A COMPARISON OF HIGH SCHOOL END OF COURSE TEST RESULTS OF ATHLETES AND NON-ATHLETES IN THREE NORTH CAROLINA HIGH SCHOOLS

A Dissertation
by
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ABSTRACT

A COMPARISON OF HIGH SCHOOL END OF COURSE TEST RESULTS OF ATHLETES AND NON-ATHLETES IN THREE NORTH CAROLINA HIGH SCHOOLS

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The purpose of this study was to determine if there is a positive relationship between participation in high school athletic programs and achievement on the five End of Course tests that have been used as exit standards for graduation in North Carolina.

Quantitative research methods were used to answer the four research questions related to this study. Nine hypotheses were developed to assist in answering the four research questions. First, three high schools in northwestern North Carolina were selected as research sites. Second, student End of Course testing data were collected along with athletic participation data from each of the three schools involved. Third, the data were analyzed as a whole as well as disaggregated by gender, ethnicity, and school of attendance to determine if there was a statistically significant relationship between participation in interscholastic athletics and achievement on End of Course tests.

The data analysis of my research revealeda statistically significant positive relationship between participation in interscholastic athletics and achievement on End of

Course test scores. This relationship held true for the aggregate research sample as a whole as well as for the data analyses when disaggregated by gender and school of attendance. With regard to the analysis of the data when disaggregated by ethnicity, this relationship held true for African American and Caucasian students. A statistically significant relationship was not found in the analysis of the data for Hispanic students. Several factors could have contributed to this finding including the small sample size of Hispanic students in the study.

A comprehensive analysis of all groups represented in the data is presented. Implications for those associated with high schools and interscholastic athletics are presented. Suggestions for further research are also presented.

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There is no way I could possibly thank everyone who has helped me in this journey to complete my degree. There are far too many to mention and not enough space in this section to include everyone. If you had any part in helping me throughout my career as a student and an educator, you are greatly appreciated. I would like to specifically thank those who have played major roles during my graduate career.

First of all I would like to thank my parents, Charlie and Mary Jane Wyant. They made sure my two brothers and I had college as a goal and ensured it was paid for so that we were able to graduate without any student debt. Only now with my two sons in college am I realizing the sacrifices they had to make for this to happen. Later they encouraged me to continue my studies in graduate school, culminating with this degree. My mother did not live to see me complete this degree but I know she is watching over me. I am thankful my father is still here to see me graduate.

My sons, Jonathan and Joshua, have also been there with me throughout my graduate studies. Many summers were spent in Boone during their childhood as I was working on earlier degrees. I tried to serve as a role model for them to follow with regard to obtaining a good education. Over the past few years it has been the two of them who have encouraged me to finish what I started. Their mother Dana, my ex-wife and best friend, was also there for this journey. She made it possible for me to take the time away from my sons to attend classes. God only knows how many times the three of them rode Tweetsie while I was

sitting in a classroom on the campus of ASU. And most recently my granddaughter Rhylee, who is proud of me but too young to understand exactly what all of this means, has inspired me to complete this journey.

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All of the professors at Appalachian State University who played a part in this journey deserve to be acknowledged. My entire college career, which began in 1984, has been spent at ASU and I feel the education I have received has been second to none. In particular I would like to thank Dr. Alice Naylor and Dr. Jim Killacky for their leadership of the doctoral program since I entered. I would also like to thank Dr. Roma Angel and Dr. George Maycock for serving on my dissertation committee and helping guide me through this process. Most of all I would like to thank my dissertation chairperson Dr. Ken Jenkins and former ASU professor Dr. Harold Wilson. These two gentlemen were there for me when I began my graduate studies at ASU in 1991 and have gone above and beyond expectations to help me reach my goals. Without them I would never have made it.

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TABLE OF CONTENTS

LIST OF TABLES

Table

LIST OF FIGURES

Figure

CHAPTER 1: INTRODUCTION

A primary purpose of education is to increase student achievement. Regardless of the subjects or grade levels involved, educators seek to increase students' knowledge and skills from their current level to a higher level. Tremendous effort and funding has been, and continues to be, invested in staff development and programs hoping to find ways to improve student achievement. Administrators focus on teacher training, class size, daily and yearly school schedules, different types of instruction, and countless other issues, all aimed at improving student achievement. Each of these areas of focus plays a part in raising student achievement, yet sometimes educators overlook existing programs that may already be helping to increase student achievement. Participation in interscholastic athletic programs is one such area of possibility.

Interscholastic athletic programs are an important part of the culture of most high schools in our country. These programs help to build school and community spirit. Nearly everyone can recall spending some Friday nights at a high school sporting event while a student in high school. Research has found many benefits of participation in interscholastic athletics from improved physical, mental, and social health (Weplay, 2009) to increased civic participation (Perks, 2007) to higher career earnings (Barron, Ewing,& Waddell, 2000; Curtis, McTeer, & White, 2003; Stempel, 2006).

There is also a significant body of research showing that students who participate in sports also perform better academically as well as in other areas related to student

achievement (Hunt, 2005; Miller, Melnick, Barnes, Farrell, & Sabo, 2005; Newman, 2005; Nuhn, 1991; Smith, 1994; Soltz, 1986; Souza, 1990). Yet schools and school systems have been slow to take measures to strengthen athletic programs as a means to improve student achievement. In recent years, some systems have actually reduced funding to their athletic programs to help balance budgets in difficult economic times. In the current seven member high school athletic conference with which I was involved, only two schools offered every sport recognized by the North Carolina High School Athletic Association (NCHSAA). This was not because there was not enough interest to field the teams but because there was not a willingness to provide the necessary funds to do so. With so much attention being focused inside the classrooms, the impact of programs outside of the classroom on student achievement could have been overlooked.

The Problem

While there is research that shows how extracurricular activities can benefit overall academics, little research exists to show if more specific extracurricular activities such as athletics has a positive effect on student achievement as measured by state level standardized tests. Although only one measure of student achievement and school success, the results of standardized tests are the most publicized. In North Carolina, End-of-Course (EOC) tests at the high school level are the standardized tests used by the Department of Public Instruction (DPI) to measure school success annually. The current reality for educators is that these are the results that receive the majority of media coverage annually when released to the public. The limited research available on the effects of participation in extracurricular activities, such as athletics, on these state level standardized tests make it difficult to demonstrate the

importance of a strong interscholastic athletic program to increased student achievement in this area.

Population Studied

For the purpose of this study, I chose to limit my research to three high schools in the northwestern area of North Carolina. The most recent statistics from the Public Schools of North Carolina showed there were 433,370 students attending public high schools in the state. According to the NCHSAA, there were 212,289 high school students who participated in athletics during the 2010 – 2011 school year. With numbers this large it was necessary to limit the data collection to a manageable size. I also wanted to conduct the research near to my current location so the results would be more applicable to my high school and other high schools with which I had interactions. If this research was to be used to improve the quality of and funding for high school interscholastic athletic programs in my area, the data needed to be applicable to the schools in this area.

Purpose of the Study

The purpose of this study was to determine if there is a relationship between participation in high school athletic programs and achievement on the five End of Course tests that have been used as exit standards for graduation in North Carolina. This study addressed this issue by focusing on End-of-Course (EOC) results for athletes and non-athletes in three different North Carolina high schools labeled Northern, Southern, and Western for the purpose of this study. Data including results from these tests as well as athletic participation were analyzed to determine if there was a statistically significant relationship between participation in athletics and higher scores on the EOC tests. This study determined this by addressing four research questions.

Research Questions

In order to guide this study, the following four research questions were used. These questions begin by considering the results for all students included in the data then consider the results for students by gender, ethnic background, and school of attendance.

1. Do students who participate in athletics have higher EOC scores than students who do not participate in athletics?
2. Do these results hold true for students regardless of their gender?
3. Do these results hold true for students regardless of their race?
4. Do these results hold true regardless of which school is attended?

The answers to these research questions provided a better understanding of the relationship between athletic participation and End of Course test results for high school students.

Hypotheses

The following are the null hypotheses used for this study.

- HO1: There will be no difference in the composite End of Course test score for all students who participated in athletics as compared to the composite End of Course test score for all students who did not participate in athletics.
- HO2: There will be no difference in the composite End of Course test score for all female students who participated in athletics as compared to the composite End of Course test score for all female students who did not participate in athletics.
- HO3: There will be no difference in the composite End of Course test score for all male students who participated in athletics as compared to the composite End of Course test score for all male students who did not participate in athletics.

- HO4: There will be no difference in the composite End of Course test score for all African-American students who participated in athletics as compared to the composite End of Course test score for all African-American students who did not participate in athletics.
- HO5: There will be no difference in the composite End of Course test score for all Caucasian students who participated in athletics as compared to the composite End of Course test score for all Caucasian students who did not participate in athletics.
- HO6: There will be no difference in the composite End of Course test score for all Hispanic students who participated in athletics as compared to the composite End of Course test score for all Hispanic students who did not participate in athletics.
- HO7: There will be no difference in the composite End of Course test score for all Southern High School students who participated in athletics as compared to the composite End of Course test score for all Southern High School students who did not participate in athletics.
- HO8: There will be no difference in the composite End of Course test score for all Northern High School students who participated in athletics as compared to the composite End of Course test score for all Northern High School students who did not participate in athletics.
- HO9: There will be no difference in the composite End of Course test score for all Western High School students who participated in athletics as compared to the composite End of Course test score for all Western High School students who did not participate in athletics.

Significance of Research

In addition to the research findings mentioned previously, there was also research available that showed participation in athletics had a positive effect on student achievement in North Carolina (Overton, 2001; Pressley & Whitley, 1996). In these two studies student athletes were found to have better grades and attendance while having fewer discipline referrals when compare to their non-athlete peers. However, no research had looked at how participation in athletics affects End of Course test results. My research adds to the prior research by focusing on these test results for students who participated in athletics and those who did not. Improving EOC results has been extremely important for high schools in North Carolina. Part of the state and federal annual measures for every high school are based on the results of EOC tests. These tests have also been used as exit standards for students graduating high school. But the significance of this research does not end there.

Over the past three years every school system in North Carolina has had to make drastic cuts to their budgets due to the economic down turn. The 2009 – 2011 biennial budget passed by the North Carolina legislature included a 12% cut in funding to the public schools. For the 2010 – 2011 school year an additional 2.73% was cut from this funding ("North Carolina Public Schools Fast Facts," 2011). Many programs and positions had been cut as a result. Sometimes these cuts involved athletic programs and teams.

Locally, Western County Schools weathered the storm better than most school systems yet theyhad their share of cuts. This was evident as one looked at the total budget for Western County Schools for the past three school years. The information in the following table was provided by the finance officer for Western County Schools (Western County Schools finance officer, personal communication, April 2012).

Table 1

Western County Schools Three Year Budget Numbers

School Year	Total Operating Budget for Western County Schools
2008 – 2009	$42,821,073
2009 – 2010	$41,223,854
2010 – 2011	$40,903,713
Net Change	**$1,917,360 decrease in funding**

This was a huge decrease in funding for a small school system such as Western County Schools. The impact of less funding had been felt in all areas, including interscholastic athletics.

At the high school level some assistant coaching positions were eliminated and two middle school sports, wrestling and track, were no longer funded by the school system. Middle school track continued to be offered to students through the efforts of the coaches to obtain outside funding but middle school wrestling was not offered. This, in all probability, impacted the skills of the athletes in those sports at the high school level. Other school systems saw even more drastic cuts.

The significance of this research has the potential to reach far beyond western North Carolina. If it can be shown that participation in interscholastic athletics benefited student achievement in the classroom, school officials everywhere would have better information available before making additional cuts to athletic programs. Additionally, local and state politicians would have more information available showing the importance of school activities outside of the classroom that might prevent further cuts to school funding. Even

more promise might be found for other states that have their own versions of content-based course–ending standardized tests in their accountability systems. It is reasonable to conjecture that the findings in Western North Carolina would be replicated in other states with similar, but distinct accountability systems.

Definition of Terms

The following will help all who read this paper understand the necessary acronyms.

- Department of Public Instruction (DPI) is the governing body for the public schools in North Carolina. General policies and procedures for all public schools in the state are set by DPI including the testing requirements each school must follow.
- End of course tests (EOC's) are state-wide tests that are given to all North Carolina students. Over the years since the mid 1990's these tests have at one time or another been given in the following subjects: Algebra I, Algebra II, Biology, Chemistry, Civics & Economics, English I, Geometry, Physical Science, Physics, and U.S. History. These EOC tests serve as the final exam for the students taking these courses and the results count as 25% of the student's final grade. The results of these tests also play a part in figuring accountability results for the high schools in North Carolina. Five of these tests, Algebra I, Biology, Civics & Economics, English I, and U. S. History served as the exit standards for students graduating from high school for the past few years although that is no longer the case. Additionally three of the tests, Algebra I, Biology, and English I serve as the school's annual measures for No Child Left Behind.
- Student achievement is defined as how well students perform on the five End of Course tests on which data were collected.

- Composite scores are metrics by which achievement on End of Course tests are reported. Each possible score on an EOC test correlate to a particular composite score. These scores were used to show where a particular student ranked in relation to all students taking a particular test. Composite scores were also used to convert the test results to a 100 point scale for grading purposes.
- The ABC program is specific to North Carolina schools. It stands for Accountability, Basics and Control and is the program used to annually evaluate the schools of North Carolina. It was designed to measure both student proficiency and annual growth that was then used to rate schools. This program had been used by North Carolina since the mid 1990's but had undergone many changes, especially at the high school level. As with most accountability programs, standardized tests in certain subjects are used to determine the success of a school. There had been as many as ten subjects tested under the ABC program over the years. However, that number has been reduced to three subjects.
- No Child Left Behind (NCLB) is the federal educational initiative that, among other things, requires that schools test and report the annual proficiency level of its students. Schools must meet increasing annual proficiency goals leading up to 100% proficiency by 2014. In North Carolina, the ABC program was already in place when NCLB was passed and was modified to meet the testing requirements of both programs. The three End of Course tests that will remain a part of the ABC program, Algebra I, Biology, and English I, were also used as a factor in determining if a school had met the annual requirements of NCLB.

- The North Carolina High School Athletic Association (NCHSAA) is the governing body for high school athletics in North Carolina. This association sets the rules and regulations that all member schools and student athletes must follow in order to participate in athletics. The NCHSAA has long been a proponent of interscholastic athletics. It has helped ensure all schools hold high academic and attendance standards for athletic participation. Under NCHSAA guidelines, all student athletes are required to maintain a passing average in at least 70% of the classes in which they are enrolled in order to participate on school sanctioned teams. Students are also required to be in attendance at school a minimum of 85% of the school days each semester. Eligibility sheets are kept on file at all high schools to verify all students participating in athletics meet these standards.
- Athletic participation is defined as actual membership and involvement on an interscholastic athletic team that is recognized by the NCHSAA.
- *t*-test is a statistical test that measures if the means of two groups are statistically different from each other. These *t*-tests were used in this research to determine if the mean EOC scores of athletes were higher than the mean EOC scores of non-athletes.

Chapter Summary

This chapter has briefly discussed the background for my research and the problem I was trying to address. It is important to note here that this study was reviewed and approved by the Institutional Review Board at Appalachian State University. This chapter has also briefly covered the significance of this research and the limitations I had placed on it. Chapter 2 will include both a more thorough literature review and set the conceptual framework for my research. In Chapter 3, I will discuss the methodology used for my

research including how the data were collected, organized and analyzed. Chapter 4 will share the results of my research and answer the research questions. In the last chapter, Chapter 5, I will discuss what I have gained from this study and suggest possibilities for further research on this topic.

CHAPTER 2: REVIEW OF THE LITERATURE

There was a significant amount of literature closely related to the purpose of, and methods used for, this study. In order to best organize this literature review, I have broken down the sources into the following categories:

- External Variables and Student Achievement
- Extracurricular Participation and Student Achievement
- Athletic Participation and Student Achievement
- Research based in North Carolina
- Non-Academic Benefits of Participation in Athletics
- Use of End of Course Test Scores
- Conceptual Framework

Each of these categories has previous research that helped build the conceptual framework for my research and the methods I used for the study.

There was an abundance of literature from previous research to show how certain external variables have impacted student achievement. While not all inclusive, several of these variables most closely related to my research are referenced in this chapter. Literature was also available showing how participation in extracurricular activities such as athletics had a positive effect on certain measures of student success. Most of this research was conducted outside of North Carolina; however two studies in North Carolina were also

referenced. I have also included several research based non-academic benefits of participation in athletics. These benefits began with the initial participation in athletics and continued well beyond the actual playing days for athletes. Finally there was literature more limited to North Carolina that showed how End of Course tests have been used as a measure of student achievement since their inception.

External Variables and Student Achievement

The achievement of students in the classroom is influenced by many factors that lie outside of the direct control of the school classroom and many times outside of the direct control of the school all together. While Vandevoort, Amrein-Beardsley, and Berliner (2004) found the quality of a teacher in the classroom is the single most important factor in determining how well a child learns, external variables need to be understood by educators. We do not educate students in isolation. Students come to us from their worlds outside of the school building. The influences of their environments cannot be ignored as we seek to educate them for their futures. Due to the sheer number of external variables that exist, compiling a comprehensive list of the ones that have impacted student achievement would not have been as meaningful as focusing on several that have been extensively researched.

One of the most researched external variables affecting student achievement in the classroom iss socioeconomic status. White (1982) found that socioeconomic status was one family characteristic that was a powerful predictor of performance in school. Students from families with high socioeconomic status achieved higher than students from families with low socioeconomic status. However, the impact of socioeconomic status was much greater at the early grades than later in school. Majorbanks (1996) found that socioeconomic status, parental involvement, and family size were particularly important family factors

thatimpacted student achievement. These three characteristics were interrelated in most cases. That is, low socioeconomic status often led to low levels of parental involvement and often these families were large in size. Hochschild (2003) found students with a low socioeconomic status had lower test scores and were more likely to drop out of school. Eamon (2005) found students from low socioeconomic status who attend poorly funded schools did not perform as well as students from higher socioeconomic classes. This led to the next external variable affecting student achievement; school funding.

Socioeconomic status has an impact on more than just an individual student or family. The socioeconomic status of the school community can also affect the funding for its schools, resulting in an even greater negative impact on student achievement. Because these schools had less funding available, they were unable to spend as much to provide resources and material to the teachers in the classroom. Sirin (2005) found socioeconomic status as one of the most important factors in determining school financing since much of the funds for local schools came from local property taxes. While property taxes were not the only source of funding for a school or school system, these taxes often significantly supplemented other funding sources. This lower funding also resulted in larger class sizes with less time and personalized attention given to individual students (Van Laar&Sidanius, 2001).

Closely related to socioeconomic status and school funding was another external factor that impacted student achievement, family makeup and support. In the previously mentioned study, Majorbanks (1996) found students from single parent households did not perform as well as those from two parent households. Additionally, he found single parents were less involved in their child's education, gave less encouragement, and had lower expectations. While this was somewhat true across all socioeconomic levels, it was more

evident in low socioeconomic single family households. Jeynes (2002) found that students whose parents were divorced were among those who scored lowest on standardized tests. Eamon (2005) found that supportive and attentive parenting had a positive effect on academic achievement.

Race has also been found to be a factor that impacts student achievement. Battle and Lewis (2002) found minority students overall had lower academic achievement than white students. However, Seyfried (1998) found that African-American students were more likely to be placed in lower academic groups which could help explain part of the achievement gap. Crosnoe, Johnson, and Elder (2004a) found that both African-American and Hispanic students were more likely to feel disconnected from their schools. This contributed to lower academic achievement as compared to their white classmates. Bali and Alvarez (2004) found that the racial make-up of a school had an influence on both test scores and the students' attachment to their school. Test scores and school attachment increased when a student's race matched the most common race of the student body.

Gender is another outside factor that could have an impact on student achievement. However, the effects of gender on student achievement were somewhat mixed. Conventional thinking had been that males achieve higher than females. Research by Chambers and Schreiber (2004) found little to no difference in achievement between the sexes. In some cases, females actually achieved higher than males. Eitle (2005) found males outperformed females in the areas of math and science but females performed better in reading. Ceballo, McLoyd, andToyokawa (2004) found that girls exert more effort at school which can lead to better performance.

The school environment has also been shown to impact student achievement. Crosnoe, Johnson, and Elder (2004a) found factors such as school size and the neighborhood in which the school is located influence student test scores. Additionally, in another study from the same year (2004b), they found funding and class size have an impact on student achievement. Higher funding and smaller class sizes tended to be associated with a positive impact on student achievement while lower funding and larger class sizes did not. Lee and Smith (1997) concluded that children from a low socioeconomic status performed better academically in smaller schools. Ironically, this same study found that students from high socioeconomic backgrounds performed better in larger school settings.

Extracurricular Participation and Student Achievement

Within each school there are also factors that influence student achievement. As mentioned earlier, the effectiveness of the classroom teacher has the greatest impact on student achievement (Vandevoort, Amrein-Beardsley, & Berliner, 2004). However, other factors such as participation in extracurricular activities can also have an impact on student achievement.

Fredricks and Eccles (2006) found students who are involved in extra-curricular activities outside the normal school day were more engaged in the classroom. These extra-curricular activities had been found to afford students an opportunity to develop a positive support system among their peers and adult staff (Heller, Calderon, & Medrich, 2003). Fredricks and Eccles further suggested schools assist in fostering student engagement in learning by offering structured activities to students outside of the normal school day. These activities would include things such as student clubs, sports teams, and volunteer activities.

They found participation in extracurricular activities can be very beneficial to the academic, social, physical, and emotional growth of students.

Athletic Participation and Student Achievement

Within extracurricular activities, participation in school athletics was a factor that has been found to have an impact on student achievement. The impact of participation in athletics as it related to student achievement, especially in North Carolina, had not been thoroughly researched. Many of the sources found during my literature review were somewhat dated which led me to this current research. There was a need for additional research on this subject as participation numbers in interscholastic athletics has increased significantly in North Carolina over the years. This can be readily seen in the following table with information on athletic participation numbers from the NCHSAA (North Carolina High School Athletic Association, 2011).

Table 2

Athletic Participation Number in North Carolina High Schools

School Year	Female Participation Numbers in High School Athletics in North Carolina	Male Participation Numbers in High School Athletics in North Carolina
1990 – 1991	33,663	69,958
2010 - 2011	89,845	122,444

Yancy (2007) concluded an increase in participation in athletics was positive since it improved the overall high school experience for students by creating a bond between teachers and students as well as lessening the chances of deviant student behaviors. More importantly for policy makers and school administrators was how this participation impacted student achievement.

In studying the impact of participation in athletics on student achievement, Reid (2005) found that high school athletic programs supplement the academic experience for students. He also found participation in high school athletics improved the chances of future academic and professional post-secondary success for those who were involved. White (2005) echoed this, finding that athletic programs developed and instilled positive attributes and provided the impetus for lifelong success for those students who participated in athletics while in high school. And while participation in athletics takes a significant amount of time, Jones (2007) concluded a healthy balance between academics and athletics was achievable. Even more recently Sitkowski (2008) cited the positive effects of athletic participation for student-athletes: self-discipline, self-confidence, lower dropout rates, and smaller percentages of drug and alcohol abuse. Each of these recent studies showed how participation in athletics had benefits for high school students. Even more evidence was found in several older studies.

Smith (1994) gave a strong argument supporting the benefits of a quality athletic program. After a thorough review of the literature, he concluded that interscholastic programs had several significant benefits for schools. Students who participated in athletics showed increased academic achievement in the classroom when compared to students who did not participate in athletics. Athletes also had a lower occurrence of discipline problems than non-athletes. Finally, the graduation rate for athletes was higher than that of their non-athlete counterparts. Additionally, Smith was somewhat critical of the limited focus given to athletics by the school reform movement. Further, he made the recommendation that schools expand their athletic programs to help meet school reform goals.

One of the sources Smith referenced in his review was Durbin (1986) who also found many benefits of participation in interscholastic athletics. In addition to increased student achievement in the classroom, he found that participation in interscholastic sports also had a positive effect on the self-respect, self-esteem and self-confidence of students. Durbin also acknowledged that athletes learned the importance of teamwork. All of these skills contributed to a student's ability to be successful in high school; moreover, they also had lasting benefits in many aspects of life. Durbin claimed that whatever life path is chosen by a student, the skills learned through participation in athletics will help them be better prepared.

Many other researchers found that participation in athletics contributed to increased academic success for students. Among them are Nuhn (1991) and Soltz (1986). In research conducted by both, the findings showed that students who participated in athletics had higher grade point averages (GPA) than those who did not participate in athletics. Similarly, Souza (1990) found that the PASS program in Hawaii had a positive impact on the classroom grades of student athletes. The key to this program was a monitoring component where coaches and regular teachers worked together to keep track of the progress of athletes.

These same benefits and others directly attributed to participation in interscholastic athletics were found in studies conducted by other researchers. Patranella (1987) found that students participating in extracurricular activities had significantly higher attendance rates. His study, based in Minnesota, found that athletes missed 1.32 per year less days than non-athletes. These findings remained constant when the data were broken into subgroups based on race and socioeconomic status. Landers and Landers (1978) found that athletes had a lower rate of discipline referrals than non-athletes. In their study, non-athletes were found to have a discipline referral rate of 39.9% while athletes had a rate of 30.3%.

Directly related to an increased graduation rate, athletes have been found to have a lower drop-out rate than non-athletes. Schafer and Armer (1968) found that only 2% of athletes dropped out of school before graduating. This was much lower than the 9.2% of non-athletes that dropped out. However, due to the age of the study and the method of computing the drop-out rate at that time, care must be taken when looking at these results. More recently, Hunt (2005) found that participating in activities outside of class created a bond with teachers which improved academic performance and kept students in school. These activities were not just limited to athletics but other things such as clubs and volunteer work.

Not only did participation in athletics have a positive impact on the academic success of students, it has been shown that coaches have a major influence on the academic success of the athletes that played for them. A study by Newman (2005) showed how coaches had a positive impact on the grades of male student athletes. Scherer (1990) focused on the influence of coaches at the university level. The results showed that coaches who recruited athletes with a strong work ethic, monitored their progress, and maintained discipline increased the academic success of their athletes. Through interviews with student athletes, Schwartz (1990) revealed several examples of how coaches influenced their lives. Among the examples found were of coaches emphasizing the importance of staying in school, promoting the pursuit of excellence at all times, and providing supplementary materials to help students be successful in the classroom. A recent study also found that participation in basketball decreased the chances of dropping out of school for African-American males (Miller, Melnick, Barnes, Farrell, & Sabo 2005).

Research Based in North Carolina

While all of this research supported the advantages of participation in athletics, it had one major drawback for local coaches and athletic directors: all of the previous research mentioned was conducted in states other than North Carolina. The previously cited studies do have implications for North Carolina, however, two studies conducted in North Carolina provided a more local perspective on the positive benefits of participation in high school athletics. These two studies were referenced by the North Carolina High School Athletic Association (NCHSAA) as a justification for high school athletics. They are somewhat dated but served as the inspiration for my current research on a related topic.

The first study was conducted by Pressley and Whitley (1996). This study is 16 years old but including it was important because of its location and because the topic is closely related to my research. It involved a comparison of athletes and non-athletes in 133 high schools that were members of the NCHSAA. When student grade point averages (GPA) were compared, athletes had significantly higher GPAs than non-athletes. On a four point scale, the mean GPA for athletes was 0.86 points higher than that of non-athletes. This held true not only for the athlete group as a whole, but also when subgroups based on race and gender were compared. In all but one subgroup, the athletes were found to have significantly higher GPAs than the corresponding group of non-athletes. In the subgroup that was not found to be significantly higher, African-American males, the GPAs were still higher for the athletes than for the non-athletes. Additional comparisons within this study showed that athletes had a better attendance rate than non-athletes. Non-athletes missed an average of a week more of school during an academic year than did their athlete counterparts. Again, these data were broken down by subgroups with results showing that all subgroups of

athletes had significantly better attendance than non-athletes. Another finding of this study was that athletes had fewer discipline problems than non-athletes, with approximately 9.5% fewer athletes being referred for discipline. Still another finding was that athletes had a 4.9% higher graduation rate than non-athletes. This led to perhaps the area where the benefits of athletic participation found in the study had the greatest impact, the drop-out rate. The drop-out rate for athletes was found to be twelve times lower than that of non-athletes. The findings in each of the five areas of comparison in this study strongly supported that participation in athletics was beneficial to student success in school.

The second study based in North Carolina was conducted by Overton (2001). He collected data from 131 high schools that were also members of the NCHSAA. Many of the same results described in the Pressley and Whitley (1996) study were confirmed by Overton. Athletes had a higher mean GPA than non-athletes, 0.81 higher on a four point scale. Athletes averaged 5.6 fewer absences during the school year than non-athletes. Discipline referrals were again found to be lower, and the graduation rate found to be higher for athletes than for non-athletes. The drop-out rate mirrored the Pressley and Whitley study and was found to be twelve times lower for athletes as compared to non-athletes. Overton also compared a set of data not included in the earlier Pressley and Whitley study. He used End of Course test data in Algebra I and English I to compare the results for athletes and non-athletes. Athletes were found to have higher mean composite scores in both tested areas. In Algebra I, athletes had a mean End of Course composite score that was 8% higher than non-athletes. In English I, their mean End of Course composite score was 11% higher. Given the emphasis now placed on standardized tests, this was a significant finding for school systems.

Non-Academic Benefits of Participation in Athletics

In the above studies researchers found that participation in athletics had academic benefits for students in schools. Other researchers also found many non-academic benefits of participation in athletics.

One of the most compelling arguments on the non-academic benefits of participation in athletics was given in an editorial found online titled "The Benefits of Competitive Athletic Sports Participation" (Mango, 2009). The benefits found were divided into three categories:

- Physical
- Mental / Conceptual
- Social

The physical benefits were easily recognizable. Those who participated in athletics were generally more physically fit than those who did not. This came from hours of training and preparation for competition. Long term, the habit of maintaining this physical fitness led to a healthier lifestyle and fewer medical problems. The mental / conceptual benefits covered a wide range of areas. Those who participated in athletics learned the importance of setting and working toward goals. They developed a desire and inner will to accomplish these goals and also developed a determination to persevere through challenges. This helped build what the author Kirk Mango referred to as a mindset for success. Athletes also developed strong character and learned coping skills that helped them overcome setbacks. Socially athletes learned the benefits of cooperation and teamwork. Participation in athletics also helped with the formation of friendships.

Another example of how participation in athletics led to success in a career was found in a Fortune 500 survey from 1987 titled "The Case for High School Activities" (National

Federation of State High School Associations, 2008). Individuals from 75 companies on the Fortune 500 list who held jobs at the executive vice president level or higher were surveyed on their participation in extracurricular activities while in high school. Some of the following participation percentages were to be expected.

- 54% were involved in student government
- 43% were in the National Honor Society
- 37% were involved in the music program
- 35% were in scouts
- 18% were involved the school's newspaper or yearbook publication

However, one response from these high ranking executives stood out above the rest. Right at 95% responded that they had participated in athletics while in high school. This common response to participation in an activity while in high school was the highest of any response by these successful executives. While it did not mean participation in athletics directly led to such a level of success in the business world, it did show something these people all had in common.

This success was not just limited to those at the highest executive level. Several studies found that those who participated in high school athletics tended to earn higher incomes regardless of their profession. Barron, Ewing and Waddell (2000) used a National Longitudinal Survey of Youth and found that males who participated in high school athletics earned 32 percent more than those who did not participate. Curtis, McTeer, and White (2003) used a National Survey of Giving, Volunteering, and Participating and found males between the ages of 25 and 34 who participated in high school athletics earned an average of $4,446 more annually than males in the same age range who did not participate in athletics.

For females in this age range, those who participated in high school athletics earned $1,462 more annually. Stempel (2006) used information from a 1996 Scripps Howard / Ohio University and found men who had participated in high school athletics had a mean annual household income of $9,333 more than those who did not participate. Interestingly this study did not find a significant difference among the mean household income for women. Still, these studies showed another possible benefit of participation in athletics with regards to success later in life. Other factors came into play but there was a common characteristic of participation in athletics while in high school. Reid (2005) found former high school athletes earned a higher yearly income and remained physically healthier compared to non-athletic high school students.

The benefits of participation in athletics later in life were not just limited to increased income or opportunities at work. Perks (2007) found that adults who had participated in youth sports programs were more civically involved than those who did not. Fejgin (1994) found that those who participated in athletic programs had a higher level of self esteem and self control. And while participation in athletics seems to benefit all groups later in life, Marsh and Klietman (2002) found that those from lower socioeconomic status benefited even more than those from higher socioeconomic statuses. And the list could go on. While there were mixed results from some of the studies regarding the non-academic benefits of participation in athletic programs, the overwhelming majority of the research showed positive results while in school as well as later in life.

Use of End of Course Test Scores

According to the North Carolina Department of Public Instruction (North Carolina Public Schools, 2012a), End of Course tests were a direct result of the North Carolina

Elementary and Secondary Reform Act of 1984. This legislative action had as its purpose to improve the education provided by the schools of North Carolina. It was passed shortly after A Nation at Risk was published in 1982, which served as a call to action for schools throughout the United States. As accountability for what should be taught by the schools in North Carolina grew, there was a need to measure if students were learning what was being taught. As a result, the development of End of Course tests began in the late 1980's with the first tests given to students in the spring of 1991 (North Carolina Public Schools, 2012b).

At first these tests had no impact on students or their grades in the classes. The tests were actually given one to two weeks prior to the end of the school year and students took an additional teacher-made test that served as the final exam for the class. The results of these tests were only used to determine how many students had learned the objectives of the class. Shortly thereafter these End of Course tests were moved to the end of the school year and served as the final exam for the class (North Carolina Public Schools, 2012a). This helped in that it provided some incentive for students to do their best on the tests.

The next significant change regarding the use of End of Course tests came in 1996 with the implementation of the Accountability, Basics, and Control (ABC) program in North Carolina (North Carolina Public Schools, 2011b). By that time, End of Course test use had grown into the primary measure of how well schools were doing. The ABC program standardized how the tests were to be used to measure schools and how they would count towards a student's final grade. Schools at the K-8 level fell under the requirements of the new ABC program for the 1996 – 1997 school year. For high schools, these requirements began with the 1997 – 1998 school year. At that time there were ten End of Course tests being used in the following classes:

- Algebra I
- Algebra II
- Biology
- Chemistry
- Civics & Economics
- English I
- Geometry
- Physical Science
- Physics
- United States History

Every student enrolled in one of these classes was required to take the End of Course test for that class and this test counted as the exam as well as 25% of the final grade in the class. Schools were required to ensure that at least 95% of the students enrolled in a class took the End of Course test. The results of these tests were then used to report how schools were doing in two areas: achievement level and growth.

The actual testing program remained fairly constant from 1996 through 2009. It was adjusted to meet the requirements of No Child Left Behind in 2001, but the same ten tests were administered each year. Five of these tests gained some additional significance when they were made exit standards for high school graduation in 2005 (North Carolina Public Schools, 2005). These five tests were:

- Algebra I
- Biology
- Civics & Economics

- English I
- United States History

Students were not only required to pass these classes as part of their graduation requirements, they were also required to achieve a Level III on the End of Course tests for these classes. There was a waiver process put in place that schools could use for students with special circumstances but this significantly altered the importance of these five tests.

Conceptual Framework

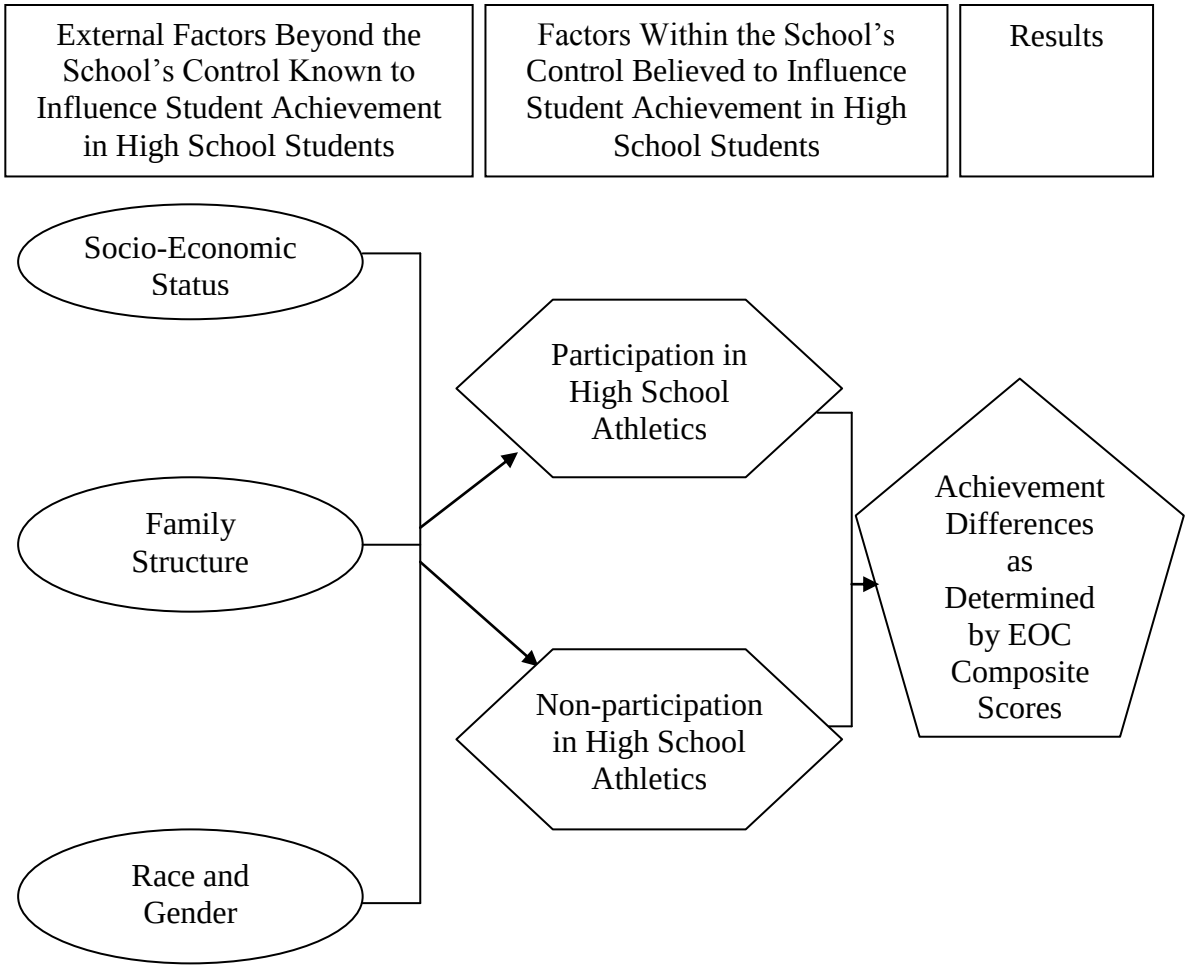
All of this previous research led to the conceptual framework for my research. The achievement of students in the classroom is influenced by many factors. The effectiveness of the teacher and instruction in the classroom is the greatest of these factors. I have also shown how many other factors influence the achievement of students. Among the most prevalent were the following:

- Socioeconomic status
- Family makeup and support
- Race
- Gender
- School Environment

There are many other factors that have been shown to impact student achievement. Some of these were well researched, others were not. Among those factors was participation in extracurricular activities which includes athletics. Research was presented that showed how participation in extracurricular activities had many benefits, including improved student achievement. However, most of this research was years and even decades old. Additionally very little of this research focused on how participation in athletics impacted the results of

End of Course tests in North Carolina. The research for this study was based on previous research in this area and sought to show how participation in athletics was potentially one additional factor impacting student achievement as determined by composite scores on End of Course tests. A visual representation of this is given in the following illustration.

Figure 1: Conceptual Framework



Chapter Summary

Many variables, some known, some unknown, have an impact on student achievement. The literature review in this chapter showed how several of these variables were well established. Those chosen for inclusion in the literature review impacted most

schools throughout North Carolina and the nation. It is important for educators to be familiar with variables that impact student achievement and understand how to compensate for those having a negative impact. For those having a positive impact schools should seek out ways to increase their presence in schools. The prior research that showed how participation in high school athletics impacted student achievement as measured by course ending standardized tests was limited. The intent of my research was to determine the appropriateness of suggesting the inclusion of one additional variable that impacts student achievement as measured by End of Course tests, participation in high school athletics.

CHAPTER 3: METHODOLOGY

As I have shown, there is little current research available on how participation in high school athletics impacts student achievement as measured by End of Course tests in North Carolina. The existing research is more than a decade old. The purpose of my study was to determine if a relationship between participation in high school athletics and student achievement as measured by End of Course test existed. I sought to accomplish this by addressing the following research questions:

1. Do students who participate in athletics have higher EOC scores than students who do not participate in athletics?
2. Do these results hold true for students regardless of their gender?
3. Do these results hold true for students regardless of their race?
4. Do these results hold true regardless of which school is attended?

In order to determine the statistical probability of these relationships, the following null hypotheses corresponding to the four research questions were used:

- HO1: There will be no difference in the composite End of Course test score for all students who participated in athletics as compared to the composite End of Course test score for all students who did not participate in athletics.
- HO2: There will be no difference in the composite End of Course test score for all female students who participated in athletics as compared to the composite End of Course test score for all female students who did not participate in athletics.

- HO3: There will be no difference in the composite End of Course test score for all male students who participated in athletics as compared to the composite End of Course test score for all male students who did not participate in athletics.
- HO4: There will be no difference in the composite End of Course test score for all African-American students who participated in athletics as compared to the composite End of Course test score for all African-American students who did not participate in athletics.
- HO5: There will be no difference in the composite End of Course test score for all Caucasian students who participated in athletics as compared to the composite End of Course test score for all Caucasian students who did not participate in athletics.
- HO6: There will be no difference in the composite End of Course test score for all Hispanic students who participated in athletics as compared to the composite End of Course test score for all Hispanic students who did not participate in athletics.
- HO7: There will be no difference in the composite End of Course test score for all Southern High School students who participated in athletics as compared to the composite End of Course test score for all Southern High School students who did not participate in athletics.
- HO8: There will be no difference in the composite End of Course test score for all Northern High School students who participated in athletics as compared to the composite End of Course test score for all Northern High School students who did not participate in athletics.
- HO9: There will be no difference in the composite End of Course test score for all Western High School students who participated in athletics as compared to the

composite End of Course test score for all Western High School students who did not participate in athletics.

Selection of Research Sites

The first step in the collection of the data needed for this study was to select a manageable sample size that was also large enough for the results to be meaningful. For my research, I chose to look at three specific high schools in northwestern North Carolina. This gave me a large enough sample size for meaningful results yet kept the data collection at a manageable level. This also gave me a better representation of ethnic diversity that allowed me to answer research question number three.

Western High School has a long history of high student achievement; therefore I wanted to include this school in my research. At the time I began this research I was also serving as the principal of Western High School. To prevent any possible bias during the data collection phase of my research, as well as assuring the Institutional Review Board of my independence from these data, I was never involved with the data collection at Western High School. Just as with the other schools involved, I only received these data once student identifiers had been removed. This allowed me to continue to use Western High School as a research site even with my ties to the school.

However, since Western High has a predominately Caucasian student population with very few minorities, I needed to include other schools with a student population that was more ethnically mixed. For the other two collection sites I chose Southern High School and Northern High School, both of which have a significant minority population. A breakdown of the 2010 – 2011 enrollment by ethnic category can be seen in Table 3 (North Carolina Public Schools, 2011a).

Table 3

School Enrollment by Ethnicity

School	African American	Asian	Caucasian	Hispanic	Other
Southern High	327	47	586	178	57
Northern High	66	12	408	62	9
Western High	12	13	1285	55	77

I also knew both of the principals at the other two schools which helped ensure the necessary cooperation in the data collection. I asked for and received approval to use data from their schools through email in November, 2011.

Selection of Data

The next step in my research process was to determine what data I needed to collect. Since I was comparing the results of End of Course test scores for athletes against those for non-athletes, there were two sets of data that needed to be collected: a list of student scores on End of Course tests and a list of students who were participating in high school athletics at the time those scores were achieved. In order to compare the results by ethnicity and gender, I also needed the data to include some basic demographic information. At the same time, it was important to me and to the other schools involved to ensure student confidentiality as the data were collected. These test scores were a part of each student's academic record and must remain protected from public release. This was also necessary in order to gain Institutional Review Board approval. Steps were taken at each school to ensure the confidentiality of the data were protected from everyone without direct access to student

records as a part of their job. Once I had determined what data were needed, I had to determine where I was going to collect these data.

While the End of Course test data were readily available in electronic format for every school system in North Carolina, data on student participation in athletics are often not kept by schools in any type of comprehensive data base. Usually the only files containing the information on student athletes are hard copies of the eligibility sheets for each sport. These eligibility sheets are required by the NCHSAA to verify students who are participating in a sport have met academic and attendance requirements so all high schools have them available. The difficulty was to match the names from these eligibility sheets to the corresponding End of Course test scores while maintaining the confidentiality of the students involved. This was accomplished through the help of different staff members at each school who had the authority to view the test scores. In order to protect the confidentiality of student records involved with these test scores, I was at no time involved with the data collection process.

Much of the rationale for conducting this research rested in the use of End of Course test scores in North Carolina. End of Course tests had traditionally been given to students as they completed certain high school classes. The purpose of these tests had been to measure how well students understood the content of each class. A further purpose had been to measure how well schools were educating their students. These standardized tests had become the defining yearly measure of school success.

I wanted to use the most recent End of Course test scores for my research, so I chose the 2010 – 2011 school year for my data collection. With the ongoing changes to the testing program in North Carolina, several End of Course tests have been eliminated over the past

few years. To ensure appropriate and meaningful data, I only looked at scores from the five academic areas that have served as graduation exit standards for high school students. These areas were:

- Algebra I
- Biology
- English I
- Civics and Economics
- United States History

Statistically Constructed Scores

Due to the courses involved in these tests and the grade level in which they were typically taken, one problem had to be overcome. Algebra I and English I were typically taken in ninth grade. Biology along with Civics and Economics were typically taken in tenth grade. Because of this, most ninth and tenth grade students had two test scores in the data collection. Eleventh grade students on the other hand typically only took United States History; therefore they only had one test score in the data collection. To ensure each student was only counted once in the analysis, individual composite scores were statistically constructed for students with scores on more than one test. A down side to using one year of End of Course data to conduct this research was that most seniors were not included in the data. By the time students had reached their senior year, most had already taken these five tests. There were some seniors who did have test scores and were included in the data.

Each of the five End of Course tests are scored based on a scale to ensure state-wide uniformity. For example, a scale score of 145 on Algebra I would be the same regardless of where in North Carolina this score was obtained. However, the scale for these scores is not

exactly the same across the five tested subjects. In other words, that score of 145 on Algebra I may not be the same as a score of 145 on English I. This created a problem when it was time to statistically construct a score for students who took multiple tests. However, the testing coordinator for Western County Schools helped me develop a solution.

According to him, (Western County Schools testing coordinator, personal communication, October, 2012) while scale scores between different tests cannot be compared, the average of the scale scores for students can be compared. In other words, since nearly all ninth graders had a test score for Algebra I and English I, their statistically constructed score was found by averaging those two test scores. Likewise, tenth grade students have a statistically constructed score that is the average of their Biology score and their Civics and Economics score. By averaging the composite scores, each student can be assigned one constructed metric that represents their overall achievement for the purpose of this research. Once the data were collected from each school, it was a simple process to average the scores for students with multiple tests.

Data Collection

After I had determined what data were needed and which schools would be involved, the actual data collection was done by staff members at the individual schools. At Western High School, the system testing coordinator created a spreadsheet with all student test scores for the school year involved in the study. This spreadsheet was set up to include the students' names, gender, and ethnicity. Students who had multiple test scores had their scores averaged into one composite constructed metric so that every student was only included once. The athletic director then took this spreadsheet and added another column for athletic participation. He then used the eligibility sheets for that school year to mark those

students who participated in interscholastic athletics. Once this was completed, the student names were removed by the system testing coordinator to protect confidentiality and the now anonymous spreadsheet was given to me.

Southern High School followed a similar procedure using the system testing coordinator, school data manager and school athletic director to collect the data. Northern High School only needed to use the school data manager for their data collection. This school had in place a practice of keeping an electronic data base of athletes created from the eligibility sheets each season. Once the data were collected at the individual school level and sent to me, I added one additional column to note which school the scores came from.

Data Analysis

Once the necessary data were collected, they were compiled into a master spreadsheet with columns for the school involved, whether the student was an athlete or non-athlete, the gender of each student and the ethnicity of each student. For the analysis of the data, this spreadsheet was uploaded into SPSS and that program was used to complete a series of *t*-tests on the following data:

- The overall scores of athletes compared to non-athletes across all three schools. Three additional *t*-tests were completed for athletes within each school involved.
- The scores of female athletes compared to female non-athletes across all three schools.
- The scores of male athletes compared to male non-athletes across all three schools.

- The scores of African American athletes compared to African American non-athletes across all three schools.
- The scores of Hispanic athletes compared to Hispanic non-athletes across all three schools.
- The scores of Caucasian athletes compared to Caucasian non-athletes across all three schools.

In order to complete my research, it was important to select the appropriate statistical method to analyze the data once they were collected. From my comparison of other similar studies where student achievement was the main focus, two statistical methods seemed to be the most commonly used methods. These were the *t*-test and the analysis of variance (ANOVA). Both would have worked with my research, however after studying the literature on both, the *t*-test seemed most appropriate.

As a general rule, *t*-tests are commonly used to compare the means of two different groups. At first I thought my comparisons would involve more than two groups since I am also looking at comparisons with regards to race, gender and school. However, within each of those subgroups the comparison was still between athlete and non-athlete leaving only two groups. Therefore a *t*-test was a better fit for the research I was conducting. An analysis of variance would have been necessary if I had been comparing results across races, genders or schools since that would have involved more than two groups. The following methodology table was used to organize the data.

Table 4

Methodology Table

School Year 2010 - 2011																		
Western						**Northern**						**Southern**					
Athletes						Athletes						Athletes					
Male			Female			Male			Female			Male			Female		
B	W	H	B	W	H	B	W	H	B	W	H	B	W	H	B	W	H
Non- Athletes						Non-Athletes						Non-Athletes					
Male			Female			Male			Female			Male			Female		
B	W	H	B	W	H	B	W	H	B	W	H	B	W	H	B	W	H

The results of the *t*-tests were intended to show if there were significant differences in the scores of students who were participating in athletics as compared to the scores of students who were not. For the purpose of my research, I chose to seek a level of significance or 0.05 or lower in order to determine whether to accept or reject the null hypotheses.

Limitation of Data Collection

There is one limitation I encountered during the data collection phase of my research. There exists the potential for human error in the data collection due to the lack of an efficient way to collect and mark the data. No current means existsthat will allow test data to easily be separated by athletic status such as it can be for race or socio-economic status. At all three schools involved the test data was kept in one electronic file while the data on athletic participation was kept in a separate file. The column noting athletic participation in the data spreadsheet had to be manually constructed. This not only creates the potential for human

error in the data collection for this study, it also limits the potential for a broader study involving more schools.

Anticipated Outcomes

Prior to the research being conducted and the results analyzed, it was anticipated the data would show that students who participate in athletics did indeed score significantly higher on EOC tests than students who did not participate in athletics. Such an outcome would follow the trend of other research that looked at different measures of student achievement. It was also anticipated that these results would be found regardless of where the students attended high school, their gender or their ethnic background.

Chapter Summary

Once the four research questions and their accompanying null hypotheses were developed, it a matter of determining what data were needed, where the data were located, how the data would be collected, and finally how the data would be analyzed. There was one problem encountered involving students who had multiple test scores present in the data. This was overcome by creating a statistically constructed score for each student that was the average of all scores available for each student. There was also a limitation in the data collection that had to be overcome. No database existed that included all of the information needed for the research. The information had to be manually compiled into a database that was then used in the data analysis. This left the potential for human error in that part of the process.

CHAPTER 4: FINDINGS

The purpose of this research was to determine if high school students who participated in interscholastic athletics have higher End of Course test scores than those who did not participate in interscholastic athletics. There was substantial research showing the academic benefits of participation in interscholastic athletics. However, there was very little research available on whether or not these benefits extend to course-ending standardized tests such as North Carolina's End of Course tests. It was my hope to add to the previous research by examining the effects of participation in interscholastic athletics in relation to End of Course tests. If a positive relationship exists, leaders may use this information to effectively counter efforts eliminating non-academic school programs.

In this chapter I share the results of the statistical analyses on the End of Course data that were collected from the three schools involved in the study. These results were used to answer the following research questions:

1. Do students who participate in athletics have higher EOC scores than students who do not participate in athletics?
2. Do these results hold true for students regardless of their gender?
3. Do these results hold true for students regardless of their race?
4. Do these results hold true regardless of which school is attended?

In order to answer these research questions, I used the following null hypotheses:

- HO1: There will be no difference in the composite End of Course test score for all students who participated in athletics as compared to the composite End of Course test score for all students who did not participate in athletics.
- HO2: There will be no difference in the composite End of Course test score for all female students who participated in athletics as compared to the composite End of Course test score for all female students who did not participate in athletics.
- HO3: There will be no difference in the composite End of Course test score for all male students who participated in athletics as compared to the composite End of Course test score for all male students who did not participate in athletics.
- HO4: There will be no difference in the composite End of Course test score for all African-American students who participated in athletics as compared to the composite End of Course test score for all African-American students who did not participate in athletics.
- HO5: There will be no difference in the composite End of Course test score for all Caucasian students who participated in athletics as compared to the composite End of Course test score for all Caucasian students who did not participate in athletics.
- HO6: There will be no difference in the composite End of Course test score for all Hispanic students who participated in athletics as compared to the composite End of Course test score for all Hispanic students who did not participate in athletics.
- HO7: There will be no difference in the composite End of Course test score for all Southern High School students who participated in athletics as compared to the composite End of Course test score for all Southern High School students who did not participate in athletics.

- HO8: There will be no difference in the composite End of Course test score for all Northern High School students who participated in athletics as compared to the composite End of Course test score for all Northern High School students who did not participate in athletics.
- HO9: There will be no difference in the composite End of Course test score for all Western High School students who participated in athletics as compared to the composite End of Course test score for all Western High School students who did not participate in athletics

A visual example of how the research questions and null hypotheses were aligned can be seen in the following chart.

Table 5

Research Questions and Null Hypotheses

RESEARCH QUESTION	RELATED NULL HYPOTHESES
1. Do students who participate in athletics have higher EOC scores than students who do not participate in athletics?	HO1: There will be no difference in the composite End of Course test score for all students who participated in athletics as compared to the composite End of Course test score for all students who did not participate in athletics.
2. Do these results hold true for students regardless of their gender?	HO2: There will be no difference in the composite End of Course test score for all female students who participated in athletics as compared to the composite End of Course test score for all female students who did not participate in athletics.
	HO3: There will be no difference in the composite End of Course test score for all male students who participated in athletics as compared to the composite End of Course test score for all male students who did not participate in athletics.

3. Do these results hold true for students regardless of their race?	HO4: There will be no difference in the composite End of Course test score for all African-American students who participated in athletics as compared to the composite End of Course test score for all African-American students who did not participate in athletics.
	HO5: There will be no difference in the composite End of Course test score for all Caucasian students who participated in athletics as compared to the composite End of Course test score for all Caucasian students who did not participate in athletics.
	HO6: There will be no difference in the composite End of Course test score for all Hispanic students who participated in athletics as compared to the composite End of Course test score for all Hispanic students who did not participate in athletics.
4. Do these results hold true regardless of which school is attended?	HO7: There will be no difference in the composite End of Course test score for all Southern High School students who participated in athletics as compared to the composite End of Course test score for all Southern High School students who did not participate in athletics.
	HO8: There will be no difference in the composite End of Course test score for all Northern High School students who participated in athletics as compared to the composite End of Course test score for all Northern High School students who did not participate in athletics.
	HO9: There will be no difference in the composite End of Course test score for all Western High School students who participated in athletics as compared to the composite End of Course test score for all Western High School students who did not participate in athletics

Research Question One

Research question one asked if athletes overall had higher End of Course test scores than non-athletes. A *t*-test was completed on all 2,803 student scores collected from all three participating schools to determine if there was a significant difference in test scores. This sample of 2,803 scores was partitioned to differentiate those who participated in interscholastic athletics and those who did not. There were a total of 1,098 students who participated in athletics and 1,705 students who did not participated in athletics included in the data. In order to answer this question there was only one null hypothesis considered.

- HO1: There will be no difference in the composite End of Course test score for all students who participated in athletics as compared to the composite End of Course test score for all students who did not participate in athletics.

The mean statistically constructed score for students who participated in athletics was 156.32 with a standard deviation of 9.01. The mean statistically constructed score for students who did not participate in athletics was 152.41 with a standard deviation of 9.60. The analysis showed a *t* value of 10.78 and a *p* value less than or equal to 0.001. This value indicates that the mean difference between these two groups was statistically significant less than or equal to a *p* value of 0.001 which is lower than the 0.05 confidence level chosen a priori to reject the null hypothesis. A summary of the data analysis on the overall student population can be seen in Table 6.

Table 6

Data Analysis for All Students

	N	M	SD	*t*	*p* value
Athlete	1,098	156.32	9.01	10.78	≤0.001
Non-Athlete	1,705	152.41	9.60		

Based on these data, HO1 was rejected. The answer to research question one was yes. Students who participated in interscholastic athletics did have statistically significant higher End of Course test scores than students who did not participate in interscholastic athletics. The fact that the overall group analysis of mean differences were derived from relatively high *N*'s where the athletic participant group had a higher mean score with a lower standard deviation led to a statistically significant difference in the *p* value.

Research Question Two

Research question two asked if the results found for research question one held true regardless of the gender of the students. In order to answer this question, the data were disaggregated first of all by gender, then by athletic participation. Two additional *t*-tests were then completed on the data collected in order to answer this question. One was completed on the 1,374 females included in the data. The other was completed on the 1,428 males included in the data.

These two samples were then further disaggregated on the basis of athletic participation. In the data collected and analyzed there were a total of 493 female students who participated in athletics and 881 female students who did not participate in athletics.

Also in the data collected and analyzed there were 605 male students who participated in athletics and 824 male students who did not participate in athletics.

There were two null hypotheses used to answer this research question.

- HO2: There will be no difference in the composite End of Course test score for all female students who participated in athletics as compared to the composite End of Course test score for all female students who did not participate in athletics.
- HO3: There will be no difference in the composite End of Course test score for all male students who participated in athletics as compared to the composite End of Course test score for all male students who did not participate in athletics.

The mean statistically constructed score for female students who participated in athletics was 157.17 with a standard deviation of 8.41. The mean statistically constructed score for female students who did not participate in athletics was 152.49 with a standard deviation of 8.41. The analysis showed a *t* value of 9.19 and a *p* value less than or equal to 0.001. This value again indicates that the mean difference between these two groups was statistically significant less than or equal to a p value of 0.001, which is again lower than the 0.05 confidence level chosen a priori to reject the null hypothesis. A summary of the data analysis on the female student population can be seen in Table 7.

Table 7

Data Analysis for Female Students

	N	**M**	**SD**	***t***	***p* value**
Female Athlete	493	157.17	8.41	9.19	≤0.001
Female Non-Athlete	881	152.49	8.41		

Based on these data, HO2 was rejected. While the standard deviation was virtually identical, the mean score for those in the athletic participant group was significantly higher. This led to a statistically significant difference on the *p* value.

As for HO3, the mean statistically constructed score for male students who participated in athletics was 155.63 with a standard deviation of 9.42. The mean statistically constructed score for male students who did not participate in athletics was 152.33 with a standard deviation of 9.79. The analysis showed a *t* value of 6.43 and a *p* value less than or equal to 0.001. Once again this value indicates that the mean difference between these two groups was statistically significant less than or equal to a *p* value of 0.001, which is again lower than the 0.05 confidence level chosen a priori to reject the null hypothesis. A summary of the data analysis on the male student population can be seen in Table 8.

Table 8

Data Analysis for Male Students

	N	**M**	**SD**	***t***	***p* value**
Male Athlete	605	155.63	9.42	6.43	≤0.001
Male Non-Athlete	824	152.33	9.79		

Based on these data, HO3 was rejected. The athletic participant group had a higher mean score and a lower standard deviation. This led to a high level of statistically significant difference.

Based on the results for both the female and male comparisons, the answer to research question two was also yes. Students who participated in interscholastic athletics performed better on End of Course test results than students who did not participate in

interscholastic athletics, regardless of whether they were male or female. That is, irrespective of gender, athletes tended to outperform non-athletes on End of Course tests at substantial levels of statistical significance. The fact that all gender-related analyses of mean differences were derived from relatively high *N*'s and relatively "tight" dispersions, as indicated by the standard deviations helped to contribute to this finding.

Research Question Three

Research question three asked if the results found in research question one held true regardless of the ethnicity of the students involved. In order to answer this question, the data were disaggregated first by ethnicity, then by athletic participation. Three additional *t*-tests were then completed on the data collected in order to answer this question. One was completed on the 410 African American students included in the data. Another was completed on the 2,115 Caucasian students included in the data. The third was completed on the 277 Hispanic students included in the data.

These three samples were then further disaggregated on the basis of athletic participation. In the data collected and analyzed there were 150 African American students who participated in athletics and 260 African American students who did not participate in athletics. With regard to Caucasian students, there were 890 who participated in athletics and 1,225 who did not participate in athletics. And lastly there were 58 Hispanic students who participated in athletics and 219 Hispanic students who did not participate in athletics.

There were three null hypotheses used to answer this research question.

- HO4: There will be no difference in the composite End of Course test score for all African-American students who participated in athletics as compared to the

composite End of Course test score for all African-American students who did not participate in athletics.

- HO5: There will be no difference in the composite End of Course test score for all Caucasian students who participated in athletics as compared to the composite End of Course test score for all Caucasian students who did not participate in athletics.
- HO6: There will be no difference in the composite End of Course test score for all Hispanic students who participated in athletics as compared to the composite End of Course test score for all Hispanic students who did not participate in athletics.

The mean statistically constructed score for African American students who participated in athletics was 147.84 with a standard deviation of 7.91. The mean statistically constructed score for African American students who did not participate in athletics was 145.79 with a standard deviation of 9.03. The analysis showed a *t* value of 2.32 and a *p* value of 0.02. While this p value was not as statistically significant as in previous findings, it was still lower than the 0.05 confidence level chosen a priori to reject the null hypothesis. A summary of the data analysis on the African American student population studied can be seen in Table 9.

Table 9

Data Analysis for African American Students

	N	**M**	**SD**	***t***	***p* value**
African American Athlete	150	147.84	7.91	2.32	≤0.020
African American Non-Athlete	260	145.79	9.03		

Based on these data, HO4 was rejected. While there was not much of a difference in the mean scores, the athletic participant group had a smaller standard deviation. This contributed to finding a statistically significant difference.

Regarding HO5, in the data collected and analyzed, the mean statistically constructed score for Caucasian students who participated in athletics was 158.24 with a standard deviation of 7.93. The mean statistically constructed score for Caucasian students who did not participate in athletics was 154.15 with a standard deviation of 9.10. The data analysis on these two groups of students had a revealed *t* score of 10.75, and a *p* value less than or equal to 0.001. Once again this value indicates that the mean difference between these two groups was statistically significant less than or equal to a *p* value of 0.001, which is again lower than the 0.05 confidence level chosen a priori to reject the null hypothesis. A summary of the data analysis on the Caucasian student population can be seen in Table 10.

Table 10

Data Analysis for Caucasian Students

	N	**M**	**SD**	***t***	***p* value**
Caucasian Athlete	890	158.24	7.93	10.75	≤0.001
Caucasian Non-Athlete	1,225	154.15	9.10		

Based on these data, HO5 was rejected. The differences in the means and the standard deviation were the biggest of any of the data groups analyzed which led to a high statistically significant difference.

As for HO6, in the data collected and analyzed, the mean statistically constructed score for Hispanic students who participated in athletics was 148.88 with a standard

deviation of 10.78. The mean statistically constructed score for Hispanic students who did not participate in athletics was 150.48 with a standard deviation of 9.13. The data analysis on these groups of students had a *t* value of 1.03 and a *p* value of 0.300. This finding was higher than the 0.05 confidence level chosen a priori to reject the null hypothesis. A summary of the data analysis on the Hispanic student population can be seen in Table 11.

Table 11

Data Analysis for Hispanic Students

	N	**M**	**SD**	***t***	***p* value**
Hispanic Athlete	58	148.88	10.78	1.03	≤0.300
Hispanic Non-Athlete	219	150.48	9.13		

Based on these data, HO6 was accepted. However, while the mean difference and standard deviation favored non-athletes, the fact that there was not a statistically significant difference can be interpreted to mean that whatever differences were found could be attributed to random error. The size of this sample was also small compared to the other groups, another variable that could explain the lack of statistically significant differences.

Based on the results of the comparisons by ethnic group, the answer to research question three was a qualified yes. The results did hold true for two of the ethnic groups in the research. For those two groups, African American and Caucasian, the athletic participant group had higher mean scores with lower standard deviations. This led to high statistically significant differences. Although the findings for the African American and Caucasian groups did not hold true for Hispanic students, the small sample size and possibility of any difference being attributed to random error mentioned above could have caused these results.

Research Question Four

Research question four asked if the results found in research question one held true regardless of which school the students attended. In order to answer this question, the data were disaggregated first of all by school of attendance, then by athletic participation. Three additional *t*-tests were completed on the data collected in order to answer this question. One was completed on the 993 Southern High School students included in the data. Another was completed on the 657 Northern High School students included in the data. The third was completed on the 1,153 Western High School students included in the data.

These three samples were then further disaggregated on the basis of athletic participation. In the data collected and analyzed, there were 319 students at Southern High School who participated in athletics and 674 students at Southern High School who did not participate in athletics. Additionally there were 369 students at Northern High School who participated in athletics and 288 students at Northern High School who not participate in athletics. And finally there were 410 students at Western High School who participated in athletics and 743 students at Western High School who did not participate in athletics.

There were three null hypotheses used to answer this research question.

- HO7: There will be no difference in the composite End of Course test score for all Southern High School students who participated in athletics as compared to the composite End of Course test score for all Southern High School students who did not participate in athletics.
- HO8: There will be no difference in the composite End of Course test score for all Northern High School students who participated in athletics as compared to the

composite End of Course test score for all Northern High School students who did not participate in athletics.

- HO9: There will be no difference in the composite End of Course test score for all Western High School students who participated in athletics as compared to the composite End of Course test score for all Western High School students who did not participate in athletics.

The mean statistically constructed score for Southern High School students who participated in athletics was 154.50 with a standard deviation of 10.51. The mean statistically constructed score for Southern High School students who did not participate in athletics was 150.36 with a standard deviation of 10.15. The analysis showed a *t* value of 5.86 and a *p* value less than or equal to 0.001. This value indicates that the mean difference between these two groups was statistically significant less than or equal to a *p* value of 0.001, which is again lower than the 0.05 confidence level chosen a priori to reject the null hypothesis. A summary of the data analysis on the Southern High School student population can be seen in Table 12.

Table 12

Data Analysis for Southern High Students

	N	**M**	**SD**	***t***	***p* value**
Southern High Athlete	319	154.50	10.51	5.86	≤0.001
Southern High Non-Athlete	674	150.36	10.15		

Based on these data, HO7 was rejected. Although the standard deviation was actually higher for the athlete group, the mean difference was substantially higher, thereby contributing to a statistically significant difference.

As regards to Northern High School, in the data collected and analyzed, the mean statistically constructed score for Northern High School students who participated in athletics was 156.20 with a standard deviation of 8.85. The mean statistically constructed score for Northern High School students who did not participate in athletics was 154.07 with a standard deviation of 9.15. The analysis showed a *t* value of 3.00 and a *p* value of 0.003. This value is lower than the 0.05 confidence level chosen a priori to reject the null hypothesis. A summary of the data analysis on the Northern High School student population can be seen in Table 13.

Table 13

Data Analysis for Northern High Students

	N	**M**	**SD**	***t***	***p* value**
Northern High Athlete	369	156.20	8.85	3.00	≤0.003
Northern High Non-Athlete	288	154.07	9.15		

Based on these data, HO8 was rejected. While there was not much of a difference in the means or the standard deviations, there was still an acceptable statistically significant difference. It is interesting to note that, in the case of Northern High School, the number of participants in interscholastic athletic activities outnumbered the non-participants. This distribution between participants and non-participants was not found in either of the other two schools or in any of the disaggregations based on gender or ethnicity.

Regarding Western High School, in the data collected and analyzed, the mean statistically constructed score for Western High School students who participated in athletics was 157.86 with a standard deviation of 7.52. The mean statistically constructed score for Western High School students who did not participate in athletics was 153.63 with a standard deviation of 8.90. The analysis showed a *t* value of 8.14 and a *p* value of less than or equal to 0.001. This again was lower than the 0.05 confidence level chosen a priori to reject the null hypothesis. A summary of the data analysis on the Western High School student population can be seen in Table 14.

Table 14

Data Analysis for Western High Students

	N	**M**	**SD**	***t***	***p* value**
Western High Athlete	410	157.86	7.52	8.14	≤0.001
Western High Non-Athlete	743	153.63	8.90		

Based on these data, HO9 was rejected. There was a substantive difference in the means, a smaller standard deviation, and a high statistically significant difference. In fact, the standard deviation for athletic participation was the smallest of any of the tests run to analyze these data. Achievement among athletes was more tightly clustered around the mean, more so than for any other participating sample in this study.

Based on the results of the comparisons by school, the answer to research question four was yes. Students who participated in athletics did perform better on End of Course tests regardless of the school they attended. The significance level for all three *t*-tests was lower than the 0.05 needed to reject the null hypotheses.

Chapter Summary

Based on my literature review I was expecting most of the results I found in my research. Students who participate in extracurricular activities have been found to have higher achievement levels in school on various measures. While there was a lack of recent empirical data dealing with athletic participation and achievement, I was still expecting the results I obtained. Although my research was limited to only three schools, there were enough data collected to make this research meaningful and generalizable.

Overall, students who participated in athletics had higher statistically constructed scores on End of Course tests than students who did not participate in athletics. The level of significance found was much greater than I was expecting and helps to strengthen the argument that students who participate in athletics perform better on course-ending standardized tests such as North Carolina's End of Course tests. These results held true on eight of the nine *t*-tests completed on the data. A summary of my findings regarding the research questions and their respective supporting hypotheses can be found in Table 15 below.

Table 15

Research Questions and Null Hypotheses Results

RESEARCH QUESTION	ANSWER	RELATED NULL HYPOTHESES	REJECT / ACCEPT
1. Do students who participate in athletics have higher EOC scores than students who do not participate in athletics?	Yes	HO1: There will be no difference in the composite End of Course test score for all students who participated in athletics as compared to the composite End of Course test score for all students who did not participate in athletics.	Reject

2. Do these results hold true for students regardless of their gender?	Yes	HO2: There will be no difference in the composite End of Course test score for all female students who participated in athletics as compared to the composite End of Course test score for all female students who did not participate in athletics.	Reject
		HO3: There will be no difference in the composite End of Course test score for all male students who participated in athletics as compared to the composite End of Course test score for all male students who did not participate in athletics.	Reject
3. Do these results hold true for students regardless of their race?	Qualified Yes	HO4: There will be no difference in the composite End of Course test score for all African-American students who participated in athletics as compared to the composite End of Course test score for all African-American students who did not participate in athletics.	Reject
		HO5: There will be no difference in the composite End of Course test score for all Caucasian students who participated in athletics as compared to the composite End of Course test score for all Caucasian students who did not participate in athletics.	Reject
		HO6: There will be no difference in the composite End of Course test score for all Hispanic students who participated in athletics as compared to the composite End of Course test score for all Hispanic students who did not participate in athletics.	Accept

4. Do these results hold true regardless of which school is attended?	Yes	HO7: There will be no difference in the composite End of Course test score for all Southern High School students who participated in athletics as compared to the composite End of Course test score for all Southern High School students who did not participate in athletics.	Reject
		HO8: There will be no difference in the composite End of Course test score for all Northern High School students who participated in athletics as compared to the composite End of Course test score for all Northern High School students who did not participate in athletics.	Reject
		HO9: There will be no difference in the composite End of Course test score for all Western High School students who participated in athletics as compared to the composite End of Course test score for all Western High School students who did not participate in athletics	Reject

I was surprised by the findings within the Hispanic population of my research. Not only did the analysis show Hispanic students who participated in athletics did not perform better on End of Course tests than Hispanic students who did not participate in athletics, the average of their constructed scores was actually lower. Given the relatively low number of Hispanic students who participated in athletics when compared to the other two ethnic groups, I suspect these findings could be different if a larger sample size had been available.

CHAPTER 5: ANALYSIS, IMPLICATIONS, AND RECOMMENDATIONS

The problem this study addressed was to determine if a statistically significant relationship existed between participation in high school interscholastic athletics and higher student achievement on course-ending standardized tests such as North Carolina's End of Course tests. Participation in interscholastic sports has been found to have many positive effects on students such as increased self-confidence (Sitkowski, 2008), lower incidents of deviant behaviors (Yancy, 2007), and helping to build a foundation for lifelong success (White, 2005). Additionally students who participated in interscholastic athletics have been found to have higher grade point averages and better attendance rates (Overton, 2001; Pressley & Whitley, 1996). It was my wish to examine if students who participated in interscholastic athletics also had higher achievement on state level standardized tests, specifically North Carolina's End of Course tests. If a positive relationship between participation in interscholastic athletics and higher student achievement on End of Course tests did exist, I also wanted to see if such a relationship held true regardless of gender, ethnicity, and participating school.

Research Questions

In order to address this problem, I developed four research questions. These questions provided structure and direction as I progressed from the literature review, through the methodology, and ultimately to the findings of my research. The research questions were:

1. Do students who participate in athletics have higher EOC scores than students who do not participate in athletics?
2. Do these results hold true for students regardless of their gender?
3. Do these results hold true for students regardless of their race?
4. Do these results hold true regardless of which school is attended?

Along with these research questions I formulated a set of nine null hypotheses to help answer these research questions during the data analysis.

Summary of Methodology

For my research, I chose to look at three specific high schools in northwestern North Carolina. Since I was comparing the results of End of Course test scores for athletes against those for non-athletes, there were two sets of data that needed to be collected: a list of student scores on End of Course tests and a list of students who were participating in high school athletics at the time those scores were achieved. In order to compare the results by ethnicity and gender, I also needed the data to include some basic demographic information. I wanted to use the most recent End of Course test scores for my research, so I chose the 2010 – 2011 school year for my data collection. To ensure appropriate and meaningful data, I only looked at scores from the five academic areas that have served as graduation exit standards for high school students (Algebra I, Biology, Civics and Economics, English I, and U. S. History). To ensure each student was only counted once in the analysis, individual composite scores were statistically constructed for students with scores on more than one test.

After I had determined what data were needed and which schools would be involved, the actual data collection was done by staff members at each school. Once the necessary data

were collected, they were compiled into a master spreadsheet with columns for the school involved, whether the student was an athlete or non-athlete, the gender of each student and the ethnicity of each student. For the analysis of these data, this spreadsheet was uploaded into SPSS and that program was used to complete a series of nine *t*-tests on these data, each test corresponding to one of the nine supportive hypotheses.

Analysis of the Research Questions

The following analysis on each of the research questions is based on the findings of the *t*-tests completed on the data collected and subsequently tied back to the relevant literature reviewed for this study.

Do students who participate in athletics have higher End of Course test scores than students who do not participate in athletics? Based on the data gathered and analyzed, it was clear the answer to this question was yes for the schools involved in my study.

The mean statistically constructed score for students who participated in athletics was 156.32 with a standard deviation of 9.01. The mean statistically constructed score for students who did not participate in athletics was 152.41 with a standard deviation of 9.60. The analysis showed a *t* value of 10.78 and a *p* value less than or equal to 0.001. This value indicates that the mean difference between these two groups was statistically significant. The fact that the overall group analysis of mean differences were derived from relatively high *N*'s where the athletic participant group had a higher mean score with a lower standard deviation led to a statistically significant difference in the p value.

This finding that students who participated in interscholastic athletics performed better on End of Course tests than students who did not participate in interscholastic athletics was supported by the literature. While research specifically related to the impact of

participation in extracurricular activities on state level standardized tests was limited, numerous recent studies were available showing how students who were involved in extracurricular activities had higher student achievement in the classroom along with other characteristics associated with success (Fredricks&Eccles, 2006; Heller, Calderon, &Medrich, 2003; Miller, Melnick, Barnes, Farrell, & Sabo, 2005; Newman, 2005; Reid, 2005; Sitkowski, 2008; White, 2005; Yancy, 2007). Other more dated studies found similar results (Durbin, 1986; Nuhn, 1991; Overton, 2001; Patranella, 1987; Pressley & Whitley, 1996; Smith, 1994; Soltz, 1986). This abundance of available literature spanning several decades showing how participation in extracurricular activities such as interscholastic athletics had a positive effect on student achievement led me to believe that I would find similar results in my study. This belief was confirmed by my findings for research question one.

Many times athletic programs are viewed as having marginal value with regards to the academics of a school. Athletic programs may be important to some in the school community but usually for reasons other than academics. Along these same lines, athletes are often thought of as less able or talented where academics are concerned and are often referred to with a denigrating description, such as "dumb jocks." It makes for easy news headlines when a famous athlete fails whether in school or in life. These headlines create stereotypes where athletes tend to be viewed in a negative light.

The findings of my study along with the previous research reviewed cast doubt on these stereotypes. Students who participate in interscholastic athletics have been shown to perform higher on many academic measures including End of Course tests. Strong athletic programs can actually help to enhance the academics of a school. Sharing this information

with those who make policies and control school budgets can help obtain additional support to enhance school athletic programs.

Do these results hold true for students regardless of their gender? Based on the data gathered and analyzed, it was clear the answer to this question was also yes for the schools involved in my study.

The mean statistically constructed score for female students who participated in athletics was 157.17 with a standard deviation of 8.41. The mean statistically constructed score for female students who did not participate in athletics was 152.49 with a standard deviation of 8.41. The analysis showed a *t* value of 9.19 and a *p* value less than or equal to 0.001. This value again indicates that the mean difference between these two groups was statistically significant. While the standard deviations for both female groups were virtually identical, the mean score for those in the athletic participant group was significantly higher.

The mean statistically constructed score for male students who participated in athletics was 155.63 with a standard deviation of 9.42. The mean statistically constructed score for male students who did not participate in athletics was 152.33 with a standard deviation of 9.79. The analysis showed a *t* value of 6.43 and a *p* value less than or equal to 0.001. Once again this value indicates that the mean difference between these two groups was statistically significant.

Based on the results for both the female and male comparisons, the answer to research question two was also yes. Students who participated in interscholastic athletics performed better on End of Course test results than students who did not participate in interscholastic athletics, regardless of whether they were male or female. That is, irrespective of gender, athletes tended to outperform non-athletes on End of Course tests at

substantial levels of statistical significance. The fact that all gender-related analyses of mean differences were derived from relatively high *N*'s and relatively "tight" dispersions, as indicated by the standard deviations helped to contribute to this finding.

This finding that students who participated in interscholastic athletics performed better on End of Course tests than students who did not participate in interscholastic athletics regardless of their gender was generally supported in the literature. Several studies were reviewed that showed gender can have an impact on student achievement (Ceballo, McLoyd, &Toyokawa, 2004; Chambers & Schreiber, 2004; Eitle, 2005); however these studies were not looking at the impact of participation in extracurricular activities. The studies mentioned above in relation to research question one did not differentiate between males and females when reporting their findings. I did believe that I would find the results of my research would hold true regardless of gender and this belief was confirmed by my findings for research question two.

Finding that student athletes performed better on End of Course tests than those who did not participate in athletics regardless of their gender also helps put to rest some common misconceptions. First of all, it is generally believed that female athletes have traditionally performed better academically than their male counterparts. The findings of this study showed that both male and female athletes had significantly higher performance on End of Course tests than those who did not participate in athletics. Secondly, these findings help to dispel the notion that participation in athletic programs takes time away from academics, which is often blamed for results of lower student achievement. Student athletes learn a valuable lesson in time management that not only helps them in school but also later in life.

Do these results hold true for students regardless of their race? Based on the data gathered and analyzed, it was somewhat clear the answer to this question was also yes at the schools involved in my study. The ethnic groups considered in this study included African American, Caucasian, and Hispanic. The results held true for two of the three ethnic groups analyzed, African American and Caucasian. In the third group where the results did not hold true, Hispanic, other factors could have impacted these results.

For example, the Hispanic sub-group had the lowest number of participants and non-participants of any of the groups or sub-groups. The lower *N*'s might have contributed to this result. In addition, Hispanic students typically grow up in a culture where interest in sports is more selective than, and not as broad as, students who grow up in a culture that embraces a wider array of sports participation. This possible cultural artifact could limit the breadth of Hispanic participation in interscholastic sports. Finally, many Hispanic students have other responsibilities outside of school that might have more to do with work, home care responsibilities, or other family obligations. These and other potential factors could well explain the lower participation that could have influenced this finding.

The mean statistically constructed score for African American students who participated in athletics was 147.84 with a standard deviation of 7.91. The mean statistically constructed score for African American students who did not participate in athletics was 145.79 with a standard deviation of 9.03. The analysis showed a *t* value of 2.32 and a *p* value of 0.02. While there was not as large a difference in the mean scores, the athletic participant group had a smaller standard deviation. This contributed to finding a statistically significant difference.

In the data collected and analyzed, the mean statistically constructed score for Caucasian students who participated in athletics was 158.24 with a standard deviation of 7.93. The mean statistically constructed score for Caucasian students who did not participate in athletics was 154.15 with a standard deviation of 9.10. The data analysis on these two groups of students had a revealed *t* score of 10.75, and a *p* value less than or equal to 0.001. The differences in the means and the standard deviation were the largest of any of the data groups analyzed, which in turn led to a high statistically significant difference.

As for Hispanic students, in the data collected and analyzed, the mean statistically constructed score for Hispanic students who participated in athletics was 148.88 with a standard deviation of 10.78. The mean statistically constructed score for Hispanic students who did not participate in athletics was 150.48 with a standard deviation of 9.13. The data analysis on these groups of students had a *t* value of 1.03 and a *p* value of 0.300. This finding was higher than the 0.05 confidence level chosen a priori to reject the null hypothesis. While the mean difference and standard deviation favored non-athletes, the fact that there was not a statistically significant difference can be interpreted to mean that whatever differences were found could be attributed to random error. The size of this sample size was also small compared to the other groups, another variable that could explain the lack of statistically significant differences.

Based on the results of the comparisons by ethnic group, the answer to research question three was a qualified yes. The results did hold true for two of the ethnic groups in the research. For those two groups, African American and Caucasian, the athletic participant group had higher mean scores with lower standard deviations. This led to high statistically significant differences. Although the findings for the African American and Caucasian

groups did not hold true for Hispanic students, the small sample size introduced the possibility that potentially more random error was present, thereby leading to these results.

Just as with regards to gender, this finding that students who participated in interscholastic athletics performed better on End of Course tests than students who did not participate in interscholastic athletics regardless of their ethnicity was not particularly widespread in contemporary literature. Several studies were reviewed that showed ethnicity can have an impact on student achievement (Bali & Alvarez, 2004; Battle & Lewis, 2002; Crosnoe, Johnson, & Elder, 2004; Seyfried, 1998); again, however, these studies were not looking at the impact of participation in extracurricular activities. The studies mentioned above in relation to research question one did not differentiate between ethnic groups when reporting their findings. I did believe that I would find the results of my research would hold true regardless of ethnicity and this belief was confirmed by my findings for research question three.

Just as with the previous finding regarding the results related to gender, finding that both African American and Caucasian student athletes performed better on End of Course tests than their non-athletic counterparts helps lay to rest a major misconception. Whereas all athletes have sometimes been viewed as "dumb jocks," African American athletes have traditionally felt the brunt of these stereotypes. The results of my study presents evidence that can establish that such a description is an unfair assumption for all athletes but especially for African American athletes.

Do these results hold true regardless of which school is attended? Based on the data gathered and analyzed, it was clear the answer to this question was also yes for the schools involved in my study.

The mean statistically constructed score for Southern High School students who participated in athletics was 154.50 with a standard deviation of 10.51. The mean statistically constructed score for Southern High School students who did not participate in athletics was 150.36 with a standard deviation of 10.15. The analysis showed a *t* value of 5.86 and a *p* value less than or equal to 0.001. This value indicates that the mean difference between these two groups was statistically significant. Although the standard deviation was actually higher for the athlete group, the mean difference was also substantially higher, thereby contributing to a statistically significant difference.

As regards to Northern High School, in the data collected and analyzed, the mean statistically constructed score for Northern High School students who participated in athletics was 156.20 with a standard deviation of 8.85. The mean statistically constructed score for Northern High School students who did not participate in athletics was 154.07 with a standard deviation of 9.15. The analysis showed a *t* value of 3.00 and a *p* value of 0.003. This value is lower than the 0.05 confidence level chosen a priori to reject the null hypothesis. While there was not much of a difference in the means or the standard deviations, there was still a statistically significant difference.

Regarding Western High School, in the data collected and analyzed, the mean statistically constructed score for Western High School students who participated in athletics was 157.86 with a standard deviation of 7.52. The mean statistically constructed score for Western High School students who did not participate in athletics was 153.63 with a standard deviation of 8.90. The analysis showed a *t* value of 8.14 and a *p* value of less than or equal to 0.001. This again was lower than the 0.05 confidence level chosen a priori to reject the null

hypothesis. There was a substantive difference in the means, a smaller standard deviation, and a high statistically significant difference.

Based on the results of the comparisons by school, the answer to research question four was yes. Students who participated in athletics did perform better on End of Course tests regardless of the school they attended. The significance level for all three *t*-tests was lower than the 0.05 needed to reject the null hypotheses. The substantial sample size in each of the three schools contributed to the significance level of the results.

Again, just as was the case with regards to gender and ethnicity, this finding that students who participated in interscholastic athletics performed better on End of Course tests than students who did not participate in interscholastic athletics regardless of the school attended was not particularly wide spread in the literature review. Three studies were reviewed that showed the school environment can have an impact on student achievement (Crosnoe, Johnson, & Elder, 2004a; Crosnoe, Johnson, & Elder, 2004b; Lee & Smith, 1997); again however these studies were not looking at the impact of participation in extracurricular activities. The studies mentioned above in relation to research question one did not differentiate between schools when reporting their findings. I did believe that I would find the results of my research would hold true regardless of the school attended and this belief was confirmed by my findings for research question three.

The fact that the findings in my study held true regardless of participating school is a powerful argument for athletic programs at other schools. The three schools involved in my student had a wide range of characteristics. It did not matter if the school was small or large, ethnically diverse or ethnically homogeneous, rural or urban; students who participated in athletics had higher student achievement on End of Course test than students who did not

participate in athletics. Any school that wants to use this research to build a case for their athletic program should be able to find similar characteristics at one of the schools in this study.

Adjustments to Conceptual Framework

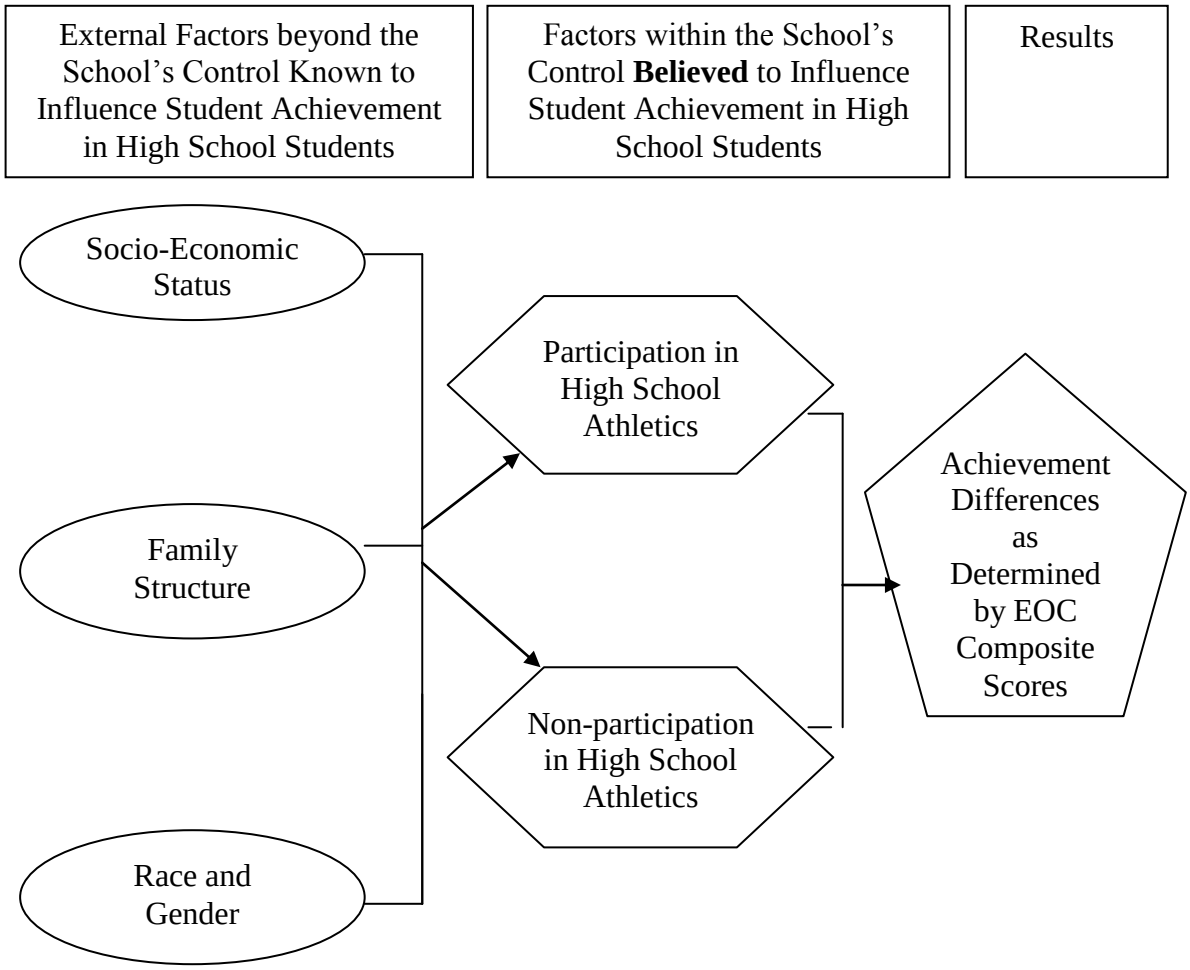
As stated in Chapter Two, all of the previous research reviewed led to the conceptual framework for my research. The achievement of students in the classroom is influenced by many factors. The effectiveness of the teacher and instruction in the classroom is the greatest of these factors, although a school climate framed by high performance expectations has considerable influence as well. Many external factors have also been found to influence the achievement of students. Among the most prevalent were the following:

- Socioeconomic status
- Family makeup and support
- Race
- Gender

There are many other factors that have been shown to impact student achievement. Some of these were well researched, others were not. Among those factors was participation in extracurricular activities which includes athletics. Research was present that showed how participation in extracurricular activities had many benefits, including improved student achievement. However, most of this research was years and even decades old. Additionally very little of this research focused on how participation in athletics impacted the results of state level standardized tests such as the End of Course tests in North Carolina. The research for this study was based on previous research in this area and sought to show how participation in athletics was potentially one additional factor impacting student achievement

as determined by composite scores on End of Course tests. A visual representation of this appears as the following illustration.

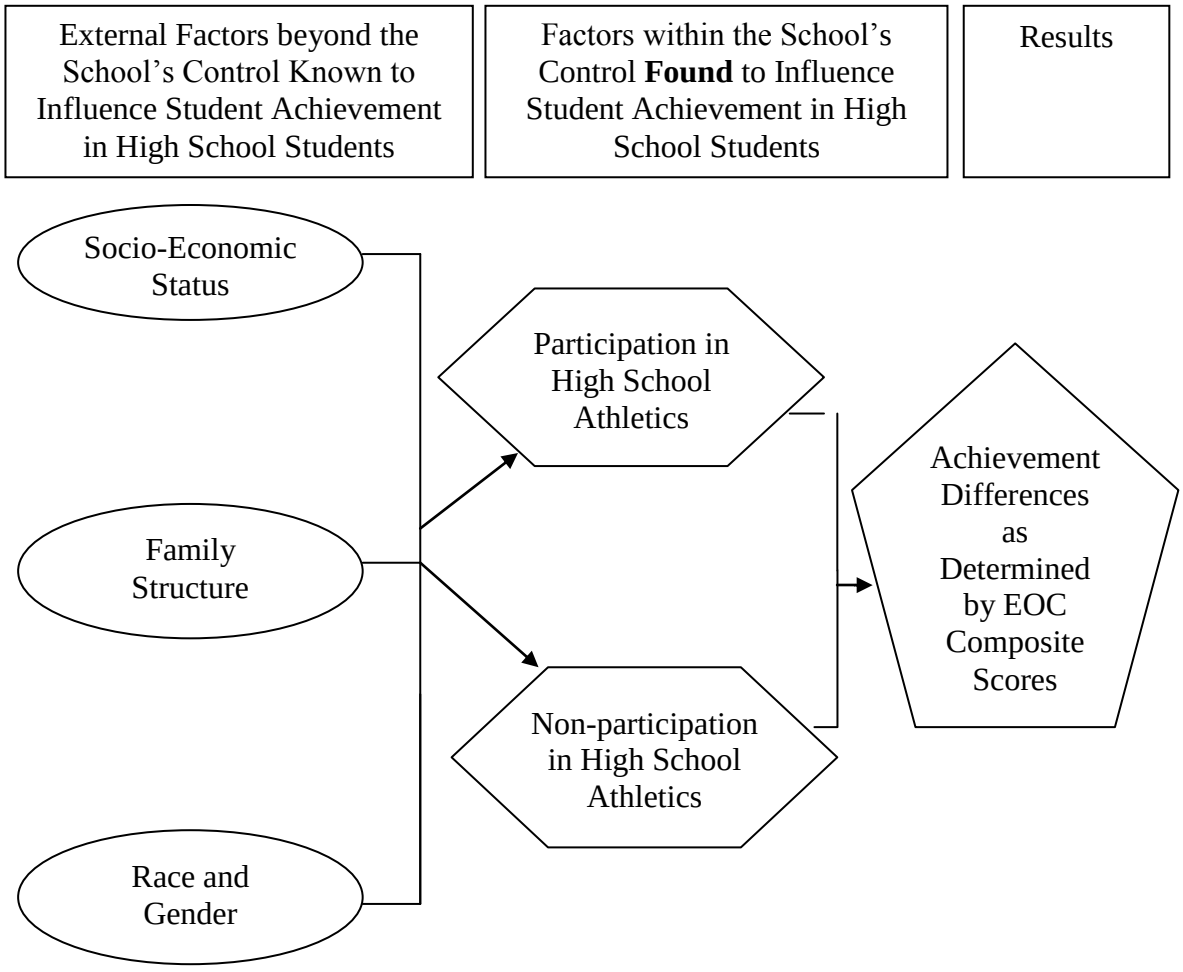
Figure 2: Conceptual Framework Revisited



In my original conceptual framework, participation in interscholastic athletics was believed to influence student achievement in high school students as determined by End of Course test results. Now I can say students who participated in interscholastic athletics did perform statistically significantly better on End of Course tests than students who did not participated in interscholastic athletics.

Therefore I would suggest that it is possible for a high school to consider athletic participation as a potential contributor to positively influencing student achievement. Participation in interscholastic athletics should be included along with the other factors influencing student achievement in the classroom. These factors include those mentioned above and others not included in my research. My conceptual framework graphic is thus modified to the following where the word "believed" is changed to "found" in the middle heading.

Figure 3: Conceptual Framework Revised



Implications

There are several implications that can be drawn from this study. The first implication is for school system leaders, especially those who make budgetary decisions such as superintendents and school board members. These school leaders have a tremendous responsibility to ensure that school funds are used in a way that maximizes the positive impact on students. Over the last few years in North Carolina severe budget cuts have made this task difficult for all involved. It is extremely important for these school leaders to be aware of programs and activities that promote positive student achievement while at the same time being very cost efficient. The findings of my study show that participation in interscholastic athletics has a statistically significant relationship to higher End of Course test scores.

A second implication is for political and legislative bodies. While my research was limited to three high schools in western North Carolina, the results are in line with other research showing the benefits of participation in extracurricular activities. These political and legislative bodies control the funding for school systems across the nation. Ensuring these bodies are aware of research results such as this could help to secure additional funding for school systems everywhere. At the very least it could serve as an argument to prevent further cuts to educational funding.

A third implication that can be drawn from this study is for school level leaders such as principals and athletic directors. These are the leaders who are directly responsible for the quality of the athletic program at the school level. Sometimes they must take less than adequate allotted budgets and make them work. Occasionally this results in the cancellation of a sports program or the inability to add additional sports programs. However, many times

there is not a financial concern behind these decisions. There are times when principals and athletic directors seek to limit their school's athletic program simply because some sports are not important to them. Sometimes it is important for principals and athletic directors to be reminded that all sports are important to some students. Regardless of whatever personal feelings they might hold for these sports, principals and athletic directors need to realize how a strong overall athletic program can have a positive effect on the overall academic program of a school.

Another implication is for high school students and their parents. Nearly all high school students and their parents have graduation as a goal when they enter ninth grade. Things happen along the way that discourages some from ever completing this goal. Given the importance of obtaining at least a high school level education in today's workforce, all students and their parents need to be aware of programs and activities that positively impact the chances of completing high school. The literature on the positive effects of participation in interscholastic athletics is filled with examples of how this participation can help student reach graduation. My study adds to this research by showing that participation in interscholastic athletics has a positive statistically significant correlation to student achievement on End of Course tests that were used as graduation exit standards.

A fifth implication that can be drawn from this study is for community members and business partners. Operating a strong and effective high school athletic program takes significant funding and resources. There are significant costs involved including coaching supplements, uniform and equipment costs, transportation to away contests, and security and game officials for home contests. Even the best budget allotments given by superintendents and school boards do not cover all of these expenses. Athletic programs rely on support from

community members and business partners to help fill the gaps left by local athletic budgets. Ensuring these community members and business partners are aware of the positive effects participation in athletics has on academics can help solicit their continued strong support. In some cases it may encourage additional support.

Similarly, the results of this study have the potential to extend beyond the geographic boundaries of Western North Carolina. These findings, while associated with North Carolina's End-of-Course tests, are not necessarily restricted to those tests. Indeed, these findings have some reasonable probability of successful replication in any state where a portion of their accountability system involves using content-based course-ending standardized tests. It is reasonable to think that athletes will perform better on those tests than non-athletes, as this study found.

A final implication has to do with the need for high schools and districts to establish electronic data bases to code participation in an array of co-curricular and extra-curricular activities. These activities have been found to be important in increasing student achievement and there is a need for them to be retrieved as easily as test scores and grade point averages. Data driven decisions regarding school improvement initiatives are only as good as the data that is easily available. This is a data set that begs to be taken out of the paper and pencil era and brought into the 21st Century.

Limitations of this Study

The limitations of this study must be considered if an attempt is made to apply these results to other schools or school settings. These limitations include the following:

1. There were relatively few senior students included in the research. Because the five courses with the End of Course tests used in my research are usually completed by

the end of a student's junior year, the only senior students included in the research were those who were unable to complete one or more of these courses earlier in their high school careers.

2. There were relatively few Hispanic students included in the research. This limitation quite possibly impacted the results of the data analysis on this subgroup of students.
3. There was not an efficient method for gathering all of the data needed for the research. The testing database present in all North Carolina school systems includes the demographic information needed such as gender and ethnicity. However, it does not include information on athletic participation by students. Each school had to manually add the athletic participation information leaving open the possibility of human error.
4. The research did not look for results broken down by individual sport. Athletic participation was treated as an aggregated construct. No attempt was made to examine differences or relationships based on the type of athletic participation. It may be that the results found hold true regardless of which sport the student is participating in. However, this was not a part of this study so no definite conclusion is possible.

Recommendations for Further Study

There are several recommendations for further study that come from my current study. First of all, it would be interesting to see if the results of my current study held true over the course of several years. Conducting a similar study that included several years' worth of testing and athletic participation data would give a better picture of how statistically significant the effects of athletic participation were on course-ending standardized test

results. This would also alleviate the limitation of a lack of senior students in the data mentioned above. Gathering several years' worth of data would automatically ensure the inclusion of all students who passed through the schools involved during the time period covered by the research.

Another possible recommendation for further study would be to obtain a larger sample size that included larger numbers from different ethnic groups. This would allow for a focus specifically on Hispanic students to see if the lack of a significantly statistical difference found in my study held true with a larger sample size. It would also allow for a focus on other ethnic groups not included in my study due to the lack of an adequate sample size such as Asian American and Multi-Ethnicity.

Following this line of thinking another study could go deeper into the disaggregated data based on ethnicity and see how subgroups compared to each other. For example, do African American female athletes perform better academically than African American male athletes? Looking at comparisons such as this could help schools develop better strategies to meet the specific needs of a certain ethnicity or gender group.

A further recommended study could also be to see if the results found in my study held true regardless of which sport a student participated in. In other words, disaggregate the data based on each sport and see if the same statistically significant results were found. It would be very interesting to see how the results for "revenue" sports such as football and basketball compared to the results for "non-revenue" sports such as cross country or golf. In difficult economic times such as we have been facing recently in North Carolina, it is the "non-revenue" sports that are sometimes targeted in budget cuts. If participation in these

sports was shown to have a statistically significant positive impact on course-ending standardized test results, it would help build a case for looking to other areas for budget cuts.

Along these same lines, a further study could be conducted that took into account the amount of time students participated in athletics. Some may only participate in one sport while others participate in multiple sports. Part of this study could also look at the student athletes who do not participate during all four years of high school for various reasons. It would be interesting to see if the amount of time involved in athletics had an impact on the amount of positive correlation to student achievement.

Yet another recommendation for further study would be to see if the statistically significant results found in my study held true in the new accountability measures currently being implemented in North Carolina. Like most states, North Carolina is moving to the common core standards for Language Arts and Mathematics. Additionally North Carolina is developing essential standards for other subjects. Assessments are being developed for all of these new standards that are being implemented for the first time during the 2012 – 2013 school year. Just as with previous accountability measures, programs and activities that can be shown to have a statistically significant positive impact on the new accountability measures will be less likely to face budget cuts.

Seeing how participation in athletics has benefits that extend to academics, it would also be interesting to conduct a study on the barriers to participation in athletics and other activities outside of the regular school day. Many students cannot participate for various reasons. If these reasons were understood, educators could then work on ideas to eliminate some of the barriers and provide additional opportunities for students to become more involved in extracurricular activities.

Finally, it would be interesting to conduct a study on how participation in athletics impacts students as the leave high school for college, the military, or the workforce. Part of this study could focus on how well students who have been participating in athletics throughout school adjust to life after their playing days are over. This could especially be interesting for those "superstar" athletes who were no longer in the spotlight.

Conclusion

I chose the topic for this study in 2006 with the hope of adding to the knowledge base showing that interscholastic athletic programs have a positive impact on student achievement. By doing so I believed I could build a case for increased support for school athletic programs. It was apparent to me and others who believed in better support for interscholastic athletics that student participation in athletics can have a positive influence on student achievement. Since that time financial support for athletic programs has gotten worse instead of better. With the downturn in the economy and the resulting budget crisis in most states, school systems everywhere have had to make some difficult decisions to make ends meet with severely reduced budgets. In many cases, school athletic budgets have seen dramatic cuts, which in turn have affected the breadth and depth of athletic offerings. In effect, fewer potential student athletes are being served.

In spite of these setbacks to interscholastic athletic support, my hope is still the same as it was in 2006. I am now even more committed to sharing the numerous academic benefits that come as a result of participation in interscholastic athletics. The research has been there to show these benefits all along. I have learned much more than I knew before I began this study and I am now better equipped to share what I have learned. This study adds one additional small piece of research to support a strong athletic program by clearly

articulating the academic benefits to be derived for those students who participate in these programs. However, no matter how well something is researched, nothing changes unless that research is put into action. Now is the time for action.

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APPENDIX A

Recruitment Email to Principals

Dear _____,

I am currently in the doctoral program at Appalachian State University and I am ready to begin the research for my dissertation. I would like to use your school as a site for data collection. Below are the specifics of my research as it applies to your school. Please look this over and respond to this email if you will grant me approval.

Here are the specifics of my research:

- I will be comparing EOC test scores of athletes versus non-athletes over the past year using the five tests that were required for graduation prior to this year.
- Not only will I be comparing the overall results, I will break the results down by gender, race and school.
- I will need your help collecting the scores from your school, including gender and race, marking those who were participating in athletics, then removing the names to protect confidentiality. At no time will I see the students' names. I have spoken to the testing department in my school system and there is an easy way to collect all of the scores. The hard part is marking the athletes which will have to be done using eligibility sheets with help from the athletic director.
- In return for your effort, I will make a $100 donation to your school that can be used as you see fit.

Please let me know if you have any questions. Thanks again.

Michael Wyant, Principal
Western High School

APPENDIX B

Thank You Email to Principals

Dear _____,

Thank you for agreeing to allow me to use your school in my dissertation research. I need one more favor to gain IRB approval. I need documentation showing you understand and approve the research I will be conducting. Below are the specifics of my research as it applies to your school. Please respond to this email with your approval. I will forward your email to the IRB for their documentation. Thanks for your help with this.

Here are the specifics of my research:

- I will be comparing EOC test scores of athletes versus non-athletes over the past year using the five tests that were required for graduation prior to this year.
- Not only will I be comparing the overall results, I will break the results down by gender, race and school.
- I will need your help collecting the scores from your school, including gender and race, marking those who were participating in athletics, then removing the names to protect confidentiality. At no time will I see the students' names. I have spoken to the testing department in my school system and there is an easy way to collect all of the scores. The hard part is marking the athletes which will have to be done using eligibility sheets with help from the athletic director.
- In return for your effort, I will make a $100 donation to your school that can be used as you see fit.

Please let me know if you have any questions. Thanks again.

Michael Wyant, Principal
Western High School

VITA

Michael Stephen Wyant was born in Catawba County, North Carolina in 1966 to Mary Jane RhoneyWyant and Charlie Clayton Wyant of Newton, North Carolina. He attended Catawba County Schools until his graduation from Fred T. Foard High School in 1984. He attended Appalachian State University graduating with a B. S. in Mathematics Education in 1988, a M. A. in School Administration in 1993, an Ed. S. in Educational Administration in 1997, and an Ed. D. in Educational Leadership in 2012.

Following the completion of his bachelor's degree, he served as a math teacher with Lincoln County Schools in Lincolnton, North Carolina at West Lincoln High School. Following the completion of his master's degree, he served as an assistant principal with Hickory City Schools in Hickory, North Carolina at Hickory High School. He returned to serve his home school system of Catawba County Schools in 1995 as an assistant principal at Maiden High School. He advanced through the school system serving as the principal of Charles H. Tuttle Middle School, the principal of Bandys High School, the Director of Middle Schools for the system, and finally the Director of High Schools for the system. In his role as a director he also oversaw athletics and driver education for the school system. In 2008 he returned to the school level serving Western County Schools (pseudonym) in West (pseudonym), North Carolina as the principal of Western High School (pseudonym).

He currently resides in Newton, North Carolina with his two sons Jonathan, a senior at Appalachian State University, and Joshua, a sophomore at Lemoyne Owen College.