THE EFFECT OF ATHLETIC PARTICIPATION
ON THE
ACADEMIC ACHIEVEMENT OF HIGH SCHOOL STUDENTS

A thesis presented
by
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to
The School of Education

In partial fulfillment of the requirements for the degree of
Doctor of Education
in the field of
Education

College of Professional Studies
Northeastern University
Boston, Massachusetts
December 2014
Abstract

Athletic participation is a major component of the high school experience for many students across the country, yet in difficult economic times athletic funding is often the first area reduced when education budgets need to be balanced. These cuts are usually performed without data on or inquiry into the relationship between athletic participation and academic achievement. If a relationship could be proven, advocates of athletics would have a stronger argument for the preservation of funding. This study utilized a quantitative, causal-comparative design to examine the relationship between athletic participation and academic achievement. Grade point averages of students who participated in high school athletics three years in a row were compared with those of students who did not participate for three years in a row. The study focused on the growth rate, or change in grade point average over the three years, in order to make a stronger argument that differences in achievement between the two groups could be attributed to participation (or lack of participation). On average, the achievement of athletes was significantly higher than that of non-participants during the first year, but athletes lost some of this advantage over the course of the study, meaning that they experienced negative growth. Non-participants did experience positive growth that was statistically significant, however the effect size was small, meaning that the practical significance is minimal. Based on the results of the study, it is difficult to make the argument that athletics are linked to improved academic achievement. While athletic participation can still be considered part of the overall education of students with numerous benefits such as the development of leadership and teamwork skills, these benefits do not seem to translate to the classroom. Because the practical significance is low, there are no recommendations based on the results of this study in relation to funding or policy changes, although school districts may want to consider making the funding of activities
proven to have a direct link to improved academic achievement their top priority. Future research in this area should continue to focus on growth rate rather than overall performance and attempt to first duplicate these results at additional sites. The rate of participation (number of sports played) should also be introduced to the conversation as it may affect results. Future studies may also wish to investigate why the rate of academic growth was so low for all students.

*Keywords:* grade point average (GPA), athletic participant, non-athletic participant, academic achievement.
Table of Contents

CHAPTER ONE: INTRODUCTION
Statement of the Problem ........................................................................................................7
Significance of the Problem ......................................................................................................10
Positionality Statement ...........................................................................................................14
Research Question ................................................................................................................15
Theoretical Framework ...........................................................................................................16
  Zero-Sum Model Theory .......................................................................................................16
  Developmental Theory ..........................................................................................................17
  Theoretical Framework Conclusion ....................................................................................22
Definition of Terms ...............................................................................................................23
Chapter One Summary ..........................................................................................................23

CHAPTER TWO: LITERATURE REVIEW
Introduction ............................................................................................................................24
Athletic Participation and Academic Achievement: Negative Findings ............................24
Athletic Participation and Academic Achievement: Positive Findings ............................27
Athletic Participation and Academic Achievement: Inconclusive Findings ....................32
Chapter Two Summary .......................................................................................................35

CHAPTER THREE: METHODOLOGY
Introduction ............................................................................................................................37
Research Design ....................................................................................................................37
Population and Sampling ......................................................................................................39
Data Collection .....................................................................................................................40
Data Analysis .......................................................................................................................40
Validity, Reliability, and Generalizability ............................................................................45
Protection of Human Subjects .............................................................................................47
Conclusion ............................................................................................................................47

CHAPTER FOUR: RESEARCH FINDINGS
Introduction ............................................................................................................................50
Sample and Data Entry ........................................................................................................50
Assumption Testing ..............................................................................................................51
The Independent t-tests .......................................................................................................56
Growth Rate ........................................................................................................................59
Significance of the Growth Rate .........................................................................................61
Summary of Data Analysis ..................................................................................................64
CHAPTER FIVE: DISCUSSION OF RESEARCH FINDINGS

Purpose .......................................................................................................................... 68
Research Question and Theoretical Framework .......................................................... 69
Results of Mann-Whitney U Tests and t-tests .............................................................. 70
Growth Rate and Academic Performance Change Results ........................................... 72
Discussion of Results .................................................................................................. 73
Summary of Results .................................................................................................... 74
Implications for Practice ............................................................................................. 75
Implications for Future Research ................................................................................. 76
Conclusions .................................................................................................................. 79

REFERENCES ............................................................................................................. 81

APPENDICES
Athletic Participation and Academic Achievement: Negative Findings ....................... 101
Athletic Participation and Academic Achievement: Positive Findings ......................... 102
Athletic Participation and Academic Achievement: Inconclusive Findings ................. 104
List of Tables and Figures

Figure 1: Developmental Theory.................................................................18

Table 1: Kolmogorov-Smirnova and Shapiro-Wilk Tests for All Three Study Years
Grouped by Participant / Non-Participant Variable........................................54

Table 2: Levene’s Test: Equal Variances Assumed ..........................................56

Table 3: GPA Summary Statistics for 2011, 2012, and 2013 ...........................57

Table 4: Mann-Whitney U Results for 2011.....................................................58

Table 5: Independent t-test Results for 2012, and 2013: Equal Variances Assumed ...58

Table 6: Kolmogorov-Smirnova & Shapiro-Wilk Tests for Acad. Performance Change 63

Table 7: Mann-Whitney U Results for Academic Performance Change...............64
Chapter One: Introduction

Statement of the Problem

Many public schools in Massachusetts are experiencing a period of extreme budget cuts in education, necessitated by a decrease in funding due to poor economic conditions. As revenue has diminished, the tightening of budgets has produced a heightened perception of the need for accountability in school programs. The emphasis has been on academic achievement, and funding has been reduced in areas like athletics, as resources have been perceived as being better used elsewhere (Lederman, 2012). However, numerous researchers have provided evidence that athletic participation is positively associated with academic achievement. In his seminal study, Marsh (1988), using a large, national sample, found that athletic participation was favorably related to numerous senior and post-secondary outcomes, including academic achievement and educational aspirations, as well as subsequent college attendance. Marsh looked at numerous extracurricular activities and found that sports are the most beneficial in relation to academic achievement. As a teacher and coach at a large high school, this researcher is concerned about cuts to athletic budgets, as he has seen firsthand the benefits of athletic participation in regards to student achievement.

Athletic budgets at high schools are being cut significantly without any understanding of the true benefits of athletic participation. Up2us.org (2011), an organization that provides support to youth sports programs around the country, provides some telling statistics about the current state of athletic funding. During the 2010–2011 school year, $1.5 billion was cut from school sports budgets nationwide. This was on top of $2 billion cut in 2009–2010. Forty percent
of school districts nationwide charge participation fees, and cuts in athletic programs are being made in all areas of the country, whether traditionally affluent or disadvantaged.

Athletics have often been targeted for cuts by education leaders who do not understand their benefits (Eide & Ronan, 2001). The researcher was present at a meeting in 2008 at our sample school when the budget was reduced to zero and one member of the school committee was still calling for the elimination of all ninth grade sports, even though these teams were being self-funded through user fees and cutting them would not reduce the budget shortfall at all. Massachusetts, which leads the United States in educational achievement in many different areas, has numerous communities cutting athletic budgets and seriously considering the elimination of high school sports (Cole, 2012; Gallotta, 2010; Kurtz, 2011; Lederman, 2012; Popke, 2007; Wagner, 2013). This situation is not specific to any one school or state and is indeed playing out all over the nation. According to Ulmer (2011), school districts in Oregon are continuing to slash athletic budgets and raise participation fees. One Oregon high school basketball coach stated that in his eleven years of coaching, “I’ve never seen anything come back that was cut, I’m very scared that [high school sports] are going to go away” (Ulmer, 2001, para. 6). A quick Internet search hits on similar issues regarding the elimination of sports in Ohio (Garcia, 2009), New Jersey (Procida & Previti, 2010), Idaho (Roberts, 2012), California and Florida (Smith, 2012), as well as New York (Webb, 2011). A recent New York Times article sums up the current situation perfectly: “In education, many administrators are quick to cut athletics, band, cheerleading, art and music because they have the vague impression that those are luxuries. In fact, they are exactly the programs that keep kids in school and build character” (Brooks, 2011, para. 8). All over the nation, athletics budgets are being cut (Arrue, 2010;
Demarest, 2010), user fees are being increased (Balise, 2010; Chirls, 2011), and sports programs are being eliminated (Aquije, 2010; Berman, 2011).

While other areas are also targeted for budget reduction, such as music, art, and health education, these subjects are usually taught during the school day and so are viewed as having more academic legitimacy than athletics. Because athletic participation takes place outside of the school day and students do not receive grades for participation as they do for their academic classes, many policy makers view athletic participation as recreation only, lacking any educational value, and therefore find this area an easy place to cut when funds are limited. In our sample public high school in Massachusetts, the athletic budget, which had previously been $500,000, was reduced to $300,000 for the 2007–2008 school year, and then to zero for 2008–2009. A $100,000 budget was reinstated for 2009–2010 but was eliminated for both 2010–2011 and 2011–2012. According to the athletic director, the athletic department needs the reinstatement of at least $100,000 or it will be forced to eliminate all junior varsity sports for the 2012–2013 school year (Mackin, 2012). The cuts have been deep and made without a needs assessment or any investigation into a possible link between participation and its impact on academic performance. Most cuts to athletic budgets are made on entirely financial grounds and are uninformed by empirically based knowledge regarding the effects of athletics on adolescent development, including academic performance (Holland & Andre, 1987). Because the athletic department has been almost completely self-funded over the last few years, student user fees have increased dramatically (Mackin, 2008). These user fees make it difficult for many students to continue participation. Budget cuts in high school athletic programs are severely limiting access to athletic opportunities, which are a valuable component of the education of students (Lederman, 2012).
As athletic funding decreases and programs are eliminated, school sports participation is diminished. For many students, sports are their primary engagement with school, and if their athletic opportunities are gone they may lose their incentive to perform academically as well (Burnett, 2000). In a national study considering data for close to 725,000 students, schools in which more than half of the students participate in athletics have a significantly higher graduation rate than schools in which less than half participate (Price, 2013). The elimination of athletic programs could result in even higher dropout rates (Burnett, 2000; Price, 2013; Stephens & Schaben, 2002).

The numerous benefits of sports participation include the development of positive self-image, sportsmanship, and sense of community and citizenship, characteristics that will help students for the rest of their lives (Fejgin, 1994). Students also develop strong work ethics by participating in sports and experience a carry-over to their academic performance (Fejgin, 1994). As a history teacher as well as a lacrosse and football coach, the researcher has seen the benefits of athletic participation, both on the field as well as in classroom performance. Many student-athletes who do not aspire to go to college put forth effort in class so that they can be academically eligible to participate (Burnett, 2000). Others find that sports can open doors to higher education that seemed previously closed. Students become more engaged with school when they play high school sports and perform better in the classroom (Stephens & Schaben, 2002).

**Significance of the Problem**

We live in an era where interscholastic athletics are being phased out of school systems as funding is limited. If athletics do in fact lead to improved academic performance, this trend could have significant negative effects as academic achievement could decrease. As stated, the
researcher has witnessed the benefits of athletic participation on students in his home district. Positive results of the proposed study could lead to heightened awareness of the academic benefits of athletic participation and help to change both school district policies and practices related to athletics as well as make a significant contribution to research in this area.

**Significance to Policy**

Findings that document a connection between participation and school performance while also addressing some of the shortcomings of previous studies could help to foster a whole new attitude about the role of athletics in schools. A conversation may begin that could include a wide variety of topics, including minimum grade point average requirements, current disciplinary codes for athletes, tutoring, coaches’ training and stipends, alumni networks, fundraising policies, publicity for athletic events, community outreach, and special events and assemblies. Rather than students being removed from sports participation as punishment for infractions or poor grades, alternate punishment or education could be provided if participation is understood to be a positive undertaking. Rather than any athletic activity, whether it be announcing game times or scores over the school public address system or having students wear their team jerseys on game days, being viewed as a distraction from learning, it can be understood to be an important component of the overall learning process.

**Significance to Practice**

Evidence of a connection between athletics and achievement would increase the likelihood that educators would encourage more students to participate. Events like pep rallies, awards ceremonies, or sign-up fairs that many criticize as a waste of time when they occur during the school day might gain legitimacy as solid practice directed at increasing student involvement. Administrators, teachers, and parents who might believe the stereotype of the
“dumb jock” may adjust their thinking to appreciate and emphasize the positive attributes that develop due to athletic participation. The evidence may also change the practice of parents removing students from teams as a punishment for poor grades or other infractions as they come to understand that positive behavior is associated with participation.

At the sample school and many like it, teachers roll their eyes when classes are interrupted for announcements about upcoming athletic events or results from previous games. Rather than being treated as a source of school and community pride, teachers complain about these announcements to the point that many schools do not make them anymore. Rather than encouraging more participation, these attitudes discourage it and must change. Because of tight budgets, spectators of athletic events are often charged at the gate before they can view an event. While this practice may be necessary to a certain extent in the current economic climate, charging students to go to a game and cheer on their classmates has a negative impact on attendance as well as the attitude many students have toward athletics. A student who goes to a big game and sees the excitement of the competition may be inspired to participate but is discouraged by the practice of charging students admission to events at their own school.

While many educators and community members understand the value of athletics, many others, often those who never participated themselves, do not. While much has been made of the preference given to athletes in some settings, there is also a reality that athletes are discriminated against in some circumstances (Burnett, 2000). While it is commonly accepted for students to miss class time due to special events for drama, band, chorus, or technical skills competitions, an athletic director who asks for a team to be dismissed a half hour early to travel to a playoff game is met with much resistance, and the in-school pep rally before the Thanksgiving football game is a thing of the past in many districts. Data indicating a link between sports and grades will help to
change some of these negative practices. While also encouraging more students to participate in sports, it could also lessen the apathy many have toward putting forth effort in their physical education classes.

**Significance to Research**

The proposed study will attempt to replicate the positive findings of numerous inquiries into this area of study while also addressing some of the shortcomings of previous studies. Many early studies that refuted the claim that there was a connection between athletic participation and academic performance are at best out of date studies of an era of different circumstances and participation patterns (Burke, 1963; Hanks & Eckland, 1976; Lupetow & Kaiser, 1974) or at worst do not adhere to the principles of the scientific method (Coleman, 1961; Kniker, 1974).

Many studies have found a positive connection between the variables in question, but have been criticized by reviewers for a variety of reasons. These criticisms include the cross-sectional, “snapshot” nature of many of the samples (Holland & Andre, 1987; Lupetow & Kayser, 1974; Marsh, 1988; Rehberg, 1969), definition of what “performance” actually means (Holland & Andre, 1987; Marsh, 1988), and failure to prove a causal relationship between athletic participation and academic achievement (Hauser & Lueptow, 1978; Melnick & Sabo, 1992; Melnick, VanFossen & Sabo, 1988). The researcher hopes to address these shortcomings in a satisfactory manner by comparing the change of grade point averages (GPAs) of athletes and non-athletes over a three-year period.

This study will be a quantitative, longitudinal study concerned with the relationship between athletic participation and academic achievement. This study will provide additional evidence of the connection between athletic participation and student academic achievement and contribute to the conversation that exists on this topic. As there are some studies that refute the
claim of a positive relationship between the variables in question or are at best inconclusive, this research may help to strengthen the argument that increased student involvement has numerous benefits. The primary contribution will be in the longitudinal nature of the study and that fact that the study will be concerned with academic growth. By completing t-tests comparing the GPAs of athletic participants versus those of non-participants for the same students over three school years, the study will attempt to address the concerns over the cross-sectional data used in previous research. Another issue from previous studies is that many researchers have looked at student-athlete GPAs at the beginning of the study period and again after participation, and if there had been any increase it was attributed to the benefits of playing sports. This study will attempt to determine if there is a statistically significant difference between athletes and non-athletes in terms of GPA change from 10th grade to 12th grade. By focusing on change rather than overall GPA the study will control for preexisting advantages that some students may have over others.

There has also been a tendency in previous studies to group all activities under the “extracurricular activities” label, lumping sports together with music, art, drama, the math team, etc., which are all very different types of activities (Silliker & Quirk, 1997; Sweet, 1986; Zaff, 2003). Intramural or club sports have also been grouped in this category, which are a very different animal as far as time commitment and intensity are concerned. This study will consider just members of high school-sponsored athletic teams.

**Positionality Statement**

As someone who has been involved in coaching for close to fifteen years, I must acknowledge considerable bias in relation to the chosen problem of practice. I have seen firsthand the positive impact that athletic participation has had on individual students, and it is
also my opinion that athletes tend to be among the “good kids” in school who do their work and cooperate with teachers. I have also seen firsthand the negative impact that budget cuts have had on the ability to maintain athletic programs, including the need to cut more individuals from teams, and the effects of fields, uniforms, and equipment that are in less than ideal condition. It is quite obvious that as a coach I am someone who feels very passionately about the benefits of athletics and that I hope this study will show that there is a positive relationship between athletic participation and academic achievement. It is vital, then, as I move forward that I remain aware of my own bias in order to conduct honest and accurate research.

**Research Question**

Although existing literature has revealed inconclusive or conflicting results, a number of studies have suggested a positive correlation between athletic participation and academic achievement. In an attempt to replicate the positive findings of Marsh (1988) and others, the purpose of this study is to further examine the topic by addressing design issues associated with many of the previous empirical studies.

Research question: To what extent does athletic participation affect academic achievement among students in a Massachusetts high school?

Athletic participation is the independent variable in the study and is defined by student membership in one or more of the offered interscholastic sports at the participating Massachusetts high school at any level of competition (freshmen, junior varsity, or varsity) for each of the three years of the study. Academic achievement is the dependent variable and is defined by student GPA. Specifically, this research will be concerned with the change in GPA from year one to year three.
Theoretical Framework

There are currently two theoretical perspectives regarding the relationship between participation in athletics and academic achievement: that participation diverts attention from academic goals or has a positive effect on academic achievement. The first, Zero-Sum Model Theory, is derived from the work of Coleman (1961), who concluded that adolescent society emphasizes peer acceptance and an indifferent approach to academic achievement. The second is the Developmental Theory, a reaction to Coleman which instead offered that participation aids in the overall development of athletes, including academically. It is this second perspective that informs the hypothesis of this study that athletic participation leads to increased academic achievement.

Zero-Sum Model Theory

Holland and Andre (1987) described Coleman’s theory to mean that an emphasis on extracurricular activities subverts the academic goals of education. This became known as the Zero-Sum Model. Coleman’s (1961) position was that a commitment to academic, social, or athletic pursuits necessitates a reduction in commitment to the other two. Because sports are both athletic and social in nature, participation is said to detract from academics. Although this is an important theory, there is a lot of evidence against it (Marsh, 1988). Participation in athletics has often been found to facilitate academic outcomes rather than detract from them (Marsh, 1988).

Developmental Theory

Holland and Andre (1987) provided evidence for an alternative, the Developmental Theory, in which athletics are viewed as experiences that enhance the total development of students. From the developmental perspective, athletics may facilitate not only nonacademic goals but also academic goals. “Participation…may, for example, enhance perceived social status
which in turn influences educational aspirations and behaviors” (Marsh, 1988, p. 4). Participation enhances self-concept and self-efficacy, which in turn has positive effects on other outcomes, like academic performance (Snyder & Spreitzer, 1990).

The study will be conducted based on the framework of the developmental perspective. According to this theory, athletic participation aids the students’ overall development, including academic. Participation in athletics may lead to experiences, attitudes, and self-perceptions that enhance academic performance as there may be an increased interest in school, including academics, generated through participation in sports. Athletes may be motivated to perform at higher academic levels in order to remain eligible, and athletic success may lead to a heightened sense of self-worth that spills over into academic performance. As coaches, teachers, and parents take an interest in athletes, including their classroom performance, athletic participation may lead to membership in elite peer groups and an orientation toward academic success, and athletes may have the hope or expectation of participating in athletics at the collegiate level (Snyder & Spreitzer, 1990).
Figure 1. Developmental Theory as applied to the relationship between athletic participation and academic achievement, as defined by Snyder and Spreitzer (1990).

*Developmental Theory and Student-Athletes:* As stated above, according to the Developmental Theory, athletic participation leads to numerous positive outcomes, including improved academic performance. Much of the rationale behind the theory is found in the work of
Bandura (1995, 1997) on self-efficacy and motivation. When students feel good about themselves because of athletic participation, there is a snowball effect, which results in improved academics. Feelings of self-worth affect how much effort individuals are willing to put forth and how they persevere in the face of obstacles or failures (Bandura, 1997).

Students with a high sense of efficacy will participate more readily, work harder, and persist longer when they encounter obstacles that hinder their progress. Self-efficacy is linked to rate of performance and expenditure of energy as well as to mental effort and achievement in a number of academic areas, including mathematics and reading comprehension. Students with the same ability may achieve differently because successful performance requires self-regulation and motivation. Because self-efficacy fosters engagement in learning and motivation, it improves academic achievement (Bandura, 1995, 1997).

Self-esteem and the belief that success is possible directly relate to success in the classroom (Bandura, 1997). Self-efficacy beliefs bring about changes in behavior and achievement. “Self-referent thought activates cognitive, motivational, and affective processes that govern the translation of knowledge and abilities into proficient action” (Bandura, 1997, p. 37). Individuals will perform differently depending on their beliefs of personal efficacy. A resilient sense of efficacy enables individuals to do extraordinary things in the face of obstacles (Bandura, 1997). Student-athletes learn this fact during competition, and it carries over to the rest of their endeavors (Snyder & Spreitzer, 1990).

The connection between self-efficacy and motivation that is developed through athletic participation also aids low-achieving, low-aspiring students. Most students at risk of academic failure are in the position because they lack interest, motivation, and a sense of purpose (Bandura, 1995). Some athletes are at-risk students and realize that they must meet a certain
minimum academic requirement in order to be eligible to participate. They initially perform
better academically out of this motivation, and the efficacy gained from athletics helps keep
them on the right track. Many of these students would not come to school otherwise, and
athletics help to develop them into good school citizens. Other students’ love for sports
competition results in a desire to compete in college. They come to understand that they must
have good grades to get into college, and athletics motivates them to do well in school to get to
the next level (Snyder & Spreitzer, 1990).

The motivation that develops due to athletic participation can enhance cognitive
processing and lead to improved academic performance (Bandura, 1997). Athletes come to
believe that they can produce desired effects by their actions, “the power to originate actions for
given purposes” (Bandura, 1997, p. 3). Efficacy beliefs regulate aspirations, behaviors, effort,
and reactions to events. The student feels competent and empowered (Bandura, 1997).

Developmental Theory and Previous Research: Numerous studies have relied upon
aspects of the Developmental Theory when looking into the relationship between athletic
participation and academic performance. In 1993, Marsh developed the
Identification/Commitment Model, proposing that athletic participation enhances identification,
involvement, and commitment to school in a way that enhances both academic as well as
nonacademic outcomes. In a six-year longitudinal study with a large, nationally representative
sample, Marsh and Kleitman (2003) found that athletic participation positively impacted student
grades, along with many other positive outcomes including educational and occupational
aspirations and attainment. Based on their results, the researchers pointed out in their summary
how important it is, in difficult economic times, that cost-cutting measures not lead to schools
eliminating sports as athletics have numerous benefits for students (Marsh & Kleitman, 2003).
Further evidence in support of the Developmental Theory is found in the work of Dobosz and Beaty (1999), who found that athletic participation leads to decisiveness, determination, loyalty, self-efficacy, and self-discipline, all characteristics found to relate to improved academic performance. Baines and Stanley (2003) offered evidence as to the valuable role that coaches play in assisting student athletes with academic deficiencies. They also suggested that academic leaders study the teaching strategies of successful coaches, specifically how they maximize student potential. Francois (2013) pointed to the importance of the coach as an additional academic counselor monitoring grades. He also mentioned codes of conduct, including minimum grade rules for eligibility, as part of the framework for the overall success of student-athletes.

The Developmental Theory also led to the creation of the Personal Excellence Model outlining the role of the coach in the athlete’s success. The main idea of this model is the utilization of the whole-person approach, wherein coaches emphasize learning and improving in all aspects of life as the priority, with winning just a natural by-product of this design. Coaches work to maximize physical, psychological, social, and academic development (Burton & Raedeke, 2008).

Athletic participation can also increase social status, which can influence educational aspirations (Spady, 1971). The value a school or community puts on an activity impacts the developmental variables (Holland & Andre, 1987). In the United States, sports are highly regarded at every level of competition, so the emphasis on athletic achievement leads to significant development of motivation and overall development (Spady, 1971). Because in many high schools athletes achieve higher levels of popularity, they often receive greater notice and academic encouragement from teachers and guidance counselors (Sprietzer & Pugh, 1973).

*Theoretical Framework Conclusion*
From the perspective of the Developmental Theory, growth takes place during the process of pursuing goals in athletics, with the emphasis being on hard work, delayed gratification, planning, competition, cooperation, organization, and the development of skills and values that lead to success (Hanson & Krauss, 1998). Observing, working, and exchanging ideas with others are vital components of development (Abdal-Haqq, 1989; Hollander, 1979). Students learn “by participating in legitimate activity” (Roth & Lee, 2007, p. 192), and student-athletes learn how to play better as they try to win. When individuals contribute to positive activities, they also increase action possibilities for themselves. Characteristics of culture such as working toward objectives, motivation, division of labor, and identity are distributed to individuals who are part of the team (Roth & Lee, 2007).

Through this process, student-athletes become more engaged and interested in school as they develop a heightened sense of self-worth and belief in their ability to succeed (Snyder & Spreitzer, 1990). High school athletes also receive extra attention from adults in the school, including not only coaches but teachers and guidance counselors, who take pride in the achievement of the teams (Snyder & Spreitzer, 1990). The motivation of the student-athlete increases, not only due to positive peer pressure and the desire to remain eligible to compete, but because increased self-efficacy often results in a desire to compete at the collegiate level (Snyder & Spreitzer, 1990). The resulting effect is that athletic participation leads to increased academic performance.
Definition of Terms

1. GPA—Grade point average (Stephens & Shaben, 2002).

2. Athletic participant—Any student who participated in one or more interscholastic sports for all three years of the study (Stephens & Shaben, 2002).

3. Non-athletic participant—A student who did not participate in interscholastic sports for all three years of the study (Stephens & Shaben, 2002).

4. Academic achievement—Measured by grade point average (Stephens & Shaben, 2002).

Chapter One Summary

In Massachusetts and across the nation, difficult economic conditions have led to budget shortfalls for numerous school districts. Many of these districts have chosen to cut athletic funding in order to balance their budgets (Lederman, 2012). These cuts have been implemented without needs assessments or any understanding of the potential benefits of athletic participation to the overall learning and cognitive growth of students (Holland & Andre, 1987). Cuts to athletic budgets and the resulting decreased participation opportunities restrict the cognitive development of children. Students who participate in athletics learn from coaches and teammates through the socialization of the team structure, and this learning leads to development (Vygotsky, 1978). The elimination of athletic opportunities could result in decreased motivation and learning and therefore decreased cognitive growth and academic achievement (Burnett, 2000; McLeod, 2007). If a positive association between athletic participation and academic achievement could be revealed, the evidence could be used to argue for the preservation of athletic funding and participation opportunities for high school students.
Chapter Two: Literature Review

Introduction

In order to understand whether or not there is a positive relationship between high school athletics and academic achievement, historical perspectives must be explored. An examination of the existing literature allows the researcher to understand what is already known and what still needs to be understood. The following literature review is divided into four sections, studies that found a negative relationship between athletic participation and academic achievement, studies that found a positive relationship, those that found no relationship, and a section on gaps in the research that provide direction for further inquiry into this subject.

Athletic Participation and Academic Achievement: Negative Findings

The trailblazer in the study of the connection between athletic participation and academic achievement was Coleman (1961), whose research has been the starting point for all subsequent inquiry. Coleman concluded that athletic participation diverts attention from academics as the primary goal of participation is popularity rather than academic achievement. He has been the reference point for study in this area for the last half century as subsequent researchers have attempted to affirm or dispel his assertions (Davidson, 2010).

The rationale for the negative relationship between athletic participation and academic achievement was that the time and energy spent at sports practice and games negatively impacted the participants’ academic outcomes. Coleman also claimed that getting good grades ranked very low in priority with students, much lower than the social status attained by being a star athlete. “The organization of activities in these high schools acts to dampen enthusiasm for concentrating one’s energy on scholarly matters” (Coleman, 1961, p. 193). Many researchers of the time came to similar conclusions. Ballantine (1981) summarized over forty studies from the 1960s and even
earlier that concluded non-athletes perform slightly better academically than athletes. While there is some validity to their findings, it can be argued that they represent a different era when grades were not as important as many students did not aspire to go to college, nor was a college education necessary for a successful career.

Coleman’s (1961) main criticism of athletics was that it was more important to students than academic achievement. Coleman’s research was the basis of his book on the subject, The Adolescent Society: The Social Life of the Teenager and Its Impact on Education, reviewed by Campbell (1962), who noted that while Coleman did utilize a questionnaire in his research there is no theory, use of statistics, explanation of methodology or rationale, or discussion of validity. Campbell and Gordon (1963) both noted the lack of theoretical formulation or hypotheses to focus his study. These are serious issues and bring to light the shortcomings of Coleman’s inquiry. Coleman’s key finding, according to another reviewer, was that “athletics…were clearly more important than scholarship as a basis for social status” (Gordon, 1963, p. 378). Coleman did not find unequivocally that athletic participation led to decreased student achievement, but many drew this conclusion from his work. Coleman’s study led to calls to cut athletics by many, including Burke (1963), who also implied that minimum grade requirements for athletes were a “joke” as principals made sure key players passed.

Lupetow and Kayser (1974) contributed to the conversation by acknowledging the validity of Rehberg’s (1969) statement that a causal relationship needed to be shown using evidence of grade improvement for the students in their sample throughout all four years of athletic participation in high school. Their study considered grades from school records for academic achievement and questionnaires filled out by seniors for post-graduate plans while controlling for intelligence as well as parental education. When they looked at the overall data,
they found a connection between athletic participation and academic outcomes, including achievement and educational aspirations. The next step in their study included an analysis of data for the same students over a four-year period. While there was a negligible change in GPA over the first three years, all students, both athletes and non-athletes, showed an increase in GPA from eleventh to twelfth grade. Therefore, according to Lupetow and Kaiser (1974), “athletic involvement is not significantly associated with higher levels or amounts of upward grade shifts during the high school period” (p. 32).

It appeared that if a study controlled for initial differences between students, athletic participation did not lead to increased student achievement during high school. This study increased the credibility of Coleman’s (1961) findings as the GPAs of athletes increased at a slightly lower rate than those of non-athletes during the high school years (Lupetow & Kaiser, 1974). Association between athletic involvement and academic achievement appeared to be due to initial differences in the two groups rather than the effects of athletic involvement itself.

Hauser and Lueptow (1978) sought to refute some of the claims of a positive relationship between the variables in question and replicate the findings of Coleman (1961) and others who found a negative relationship between athletic participation and academic outcomes, and concluded that Coleman’s original findings were correct. Like many others, Hauser and Lueptow (1978) were very critical of studies that based claims of a causal relationship between athletic participation and academic achievement on cross-sectional data (despite this criticism, numerous studies right up to the present day will continue to make this claim). The researchers acknowledged that while athletes had higher GPAs when graduating than they did when starting high school, they did not gain as much as non-athletes, which is a relative decline in achievement. Their findings were consistent with the idea that any gains by athletes over non-
athletes could be attributed to initial differences between the two. Their study showed that athletes were better students to begin with but lost a portion of their advantage during their years of athletic involvement (Hauser & Lueptow, 1978). Other more recent studies at both high school and college levels have resulted in similar findings, including Cantor and Prentice (1996), Haynes (1990), Melnick and Sabo (1992), and Melnick, VanFossen and Sabo (1988). Melnick, Vanfossen, and Sabo (1988) found that sports participation did not lead to increased academic achievement. Melnick and Sabo (1992) suggested that most athletes do not experience higher GPAs as a result of participation.

**Athletic Participation and Academic Achievement: Positive Findings**

While some scholars agreed with Coleman (1961), others of the same era found evidence of a connection between participation and achievement (see, for example, Eidsmore, 1963; Krauss, 1964; Rehberg & Shafer, 1968; Shafer & Rehberg, 1970). However, by the late 1960s, some researchers had begun questioning the claims of a causal relationship between athletic participation and grades as most of the work done was cross-sectional rather than longitudinal in nature (Rehberg, 1969). A longitudinal study is important because in order to conclude that there is a causal relationship between the variables, a researcher needs to prove that achievement differences between athletes and non-participants are not the result of initial or prior differences between the groups. This is the primary criticism of most of the studies in this area.

A major milestone in this field of study was the work of Holland and Andre (1987). Holland and Andre reviewed numerous previous studies looking at the relationship between athletics and academic achievement, educational aspirations and attainment, and other factors. They discussed methodological limitations—cross-sectional data, difficulty proving causal relationship, sample structure, design, lack of control for socioeconomic status (SES), etc. Many
of the limitations they noted have been addressed, but not all. Since 1987, many studies have replicated positive findings while trying to improve upon previous studies’ methods (Marsh, 1988; Stephens & Schaben, 2002).

To address the criticism of the cross-sectional nature of most of the studies in this area, Marsh (1988) considered a large, national sample of data from students’ sophomore and senior years in order to note changes in academic achievement, attitudes, and behaviors in the last two years of high school, as well as subsequent college attendance or other post-secondary outcomes. Data for students two years after graduation was also utilized. Multiple regression was used to relate participation to senior and post-secondary outcomes. Marsh found that athletic participation was favorably related to numerous senior and post-secondary outcomes, including academic achievement and educational aspirations, and subsequent college attendance. Marsh looked at numerous extracurricular activities and found that sports are the most beneficial.

Marsh’s work is an important study in this field as it was longitudinal and because he concluded not only that there was a positive association between athletic participation and academic achievement, but that out of all possible extracurricular activities offered at the high school level, athletics are the most beneficial. However, there are some issues with Marsh that future researchers could attempt to resolve. Even though he did control for other variables, Marsh was still essentially comparing the overall academic performance of athletes to that of non-athletes. While it is promising to see that athletes were ahead both as sophomores and as seniors, it is very difficult to claim a causal relationship as there still could be other intrinsic factors aiding athletes. Rather than overall GPAs, the growth in GPA for the two groups in question from grade ten to grade twelve would be a better indicator that athletic participation positively affects academic achievement. Marsh did seem to understand this point to a certain
extent but made the perplexing statement that he did not interpret the higher academic achievement of sophomore athletes as being the result of athletic participation, but he did for seniors. Marsh was also primarily concerned with “total activity scores” (p. 17) and focused on overall extracurricular participation rather than just athletics.

While the 1980s and 1990s seemed to bring more positive findings, some results were still mixed, and many researchers were incredibly still relying on cross-sectional data. Positive associations from the 1990s included that athletic participation promoted student engagement in school and aided academic achievement (Lamborn, Brown, Mounts, & Steinberg, 1992), helped students develop support networks of high-achieving peers and adults (Reis & Dias, 1999), and led to confidence that spilled over to the classroom (Snyder & Spreitzer, 1990).

More recent literature also supports the positive relationship between participation and academic achievement (see, for example, Broh, 2002; Crosnoe, 2001; Eccles & Barber, 1999; Gerber, 1996; Hanson & Kraus, 1998; Marsh & Kleitman, 2003; McHale, Crouter & Tucker, 2001). Many recent studies have found some of the connections discussed here, including the relationship between athletics and self-concept, motivation, academic achievement, and post-secondary goals. Stephens and Schaben (2002) found an association between interscholastic sport participation and higher academic achievement and argued that this link should inform decisions regarding the allocation of money, time, and personnel for athletics. Feldman and Matjasko (2005) reviewed numerous studies and noted the positive consequences of participation. Broh (2002) found that sports participation led to more time spent on homework and improved math and English grades. Marsh and Kleitman (2003) found that athletic participation was related to college enrollment and higher levels of achievement while also controlling for many other factors related to educational outcomes. O’Bryan (2010) found that
varsity sports participation was a significant positive predictor of college preparedness and that participation in athletics does not deter students from academics. O’Bryan concluded that athletic participation led to more parental involvement, which had positive impact on student performance.

There exists a considerable number of larger, longitudinal studies that claim a positive relationship between athletic performance and academic achievement such as Whitley (1999), Jordan (1999), Carlson et al. (2005), Eide and Ronan (2001), and Videon (2002). Videon found an association between participation and positive educational outcomes like higher GPAs using national longitudinal data. Whitley (1999) utilized data from three different school years (1994, 1995, and 1996) and the findings were remarkably consistent over the three years. Athletes did better three years in a row, but it is not known whether their performance grew at a faster rate than that of non-athletes.

Whitley (1999) compared different subgroups of students using paired t-tests and found that athletes overall have a 22.66% higher GPA than non-athletes. This study seems to stand out due to the large sample size (data from close to 300,000 students) and the positive findings. Whitley’s (1999) findings were consistent with both Soltz (1986) and Nuhn (1991), who found that the GPAs of athletes were higher. Whitley also measured numerous subgroups of athletes against non-athletes, including groups broken out by race and gender, and found that the GPAs of all of the subgroups were significantly higher than those of the non-athletes. “The analysis of the data for the different subgroups showed that all of the athlete subgroups outperformed the non-athlete group as a whole, as well as their non-athlete subgroup peers” (Whitley, 1999 p. 229). Into the twenty-first century, most studies in this area were still using cross-sectional data,
and even those that were longitudinal proved only that athletes kept their advantage for more than one year but did not prove a causal relationship.

Even after decades of inquiry, many studies still rely on cross-sectional data, which means the debate and criticism over this practice continues. Filsinger (2012) looked at 300 students at five high schools and found that female athletes were the top academic performers on average. Francois (2013) looked at all students at a high school in Wisconsin and found athletes achieved at a significantly higher level than non-athletes. Oldencamp (2012) also had positive results looking at one year’s performance. Sziraki (2011) and Thompson (2012) offered more of the same. On the surface, Price’s (2013) study looked like a good one with a national sample of more than half a million students and athletes with an overall GPA of 3.01 compared to non-athletes at 2.72. However, only data from one school year, 2011–2012, is considered. Macaluso (2013) and McCorkle (2012), in qualitative single case studies, both found positive relationships. Even current research that is not cross-sectional, like Powers (2011), a longitudinal study utilizing standardized test scores from 2007–2010 that compared athletes to non-athletes, still compared the overall GPA of athletes to that of non-participants rather than GPA change for the two groups. A much stronger claim of a relationship between athletic participation and academic achievement can be made if there is a statistically significant difference in the change in GPAs for the two groups rather than considering only overall GPA.

As stated previously, with cross-sectional data, issues of causal ordering are problematic. Because of this, associations between athletic participation and academic achievement may not indicate that participation in sports leads to increased academic achievement (Videon, 2002). The other possibility, as described by Spreitzer (1994), is that highly motivated and disciplined students are naturally drawn to the competition, achievement, and goal orientation that are
inherent in athletics. Are better outcomes due to athletics, or do athletics simply attract more motivated and capable students? Manlove’s (2013) mixed-methods study is a great example of the issues in this area. The quantitative data show a positive relationship between athletics and performance, while the qualitative data point to other factors affecting performance such as emotional support and intrinsic drive.

**Athletic Participation and Academic Achievement: No Relationship or Inconclusive Findings**

While some studies seemed to confirm Coleman’s (1961) findings regarding a negative relationship between athletic participation and academic achievement while others instead declared that the relationship is positive, still others continue to question both sides. According to Coleman, time spent playing sports was time away from studying (Hanks & Eckland, 1976). It is wrong to assume time spent on one is automatically subtracted from another, as that is an empirical question that must be studied. The research of Hanks and Eckland (1976) had an important impact on the causal status of the question as they surveyed high school students in 1955 and followed up with them in 1970. They concluded that “athletic participation is largely unrelated to ability, grades, or even curriculum” (Hanks & Eckland, 1976, p. 281). They went on to state that any evidence of higher grades for athletes could be attributed to teacher bias toward athletes. While their study could be interpreted as confirming the findings of Coleman (1961), they did, however, also find that athletic participation led to higher educational expectations and that students were more likely to participate if they hoped to go to college. It is also important to note that Hanks and Eckland (1976) found no evidence that participation in athletics is detrimental to academic performance. Their study brought up an important question: Does participation lead to good grades, or do you need good grades in order to participate?
While some researchers found no evidence of a connection, Kniker (1974), in a review of many studies from the 1960s, stated that even when research confirms differences between athletes and non-athletes, one must be careful when stating that athletics are the cause of the differences. In a useful summary of work in the area up to that point, including those with positive findings and those with negative, he concluded that neither side had proven its case. He also noted that at that time “90% of the student body at the high school level does not participate in interscholastic programs” (Kniker, 1974, p. 188). These were different times, and many earlier arguments or findings do not have much bearing today. Access to athletics was more restricted. Title IX was only two years old at the time, and as opportunity was beginning to increase, so were the benefits of participation. In the 1970s, “the research done in the area of values and athletics has been sparse…[and] neither the proponents nor the critics of athletics were able to offer substantial evidence to prove that athletics is either beneficial or harmful” (Kniker, 1974, p. 119).

While Marsh (1988), Whitley (1999), and others with positive findings provided encouragement for this researcher, the fact remains that over the fifty years of study in this area the results have been mixed. Even recent inquiry has yielded some mixed or even negative results. While most studies of the last twenty years indicate that students who participate in sports do better academically, earlier inquiries dating back to the 1960s and 1970s concluded no advantage for athletes and found in many cases that non-athletes did slightly better (Ballantine, 1981). Early analyses were inconsistent at best (Broh, 2002). More recently, Sabo et al. (1993) found that athletic participation is unrelated to achievement in grades, test scores, aspirations, or college attendance.
Other recent studies with mixed results include Rees and Sabia (2010), who acknowledged that numerous studies have found that athletes get better grades and have higher educational and occupational aspirations, but they concluded with ordinary least squares estimates that “sports participation is associated with an increase in GPA of approximately 0.17 points” (Rees & Sabia, 2010, p. 753). Other tests used by the researchers found that “the relationship between sports participation and grades are usually much smaller in magnitude or are the opposite sign” (p. 753). Rees and Sabia concluded that results were mixed and any positive results could be attributed to characteristics of the individual student-athletes rather than to participation. While they did not find any conclusive evidence of a relationship between participation and improved academic performance, they acknowledge some evidence of positive spillover of sports in relation to college aspirations.

Schlesser (2004) used a two-way analysis of variance to examine the relationship between gender, extra-curricular participation, and GPA. He found for both males and females that participation was associated with higher GPAs. However, he noted that the study showed no causal evidence that the participation was what led to the higher GPAs and lists other possible reasons such as teacher bias toward participating students and parents’ influence on participation. Other more recent studies, including Bell (2012), have noted that factors other than athletic participation have a greater impact on academic achievement.

These studies have created room for debate and helped inform the decision to focus on this issue. The researcher heeds the advice of Holland and Andre (1987), who suggest that more research should take place regarding this subject. While some has been done since then, the mixed results suggest that it is still worthwhile to heed their advice.
Chapter Two Summary

Fifty years of inquiry into this subject have yielded mixed results, and while most of the more recent studies have pointed to a positive association between the variables in question, many of those have still been criticized for cross-sectional data or the lack of evidence proving a causal relationship. The most important methodological issue regarding this field is whether the correlation between athletic participation and positive academic achievement reflects a causal influence (Marsh, 1988). There have been two predominate experimental designs regarding inquiry into this area: cross-sectional, one-wave designs that correlate participation with outcome variables and longitudinal, multi-wave designs that relate changes in outcome variables to participation. Because the goal “is to infer the consequences of participation, there is little justification for single-wave designs even though this type of study predominates” (Marsh, 1988, p. 5). It is impossible in a single-wave study to determine if participation is a cause or an effect of academic outcomes. It is clear that the proposed study must be longitudinal in nature. However, because athletics are a self-selected intervention, there may never be a completely adequate answer to whether participation causes improved achievement (Marsh, 1988).

Based on the literature review, a contribution to the ongoing conversation in this area of study could be made with a research study that compares the change in GPA for athletes during the high school years to the change in GPA for non-athletes during the same period. Although this type of study can still be criticized as lacking evidence proving the casual relationship between athletic participation and academic achievement, it may be impossible to prove this relationship completely and this proposed study is at the very least an improvement upon what has been done previously. “These associations [athletic participation and academic achievement]
may simply be a reflection of unobservables correlated with both sports participation and the outcome under study as opposed to casual in nature” (Rees & Sabia, 2010, p. 751).
Chapter Three: Methodology

Introduction

This study examined the nature of the relationship between athletic participation and academic achievement in high school students. As noted in chapter one, difficult economic times have resulted in cuts to high school athletic budgets without any consideration of the benefits of high school athletic participation. If a link could be shown between athletic participation and higher academic achievement, advocates of athletics would have a stronger argument when attempting to preserve funding for high school athletic programs. This chapter includes the discussion of research design, population and sampling strategies, data collection, and data analysis methods as well as sections on validity, reliability, and generalizability of the study’s results and the protection of human subjects involved in this study.

Research Question

To what extent does athletic participation affect academic achievement among students in a Massachusetts high school?

Hypothesis

There will be a statistically significant greater GPA increase for students who participated in high school athletics three years in a row than those who did not participate for three years in a row.

Research Design

This quantitative study utilized a causal-comparative research design to identify whether athletic participation has any effect on high school students’ academic achievement. A causal-comparative design was chosen because the study attempts to determine the consequences of differences between two groups that already exist (Fraenkel, Wallen, & Hyun, 2012). This
research design is typically used to compare two or more groups of subjects, often comparing averages (Fraenkel et al., 2012). Causal-comparative design allows the researcher to study the potential effect of a variable on another one where a true experimental design is not possible as the variables in question cannot be manipulated. The group difference variable in this case is athletic participation, and the members of the sample population have previously either participated or not participated in athletics. The results in question are the GPAs of the students in the two groups. Student performance was compared to see if there are significant differences between athletic participants and non-participants.

While a causal-comparative design is ideal for this study because it is often used in researching the effects of group membership (Fraenkel et al., 2012), it is not without its limitations. The most significant limitation is the lack of control over threats to internal validity (Fraenkel et al., 2012). Because athletic participation is a self-selected intervention, there is a lack of randomization in the forming of the two groups and manipulation of the independent variable has already occurred, so while it may be possible to identify relationships, causation cannot be fully established. Causal-comparative studies are more likely to provide weaker evidence for causation than experimental studies where the independent variable can be manipulated (Fraenkel et al., 2012). In a causal-comparative study, it is always possible that the groups are not equivalent in some way, that another important variable or variables apart from the identified group membership variable will impact the outcome in a significant manner. Causes can be effects, effects can be causes, or something else—intrinsic motivation, socioeconomic status, gender, or ethnicity, to name a few variables—could have an impact on the research results.
Although it may not be possible to prove a causal relationship between athletic participation and academic achievement with a causal-comparative design, the results of this study have the potential to contribute to the conversation in this area as previous studies regarding the relationship in question have been criticized for the failure to account for pre-existing differences between participants and non-participants. Because this study is longitudinal in nature and concerned with changes in GPA over a three-year period for athletes versus non-athletes, the research design inherently controls for preexisting subject characteristics. Although the question being considered may never be completely answered to the satisfaction of everyone, if a positive relationship is found it could strengthen the arguments in favor of maintaining athletics and at the very least supply policy makers with more information to aid in their decision-making regarding school funding.

**Population and Sampling**

The site of this study is a high school in eastern Massachusetts, an urban community of close to 60,000 inhabitants where the researcher has taught history and coached lacrosse and football for more than a decade. For the 2013–2014 school year, there were 2,053 students enrolled. The student body is 84.5% white, 5.4% Hispanic, 4.3% African American, 3.5% Asian, and .3% Native American, Hawaiian, or Pacific Islander. English language learners make up 6.7% of the population. Thirty-one percent of students are classified as low income, with the same percentage receiving free or reduced lunch. In addition, 40.3% of students are classified as “high needs” by the state department of education. Each year, just over half of the seniors go on to attend a two or four-year college.

The participants in this study are students from the school, athletes and non-athletes, for the school years 2010–2011, 2011–2012, and 2012–2013. This site was chosen with the hope
that the results of this study would have a positive impact in the researcher’s home district, specifically in preserving and increasing funding for high school athletics. Although a convenience sample is not ideal, a random sampling would not be practical as athletic participation is optional for students and the formation of the teams predates the study. Nonetheless, with more than 2,000 students at the school and three years’ worth of data, the sample school is a more than adequate setting for this type of study. However, because this is a convenience sample, a study conducted with data from a site that was accessible to the researcher (Creswell, 2003), there is a limitation on the generalizability of study findings to other populations.

**Data Collection**

In order to determine whether there is a correlation between athletic participation and academic achievement, student archival data was examined. Preexisting data sets for the students in question include GPA and whether they participated in high school athletics over the three-year period of the study. Permission to collect and use this data was granted by the superintendent of schools, and the researcher has obtained printouts of these data for the 2010–2011, 2011–2012, and 2012–2013 school years. GPA information was provided by the school guidance department and athletic participation information by the athletic department.

**Data Analysis**

The first step in data analysis was reviewing the GPA printouts and athletic team rosters to determine which students could be included in the study. The student information must be screened so that only relevant, clean data are used in the analysis. In order to be included, a student must have attended the school for all three years. Any student that did not attend three years was immediately excluded. In conducting the proposed study, the operating definitions of
“athletic participant” and “non-participant” are extremely important. An athletic participant is defined as any student who was a member of at least one high school athletic team for each of the three years. A non-participant is defined as any student who was not a member of a high school athletic team for any of the three years. This categorization eliminated a substantial group of students from the study who participated only one or two years. The remainder of the sample for the study is 110 athletic participants and 110 non-participants, allowing the researcher to reach the goal of 100 students per sample group. Samples of less than 100 are generally considered small, while “samples between 100 and 200 can be good enough provided there are relatively few factors each with only a small number of indicator variables” (Field, 2009, p. 647). More specifically, Fraenkel et al. (2012) recommend a sample size of 30 in each group for causal-comparative studies, so the sample is more than adequate. There are actually 192 non-participants, but only 110 were used, matched by gender. The researcher wanted the groups as similar as possible in order to explain differences on the dependent variable as being due to group membership (Fraenkel et al., 2012). The sample students, as well as their GPA information, were next entered into the Statistical Package for the Social Sciences (SPSS) software. After the data was entered, student names were removed and replaced with unique identification numbers.

In order to account for preexisting subject characteristics, the study considered changes in GPA over the three years of the study for athletic participants as compared with changes for non-participants. Because student overall performance is affected by so many other factors, such as socioeconomic status and parental involvement, this study is not concerned primarily with the overall means of the two groups, but rather the change, either negative or positive, in student GPA over the three years when students were either participating or not participating in athletics.
If the hypothesis is correct, the GPAs of the athletic participants would increase at a statistically significant higher rate.

The statistical technique utilized was an independent t-test to compare the means of the changes in GPA for each of the two groups. “The t-test is a parametric statistical test used to see whether a difference between the means of two samples is significant” (Fraenkel et al., 2012, p. 233). The t-test compares the means for two independent groups (Fraenkel et al., 2012). The study was focused on determining whether or not there is a statistically significant difference in the GPA change for the two groups during the years of the study. When utilizing a t-test, the “effect” of athletic participation is the difference between the two group means. Under the null hypothesis, there is an expectation that athletic participation will have no effect on the participants, therefore the sample means should be very similar (Field, 2009). However, if the difference between the samples collected is larger than expected based on the standard error, it represents a genuine difference between the samples and the null hypothesis is incorrect (Field, 2009). If the null hypothesis is incorrect, the researcher gains confidence that the sample means differ because of the different conditions for each group.

An independent t-test is a parametric test and, like most parametric tests, must meet four assumptions for the results to be considered reliable (Field, 2009). First, the sample must be normally distributed. Normal distribution, the “bell-shaped curve,” assumes that the majority of scores fall around the center of the distribution. This assumption can be checked by plotting a graph of the GPAs for each group. This graph, known as a frequency distribution or histogram, is very useful for assessing properties of the distribution of scores (Field, 2009). Both the Kolmogorov-Smirnova test and the Shapiro-Wilk test were conducted to compare the scores in
the sample to a normally distributed set of scores with the same mean and standard deviation (Field, 2009).

The second assumption is that data are measured at least at the interval level (Field, 2009). The level of measurement refers to the relationship between what is being measured and the numbers that represent what is being measured. An interval variable is a type of continuous variable that gives a score for each person in the sample on the measurement scale being used—in this case, a grade point average out of a maximum of four. For data to be considered interval, “equal intervals on the scale [must] represent equal differences in the property being measured” (Field, 2009, p. 9). GPA meets this assumption as it is a clearly defined and accepted measurement scale and each student receives a score using the same scale.

Because an independent t-test is used to test different groups of people, it also assumes homogeneity of variance, that the variances in the populations are the same throughout the data (Field, 2009). With two groups of data in the proposed study, the variance in the outcome variable, GPA, should be the same for both groups. With two groups and three years’ worth of data for each group, the assumption of homogeneity of variance means that the spread of scores around the mean will stay the same for both groups for each of the years, even if the means increase or decrease. Levene’s test was used to determine homogeneity of variance (Field, 2009). It tests the null hypothesis that the variances in the groups are zero, looking at the difference between each score and mean of the group from which it came. The final assumption is that scores are independent because they come from different people. It is assumed that the behavior of one participant does not influence the behavior of another (Field, 2009). With GPA, it is a safe assumption that students are working independently and that the integrity of the school’s grading system is intact.
If assumptions are violated, there are options for reducing the impact. The first and most basic is to verify that all data have been entered correctly. If no errors have been made, other options can be explored. The second would be to remove the data for the person who contributed the outlier (Field, 2009). This is not a very attractive option unless extenuating circumstances are suspected. For example, a GPA of 0.00 might mean that a student left school before the completion of the year and did not receive credit for any courses taken. Because a t-test is a parametric test, a third option is to run its non-parametric test, the Mann-Whitney test, to look for differences between the two samples.

Non-parametric tests like the Mann-Whitney test are used when it is not possible to easily correct problems with the distribution of a data set. The Mann-Whitney test ranks data and then analyzes the ranks, rather than the actual data to overcome issues of distribution (Field, 2009). For this study, the lowest GPA change score would be assigned a rank of 1, the next lowest a rank of 2, and so on. If all of the scores were ranked from lowest to highest ignoring the group to which a person belonged, if there was no relationship between athletic participation and increased academic performance, one would expect to find a similar number of high and low ranks in each group and the summed total of each group to be close to the same. If athletic participation does in fact impact academic achievement, one would expect the higher ranks to be in the participation group and the sum of the ranks to be higher for this group (Field, 2009). For this study, it was necessary to utilize the Mann-Whitney U test twice as the assumption of normal distribution was violated for 2011 GPA non-participants as well as when calculating the academic performance change rate.

**Validity, Reliability, and Generalizability**
Establishing validity and reliability are significant in order to obtain results that can be trusted and utilized to make inferences about relationships that could affect policy and practice. A test is valid if it measures what it is claiming to measure (Creswell, 2003). GPA was chosen as the dependent variable because it is the most common and widely accepted measure of academic performance. As the study is concerned with the effects of athletic participation on GPA, participation is to be compared with non-participation. Historically, possible preexisting differences between participants and non-participants that could impact GPA have led to questions about the validity of this type of study (Fraenkel et al., 2012). Because students choose to participate in athletics and the research design is causal-comparative, meaning variables have already been manipulated and cannot be changed by the researcher, it will always be possible that other factors are impacting research outcomes. The inability to prove causality is sometimes referred to as the third-variable problem, which states that “causality between two variables cannot be assumed because there may be other measured or unmeasured variables affecting the results” (Field, 2009, p. 173). The proposed study will attempt to counter this threat to the validity of the results by looking at the change in GPA for the two groups over the three-year period of participation or non-participation. Thereby, only students with three years of data were included in the study.

Validity is a necessary but not sufficient condition of a measure. A second condition is reliability, which is the ability to produce consistent results when the same entities are measured under different conditions (Field, 2009). Reliability is concerned with whether consistent data will result no matter how many times the tests are run and who is collecting the data and running the tests (Creswell, 2003). The key to the reliability of the results of the proposed study is that the study focuses on GPA change rather than overall GPA. This difference minimizes the effects
of variables other than athletic participation. For example, a student from a wealthy background who has parents who check his homework every night might have a higher GPA overall, but this study is concerned only with the change in his GPA over the three years in question, which will account for his higher starting position. In addition, the non-participation group serves as a control group in this study, as the intervention, athletic participation, only impacts the participants group.

Another important factor to consider is generalizability. Quantitative research attempts to determine trends, opinions, and attitudes of a population by generalizing the study of a sample of that population (Creswell, 2003). Both the nature of the sample and the setting of the study must be weighed when considering generalizability (Fraenkel et al., 2012). As stated above, the use of a convenience sample limits the generalizability of study findings to other populations. Also, as the research is causal-comparative rather than experimental, a causal relationship between the variables in question can only be implied, not proven. It is the position of the researcher that the study can still positively impact the education of students despite these limitations.

**Protection of Human Subjects**

Although this study does include adolescent participants, they cannot be harmed in any way as participation is limited to archival athletic and achievement data and student names were removed from data lists. Athletic participation and academic achievement have occurred regularly at the school apart from this study, and the study will not attempt to manipulate these practices but rather provide a systematic, quantitative analysis of the effects of athletic participation on academic achievement. Permission was granted by the superintendent of schools for the researcher to obtain the necessary data, and other school officials, including members of the guidance and athletic departments, supplied the researcher with all requested data. The
The researcher currently works as a teacher at the school where the sample was obtained and so can be certain of the above conditions.

As stated, all student data used in this study was coded by number. No student, teacher, or coach names appear in any of the data. The researcher has kept this data in a secure location and has not shared it with anyone. All of the materials will be destroyed at the conclusion of the study. The researcher has not and will not have any interaction with students related to their participation in this study, and no participants were deceived in any way.

Conclusion

This chapter indicates how the research study responds to a problem of practice by addressing a gap in the literature. Previous studies related to this topic utilized cross-sectional data and looked at only overall GPA without accounting for preexisting differences that might give athletes an initial advantage in their achievement. By executing a longitudinal study that focuses on the change in GPA over a three-year period, the researcher hopes to better account for any other factors that might impact student achievement. Assessing the effect of athletic participation on student academic achievement is a complicated undertaking, and even if the hypothesis of this study was determined to be true, only a relationship could be claimed, not causation. No study can completely answer the question: Does athletic participation impact academic achievement? However, the results of this study could inform decision-makers determining the role and financial support for athletics in school systems.

The study was conducted at a large high school in Massachusetts. Participants include students who attended the school during the last three years divided into two groups: those that were members of high school athletic teams for all three years, and those that were not members for any of the three years. A total of 110 students were included in each group, divided equally
by gender. Along with athletic participation information, data collection also included archival 
GPA information for the sample population. The researcher employed independent t-test as well 
as Mann-Whitney U test analysis to compare the change in GPA for the two groups over the 
three years of the study. By looking at the change mean rather than the overall mean, the 
researcher accounted for preexisting differences like socioeconomic status or intelligence that 
might give some students an advantage over others. In addition, assumptions have been taken 
into account and were checked during the course of the analysis. The researcher has also 
established procedures to ensure validity and reliability and has identified the limitations. The 
researcher has ensured the protection of all human subjects participating in this study.

The researcher has watched as athletics in the sample district have been dismantled in 
these difficult economic times. In the last few years at the sample high school, most athletic user 
fees have increased 100% while some have increased 400% (Mackin, 2008). These increases are 
not the exception but are in fact typical of schools systems in the area. Extracurricular activities 
as a whole are usually just 1–3% of the entire school budget while engaging 60–70% of students 
(Suffolk University Law Review, 2006). In the sample district, the athletic budget is less than 
.2% of the entire education budget (Massachusetts, 2007; Mackin, 2008). And yet there are those 
that call for more cuts.

Not only does the researcher hope to make a contribution to the ongoing conversation 
regarding the effects of athletic participation on academic performance with a sound research 
design that attempts to address some of the unanswered questions on this topic, he hopes through 
the research to have an impact on the home school district and others like it where athletics are 
seen by more and more decision makers as a waste of money, a simple diversion that perhaps 
should not be a part of the offered curriculum, or at the very least should be the first area cut
when funds are short. The researcher hopes to help preserve the beneficial opportunities that he and so many others have been able to enjoy and learn from. The ultimate goal of education is to maximize the achievement of students. Through this investigation the researcher can help to foster informed decision-making so that all students have a chance to reach their full potential.
Chapter Four: Research Findings

Introduction

The purpose of the research was to determine the nature of the relationship, if any, between athletic participation and academic achievement. As previously mentioned, three years of archival data were utilized and independent t-tests and Mann-Whitley U tests administered in order to compare the GPA means of student athletic participants and non-participants, the results of which are presented below. As stated previously, early studies in this area have been criticized for their cross-sectional design (Holland & Andre, 1987) as well as focus on overall GPA rather than change in GPA (Marsh, 1988). While tests were run to compare the overall GPA means for each of the years and that data is included, the primary focus of this study is to compare the change in GPA for athletic participants as well as non-participants over the three years in question. This was done by calculating the GPA growth rate for each group, and testing the significance of the growth rate through the academic performance change test. The position of the researcher is that the GPA growth of athletic participants must be statistically significant and higher than that of non-participants in order for any claim of a relationship between participation and academic achievement to be made.

Sample and Data Entry

The athletic participant data consists of 62 males and 48 females for a total of 110. All of these students participated in at least one high school sport for all three years of the study. As stated in chapter three, there are 192 non-participants, so an online randomizer program was utilized (randomizer.org) to select 62 males and 48 females in order to match the other group not only by number but by gender. Student names were then replaced by numbers so that the data entered into the SPSS software would be anonymous. The “names” 1 through 110 are the
athletic participants, and 111 through 220 the non-participants. After the data was entered into SPSS version 19, testing could begin.

Assumption Testing

Because an independent t-test is a parametric test, assumptions must be met before the tests are run if they are to be considered accurate. Before running the actual t-tests, histograms were created using the SPSS software in order to determine if the data from the samples in both groups were normally distributed. As evident from the presence of the “bell-shaped curves” in Charts 1, 2, and 3 below, the majority of the scores fall around the center of the distribution and so by this test the first assumption has been met. While it is important and necessary to run the Kolmogorov-Smirnova and Shapiro-Wilk tests, histograms should always be considered along with them as with large samples these tests can come back as significant even when scores are only slightly different from a normal distribution (Field, 2009).

Chart 1: 2011 GPA Frequency Distribution Stacked Histogram

Chart 2: 2012 GPA Frequency Distribution Stacked Histogram
The next step in checking if the assumption of normal distribution has been met is to run the Kolmogorov-Smirnova test or the Shapiro-Wilk test to compare the scores in the sample to a normally distributed set of scores with the same mean and standard deviation (Field, 2009). Both of these tests were run for each year utilizing the participant / non-participant grouping in the factor field. As noted in Table 1, there were some $p$ values (the Sig. column) less than .05, indicating a deviation from normality. For the Kolmogorov-Smirnova test, In Table 1, for GPA 2011 athletic participant, $D(110) = .074$, $p \geq .05$ is normal, and GPA 2011 non-athletic participant, $D(110) = .089$, $p \leq .05$ is significantly non-normal. For GPA 2012 athletic
participant, \( D(110) = .059, p \geq .05 \) is normal, and GPA 2012 non-athletic participant, \( D(110) = .081, p \geq .05 \) is normal. For GPA 2013 athletic participant, \( D(110) = .067, p \geq .05 \) is normal, and GPA 2013 non-athletic participant, \( D(110) = .077, p \geq .05 \) is normal.

Table 1

*Kolmogorov-Smirnova and Shapiro-Wilk Tests for All Three Study Years Grouped by Participant / Non-Participant Variable*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Kolmogorov-Smirnova</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic df Sig.</td>
<td>Statistic df Sig.</td>
</tr>
<tr>
<td>GPA 2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athletic Participant</td>
<td>0.074 110 .182</td>
<td>.980 110 .096</td>
</tr>
<tr>
<td>GPA 2011</td>
<td>0.089 110 .032</td>
<td>.975 110 .039</td>
</tr>
<tr>
<td>Non-participant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPA 2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athletic Participant</td>
<td>0.059 110 .200</td>
<td>.985 110 .238</td>
</tr>
<tr>
<td>GPA 2012</td>
<td>0.081 110 .072</td>
<td>.986 110 .318</td>
</tr>
<tr>
<td>Non-participant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPA 2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athletic Participant</td>
<td>0.067 110 .200</td>
<td>.986 110 .288</td>
</tr>
<tr>
<td>GPA 2013</td>
<td>0.077 110 .111</td>
<td>.987 110 .381</td>
</tr>
<tr>
<td>Non-participant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

While some of the deviations were significant, one should keep in mind that the sample is large. The results could possibly reflect the bimodal distribution found in GPA scores (Field, 2009). When the tests were run for all three years by group, the results point to normal distributions for all sections for both tests, except for 2011 non-participants. This is important,
because the analysis in this study involves comparing groups, so what is important is not the overall distribution but the distribution in each group (Field, 2009). In addition, as noted above, these tests can be significant in large samples even if the scores are only slightly different from normal. Also, the Shapiro-Wilk test has more power to detect differences from normality (Field, 2009), yet in most cases these $p$ values are higher, signifying the distribution is normal.

While there is significant evidence to support normal distribution, the Mann-Whitney U test was run as the significance test for the 2011 GPA data, the results of which are included in Table 4. A non-parametric test such as Mann-Whitney is useful when an assumption has been violated as it works on the principle of ranking the data (Field, 2009). Each score is ranked from lowest to highest, ignoring the group to which a subject belonged, and if there is no difference the summaries of the ranks should be close to even. The results for 2011 will be discussed in the next section.

As the second assumption has been met due to the fact that GPA is a clearly defined and accepted measurement of student academic achievement at the interval level, the next assumption to address is homogeneity of variance. This means that with groups of data, the variance of the dependent variable should be the same for both athletic participants and non-participants. The spread of scores around the mean for each group in each year should stay the same, even if the means increase or decrease. The best method for determining homogeneity of variance is by utilizing Levene’s test (Field, 2009). Levene’s test tests the null hypothesis that the variances in the two groups are equal, which means that the difference between the variances is zero. If the result of Levene’s test is that $p \leq .05$ then the null hypothesis is incorrect, the variances are significantly different, and the assumption of homogeneity of variance has been violated.
As listed in Table 2, for Levene’s test for each of the three years of the study, \( p \geq .05 \), meaning that the variances are equal and the assumption of homogeneity of variance has been met. For GPA 2011, \( F = 1.88, p \geq .05 \), variances are not significantly different. GPA 2012, \( F = .350, p \geq .05 \), variances are not significantly different. GPA 2013, \( F = .290, p \geq .05 \), variances are not significantly different.

Table 2

\textit{Levene’s Test: Equal Variances Assumed}

<table>
<thead>
<tr>
<th>Variable</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA 2011</td>
<td>1.884</td>
<td>.171</td>
</tr>
<tr>
<td>GPA 2012</td>
<td>.350</td>
<td>.554</td>
</tr>
<tr>
<td>GPA 2013</td>
<td>.290</td>
<td>.591</td>
</tr>
</tbody>
</table>

The final assumption to be considered is that scores are independent because they come from different people. As stated in chapter three, one can safely assume that the integrity of grades from a public high school are beyond questioning and that this assumption has been met. With that said, all assumptions have been reasonably met, and no other steps must be taken in order to ensure the quality of the data.

\textbf{The Independent t-tests}

Independent t-tests were run with the grouping variable being whether students were athletic participants or non-participants. As noted below in Table 3, the GPAs for athletic participants are higher than those for non-participants in each of the three years of the study (Mean column). In previous studies, this result led to claims of a relationship between athletic participation and academic achievement (Holland & Andre, 1987; Marsh, 1988). However,
because overall GPA does not account for pre-existing differences, this study will take the calculations a step further.

Table 3

*GPA Summary Statistics for 2011, 2012, and 2013*

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>St. Deviation</th>
<th>St. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA 2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ath. Participant</td>
<td>110</td>
<td>2.88</td>
<td>.617</td>
<td>.059</td>
</tr>
<tr>
<td>GPA 2011</td>
<td>110</td>
<td>2.67</td>
<td>.717</td>
<td>.068</td>
</tr>
<tr>
<td>Non-participant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPA 2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ath. Participant</td>
<td>110</td>
<td>2.78</td>
<td>.630</td>
<td>.060</td>
</tr>
<tr>
<td>GPA 2012</td>
<td>110</td>
<td>2.62</td>
<td>.676</td>
<td>.064</td>
</tr>
<tr>
<td>Non-participant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPA 2013</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ath. Participant</td>
<td>110</td>
<td>2.75</td>
<td>.601</td>
<td>.057</td>
</tr>
<tr>
<td>GPA 2013</td>
<td>110</td>
<td>2.69</td>
<td>.626</td>
<td>.060</td>
</tr>
</tbody>
</table>

Because the assumption of normality of distribution was violated for 2011 non-participants, a t-test cannot be used to determine significance. Instead, the Mann-Whitney U test was run for 2011 and the results are in Table 4. For this test, scores are ranked from lowest to highest regardless of group, so the group with the lowest mean rank is the group with the greater number of lower scores in it (Field, 2009). The higher mean rank for athletic participants coordinates with the higher 2011 GPA mean from Table 3 above. The sum of ranks is also higher for athletic participants. The test statistic is also included, as well as the most important
part of the table, the significance value of the test. For this data, the Mann-Whitney U test is significant ($p \leq .05$).

Table 4

*Mann-Whitney U Results for 2011*

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA 2011</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athletic</td>
<td>110</td>
<td>119.84</td>
<td>13182</td>
</tr>
<tr>
<td>Participant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPA 2011</td>
<td>110</td>
<td>101.16</td>
<td>11128</td>
</tr>
<tr>
<td>Non-participant</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The second table produced when an independent t-test is run contains the main test statistics. After examining the results of Levene’s test, it is known that the variances for each of the groups are equal, so the “Equal variances assumed” row of the SPSS output file is the one that should be considered. Table 5 below contains a summary of the results of the independent t-test for 2012 and 2013. As noted, because the assumption of normality was violated for 2011, the independent t-test cannot be used to test for significance for that year.

Table 5

*Independent t-test Results for 2012, and 2013: Equal Variances Assumed*

<table>
<thead>
<tr>
<th>Variable</th>
<th>t</th>
<th>Sig.</th>
<th>Mean Differ.</th>
<th>St. Error Differ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA 2012</td>
<td>1.79</td>
<td>.075</td>
<td>.157</td>
<td>.088</td>
</tr>
</tbody>
</table>
Tables 3, 4, and 5 are utilized for the reporting of the test results. As noted, 2011 includes results from the Mann-Whitney U test, and 2012 and 2013 include results from the independent t-tests. For 2011, on average, athletic participants had higher GPAs ($M = 2.88$, $SE = .059$) than non-participants ($M = 2.67$, $SE = .068$). This difference was significant, $U = 5023$, $Z = -2.18$, $p \leq .05$; representing a small-sized effect $r = -.15$.

For 2012, on average, athletic participants had higher GPAs ($M = 2.78$, $SE = .060$) than non-participants ($M = 2.62$, $SE = .064$). The difference was not significant, $t(218) = 1.79$, $p = .05$; representing a small-sized effect $r = .12$.

For 2013, on average, athletic participants had higher GPAs ($M = 2.75$, $SE = .057$) than non-participants ($M = 2.69$, $SE = .060$). The difference was not significant, $t(218) = .77$, $p \geq .05$; representing a small-sized effect $r = .05$.

As discussed in the literature review, a number of previous studies have cited this type of data as proof that athletic participants achieve higher academically than non-participants (Marsh, 1988). In this paragraph, it would be noted that the difference for 2011 was statistically significant, and, even though athletes lost part of their advantage during the second and third years of the study, they still outperformed non-participants. However, the unique contribution of this study is to acknowledge that this type of logic is flawed, as it does not account for pre-existing differences between athletic participants and non-participants. Whether it be intrinsic motivation that makes some students put forth more effort and energy which results in going out for sports or studying for tests, or perhaps parental involvement, socioeconomic status, or a host of other possibilities, athletes often have a higher starting point than non-athletes. It would make
sense then that their overall achievement level would be higher if they start ahead, but can that be attributed to participation? In order to better isolate the effect of athletic participation, this study’s main focus is on the change in GPA from year one to year three, what will be referred to as the growth rate. If athletic participation results in higher academic achievement, the GPAs of athletes should grow at a higher rate than those of non-participants.

**Growth Rate**

To determine the change for the GPAs of the two groups, a growth rate formula can be applied. To this point the term “GPA change”, rather than “GPA growth” has been used as it is understood that it is possible that one or both of the groups will not see an increase in GPA over the three years of the study, so “growth” may not be applicable. Nevertheless, a growth rate formula needs to be utilized to determine GPA change, so use of the word growth should be understood to mean either positive growth or negative growth.

The growth rate could be calculated by utilizing a simple formula as follows:

\[
\frac{\text{present} - \text{past}}{\text{past}} \quad \text{or} \quad \frac{\text{2013 GPA mean} - \text{2011 GPA mean}}{\text{2011 GPA mean}}
\]

However, while the above formula for simple growth rate would be useful for this study, it does not take into account that the study is considering data from three years. For this study, a slightly more complex formula will be utilized for calculating the growth rate over all three years. The following growth rate formula is useful when data exists over regular time intervals, such as school years, with a corresponding value for quantity (GPA). This method will calculate an annual growth rate for each of the years:

\[
\text{present} = \text{past} \times (1 + \text{growth rate})^n \quad (\text{Where } n \text{ is the number of time periods})
\]

Next the growth rate is isolated by manipulating the equation to get it on one side:
growth rate = (present / past) \(^{1/n}\) - 1

The equation is as follows for athletes, where the 2013 mean GPA equates to “present” and the 2011 mean GPA is “past”:

\[
growth rate = (2.75/2.88)^{1/3} - 1
\]

\[
growth rate = (0.95)^{1/3} - 1
\]

\[
growth rate = 0.98 - 1
\]

\[
growth rate = -0.02
\]

As a percentage = -2%

During the years of participation, the change (growth) in GPA for athletic participants was negative two percent. This is clearly in contradiction to the hypothesis that athletic participation is related to improved academic performance.

The same calculation needs to also be performed for non-participants:

\[
growth rate = (2.69/2.67)^{1/3} - 1
\]

\[
growth rate = (1.01)^{1/3} - 1
\]

\[
growth rate = 1 - 1
\]

\[
growth rate = 0
\]

As a percentage = 0%

For non-participants, the growth rate is zero, meaning that there was no change in average GPA over the three years of the study.

**Significance of the Growth Rate**

The next step in relation to the growth rate is to determine if the difference in the growth rate for the two groups is statistically significant. This could be done by running an independent t-test comparing the growth rate means for each of the groups. An additional variable, called
“academic performance change”, was calculated by applying the growth rate formula utilized above (growth rate = (present/ past) \(^{1/n}\) -1) to each of the 220 subjects in the two sample groups.

After the data entry and growth rate calculations were performed, it was necessary to test for assumptions related to the new variable. A stacked histogram was created (Chart 4) to check the frequency of the distribution and to provide the means and standard deviations in academic performance change for athletic participants and non-participants.

Chart 4: Academic Performance Change Frequency Distribution Stacked Histogram

The Kolmogorov-Smirnova and Shapiro-Wilk tests were run to determine if the samples were normally distributed. As noted in Table 6, for both athletic participants and non-participants in each of the tests the samples are not normally distributed (Sig. column: \(p \leq .05\)).
Table 6

*Kolmogorov-Smirnova & Shapiro-Wilk Tests for Acad. Performance Change*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Participation Status</th>
<th>Kolmogorov-Smirnova</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Performance Change</td>
<td>Athletic Participant</td>
<td>.169 110 .000</td>
<td>.892 110 .000</td>
</tr>
<tr>
<td>Academic Performance Change</td>
<td>Non-Participant</td>
<td>.171 110 .000</td>
<td>.877 110 .000</td>
</tr>
</tbody>
</table>

Because the first assumption, normality, has been violated a t-test cannot be used. Instead, the Mann-Whitney U test was utilized to check for significance. As noted below in Table 7, in relation to academic performance change, non-participants had a higher mean rank and summary of ranks. This calculation determined that the differences were significant ($p \leq .05$).
Table 7

**Mann-Whitney U Results for Academic Performance Change**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Participation Status</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Performance Change</td>
<td>Athletic Participant</td>
<td>110</td>
<td>99.30</td>
<td>10922.50</td>
</tr>
<tr>
<td>Academic Performance Change</td>
<td>Non-Participant</td>
<td>110</td>
<td>121.70</td>
<td>13387.50</td>
</tr>
</tbody>
</table>

Academic performance change for athletic participants did differ significantly from that of non-participants ($M = .01$), $U = 4817.50$, $Z = -2.62$, $p \leq .05$, representing a small–sized effect $r = -.18$.

**Summary of Data Analysis**

In this chapter, the researcher presented the findings of the study based on the analysis of the data. The research results were organized so that information regarding assumption testing was presented first, followed by Mann-Whitney U and independent t-test results. The results were then utilized to calculate the GPA growth rate. Along with the growth rate calculation, individual academic performance change scores were calculated and the Mann-Whitney U test conducted to see if the difference in the scores for the two groups is significant. The results of the tests and growth rate calculations allowed the research to answer the research question: To what extent does athletic participation affect academic achievement among students in a Massachusetts high school?
Data consisting of 110 athletic participants and 110 non-participants was analyzed using SPSS software. Assumptions for parametric tests were met for 2012 and 2013 GPA data utilizing the Kolmogorov-Smirnova and Shapiro-Wilk Tests to test for normal distribution, and Levene’s test for homogeneity of variance. For 2011, the assumption of normal distribution was not met for non-participants, so the Mann-Whitney U test was utilized to test for significance between the groups. Independent t-test were then run to compare the means of the two groups for 2012 and 2013. For all three years of the study athletic participants outperformed non-participants in academic achievement by the chosen measure, GPA. For the first year, 2011, the difference was statistically significant. In 2012 and 2013 athletes lost part of their advantage as the GPA means were closer and the differences were not statistically significant. On this basis, one could argue, perhaps convincingly, that the answer to the research question: To what extent does athletic participation affect academic achievement among students in a Massachusetts high school? is a resounding “somewhat”, as there was a significant advantage for one year of the study, and even though non-participants seemed to be catching up, athletes held on to their lead through senior year. As stated, other researchers have made this argument in the past and this argument has been criticized for not controlling for other variables that might affect academic achievement.

Because the hypothesis of this study is: There will be a statistically significant greater GPA increase for students who participated in high school athletics three years in a row than those who did not participate for three years in a row, it is not enough for athletes to have higher GPAs than non-participants. If there is a relationship between athletic participation and academic achievement, the mean GPA for the athlete group should increase during the years of participation. This clearly was not the case, as there was a small but steady decrease in the
average GPA for athletes over the three year periods, resulting in a -2% growth rate. Non-participant GPAs went down slightly year two, and then up slightly year three, resulting in a 0% growth rate. Overall, from year one to year three, the GPA mean of athletic participants went down .13, and the mean for non-participants increased .02.

One final test was run in order to determine if the difference in the growth rate is statistically significant. An academic performance change variable was calculated by applying the growth rate formula to each individual subject in both sample groups. As this variable failed the assumption test for normal distribution, the Mann-Whitney test was run to test for significance. There is a statistically significant difference in the academic achievement change of athletic participants and non-participants, but the effect size is less than .20 indicating a small-sized effect. While statistically significant, the practical significance is weak.

As a result, there is no statistical basis for an argument that there is a relationship between athletic participation and academic achievement. On the contrary, with a negative growth rate for athletic participants along with a statistically significant lower score in academic performance change, one may be tempted to make the opposite argument. However, while the academic performance change difference is statistically significant, the small effect size means that the practical significance is weak.

To what extent does athletic participation affect academic achievement among students in a Massachusetts high school? Participants of athletics three years in a row in high school differ significantly in academic achievement growth from non-participants of athletics three years in a row. The hypothesis that the GPAs of athletes would increase at a greater rate than those of non-participants is rejected. However, the practical significance is weak as the effect size is
extremely small, so no recommendations for changes in policy or practice will be made based on the results of this study.
Chapter Five: Discussion of Research Findings

Purpose

The purpose of this study was to gain a deeper understanding into the impact, if any, that athletic participation has on academic performance. While some previous researchers have claimed that there is no relationship (Lupetow & Kayser, 1974), others have claimed that participation has a positive effect on academic performance (Marsh, 1988). In the 21st century, as budgets are tighter and legislation mandating educational programs (and spending) continues to increase, school policy makers have to make difficult decisions as to the allocation of limited education funds. If a positive relationship between athletic participation and student academic achievement could be found, a stronger case could be made for the adequate funding of high school athletics.

Research claiming a positive relationship between athletics and academics has been criticized for being cross-sectional in nature, as well as not controlling for pre-existing differences (Holland & Andre, 1987). Even with a longitudinal study that looks at achievement over two or three years, factors other than athletics could be contributing to the higher achievement of the athletic participant group. This study attempted to address this criticism by focusing not on academic achievement itself, measured by GPA, but on the growth (change) of GPA over the course of athletic participation. For any claim of a positive relationship between athletic participation and academic achievement to be made, the GPAs of athletes must increase at a higher rate during the years of participation than those of non-participants at the same school, in the same grades, and with the same gender makeup, during the same time period, and this positive academic performance change must be statistically significant. By concentrating on GPA growth rate, this study has focused on the effects of participation alone. If there are other
variables helping students of either sample group, whether they be socio-economic status, intrinsic motivation, or parental involvement, these students will have a higher starting GPA than those without such advantages, and the purpose of this study is to negate the starting advantage by focusing solely on the growth of GPA over the course of the study.

**Research Question and Theoretical Framework**

As athletics have played a significant role in the high school experience of many students, both past and present, and funding or lack thereof has become such a crucial issue, this research contributes to the existing research regarding the relationship between athletic participation and academic achievement. The researcher, using a quantitative, causal-comparative design asked one research question: To what extent does athletic participation affect academic achievement among students in a Massachusetts high school?

This question was evaluated based on the Developmental Theory, where athletics are considered experiences that enhance the total development of students (Holland & Andre, 1987). Under this theory, participation may influence academic goals by enhancing social status and self-efficacy, which lead to increased educational aspirations and behaviors (Marsh, 1988; Snyder & Spreitzer, 1990).

The researcher’s hypothesis, that: there will be a statistically significant greater GPA increase for students who participated in high school athletics three years in a row than those who did not participate for three years in a row, was informed by this theory. The ideas that athletes develop an increased interest in school through participation in sports and athletic success leads to a heightened sense of self-worth that spills over into the classroom, were central to the researcher’s position that a positive relationship would be found.
However, a second theory, known as the Zero-Sum Model Theory, contends that adolescent society emphasizes peer acceptance and interaction along with indifference toward academic achievement (Coleman, 1961). According to this theory, there are only so many hours in a day to be divided between academic, social, or athletic pursuits, and an increase in one necessitates a decrease in time spent on the others. Because sports are both athletic and social by nature, Coleman (1961) contended that they detracted from academic achievement.

Statistical analysis was completed using SPSS software and the following sections provide results and discussion related to the research question and hypothesis.

**Results of Mann-Whitney U and independent t-tests**

A fundamental concern of any research study is whether or not research findings are actually answering the question being asked. Early studies (Eidsmore, 1963; Shafer & Rehberg, 1970) were criticized for claiming a causal relationship between athletic participation and academic achievement while utilizing cross-sectional data. A longitudinal study was necessary in order to prove that differences in achievement were not the result of prior differences between the two groups. Along with the use of cross-sectional data, the sample structures, research designs, and lack of controls for other variables such as socioeconomic status of studies claiming positive results have been criticized (Holland & Andre, 1987).

Some researchers attempted to respond to these criticisms with the use of longitudinal data and by controlling for other variables that could affect achievement. Marsh (1988) considered data from students’ sophomore and senior years to determine changes in academic achievement. Marsh (1988) claimed to have found a positive relationship between athletic participation and academic achievement as the GPAs for athletes were higher both in grade 10 and in grade 11.
These findings are very similar to the initial test results for this study. For all three years, the GPAs for athletes are higher than those of non-participants. For 2011, the GPA mean for athletes was 2.88, while for non-participants it was 2.67. This difference is statistically significant. A cross-sectional study, such as those run in the 1960s and 1970s, might look at the data for 2011 and claim a positive relationship between athletic participation and academic achievement. Even a longitudinal study, like those run in more recent years, would look at the higher GPA for athletes for all three years (2012: athletes GPA 2.78, non-participants GPA 2.62; 2013: athletes GPA 2.75, non-participants GPA 2.69) and make the claim that athletic participation has a positive effect on academic achievement. The Developmental Theory would be cited and the results would be claimed as evidence that there is a connection between athletics and improved academic achievement.

However, by looking more closely at the test results it is difficult to claim a positive relationship. While athletes started with a statistically significant higher mean GPA than non-athletes (2.88 to 2.67 for 2011), as noted many times previously, this initial advantage could have been caused by other factors. In addition, the GPAs of the athlete group went down in each of the two subsequent years (from 2.88 in 2011 to 2.78 in 2012 to 2.75 in 2013). If any claim of a positive relationship is to be made, the mean GPA for athletes should increase in years two and three, not decrease. In addition, while non-participants did lose some ground from year one to year two (2.67 in 2011 to 2.62 in 2012), the 2.69 GPA in year three (2013) is the highest of all three years for non-participants, which can be interpreted to mean that not participating in athletics does not disadvantage a student academically in any way and results in a slight academic advantage.
The results to this point make this study similar in many ways to that of Lupetow and Kayser (1974). Their study acknowledged that a relationship could only be claimed if there was evidence of grade improvement for the student-athletes over multiple years of participation. Their findings included an initial achievement advantage for athletes in the first year, following by a negligible GPA change for both athletes and non-athletes over the three years of the study. For Lupetow and Kayser (1974), both groups actually had slight increases in GPA that were not statistically significant. The test results for the current study are very similar, except that a slight decrease in GPA resulted for the athlete group. These negative results are made even clearer when the growth rate formula and academic performance change are considered.

**Growth Rate and Academic Performance Change Results**

As stated previously, the key contribution of this study is the concept that the GPA growth rate, or change in GPA from year one to year three, and the academic performance change test are the most important results because if a relationship between athletic participation and academic achievement is to be claimed, the GPAs of athletes must grow at a higher rate than those of non-participants over the period of the study and the difference must be statistically significant. The finding that the mean GPA growth rate for athletes is -2% means that only one conclusion can be drawn, that there is no relationship between athletic participation and improved academic achievement. In fact, a better case could be made that there is a negative relationship between athletic participation and academic achievement.

In addition, even though the t-tests show that the mean GPA for non-participants decreased slightly from year one to year two and then increased in year three, this difference was so small that non-participants had a growth rate of zero, meaning that students that do not participate in high school athletics do not experience any change to their academic performance,
be it positive or negative. Based on the growth rate results, a student who wants to do his or her best in high school would have a slight advantage if athletic participation was avoided.

After the growth rate formula was applied to all test subjects for the calculation of the academic performance change variable, the Mann-Whitney U test found that the higher academic performance change rate for non-participants was statistically significant. The effect size is small, meaning that practical significance of this result is weak.

**Discussion of Results**

The -2% growth rate for athletes compared to the steady academic performance of non-participants, as well as the statistically significant advantage of non-participants in regards to academic performance change must lead the researcher to question the Developmental Theory and take a closer look at the Zero-Sum Model Theory proposed so many years ago (Coleman, 1961). According to the Developmental Theory, athletic participation leads to increased interest in school, a heightened sense of self-worth, more attention from adults such as teachers and coaches, membership in elite peer groups, a desire to meet eligibility requirements, as well as aspirations to compete in college (Snyder & Spreitzer, 1990). While all of this may still be true, there is no evidence in this study to suggest that any of these factors leads to improved academic performance. Coleman (1961) would definitely interpret “membership in elite peer groups” to mean “popularity” and see this factor as a negative in relation to academic achievement. In fact, if any or all of these advantages result from athletic participation and athletes are still experiencing negative GPA growth it is possible that the earliest negative theories regarding athletic participation and academic achievement are the ones that are correct.

After analyzing the results of this study it is apparent that renewed attention should be paid to the Zero Sum Model Theory. Perhaps the athletic and social aspects of high school
sports are not leaving enough time or energy for academic pursuits. Whether it be the pressure to win that results in a requirement to be on time for practice every day and leaves little time to make up school work or get extra help, or long bus rides for away games, or the fact that practice and games can leave competitors both physically and mentally exhausted, student-athletes may not have enough time or energy to improve their academic performance. Concussions have also recently become a detriment to the academic achievement of athletes as, while the modern understanding of their effects is an excellent improvement for the health of student-athletes, the new knowledge results in student concussion sufferers in school for half days only with serious restrictions on school work, often giving student-athletes an insurmountable mountain of work to make up when cleared to resume academic activities. While the above possibilities may all be factors that are detrimental to student-athlete academic performance, they are ultimately similar to what Coleman said back in 1961, that athletic participation diverts attention from athletic goals.

Summary of Results

The research question proposed was: To what extent does athletic participation affect academic achievement among students in a Massachusetts high school? The answer is that participants of athletics three years in a row in high school differ significantly in academic achievement growth from non-participants of athletics three years in a row. However, while this seems like and is disappointing news for advocates of athletic funding, the results are not significant enough to affect policy. The practical significance is weak as the effect size is extremely small, so no recommendations should be made to academic leaders regarding the allocation of funding or other decisions related to athletic policy based on the results of this study.
Along with the weak practical significance from the academic performance change test, other conclusions can be drawn that make it difficult to make any policy recommendations based on these results. Because the GPA mean differences resulting from the t-tests were not statistically significant, it would be difficult to claim that athletic participation has a negative impact on academic achievement, although it should be noted that there was a slightly negative GPA growth rate (-2%) for athletes and when compared to the steady achievement of non-participants. It is accurate to conclude that students who participate in high school athletics have a slight academic disadvantage compared to those who do not. The hypothesis that: there will be a statistically significant greater GPA increase for students who participated in high school athletics three years in a row than those who did not participate for three years in a row, has clearly been rejected. While in year one of the study athletes had a statistically significant higher GPA than non-participants, this advantage could be the result of pre-existing differences between the two groups, and, while athletes continued to have higher GPAs in years two and three, these differences were not statistically significant and in fact the GPAs of the athlete group actually went down.

**Implications for Practice**

Based on the results one cannot make the argument that athletics are linked to improved academic achievement. While athletic participation can still be considered an important part of the overall education of students, helping to develop teamwork, leadership, and perseverance, these benefits do not translate to the classroom. Any future arguments for the preservation of the funding of athletic programs should be made based on these factors, as well the recreational benefits of athletics, but not based on a relationship to increased academic performance. Playing sports in high school is a great experience for a number of students and funding should continue,
but not at the expense of other programs that are directly related to academic achievement. Coaches should be encouraged to allow students to be late for practice if receiving extra help or making up academic work, and practice and game schedules should be created with consideration given to the need of students to have time for homework and studying. Activities such as pep rallies for sporting events perhaps should be kept to a minimum if they interfere with the normal academic school schedule. The argument made by many that athletic funding should be cut to avoid budget shortfalls has more credence as a result of this study if the alternatives are laying off teachers or increasing class size. However, it is important to state again that there is no claim made in this study to the practical significance necessary to make recommendations regarding funding or policy changes.

**Implications for Future Research**

The literature review utilized in this research provides a robust method of understanding the history and the issues associated with attempting to ascertain the nature of the relationship between athletic participation and academic achievement. This research has attempted to address the fundamental criticism of past studies, that claims of a positive relationship are inaccurate as initial, pre-existing differences were not accounted for. Future research should first attempt to replicate this study’s results as this research, focused on GPA growth rate, is the first of its kind. The inclusion of additional research sites of differing types would also allow for an improved understanding and validation of these results as this research was conducted at a single site.

If similar findings result, future research should focus on Coleman’s (1961) Zero Sum Model Theory in an attempt to understand why athletic participation does not lead to improved academic performance. Coleman’s (1961) position that popularity is the main goal of high school and that it is often achieved through athletics could be explored in a mixed methods study.
that analyzes the attitudes and roles of athletes along with their academic achievement through interviews. Other factors in the equation, such as teachers and their influence and attitudes toward athletes compared to non-participants, should be explored. This would include the impact, if any, of teachers’ academic support to athletes beyond regular class time whether it be for extra help or additional time for assignments missed so that athletes remain eligible to compete. Coaches should also be interviewed in order to determine how their attitudes and influence impact achievement. The question of post-secondary aspirations should also be explored as a factor affecting the achievement of both athletic participants and non-participants.

Future studies should also determine if participants differ significantly in academic performance growth based on the rate of participation, be it one sport, two, three, or even more. It is possible that participation rate was an intervening variable to the results of this study but its effects are unknown at this point. If there is any validity to the Zero Sum Model Theory, students who participate in two or more sports for three years might experience negative academic growth while playing just one sport might be the right amount for participation to have a positive impact. A study comparing one sport participation to two or more sport participation would help to answer this question.

Another interesting group that was not analyzed in this study is students who were athletes for a year or two but then ended their participation. It is important to investigate why this occurs and to analyze the academic results for these students. It seemed to this researcher, while gathering sample data for this study, that some students ended participation due to low GPAs that did not meet the minimum requirement to participate, but others were doing well academically. Did they stop participating because they were not good athletes, or did they find, as Coleman theorized, that the time spent participating was taking away from their academic
pursuits? If students who participate in athletics often have pre-existing advantages such as intrinsic motivation, involved parents, and leadership qualities, and if students who have these advantages and then stop participating have higher GPA growth rates than those who continue to participate, then a strong case could be made in support of the Zero Sum Model Theory.

Another concept that must be examined is student resilience. Current educational theory holds that student work ethic, or “grit” as it is being called, is more important for future success that overall intelligence or achievement in high school. Students for whom everything comes easy often do not have the grit or resilience to succeed in college or beyond when encountering challenging circumstances. If this idea is true, then a strong case could be made that athletics, where students are constantly working to improve and overcome obstacles, are an important component of the overall success of students. This may be the key area of inquiry for those who believe that athletics are contributing to the success of students.

If the preceding recommendations are implemented and the results are the same for both groups as in this study, then the bigger question that needs to be asked is why students, both athletes and non-participants, do not experience growth in their GPAs throughout their high school careers. If, as students grow older, they are accumulating new knowledge and skills, why is their performance static? Are they taking harder courses as they get older, resulting in a lack of perceived growth results, or are there other variables involved? Future studies should attempt to determine if additional course rigor is impacting achievement by utilizing a weighted GPA rather than the simple GPA used here. Do teachers grade harder as students get older? It would seem that as students mature, they should become more concerned about the future, whether it be attempting to get into college or preparing for the workplace, and an increase in focus on the future would result in improved academic performance, but this is not the case.
Conclusions

The purpose of this study was to gain a deeper understanding of the relationship between athletic participation and academic achievement. The researcher has noted many calls for a reduction in athletic funding without any analysis of the academic benefits of athletic participation. This study attempted to account for the impact on academic achievement of variables other than athletic participation by focusing on GPA growth rate, rather than overall GPA, the argument being that if athletic participation is related to improved academic achievement, the GPAs of athletes should increase at a higher rate than those of non-participants.

After comparing the means of the two groups by running the Mann-Whitney U test and independent t-tests and then utilizing this data to calculate the GPA growth rates of both groups, the researcher found that athletes had a GPA growth rate of -2%, compared to 0% for non-participants. The growth rate formula was then applied to all individual subjects in the two sample groups in order to calculate the academic performance change rate for each. Not only was the hypothesis that athletes would see an increase in GPA that was higher than that of non-participants rejected, athletes actually saw negative growth, while non-participants stayed the same. The Mann-Whitney U test for academic performance change resulted in a higher change rate for non-participants that is statistically significant. While the difference is significant, the effect size is small, meaning that the practical significance is weak and no recommendations for change should be made based on the results of this study.

With these results, it is not possible to make the argument that there is a relationship between athletic participation and increased academic performance. Policy-makers should keep this in mind when making decision regarding school funding. While high school athletics are still important, they should not be funded if teachers or small-sized classes must be sacrificed in
order to do so. It is recommended that future researchers attempt to duplicate these findings at
different sites, and address the researcher’s suggestions such as utilizing interviews of athletes, teacher, coaches, and other entities related to this question. Student resilience should be
examined in order to determine its relationship to student success. A weighted GPA variable
should also be explored in order to better determine if the lack of perceived academic growth for all students is due to the increased difficulty of higher level courses or other factors.
References


Manlove, K.J. (2013). The impact of extracurricular athletic activities on academic achievement, disciplinary referrals, and school attendance among Hispanic female 11th grade students.


Appendixes

Appendix A: Athletic Participation and Academic Achievement: Negative Relationship

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### Appendix B: Athletic Participation and Academic Achievement: Positive Relationship

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### Appendix C: Athletic Participation and Academic Achievement: No Relationship or Inconclusive

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