effects and main effect sizes suggested a very small effect (ranging from < .001 to .045). These results are presented in Table 9.

Table 9

Factorial Analysis of Variance (ANOVA) of Athletic Participation, Homework, and Socioeconomic Status: Mathematics Achievement

Source	df	SS	MS	F	p	η^2
Athletic participation (AP)	1	139.907	139.907	1.447	.299	.000
Self-reported weekly time spent on homework (HWRK)	2	20,072.980	10,036.490	103.780	.000	.028
Socioeconomic status (SES)	1	33,200.758	33,200.758	343.305	.000	.045
AP * HWRK	2	190.363	95.182	.984	.374	.000
AP * SES	1	995.692	995.682	10.296	.001	.001
HWRK * SES	2	914.371	457.186	4.727	.009	.001
AP * HWRK * SES	2	175.336	87.668	.907	.404	.000
Error	7,439	692,745.287	93.123			
Total	7,451					

$r^2 = .11$

Results of the Means and Standard Error Comparison

Statistically significant differences were indicated for the two-way interaction between (a) athletic participation and SES and (b) self-reported weekly time spent on homework and SES. Figure 3 illustrates the interaction between athletic participation and SES. It was noted that low SES non-athletes had higher mean scores than their athletic counterparts while non-athletes at or above the poverty level had lower mean scores than their athletic counterparts.

Estimated Marginal Means of C7 RC4 MATH IRT SCALE SCORE
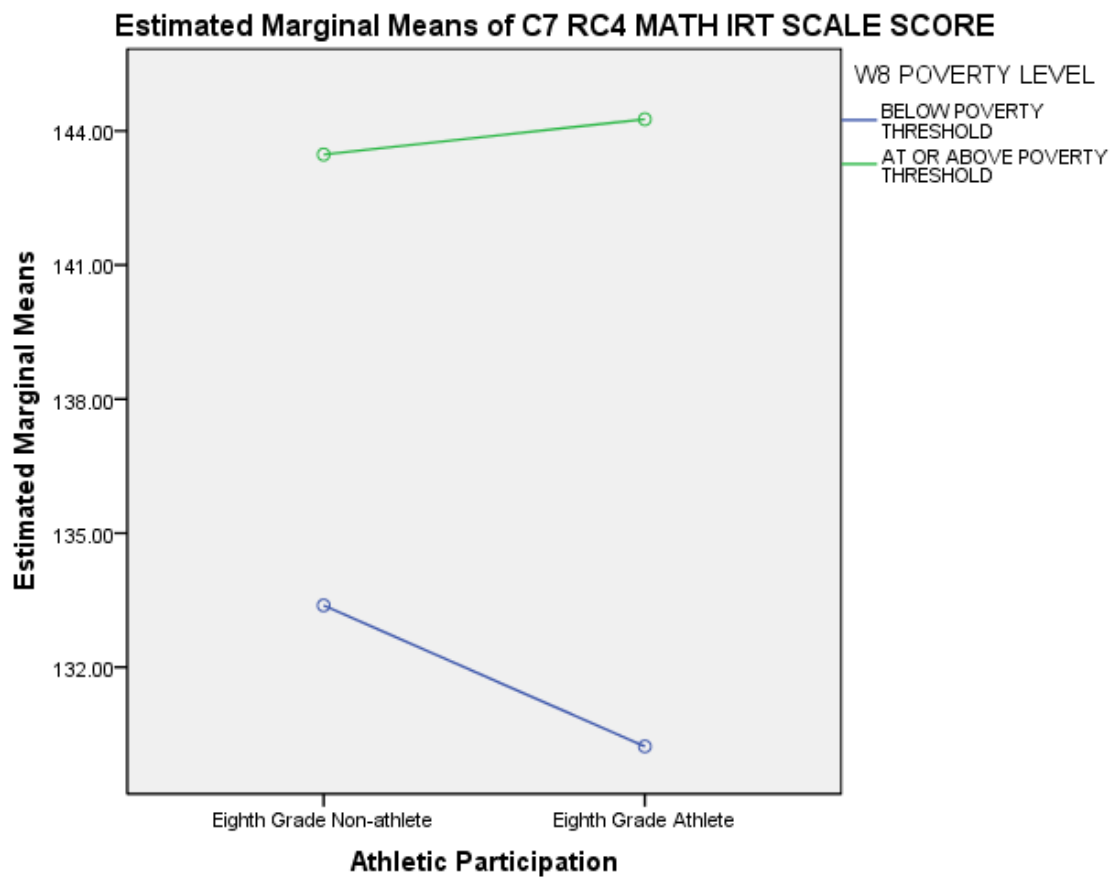
Figure 3: *Two-way interaction Between Athletic Participation and SES*

Figure 4 illustrates the interaction between self-reported weekly time spent on homework and SES. It was noted that students at or above the poverty level had statistically significant higher mean scores than students below the poverty level.
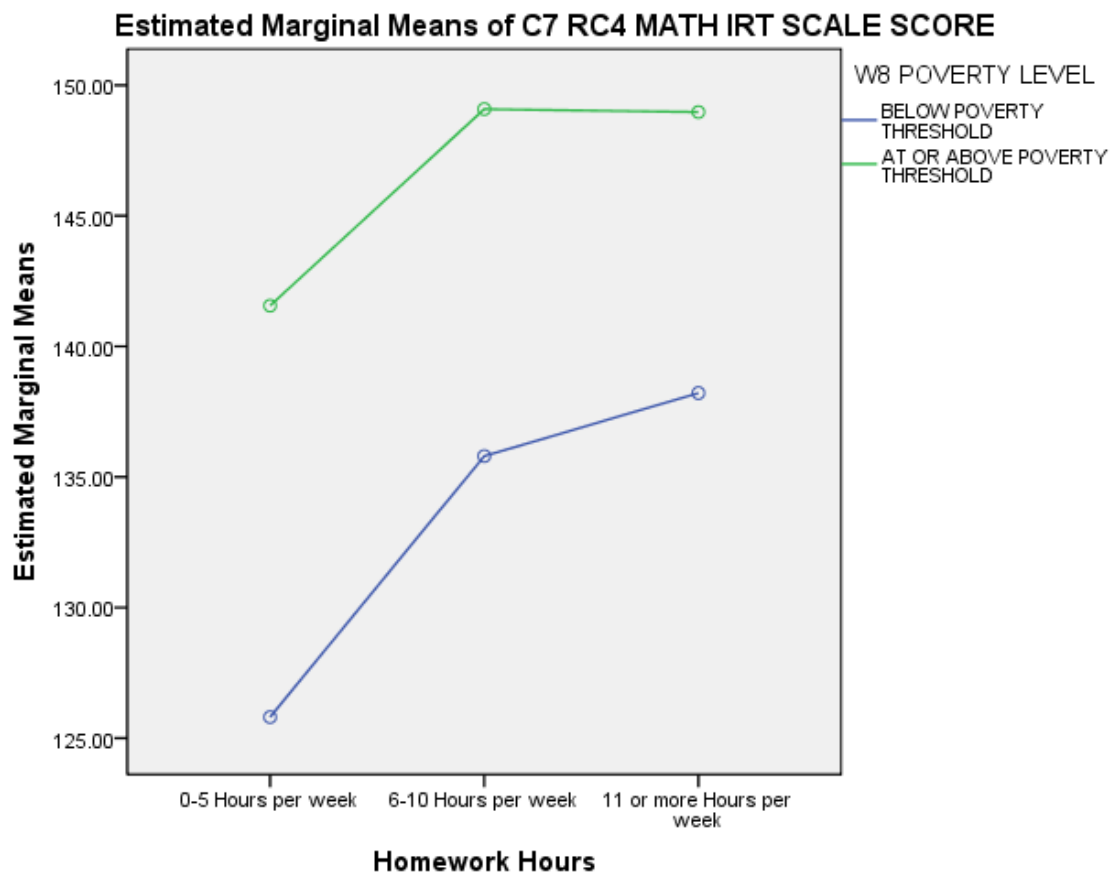
Figure 4: *Two-way Interaction Between Self-reported Time Spent on Homework and SES*

In addition, there were statistically significant differences in the main effects of self-reported weekly time spent on homework and SES. Table 10 presents the statistically significant differences for Mathematics IRT scores based on the two-way interaction between (a) athletic participation and SES and (b) self-reported weekly time spent on homework and SES. Students at or above the poverty level had higher means than those below the poverty level in all areas.

Table 10

SES: Means for Mathematics Item Response Theory (IRT) Scale Scores

	At or above poverty level		Below poverty level	
Independent Variable	Mean	SE	Mean	SE
Athletic Participation				
Non-athlete	145.821	.438	134.851	.954
Athlete	147.258	.329	131.692	.916
Time Spent on Homework				
0 – 5 hours per week	141.560	.384	125.802	.745
6 – 10 hours per week	149.085	.483	135.799	1.241
11+ hours per week	149.974	.543	138.213	1.358

Further analysis revealed as self-reported time spent on homework increased, mean scores for mathematics achievement increased. Tukey HSD post hoc analysis indicated students spending 0 – 5 hours per week ($M = 133.681$, $SE = .419$) scored lowest, with statistically significant scores compared to those who reported spending 6 – 10 hours per week ($M = 142.442$, $SE = .666$). Those who reported spending 11+ hours per week ($M = 143.594$, $SE = .731$) had the highest mean scores and were statistically significant when compared to those who spent 0 – 5 hours per week. However, students who spent 6 – 10 hours per week had no statistical significance when compared to those who spent 11 or more hours per week. In addition, eighth grade students at or above the poverty level ($M = 146.540$, $SE = .274$) had higher mean scores than those below the poverty level ($M = 133.271$, $SE = .662$).

Research Question 3

To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-stated future educational goals and socioeconomic status?

A factorial analysis of variance (ANOVA) was generated to evaluate the extent to which there was a mean difference in mathematics achievement based on participation in sports, setting future educational goals, and socioeconomic status. A design effect adjusted weight (as described in Chapter 3) was applied to ensure the estimates accommodated the complex sampling design.

The dependent variable was mathematics achievement measured by the IRT scale score from the mathematics direct cognitive assessment. The independent variables were (a) student athletes and non-athletes (b) self-stated future educational goals, and (c) socioeconomic status.

The extent to which the assumptions of the factorial ANOVA were met are detailed first. This is followed by the results of the factorial ANOVA.

Assumptions of the Factorial ANOVA

The assumption of normality for mathematics achievement was tested and not met based on residuals. A review of the Kolmogorov-Smirnov test ($KS = .089$, $df = 7451$, $p = .000$) indicated evidence of non-normality. However, skewness (-.922) and kurtosis (.864) indicated normality was a reasonable assumption. The boxplot indicated significant outliers with the distribution for both athletes and non-athletes. Further

review revealed the residuals for athletes and non-athletes with low SES status were the primary outliers on the low end. The histogram and Q-Q plot showed evidence of abnormal distribution among the reading achievement scores. According to Levene's test for homogeneity [F (11, 7439) = 30.60, p =.000], the assumption was not met. However, Lomax and Hahs-Vaughn (in press) indicated that a large sample, which was present in the ECLS-K data set, may fail the Levene's test and still provide robust estimates. Scatterplots of the residuals were reviewed in comparison to the levels of each independent variable. A slightly patterned display of points around zero indicated the assumption of independence was violated; therefore, there may be an increase in the chance of Type I or Type II errors.

Results of the Factorial ANOVA

It was concluded that the three-way interaction between athletic participation, self-stated future educational goals, and SES was not statistically significant. In addition, the two-way interaction between (a) athletic participation and self-stated future educational goals, (b) athletic participation and SES, and (c) self-stated future educational goals and SES were not significant. However, there were statistically significant main effects for athletic participation (F = 18.661, df = 1, p = .000), self-stated future educational goals (F = 253.196, df = 2, p = .000), and SES (F = 689.012, df = 1, p = .000). Effect sizes for all interaction effects and main effect sizes suggested a very small to medium effect (ranging from < .001 to .077). These results are presented in Table 11.

Table 11

Factorial Analysis of Variance (ANOVA) of Athletic Participation, Setting Future Educational Goal and Socioeconomic Status: Reading Achievement

Source	df	SS	MS	F	p	η²
Athletic participation (AP)	1	3,016.271	3,016.271	18.661	.000	.003
Self-stated future educational goals (Ed Goals)	2	81,850.168	40,925.084	253.196	.000	.064
Socioeconomic Status (SES)	1	100,053.378	100,053.378	689.012	.000	.077
AP * Ed Goals	2	285.556	142.778	.883	.413	.000
AP * SES	1	522.250	522.250	3.231	.072	.000
Ed Goals * SES	2	163.224	81.612	.505	.604	.000
AP * Ed Goals * SES	2	20.652	10.326	.064	.938	.000
Error	7,439	1,202,394.742	161.634			
Total	7,451					

$r^2 = .20$

Results of the Means and Standard Error Comparison

Analysis of the means revealed significant variances in mean scores among the independent variables. Eighth grade non-athletes (M = 165.243, SE = .579) had higher mean scores than athletes (M = 161.818, SE = .542). Students at or above the poverty level (M = 173.392, SE = .326) had higher mean scores than those below the poverty level (M = 153.668, SE = .723). Additionally, Tukey HSD post hoc analysis revealed students whose self-stated future educational goals were to obtain a graduate degree (M = 173.173, SE = .751) had statistically significant higher mean scores than those obtaining

a bachelor's degree (M = 165.148, SE = .702) and statistically significant higher scores than students who indicated unknown or obtaining less than a bachelor's degree (M = 152.270, SE = .598). Students with goals to obtain a bachelor's degree had statistically significant higher scores than those who were unknown goals or obtaining less than a bachelor's degree.

Research Question 4

To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework and socioeconomic status?

A factorial ANOVA was generated to evaluate the extent to which there was a mean difference in mathematics achievement based on participation in sports, self-reported time spent completing homework, and socioeconomic status. A design effect adjusted weight (as described in Chapter 3) was applied to ensure the estimates accommodated the complex sampling design.

The dependent variable was the reading achievement measured by the IRT scale score from the reading direct cognitive assessment. The independent variables were (a) student athletes and non-athletes, (b) self-reported weekly time spent on homework, and (c) socioeconomic status.

The extent to which the assumptions of the factorial ANOVA were met are detailed first. This is followed by the results of the factorial ANOVA.

Assumptions of the Factorial ANOVA

The assumption of normality for mathematics achievement was tested and not met based on residuals. A review of the Kolmogorov-Smirnov test ($KS = .090$, $df = 7,249$, $p = .000$) for normality indicated evidence of non-normality. However, skewness (-.965) and kurtosis (.820) indicated normality was a reasonable assumption. The boxplot graph indicated an abnormal distribution of the residuals based on significant outliers. The histogram and Q-Q plot showed evidence of abnormal distribution among the reading achievement scores. According to Levene's test for homogeneity [$F (1, 3) = 25.15$, $p = .000$], the assumption was not met. However, Lomax and Hahs-Vaughn (in press) indicated that a large sample, which was present in the ECLS-K data set, may fail the Levene's test and still provide robust estimates. Scatterplots of the residuals were reviewed in comparison to the levels of each independent variable. A slightly patterned display of points around zero indicated the assumption of independence was violated; therefore, there may be an increase in the chance of Type I or Type II errors.

Results of the Factorial ANOVA

It was concluded that the three-way interaction between athletic participation, self-reported weekly time spent on homework, and SES was not statistically significant. The two-way interaction between athletic participation and self-reported weekly time spent on homework and between athletic participation and SES were not significant. However, the two-way interaction between self-reported weekly time spent on homework and SES ($F = 3.477$, $df = 2$, $p = .031$) was statistically significant. In addition, there were

statistically significant main effects for athletic participation ($F = 11.649$, $df = 1$, $p = .001$) and self-reported time spent on homework ($F = 107.207$, $df = 2$, $p = .000$), and SES ($F = 577.320$, $df = 1$, $p = .000$). Effect sizes for all interaction effects and main effect sizes suggested a very small to medium effect (ranging from $< .001$ to $.074$). These results are presented in Table 12.

Table 12

Factorial Analysis of Variance (ANOVA) of Athletic Participation, Weekly Time Spent on Homework, and Socioeconomic Status: Reading Achievement

Source	df	SS	MS	F	p	η^2
Athletic participation (AP)	1	1,956.118	1,956.118	11.649	.001	.002
Self-reported weekly time spent on homework (HWRK)	2	36.004.164	18,002.082	107.207	.000	.029
Socioeconomic Status (SES)	1	96,943.101	96,943.101	577.320	.000	.074
AP * HWRK	2	134.855	67.428	.402	.669	.000
AP * SES	1	628.736	628.736	3.744	.053	.001
HWRK * SES	2	1167.797	583.899	3.477	.031	.001
AP * HWRK * SES	2	293.280	146.640	.873	.418	.000
Error	7,237	1,215,230.790	167.919			
Total	7,249					

$r^2 = .149$

Results of the Means and Standard Error Comparison

     Statistically significant differences were indicated for the two-way interaction of self-reported weekly time spent on homework and SES and the main effects of athletic participation, self-reported weekly time spent on homework, and SES.   Figure 5 illustrates evidence of the difference in mean scores with the two-way interaction effect of self-reported time spent on homework and SES.
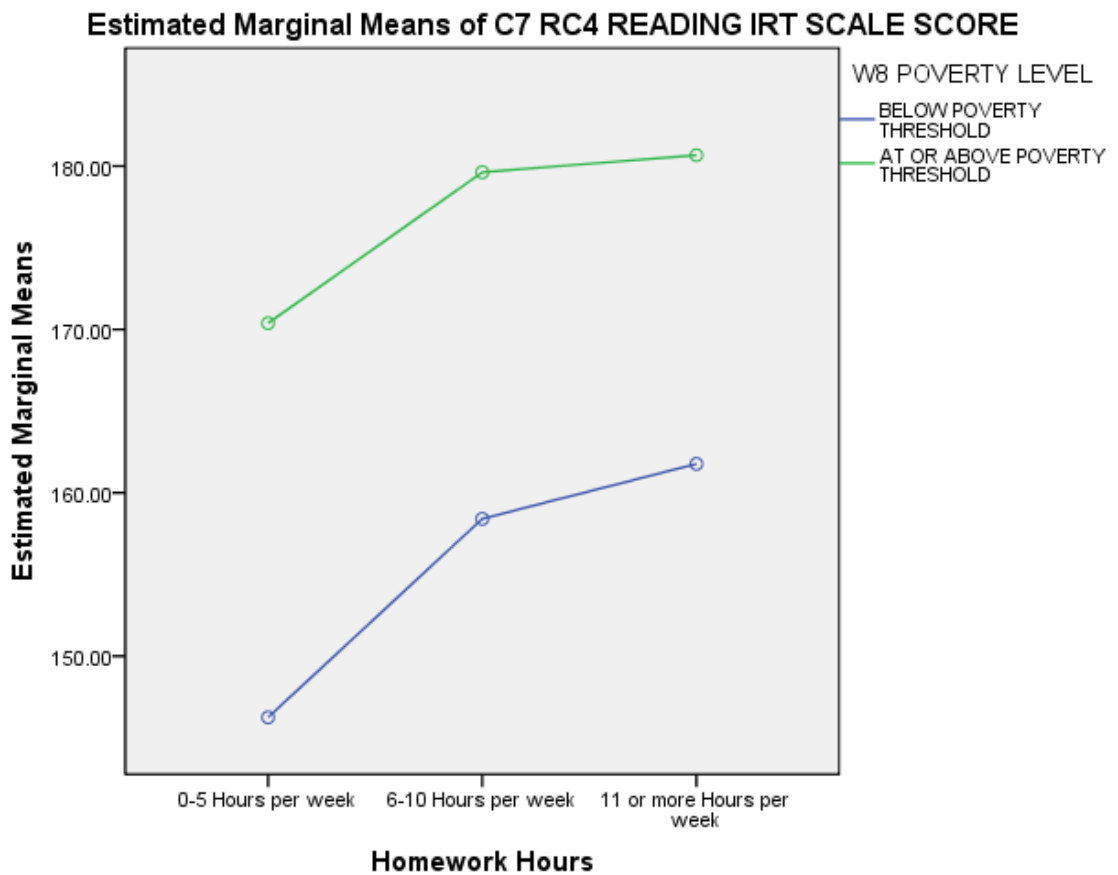

Figure 5: *Two-way Interaction Between Self-reported Time Spent on Homework and SES*

Table 13 presents the means and standard errors for Reading IRT scores based on the two-way interaction effect between self-reported weekly time spent on homework and SES. Students at or above the poverty level had higher mean scores than students below the poverty level.

Table 13

Self-reported Weekly Time Spent on Homework: Means for Reading Item Response Theory (IRT) Scale Scores

	At or above the poverty level		Below the poverty level	
Self-reported Weekly Time Spent on Homework	Mean	SE	Mean	SE
0-5 hours per week	170.383	.478	146.258	.927
6-10 hours per week	179.621	.601	158.409	1.544
11+ hours per week	180.662	.676	161.767	1.690

According to Tukey HSD post hoc analysis, eighth grade students who reported spending 11+ hours per week ($M = 171.215$, $SE = .910$), had the highest mean scores, but were not statistically significant in comparison to those who spent $6 - 10$ hours per week ($M = 169.015$, $SE = .829$). Students who reported spending 11+ hours per week had statistically significant higher scores than those who reported spending $0 - 5$ hours per week ($M = 158.321$, $SE = .521$) on homework. Students at or above the poverty level ($M = 176.889$, $SE = .341$) had higher mean scores than those students below the poverty level ($M = 155.478$, $SE = .823$). Also, eighth grade non-athletes ($M = 167.704$, $SE = .653$) had higher mean scores than athletes ($M = 164.663$, $SE = .606$).

Additional Analyses

Mathematics Achievement and Gender

A factorial ANOVA was generated to evaluate the extent to which mathematics achievement was influenced by participation in sports and gender. A design effect adjusted weight (as described in Chapter 3) was applied to ensure the estimates accommodated the complex sampling design.

The dependent variable was the mathematics achievement measured by the IRT scale score from the mathematics direct cognitive assessment. The independent variables were (a) student athletes and non-athletes and (b) gender.

The extent to which the assumptions of the factorial ANOVA were met are detailed first. This is followed by the results of the factorial ANOVA.

Assumptions of the Factorial ANOVA

The assumption of normality for mathematics achievement was tested and not met based on residuals. A review of the Kolmogorov-Smirnov test ($KS = .079$, $df = 8208$, $p = .096$) for normality indicated evidence of normality. Skewness (-.974) and kurtosis (.733), however. indicated normality was not a reasonable assumption. The boxplot graph indicated an abnormal distribution of the residuals based on significant outliers. The histogram and Q-Q plot showed evidence of abnormal distribution among the mathematics achievement scores. According to Levene's test for homogeneity [$F 3 = 11.37$, $p = .000$], the assumption was not met. However, Lomax and Hahs-Vaughn (in

press) indicated that a large sample, which was present in the ECLS-K data set, may fail

the Levene's test and still provide robust estimates. Scatterplots of the residuals were

reviewed in comparison to the levels of each independent variable. A slightly patterned

display of points around zero indicated the assumption of independence was violated;

therefore, there may be an increase in the chance of Type I or Type II errors.

Results of the Factorial ANOVA

It was concluded the two-way interaction between athletic participation and

gender was not statistically significant. There were statistically significant main effects

for athletic participation ($F = 32.287$, $df = 1$, $p = .000$) and gender ($F = 27.667$, $df = 1$, p

$= .000$). Effect sizes for all interaction effects and main effect sizes suggested a very

small effect (ranging from $< .001$ to $.004$). These findings are indicated in Table 14.

Table 14

Factorial Analysis of Variance (ANOVA) Model of Athletic Participation and Gender: Mathematics Achievement

Source	df	SS	MS	F	p	η^2
Athletic participation (AP)	1	3,649.906	3,649.906	32.287	.000	.004
Gender	1	3,127.595	3,127.595	27.667	.000	.003
AP * Gender	1	.230	.230	.002	.964	.000
Error	8204	927,425.023	113.045			
Total	8207					

$r^2 = .008$

Results of the Means and Standard Error Comparison

Statistically significant differences were indicated for athletic participation and gender. Eighth grade athletes (M = 143.229, SE .304) had higher mean scores than non-athletes (M = 140.580, SE = .369). Additionally, males (M = 143.198, SE = .341) had higher mean scores than females (M = 140.681, SE = .336).

Reading Achievement and Gender

A factorial ANOVA was generated to evaluate the extent which reading achievement was influenced by participation in sports and gender. A design effect adjusted weight (as described in Chapter 3) was applied to ensure the estimates accommodated the complex sampling design.

The dependent variable was the reading achievement measured by the IRT Scale Score from the mathematics direct cognitive assessment. The independent variables were (a) student athletes and non-athletes, and (b) gender.

The extent to which the assumptions of the factorial ANOVA were met are detailed first. This is followed by the results of the factorial ANOVA.

Assumptions of the Factorial ANOVA

The assumption of normality for reading achievement was tested and not met based on residuals. A review of the Kolmogorov-Smirnov test (KS = .096, df = 8208, p = .000) for normality indicated evidence of non-normality. Skewness (-1.302) and kurtosis (.578), however, indicated normality was a reasonable assumption. The boxplot graph

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indicated an abnormal distribution of the residuals based on significant outliers. The

histogram and Q-Q plot showed evidence of abnormal distribution among the

mathematics achievement scores. According to Levene's test for homogeneity [F (1,3) =

17.19, p = .000], the assumption was not met. However, Lomax and Hahs-Vaughn (in

press) indicated that a large sample, which was present in the ECLS-K data set, may fail

the Levene's test and still provide robust estimates. Scatterplots of the residuals were

reviewed in comparison to the levels of each independent variable. A slightly patterned

display of points around zero indicated the assumption of independence was violated;

therefore, there may be an increase in the chance of Type I or Type II errors.

Results of the Factorial ANOVA

The two-way interaction between athletic participation and gender was

statistically significant (F = 577.320, df = 1, p = .000). When analyzing the main effects

there were statistically significant differences in the means for athletic participation (F =

32.287, df = 1, p = .000) and gender (F = 27.667, df = 1, p = .000). Effect sizes for all

interaction effects and main effect sizes suggested a very small effect (ranging from <

.001 to .006). These findings are indicated in Table 15.

Table 15

Factorial Analysis of Variance (ANOVA) Model of Athletic Participation and Gender: Reading Achievement

Source	df	SS	MS	F	p	η²
Athletic participation (AP)	1	906.591	906.591	4.480	.034	.001
Gender	1	9,936.558	9,936.558	49.098	.000	.006
AP * Gender	1	790.777	790.777	3.907	.048	.000
Error	8204	16,033.296	202.381			
Total	8207					

$r^2 = .149$

First findings of the analysis in Table 16 revealed varying mean Reading IRT scores among the athletic participation and gender. The results indicated mean scores for reading achievement were significantly higher for females than males based on athletic participation.

Table 16

Gender: Means for Reading Item Response Theory (IRT) Scale Scores

	Non-athlete		Athlete	
Athletic Participation	Mean	SE	Mean	SE
Males	168.281	.679	168.366	.532
Females	171.323	.641	173.798	.556

Further analysis indicated eighth grade athletes (M = 171.082, SE = .385) had higher mean score in reading than non-athletes (M = 169.802, SE = .467). Also, females (M = 172.561, SE = .424) had higher mean scores than males (M = 168.323, SE = .431).

CHAPTER 5
SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

In 2002, President George W. Bush signed into law the legislation known as the No Child Left Behind Act (NCLB) of 2001. This legislation introduced the concept of adequate yearly progress (AYP) which became the federal accountability measure for student achievement on an annual basis.

Since its implementation in 2002, AYP has demanded the attention of educational leaders in all 50 states and the local school districts (Beveridge, 2010; Bracey, 2003; Everson & Millsap, 2004). Within these districts, each public school was required to show annual growth in academic achievement. Through the NCLB, AYP required states, school districts, and public schools to monitor the academic performance of all students through state-selected measures (U.S. Department, 2002). Florida, for instance, used the Florida Comprehensive Assessment Test to assess student progress on state standards (Florida Department, 2010c).

The state of Florida failed to meet AYP in 2010 – 2011, and has done so each year since as far back as 2002 - 2003 (Florida Department, 2011c). In turn, educational leaders continue to create interventions with the intention of successfully satisfying their state's AYP criteria (Ladner & Lips, 2010). Past research suggested that, beyond summative assessment tools, there have been many different variables that affect a school's academic success and its ability to show learning gains (Marzano et al., 2001).

With this in mind, leaders have been searching for methods of instruction to increase student achievement (Ladner & Lips, 2010).

Purpose of the Study

The primary goal of this study was to compare academic achievement in mathematics and reading among eighth grade athletes and non-athletes and determine if a difference existed between these two distinct groups. This was, in essence, an investigation of academic accountability within athletics and, through the use of multiple control variables, the study was intended to expand the comparison between the two separate groups.

Summary and Discussion of the Findings

The following summary and discussion of the findings have been organized around the four research questions which guided the investigation.

Research Question 1

To what extent is there a difference in mathematics achievement between eighth grade athletes and non-athletes while controlling for self-reported future educational goals and socioeconomic status?

Mathematics Achievement Analyses

The analyses of the data collected to answer this research question were performed by generating a factorial ANOVA. There was not a statistically significant difference based on the three-way interaction between athletic participation, educational goals, and SES. The same was true for the two-way interaction between athletic participation and self-reported future educational goals, as well as self-reported future educational goals and SES. There was a statistically significant difference based on the two-way interaction between athletic participation and SES, but the effect was very small. One specific indicator of significance was low SES athletes had lower mean scores than low SES non-athletes, while athletes at or above the poverty level had higher mean scores than their non-athlete counterparts. This indicated athletics had a positive statistically significant affect on academic achievement in mathematics for students at or above the poverty level.

The main effects of self-reported future educational goals and SES were statistically significant, with moderate effect sizes. The results indicated that students at or above the poverty level had higher mean scores in comparison to those below the poverty level. Post hoc results indicated that as educational goals increased, mathematics achievement increased as well. The overall effect sizes ranged from small to medium. Readers are reminded these results may reflect an increased chance of Type I or Type II errors due to the violation of independence and normality.

Discussion of the Findings

The interaction of athletic participation and SES was a significant indicator of increased mean scores in mathematics achievement. When implementing practices according to these findings, educational leaders could forward this valuable information to classroom teachers, to help them build the levels of self-efficacy among their students, especially low SES students.

The findings in this study revealed a consistent increase in mathematics achievement as the future educational goals increased, which was consistent with Ramdass and Zimmerman (2008) as student increase in self-efficacy positively impacted mathematics achievement. In addition, the findings aligned with Boekaerts, Otten, and Voeten (2003), who concluded that students' self-efficacy, positive or negative, impacted standardized test scores.

Minimal research was found comparing athletes to non-athletes based on standardized test scores. The findings of this study, however, contradicted those of JacAngelo (2003), who found that athletes outscored non-athletes in FCAT mathematics in a Florida school district. The findings in this study coincided with those of Coleman (2010), who found no significant difference in mathematics scores for athletes and non-athletes in the state of Tennessee.

Research Question 2

To what extent is there a difference in mathematics achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework and socioeconomic status?

Mathematics Achievement Analyses

The analyses of the data collected to answer this research question were performed by generating a factorial ANOVA. The results indicated the three-way interaction between athletic participation, self-reported weekly time spent on homework, and SES was not statistically significant. However, there was a statistically significant two-way interaction between athletic participation and SES where eighth grade athletes, who were at or above the poverty level, had higher mean scores than their non-athlete counterparts who were at or above the poverty level. In addition, low SES athletes had higher mean scores than low SES non-athletes.

There were statistically significant main effects for time spent on homework and SES. Students at or above the poverty level scored significantly higher on the mathematics direct cognitive assessment than their low SES counterparts. Results also indicated a continuous increase in mathematics scores as the amount of time spent on homework increased. Post hoc analysis indicated statistical significance occurred in comparing students with 0 – 5 hours spent on homework compared to 6 – 10 hours and 0 – 5 hours compared to 11+ hours. However, no statistical significance was found when comparing 6 – 10 hours and 11+ hours per week. Readers are reminded these results may

reflect an increased chance of Type I or Type II errors due to the violation of independence and normality.

Discussion of the Findings

The findings in this study revealed a consistent increase in mathematics achievement as the amount of time spent on homework increased. Kitsantas et al. (2011) found increased homework efforts had a negative impact on mathematics achievement, but a positive impact on mathematics based on increased self-efficacy. This finding was in direct opposition to many of the findings in this study, which showed increases in homework increased mathematics achievement, but aligned with the findings that increased academic goals increased academic achievement. Lauver's (2002) results were supported by the findings in this study. Students in afterschool programs increased academic achievement with one or more hours of homework participation, as did athletes in this study.

Stereotypically low scores on mathematics assessments for low SES students (Spencer, & Castano, 2007) were also found in this study. As determined by previous researchers (Fashola & Slavin, 1997; Johnson, 2006; Toutkoushian & Curtis, 2005), students below the poverty level were outscored by students who were noted as at or above the poverty level. Low SES students, both athletes and non-athletes, were again outscored in all categories and subcategories throughout this study as previously noted by Gough (2001) and Bracey (2002). In contrast, Everson and Millsap's (2004) indicated that low SES athletes closed the gap in academic achievement. The findings of

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Lipscomb (2007) and Little (2009) were supported when comparing the higher mean scores in mathematics for athletes at or above the poverty level compared to the non-athletes at or above the poverty level.

Research Question 3

To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-stated future educational goals and socioeconomic status?

Reading Achievement Analyses

The analyses of the data collected to answer this research question were performed by generating a factorial ANOVA. The results indicated that both the three-way and all two-way interaction effects between the independent variables were not statistically significant. The main effects of self-stated future educational goals and SES were statistically significant with medium effects. The Tukey HSD post hoc analysis indicated that students' increased future educational goals significantly increased their mean reading achievement scores. As eighth grade student educational goals increased from unknown or less than a bachelor's degree to a bachelor's degree, mean scores increased. The same was true as educational goals increased from a bachelor's degree to a graduate degree. Students at or above the poverty level had higher mean scores in reading than students below the poverty level.

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In addition, non-athletes had higher mean scores than athletes. Athletic participation was a minimally significant indicator of variances in mean reading scores. Though athletic participation was significant, the overall effect size was very small. Readers are reminded these results may reflect an increased chance of Type I or Type II errors due to the violation of independence and normality.

Discussion of the Findings

The results for self-stated future educational goals were similar in reading achievement to those of Beghetto (2006). As found in this study, higher self-efficacy (Bandura, 1989; 1997; 2001) was indicated by higher educational goals, which was measured by self-stated future educational goals. Students with higher measures of future educational goals had higher scores in reading achievement. In previous studies (Hawkins & Mulkey, 2005; Kitsantas et al., 2011; Mucherah & Yoder, 2008), athletes and non-athletes with higher achievement scores also had higher levels of self-stated goals, which was supported by this study and post hoc analysis determined the increase to be statistically significant.

The results for lower mean scores among athletes was a contradiction to JacAngelo (2003), who found that athletes had higher mean scores than non-athletes in reading. However, this study found statistically significant differences in reading achievement between athletes and non-athletes, but Coleman (2010) found no significant difference in reading achievement based on athletic participation.

Research Question 4

To what extent is there a difference in reading achievement between eighth grade athletes and non-athletes while controlling for self-reported weekly time spent on homework and socioeconomic status?

Reading Achievement Analyses

The analyses of the data collected to answer this research question were performed by generating a factorial ANOVA. The results indicated there was no statistically significant difference in mean scores based on the three-way interaction effect between athletic participation, time spent on homework, and SES. The same was true for the two-way interaction effect for athletic participation and self-reported time spent on homework as well as athletic participation and SES. However, there was a statistically significant difference in eighth graders' mean reading scores based on the two-way interaction between self-reported time spent on homework and SES. Tukey HSD post hoc analysis revealed eighth grade students who reported spending 11+ hours per week had the highest mean scores in comparison to those who spent $6 - 10$ hours per week, but the scores were not statistically significant. However, the students with $0 - 5$ hours per week on homework were significantly lower than those who spent $6 - 10$ hours per week and those who spent 11+ hours per week. Also, students at or above the poverty level had higher mean scores than those students below the poverty level within each category of self-reported time spent on homework.

There were statistically significant main effects for athletic participation, time spent on homework, and SES. Results indicated increased reading achievement scores among eighth grade students based on self-reported weekly time spent on homework. In this study, all increases in time spent on homework revealed increased reading mean scores, though some increases in scores were not statistically significant. Non-athletes had statistically significant higher mean scores than athletes. The effects for time spent on homework and athletic participation were small. Students at or above the poverty level had higher means than those below the poverty level, which had a medium effect. Readers are reminded these results may reflect an increased chance of Type I or Type II errors due to the violation of independence and normality.

Discussion of the Findings

The results indicated increased homework participation by eighth grade students had a positive effect on academic achievement in reading. Cooper and Valentine (2001) found mixed results regarding academic achievement for students who spent no time on homework and increased levels up to 10 hours. They indicated that more than 10 hours spent on homework began a steady decrease in academic achievement. In contrast, the present study indicated a continuous increase in academic achievement for students who spent 11 or more hours per week on homework, but statistically significant differences in reading achievement were not noted between those spending 6-10 hours per week in comparison to those who spent 11 or more hours per week.

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The findings also supported previous research which indicated a difference in reading achievement based on SES (Fashola & Slavin, 1997; Johnson, 2006; Toutkoushian & Curtis, 2005). These results continue the existence of stereotypically low scores in reading for low SES students (Spencer & Castano, 2007).

Additional Analyses

A separate factorial ANOVA was generated for both mathematics and reading achievement based on athletic participation and gender. In this analysis, the eighth grade sample was larger by at least 700 students in comparison to the sample in the four research questions. The smaller sample in the four research questions was due to non-response on either self-reported time spent on homework or self-stated future educational goals.

There was a statistically significant two-way interaction between athletic participation and gender when comparing reading achievement. Female and male athletes had higher mean scores in reading than non-athletes based on gender, while females had higher mean scores in reading than males. With no previous literature comparing the achievement of male and female athletes, the research can only be analyzed according to the literature which provides evidence of differences in scores based on gender (Geist & King, 2008; Perie et al., 2005; Rampey et al, 2009; Sadowski, 2010) and athletic participation (Lipscomb, 2007; Little, 2009) as separate main effects.

There was no statistical significance in the two-way interaction between athletic participation and gender when comparing mathematics achievement. The main effects

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indicated significantly higher mean scores for male and female athletes in mathematics than non-athletes, which aligned with Lipscomb (2007) and Little (2009). The results also revealed common differences with previous research (Perie, et al., 2005; Rampey et al., 2009), where males outscored females in mathematics. Readers are reminded these results may reflect an increased chance of Type I or Type II errors due to the violation of independence and normality.

The overall findings in the additional analyses were consistent with previous researchers (Ding et al., 2006; Everson & Millsap, 2004; Marsh et al., 2005; Perie, et al., 2005; Sadowski, 2010) who found gaps in reading and mathematics achievement between males and females. The differences in reading and mathematics based on gender were also consistent with previous research (Perie, et al., 2005; Rampey et al., 2009) as males had higher mean scores in mathematics, while females had higher mean scores in reading.

Conclusions

Using data from the ECLS-K, this research sought to determine to what extent a statistically significant difference existed between athletes and non-athletes based on academic achievement in mathematics and reading. Based on the results of factorial ANOVAs, the following conclusions are offered.

1. Participation in athletics, at least in this eighth grade data set, did not result in improved student achievement for all students in either reading or mathematics. Self-reported time spent on homework and socioeconomic

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status were consistently significant factors based on the models tested. Although educators cannot influence socioeconomic status, they can create measures to provide time for supported academic practice within the school day and beyond the school day under the tutelage of content experts.

2. Goal setting and monitoring progress towards goal achievement may hold promise for adolescents in improving student achievement within the areas of reading and mathematics. Although athletic participation was associated with lower mean scores in mathematics and reading, eighth grade athletes and non-athletes had similar increases in achievement scores based on future educational goals. Athletes and non-athletes had no significant differences in educational aspirations. As students reached for graduate degrees, their scores were categorically higher in mathematics and reading achievement than students with lower educational aspirations.

Implications for Policy and Practice

With continued pressure from government entities in public education through NCLB, educational leaders must search for all means necessary to increase academic achievement for their students. The same should be said regarding athletic directors and coaches. With limited budgets, leaders must take action to disperse funding (F.S.A. § 1011.62, 2010) to those areas that have a significant impact on academic achievement based on AYP measures (FLDOE, 2010a).

Some results in this study indicated athletes outscored their non-athlete counterparts. Thus, there may be a necessity to fund athletics for low SES when there are associated fees in pay-to-play athletic programs.

Duffy et al. (2008) addressed the inability of the curriculum to resolve all academic achievement concerns. In this study, results indicated that athletic participation was not a consistent indicator of differences in higher scores for athletes in comparison to non-athletes. However, there were indications that academic goal setting and time spent on homework have positive relationships with academic achievement. Athletic directors and coaches should develop strategies to help students develop both academic and athletic goals. Furthermore, they should consider their role as, not only to win in athletic competitions, but also to support students in required homework time with support and reteaching before athletic practices. McMillen (1991) was clear in stating that competitive sports had taken a priority over education, especially at the collegiate level. The fear of athletics over academics, already a threat in high schools, could trickle down to middle schools.

In reflecting on the literature focusing on athletic participation and academic achievement, it was determined that a lack of modern academic accountability exists within this domain. As it stands, states have athletic governing bodies that maintain eligibility based on attendance, behavior, and grade point average. Student athletes in Florida who fail the FCAT but have a passing grade point average are permitted to continue participating in sports. As it stands, student athletes will never graduate from

high school if they do not pass the FCAT, so it stands to reason that athletic directors and coaches should develop required assessment tutoring sessions for those who have a demonstrated need.   The commitment to student athletes should be to each student's year-round academic achievement, not just to the period of time during the sports season.

Recommendations for Future Research

1. A study could be used to compare the academic motivation of athletes versus non-athletes to understand the coach-athlete relationship in regard to academics. Studies in this area could focus on coaches as academic motivators of student athletes and the differences in levels of academic motivation between athletes and non-athletes.

2. This study could be replicated using a sample of high school students. This would provide for a comparison of athletes and non-athletes at the high school level where a different level of achievement is expected.

3. A study could be conducted of the perceptions of district athletic directors and coaches as to the importance of intrinsic and extrinsic motivators to school athletes.

4. Further research should be conducted to identify practices and policies which support and encourage increased achievement among athletes, to include differences in gender.

5. Qualitative research could be conducted to investigate the motivators of middle school athletes who excel academically and come from low socioeconomic backgrounds.

6. A longitudinal study could be conducted to investigate the academic success, at the collegiate level of student participation in middle and high school sports to determine the impact athletic participation had on their overall academic success.

7. Propensity score analysis could be used determine the effects of athletic participation on academic achievement.

8. A study which focuses on low SES non-athletes versus low SES athletes would accommodate the necessity for providing scholarships for pay-to-play athletic programs as they are becoming more common.

9. A study which compares student grade point average during practice and playing seasons versus out-of-season grade point average would provide evidence of lower academic achievement for athletes who are not involved in sports during a given time of the academic year.

<div align="center">Summary</div>

An introduction was provided and the purpose of the study was established to compare eighth grade athletes and non-athletes. A summary and discussion for each of the research questions and the additional analyses was presented. Each discussion involved comparisons to previous research and the analysis of data led to findings that

were both similar and dissimilar to those of previous researchers. Conclusions of the

research were presented based on the evidence, followed by implications and

recommendations for future research.

APPENDIX A
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Pearson
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To: Venita M. Lewis:
Good morning. My name is John Shelby and I am a doctoral student at the University of Central Florida. I am using Albert Bandura's Social Cognitive Theory as the primary theory for my dissetation comparing academic achievement between 8th grade athletes and non-athletes based on standardized test scores. With your permission, I would like to include a specific figure in my dissertation that explains to the reader the process of Triadic Reciprocality as indicated on page 24. The image below provides the view in which my figure is slightly adapted from the figure used in the text, Social foundations of thought and action: A social cognitive theory. Bandura, A. (1986) Englewood Cliffs, NJ: Prentice Hall. ISBN: 9780138156145
If you have any questions or concerns, please contact me at the e-mail address listed below.

John Shelby
Assistant Principal, Matanzas High School
Home of the Pirates
shelbyj@flaglerschools.com
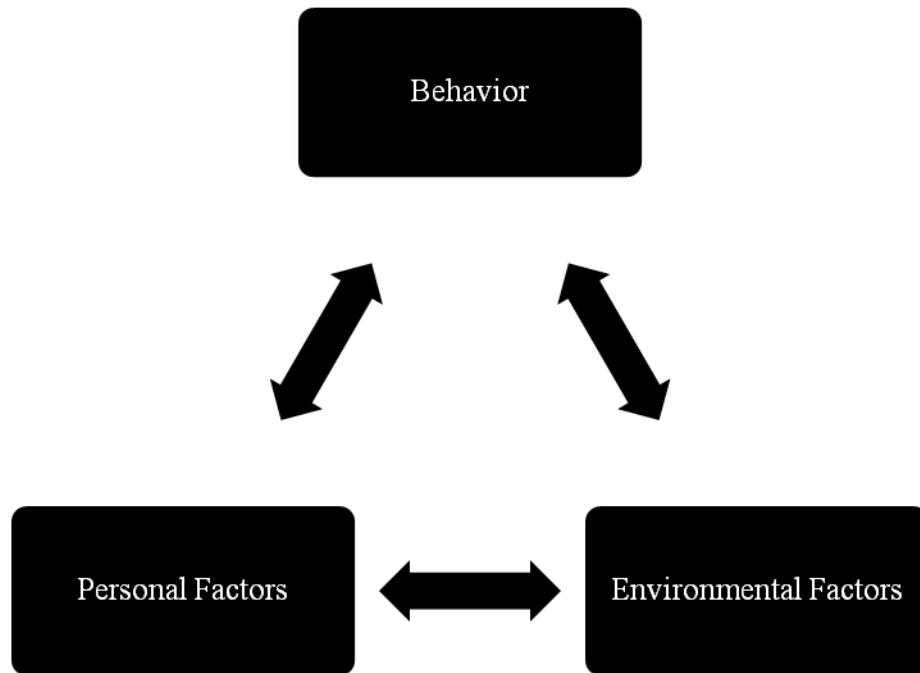
(Bandura, 1986, p. 24) Triadic Reciprocality

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Sep 20, 2011   PE Ref # 163382

JOHN SHELBY
160 Birchwood Drive
Palm Coast, FL 32137

Dear Mr. Shelby:

You have our permission to include content from our text, *SOCIAL FOUNDATIONS OF THOUGHT & ACTION:A SOCIAL COGNITIVE THEORY, 1st Ed. by BANDURA, ALBERT,* in your Doctoral dissertation thesis for your studies at UNIVERSITY OF CENTRAL FLORIDA.

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Page 24 Triadic Reciprocality for dissertation comparing academic achievement between 8th grade athletes and non-athletes based on standardized test scores.

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Sincerely,

Cheryl Freeman

Cheryl Freeman, Permissions Administrator

APPENDIX B
ECLS-K DATA APPROVAL

RE:
McCarroll, Jill [Jill.McCarroll@ed.gov]
You replied on 2/22/2011 11:59 AM.
Sent: Tuesday, February 22, 2011 8:42 AM
To:
Shelby, John

Hello Mr. Shelby,

Use of the public-use ECLS-K data does not require any copyright permission steps.
Please cite the ECLS-K in your paper as the source for your dissertation data. Please be
sure to use the full study name: Early Childhood Longitudinal Study, Kindergarten Class
of 1998-99 (ECLS-K). I believe that unless you are referencing a particular document, a
year is not needed in reference to the study. You may want to cite the specific
instruments that you used data from (e.g., the ECLS-K round 5 child assessment and
school administrator questionnaire), and reference the year those particular instruments
were fielded in the ECLS-K (e.g., 2004 for 3rd grade).

We maintain an online bibliography of dissertations, articles, and books using the ECLS-
K data (http://nces.ed.gov/ecls/bibliography.asp). When you finish your work, we'd
appreciate it if you would send us the dissertation citation so that we can include it in this
online bibliography. Please send the citation to ECLS@ed.gov.
I hope this information is helpful, and best of luck with your research!
Take care,

Jill
~~*~*
Jill Carlivati McCarroll, Ph.D.
  Education Statistician
  National Center for Education Statistics
  (202) 219-7002
  Jill.McCarroll@ed.gov

APPENDIX C
INSTITUTIONAL REVIEW BOARD APPROVAL

From : **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To : **John F. Shelby, Jr.**

Date : **March 16, 2011**

Dear Researcher:

On 3/16/2011 the IRB determined that the following proposed activity is not human research as defined by DHHS regulations at 45 CFR 46 or FDA regulations at 21 CFR 50/56:

Type of Review:	Not Human Research Determination
Project Title:	A COMPARISON OF ACADEMIC PERFORMANCE OF SEVENTH AND EIGHTH GRADE STUDENT ATHLETES AND NON-ATHLETES
Investigator:	John F Shelby Jr.
IRB ID:	SBE-11-07550
Funding Agency:	
Grant Title:	
Research ID:	N/A

University of Central Florida IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are to be made and there are questions about whether these activities are research involving human subjects, please contact the IRB office to discuss the proposed changes.

On behalf of the IRB Chair, Joseph Bielitzki, DVM, this letter is signed by:

Signature applied by Joanne Muratori on 03/16/2011 04:03:48 PM EST

IRB Coordinator

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