

ABSTRACT

KEARNS, BENJAMIN TAFT. A Propensity Score Matching Study of Community College Athletics (Under the direction of Dr. James Bartlett).

College athletics can be a contentious idea among educators, especially those who question its value with respect to institutions of higher learning. This study implemented propensity score matching to study what impact being a student athlete had on athletes attending a community college.

Much of the literature on community college athletics focuses on funding issues and what impact athletics has on student support services, but nothing reports how student athletes are performing compared to their non-athlete peers. This study is significant because it examines the impact that student athletes have on outcomes like GPA, transfer rates, and what developmental courses are taken. Demonstrating the value of these outcomes can help community college administrators as they plan for their athletic programs.

The population for this study consisted of community college students at a medium sized community college located in the southeastern part of the United States. The major research questions of this study examined the characteristics of the student athletes and non-athletes at this community college. Characteristics include hours attempted, developmental coursework attempted, GPA, and transfer to a four-year school.

The study implemented propensity score matching. This allowed for the creation of balanced groups of students to see what impact being a student athlete had. The students were matched on age, financial aid status, gender, and educational goals. The results indicated that the overall model of seven predictors (age, male, African American, American Indian, taking courses to transfer, not having any financial aid, and having received a Pell Grant) were statistically reliable in predicting membership in the dependent variable.

The findings of this study revealed that student athletes were significantly different in GPA, enrollment in developmental reading, and transfer rates. This indicates that overall, student athletes at this community college performed better than those non-athletes that were similar in profile. Future research is needed to discover if hours attempted is significant within a larger sample size, what effect a longer cohort may have, and if there are any differences in rural vs. urban or small vs. large community colleges.

© Copyright 2019 by Benjamin Taft Kearns

All Rights Reserved

A Propensity Score Matching Study of Community College Athletics

by
Benjamin Taft Kearns

A dissertation submitted to the Graduate Faculty of
North Carolina State University
in partial fulfillment of the
requirements for the degree of
Doctor of Education

Adult and Community College Education

Raleigh, North Carolina

2019

APPROVED BY:

Dr. James Bartlett
Committee Chair

Dr. Bobbie Frye

Dr. Jayne Fleener

Dr. Diane Chapman

DEDICATION

There are three people who have meant more to me than anyone and without their love and devotion, this would have never been possible. Jess, you are my rock and your unwavering support in the times I had doubts was the only reason I made it, and I could not have done this without you. Eliot, you are my inspiration and the reason I want to better myself. Your encouragement, especially at the end, was invaluable. Lastly, to my mom Dana, your love and belief in me, especially when I believed so little, is why I have come further than I ever could have imagined.

BIOGRAPHY

Ben Kearns is a native of Pinebluff, North Carolina. He completed his undergraduate studies at East Carolina University where he earned a Bachelor of Arts in Philosophy with a minor in Business. Ben attended the University of South Carolina where he earned a Master of Library and Information Science degree and Western Carolina University where he earned a Master of Science in Mathematics.

Ben has worked a variety of jobs including being a university public services librarian, a university math tutoring center coordinator, a university math instructor, and a community college math instructor. Ben enjoys being in the classroom and the challenges of getting students to engage and enjoy math. Ben's primary research area is examining community college athletics as there is an opportunity to contribute to an underrepresented body of knowledge.

ACKNOWLEDGMENTS

Thanks go out to my dissertation chair, Dr. James Bartlett. His overall support and initial brainstorming helped take a vague idea and streamline it into something that I enjoyed learning more about. I also want to thank my dissertation committee members who took time out of their busy schedules to contribute: Dr. Diane Chapman, Dr. Jayne Fleener, Dr. Chad Hogan, and Dr. Bobbie Frye.

I want to give special thanks to Dr. Bobbie Frye, who not only served on my dissertation committee but helped me make that final push to get done. I would not have been able to finish if not for her patience and gift of time and being a sounding board for the data analysis.

A special shout-out goes to Kirk and Lisa, your senses of humor helped make a stressful situation bearable. I miss having breakfast with you both. Thank you also to those who are not named here but were a part of this journey. You know who you are.

TABLE OF CONTENTS

LIST OF TABLES	ix
LIST OF FIGURES	x
CHAPTER ONE: Introduction	1
Governance	2
Scholarship Aid	2
Campus Setting	3
Gender Equity of Programs	3
Statement of the Problem	4
Purpose of the Study	5
Theoretical Framework	6
Conceptual Framework	11
Research Questions and Research Methods	12
Research Questions	12
Research Methods	13
Significance of the Study	14
Limitations	15
Delimitations	16
Definition of Terms	17
Summary	19
CHAPTER TWO: Literature Review	21
Context of Community College Athletics Literature	21
Integrative Literature Review	21

Emerging Topic	22
Observations	22
Research Areas	24
Seminal Works	29
Theoretical Frameworks	30
Theoretical Frameworks Used in Study	33
Positivism	34
Contingency Theory	35
Propensity Score Matching in Educational Research	36
Summary	38
CHAPTER THREE: Methods	39
Propensity Score Analysis Overview	39
Application to Research Topic	41
Population in the Study	42
Construction of the Data Set	43
Recoding Variables	43
Data Analysis	44
Pre-Screening Data	45
Covariate Identification	45
Propensity Score Estimation	45
Propensity Score Match and Selecting	46
Assessing the Quality of the Match	46
Summary	47

CHAPTER FOUR: Results	48
Data Analysis	48
Two-Year Outcomes	57
Summary	59
CHAPTER FIVE: Discussion	60
Conclusions and Discussion	61
Research Question 1	61
Research Question 2	62
Research Question 3	63
Research Question 4	64
Research Question 5	64
Recommendations for Practice and Research	65
Recommendations for Practice	65
Recommendation 1	65
Recommendation 2	66
Recommendation 3	68
Recommendation 4	69
Recommendation 5	71
Implications for Practice	71
Recommendations for Research	73
Recommendation 1	73
Recommendation 2	74
Recommendation 3	74

Recommendation 4	75
Recommendation 5	76
Limitations	76
Conclusion	78
References	79

LIST OF TABLES

Table 1. Publication Dates of Articles, Dissertations, and Theses	23
Table 2. Breakdown of States Represented in Dissertations/Theses	24
Table 3. Coding Method and Occurrences	25
Table 4. Top Cited Resources on Community College Athletics	29
Table 5. Middle Range Theories Used in Dissertations	33
Table 6. Covariate Variable Types and Coding Schemes	44
Table 7. Outcome Variable Types and Coding Schemes	44
Table 8. Descriptive Statistics for Treatment and Control Groups	50
Table 9. Results of Logistic Regression Covariates in the Model	52
Table 10. Group Mean and Standard Deviation Characteristics of Covariates Before Propensity Matching	54
Table 11. Group Mean and Standard Deviation Characteristics of Covariates After Propensity Matching	55
Table 12. Percent Share of Sum of Means Before and After Matching	57
Table 13. Outcomes for <i>T</i> -test of Control and Treatment Groups After Propensity Score Matching	58
Table 14. Chi-Square Results for Transfer Outcomes in Treatment and Control Groups After Matching	58

LIST OF FIGURES

- Figure 1. Contingency Theory mapping of potential organizational and environmental variables in relationship to the covariates and outcomes being studied. 10
- Figure 2. Map of conceptual framework showing the population, covariates, propensity score matching, and outcomes being studied. 12
- Figure 3. Percentage share (bound by 0 – 100%) of the sum of each covariate mean for the treatment and control group across characteristics of certain covariates before propensity score matching. Notice that the group means are not equally balanced among the covariates in each group. 56
- Figure 4. Percentage share (bound by 0 – 100%) of the sum of each covariate mean for the treatment and control group across characteristics of certain covariates after propensity score matching. Notice that the group means are more equally balanced among the covariates in each group. 56

CHAPTER ONE: INTRODUCTION

College athletics can be contentious among educators as some question the educational value athletics bring to institutions of higher learning (Kuga, 1996; Lumpkin, 2008). The notoriety student athletes sometimes achieve off the field and outside the classroom can provide ammunition to the detractors of athletic programs (Lawrence, Ott, & Hendricks, 2009). Couple that with the apparent arms race to build facilities at many Division I university programs, and one can see why it is important to exercise caution when choosing to start an athletic program in this day and age (Hoffer, & Pincin, 2016; Tsitsos, & Nixon, 2012). Mirroring their academic counterparts, community college athletics and athletic programs experienced a growth spurt during the early part of the last decade, even though funding and support services are significantly less than the average four-year university (Ashburn, 2007; Byrd & Williams, 2007; Hines, 2005). This growth continued to occur during the aftermath of the “Great Recession” of 2007 – 2011 (Muir, 2015).

Athletics at United States community colleges date back (surprisingly) prior to World War I (Bush, Castaneda, Hardy, & Katsinas, 2009). What began as a few community or junior colleges fielding track and field teams has blossomed into the current national landscape of community colleges with varying athletic programs. There are now over 700 community college athletic programs in the U.S. (“About the USCAA”, 2016; “About the NWAC”, 2016; “NJCAA Member Colleges”, 2016). The following background will provide insight into governance, scholarship aid, campus setting, and gender equity for the community college athletics landscape.

Governance

Governance by a national organization is not as clear cut for community college athletics as it is for athletic programs at universities. The National Collegiate Athletic Association (NCAA) governs all university athletic programs across the country, and policy choices made by the NCAA affect all aspects of these programs. Community college athletics have a similar governance model in the National Junior College Athletic Association (NJCAA), but there are some notable differences.

The state of California and its 100-plus community college athletic programs has its own governing body, the California Community College Athletic Association (CCCAA), which does not fall under NJCAA governance (“About the CCCAA”, 2016). The states of Washington, Idaho, and Oregon also have their own governing body, the Northwest Athletic Association of Community Colleges (NWAACC), which also does not fall under NJCAA governance. The NWAACC governs 34 community colleges with athletic programs (“About the NWAACC”, 2016).

There are also approximately 30 college athletic programs identified that do not operate under any governing body (Castaneda, Katsinas, & Hardy, 2005). While the NJCAA has governance over the large majority of athletic programs at the community college level, there are potentially minor differences between the governance and by-laws of these three organizations.

Scholarship Aid

Community college athletic programs are classified into three levels concerning athletic scholarships. Schools that offer scholarship awards covering the full cost of tuition comprise the first level, which is classified as Division I by the NJCAA. The second level is

comprised of programs that offer partial scholarships, which is classified as Division II by the NJCAA. Lastly, programs that offer nothing in the way of athletic scholarships are classified as Division III by the NJCAA. California community colleges offer no scholarships based on athletics, which is equivalent to Division III in the NJCAA. The NWAACC offers partial scholarships, which is equivalent to Division II (Bush et al., 2009).

As a frame of reference, approximately 47 million dollars in athletic scholarship aid was awarded during the 2002-2003 year (Castaneda et al., 2005). In 2005, Bush et al. studied 567 community colleges with athletic programs and found 357 (63%) offered some form of financial aid to their student athletes while 210 (37%) did not (Bush et al., 2009).

Campus Setting

Campus setting is defined as rural, suburban, and urban. The 2005 data provided by Bush et al. show 54% of community college athletic programs are located at rural institutions, 26% are located in suburban areas, and 20% are in urban centers. One difference between rural and other campus settings is that almost 80% of the rural schools offer some form of athletic financial aid. Research suggests that rural schools are using athletic scholarships as a means to bolster enrollment numbers (Castaneda et al., 2005; Ashburn, E., 2007).

Gender Equity of Programs

The Education Amendments of 1972 contained an important section that changed college athletics dramatically when it was passed into law. The ninth amendment, or simply Title IX, stated, “No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving federal financial assistance” (“Title IX,” 2013). All

public community colleges are subject to Title IX, a fact that has led to more opportunities for women to compete in athletics. As of 2003, men's teams accounted for roughly 51% of the total number of community college athletic teams, and women's teams accounted for roughly 49% (Castaneda et al., 2005).

On the surface, this seems reasonably equitable. Closer scrutiny, however, reveals that there is still a marked disparity in the breakdown of participants. Castaneda et al. showed that only 37% of the participants were women and that women only accounted for 42% of the athletic scholarships awarded. The biggest reason for this dissonance between equitable number of teams and inequitable number of participants is football. There is a minimal number of female participants in the sport, if any, and football programs have large team sizes and award a higher percentage of athletic scholarships.

Statement of Problem

Understanding how athletes perform academically in relation to their non-athletic peers is important since the funding for athletic programs is inherently unstable (Byrd & Williams, 2007). Faculty at higher education institutions often perceive student athletes as lacking the educational skills needed to succeed academically (Storch & Ohlson, 2009). If athletes are performing better than their non-athletic peers, then funding for athletics can be easily justified. If athletes are performing worse, then utilizing student support services to help athletes can become a top priority for administrators.

Additionally, the exhaustive literature review conducted in Chapter Two on this subject area shows no empirical studies that determine if community college athletes are more or less academically successful compared to their non-athlete counterparts. This could lead to new athletic programs being added or contracted without any prominent research

acting as a guide on how athletes perform academically in comparison to their non-athletic peers. Undoubtedly, each college that has added or contracted athletics has gathered information to help in justifying that decision. However, community college administrators could have made decisions based on incomplete data which subsequently could lead to making unnecessary mistakes. Interestingly, a study of community college presidents showed they perceive athletics as being beneficial for a variety of reasons without having any published empirical research to validate those perceptions (Williams & Pennington, 2006).

A study that examines the differences in academic and demographic characteristics of athletes versus non-athletes will allow administrators to be aware of the advantages and disadvantages of having athletic programs and be better informed in their choices, whether it be in starting or maintaining an athletic program.

Purpose Statement

The purpose of this quantitative study is to examine two aspects of community college athletics. Examining the demographics of athletes and non-athletes to determine if there are any significant differences is the first aspect. Demographic examples include gender, ethnicity, age, educational goals, and if the athlete receives financial aid. The second aspect is to examine if being an athlete impacted student outcomes. Examples include overall grade point averages, participation in developmental courses, transfer rates, and credit hours attempted.

To conduct this study, a cohort of students from a community college from the southeastern United States was selected in the 2013 – 2015 school year. The selected community college serves a medium sized population with surrounding rural areas. This community college offers a wide variety of majors, areas of study, and academic programs.

The student data was collected with the assistance of the Institutional Research Department at the respective community college.

Propensity score matching was used in analyzing the collected student data. Propensity score matching is a technique used to simulate an experimental study when randomization is not possible with observational data (Rosenbaum & Rubin, 1983). Propensity score matching mimics the characteristics of randomized controlled trials, thus reducing selection bias (Beal & Kupzyk, 2014). Selection bias is a concern since there is no experimental control of who is an athlete and who is a non-athlete, which threatens the validity of the study (Pan, 2015). Education studies often lack funding to conduct randomized trails and for this reason often employ “after the fact” data for analysis (Titus, 2007). When looking at past data, it is hard to account for selection bias or even know why a person selected to be in a particular group. Propensity score analysis is an excellent tool in examining “after the fact” data, which is why it was employed for this study (Beal & Kupzyk, 2014). This study is critical in understanding the value athletics bring to a community college by examining the academic and demographic similarities and differences between athletes and non-athletes.

Theoretical Framework

The literature surrounding community college athletics was examined to see what frameworks have been used to guide any research already published. This examination indicated possible candidates for theoretical frameworks for this study.

According to Camp (2000), a theoretical framework is defined as “a set of theoretical assumptions that explain the relationships among a set of phenomena” (p. 12). This idea is an extension of Creswell (1994) who posited that there are three levels of theories: grand,

middle range, and substantive. After carefully considering the grand and middle range theories from the literature on community college athletics, two theories will guide this study. It was desired to have a grand theory as the overall guiding theoretical framework with a middle range theory to get into the specifics of the variables used for the proposed study. With that idea in mind, the grand theory chosen was Positivism with Contingency Theory being the selected middle range theory.

Positivism

Defining Positivism can be a bit tricky as there is not a “one size fits all” explanation, and Positivism continues to be employed in different ways across different fields of research (Hassan, 2016). Since multiple community colleges were examined for this study, looking at Positivism in terms of organizational theory seemed appropriate. According to Bess and Dee (2008), “Positivism assumes that an objective environment exists outside the boundaries of an organization. Organizational analysts seek to understand as completely and accurately as possible the internal conditions, the external environment, and the interaction between them” (p. 134). There is much literature challenging the assertion that it is possible to truly have an objective environment, and seeking understanding is still fraught with bias and philosophical concerns (Howe, 2009). However, Positivism still remains popular today for social scientists and educational researchers. The appeal of Positivism is eloquently summarized by the following quote from Hassan (2016), which references Positivism’s blossoming in natural science research:

There are numerous valid reasons for positivists to follow the natural sciences as a role model for work in the social sciences. Positivism provides an enormous cultural authority to social scientists, which were previously possessed only by the scientific

experts who used to provide regular advice to governments on difficult matters of technical policy-making, from food safety to building standards and so on. Positivist approaches enable social scientists to present their disciplines as sufficiently and rigorously as the scientific experts, which provide them the platform to make strong claims about the reliability, objectivity and usefulness of the knowledge they have to offer. (p. 320)

While Hassan was referring specifically to social scientists, it is apparent that the same desires exist for educational research to be held as sufficient and rigorous as well.

Further evidence in the justification for using Positivism as a grand theory for this study is found in the following:

As Brennan (2008) points out, “For future higher education research this indicates a need to analyze the operational dimensions of this interaction between external demands and internal goal setting. What is happening in the processes of identifying needs and goals and of coping with them in the daily life of higher education institutions” (p.384)? Examining the literature also seems to suggest that community colleges need to better identify the internal versus external demands of having an athletic program (Hagedorn & Horton, Jr., 2009; Lawrence, Mullin, & Horton, Jr., 2009).

This paragraph perfectly matches the assumptions of Positivism as defined by Bess and Dee on the previous page and thus seemed like a natural fit for the study.

Contingency Theory

Since Contingency Theory is philosophically rooted in Positivism (Bess & Dee, 2008), it was a logical choice as a middle range theory for guiding the study. This study

examines the differences between athletes and non-athletes over academic and demographic characteristics, which could impact how decisions are made concerning community college athletics at the administrative level. The essence of Contingency Theory is there is not just one best way to make leadership decisions (Foster, 2006). The organizational applications of Contingency Theory, again from Bess and Dee, are:

The basic premise of contingency theory is that organizational effectiveness is contingent on a judicious, rational matching of organizational variables to environmental conditions. Contingency theorists attempt to identify both the environmental variables and organizational elements that can best predict which organizational designs and leadership approaches are likely to be most effective.

Leaders can then restructure organizations based on which design is the best fit for their environment (p. 145).

The matching of organizational variables to environmental conditions is the basis for how this study examined the academic and demographic characteristics of athletes and non-athletes. Figure 1 shows a potential mapping of organizational and environmental variables under a Contingency Theory lens (Washington, 2017).

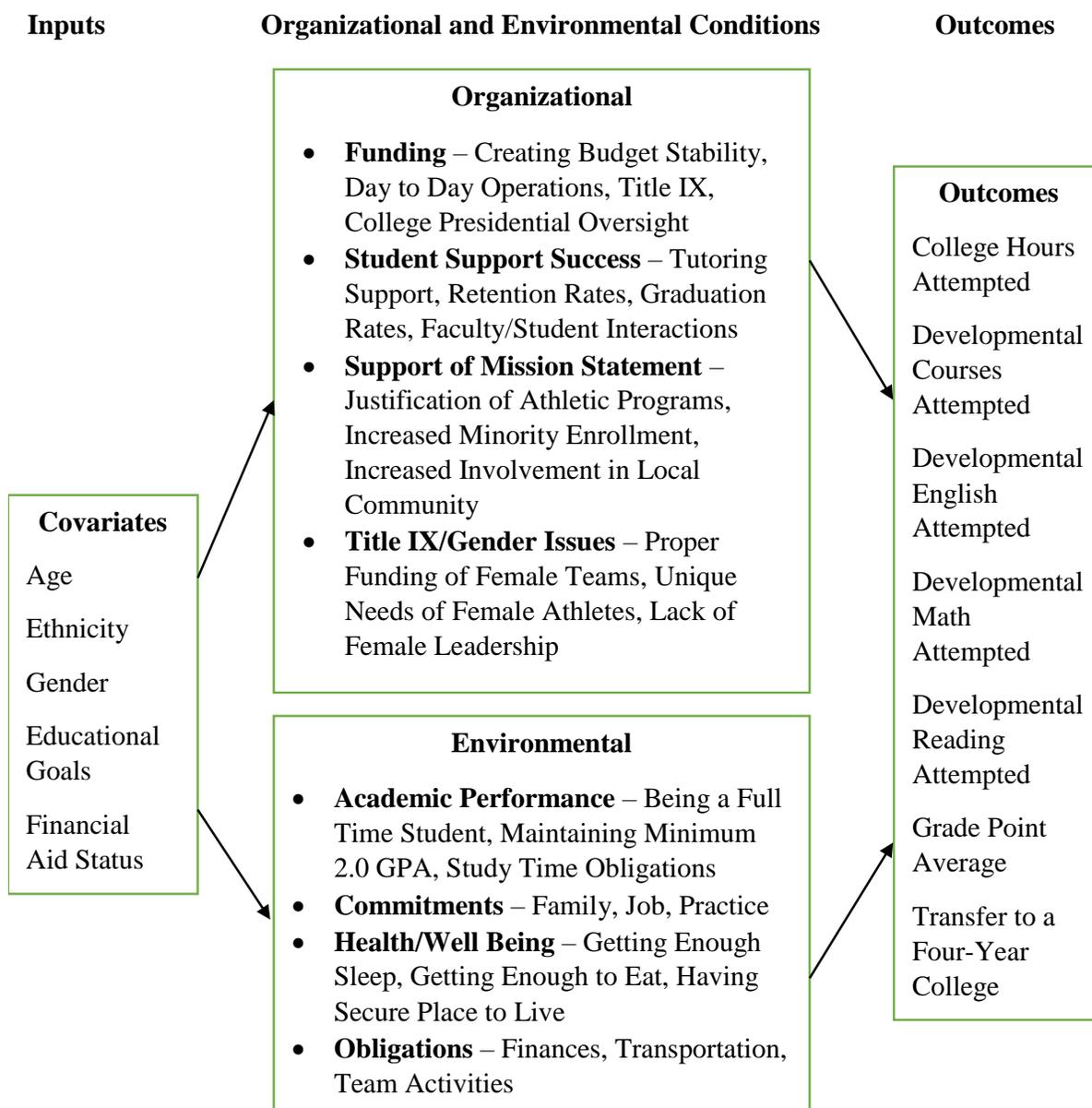


Figure 1. Contingency Theory mapping of potential organizational and environmental variables in relationship to the covariates and outcomes being studied.

Using Positivism as a grand theory with Contingency Theory as a supporting middle range theory effectively guided this study and helped generate future research ideas based on the resulting data. Since the study only examined a single community college with no

identifying data, it was not problematic in addressing the philosophical objections to Positivistic research.

Conceptual Framework

The conceptual framework for this study provides a map for utilizing propensity score matching to demonstrate the impacts of being a community college student athlete on various academic outcomes. This mapping includes the population of community college students studied, the treatment variable (those who are athletes), the control variable (those who are non-athletes), demographic covariates, the process of propensity score matching, and the academic outcome variables.

The conceptual framework begins with a parceling of the two groups of students that were examined in the study: those students who participated in athletic programs and those students that did not. The groups were not assumed to be equivalent and were initially examined using the covariates without propensity score matching. The covariates used in the study are age, ethnicity, gender, educational goals, and financial aid status. The next step was to create two balanced groups (athletes and non-athletes) for study. Logistic regression was used to create propensity scores that would allow for matching of the two distinct groups. The propensity score model was then tested to see how well it performed in creating equivalent groups. Finally, the outcome variables were examined for the two groups. The outcome variables for this study included overall GPA, total number of developmental courses attempted, total number of developmental math courses attempted, total number of developmental reading courses attempted, total number of developmental English courses attempted, hours attempted, and transfer rates. The following figure shows the conceptual mapping (Marts, 2016).

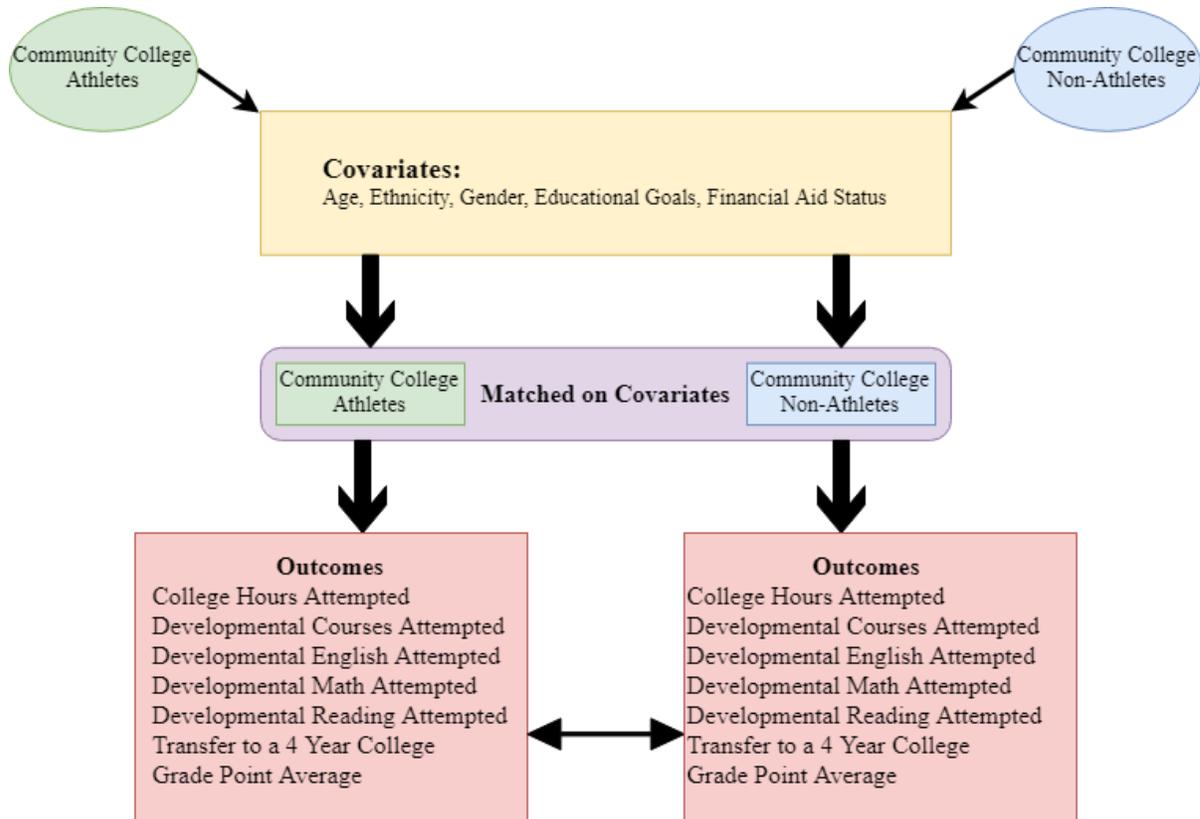


Figure 2. Map of conceptual framework showing the population, covariates, propensity score matching, and outcomes being studied.

Research Questions

This study was conducted using five research questions. These five questions guided the study and ensured the purpose of the study was met:

1. What are the demographic and academic characteristics of the study population?
2. What are the demographic and academic characteristics of the athletes and non-athletes in the study?
3. Is there a difference in demographics and academic characteristics of the athletes and non-athletes prior to propensity score matching?

Hypothesis 1

Ho: There is no difference between athletes and non-athletes.

Ha: There is a statistically significant difference between athletes and non-athletes.

4. Is there a difference in demographics and academic characteristics of athletes and non-athletes after propensity score matching?

Hypothesis 2

Ho: After propensity score matching, there is a statistically significant difference between athletes and non-athletes.

Ha: There is no difference between athletes and non-athletes.

5. Is there a difference between the athletes and non-athletes in terms of academic success as measured by hours attempted, grade point average, and successful transfer rate as well as developmental course participation after propensity score matching?

Research Methods

The research method implemented for this study is propensity score matching. A propensity score estimation is found by using a logistic regression model to compute a conditional probability of a person from the control group being in the treatment group given a composite profile of covariates (characteristics) of a person in the sample (Rojewski, Lee, & Gemici, 2010). This conditional probability is calculated by using the observed characteristics and assigning the treatment indicator as the dependent variable. Propensity scores range from 0.0 to 1.0, and these scores are used to make matches from each group. Utilizing propensity score matching allowed the researcher to meet the purpose of this study

and determine if there is an academic impact of being a student athlete at the studied community colleges.

Significance of Study

There was virtually no quantitative analysis found in the literature on community college athletics. A few articles and two dissertations used descriptive statistics in conducting their research, and none used any inferential statistical methods (Byrd, 2007; Byrd, & Williams, 2007; Castaneda, 2004; Castaneda, Katsinas, & Hardy, 2006; Williams, Byrd, & Pennington, 2008). The Castaneda dissertation is the only resource that includes any demographic characteristics of community colleges that sponsored athletic programs. This lack of inferential statistical analysis in the research on community college athletics indicated a clear need for a study using advanced statistical methods.

This type of study will benefit community college administrators who are thinking of starting or ending athletics at their college or are trying to make data-driven decisions about how to allocate their internal resources for their athletic programs. For example, if there is a statistical difference in grade point averages between athletes and non-athletes, community colleges with athletic programs could allocate additional student support or tutoring services for the athletic community.

Researchers will also benefit from this study by having data to promote future research to examine and explain the implications of the differences in academic and demographic characteristics between athletes and non-athletes. A well-designed statistical analysis could be easily modified and then utilized by future researchers of community college athletic issues. The next logical step for future research using this idea would be to

examine all of the community colleges in a state with a large number of community college athletic programs, like California, Mississippi, or Kansas.

Limitations

There were five recognized limitations within this research. First, there was no control over which students are student athletes at the respective community colleges. Thus, certain demographics are more prevalent in the data used. However, propensity score matching allows for dividing athletes and non-athletes into statistically comparable groups which alleviates this concern.

Second, participation in community college athletics varies from college to college. Some community colleges offer varying amounts of athletic aid and others do not. This could be a factor in retention. Also, some community colleges have significantly longer distances to travel to participate in athletic events than others. For those community colleges with extra travel time, this could take away from an athlete's ability to maintain good study habits, thus negatively affecting their grades compared to athletes with shorter travel distances.

Third, it is not uncommon for a student athlete at the community college level to enroll as a student for one year and then become a student athlete the next, or vice-versa. This limitation was not a problem for this study as athletic rosters were examined for the two-year cohort. If a student was an athlete in one of the two years and not the other, they were labeled accordingly and sorted by the propensity score matching.

Fourth, there was the potential for selection bias in this study. Education studies often lack funding to conduct randomized trials and for this reason often employ "after the fact" data for analysis (Titus, 2007). When looking at past data, it is hard to account for selection bias or even know why a person selected to be in a particular group. Since there were a large

number of variables to be considered, selection bias could have been a problem since community college athletes generally have different academic and retention backgrounds than non-athletes (Mendoza, Horton, & Mendez, 2012) as well as potentially having different impacts on student support services at a community college (Storch & Ohlson, 2009).

Propensity score matching reduces the problem of selection bias and non-random assignments and is often used with “after the fact” data (Titus, 2007). This could explain why propensity score analysis has skyrocketed in educational research in the last decade (Frye, 2014).

The final limitation identified for this study was the chosen research method. Propensity score matching reduces the problem of selection bias and non-random assignments (Titus, 2007). In doing so, however, propensity score matching eliminates a large number of students from the data analysis. For example, only full-time students were matched since athletes must be full time to be eligible. Thus, all part-time students were eliminated. Making sure non-athletes are represented in the study is vital. This concern is mitigated by propensity score analysis’ ability to represent the untreated group as part of the analysis (Titus, 2007).

Delimitations

This study is limited to a single community college during the academic years 2013-2015. The researcher worked with the Institutional Research department at that institution to gather the data on the student population being studied. There is no suggestion that this community college is representative of all community colleges in the United States.

The demographic variables to be used as covariates include age, ethnicity, gender, educational goals, and financial aid status. The outcome variables to be studied will be

controlled through the research and include overall GPA, total number of developmental courses attempted, total number of developmental math courses attempted, total number of developmental reading courses attempted, total number of developmental English courses attempted, hours attempted, and transfer rates.

The final delimitation of this study is the definition of a community college student athlete. This is someone who participates in any sport sanctioned by either the National Junior College Athletic Association (NJCAA), the California Community College Athletic Association (CCCAA), or the Northwest Athletic Association of Community Colleges (NWAACC). This definition does not include any community college student who participates in club sports at their respective schools. The community college used in this study is a member of the NJCAA.

Definition of Terms

Athletic Program. An athletic program is the collection of sanctioned sports that a college offers. Athletic programs can vary in size depending on the college.

Athletic Scholarship Aid. Community college athletic programs are classified into three levels concerning athletic scholarships: Division I are schools that offer scholarship awards covering the full cost of tuition, Division II are schools that offer partial scholarships, and Division III are schools that offer no scholarship assistance.

Community College Student Athlete. This is someone who participates in any sports sanctioned by the National Junior College Athletic Association (NJCAA), the California Community College Athletic Association (CCCAA), or the Northwest Athletic Association of Community Colleges (NWAACC).

Completion Rates. The percentage of a school's students who complete their program within the published time for the program.

Credits – Attempted. The total number of credits that a student is enrolled in at the 10% census date.

Credits – Completed. The total number of credits that a student is enrolled in at the end of the semester.

Developmental English. A remedial course designed to prepare community college students for a beginning course in college English by strengthening foundational English skills.

Developmental Math. A remedial course designed to prepare community college students for a beginning course in college math by strengthening foundational math skills.

Developmental Reading. A remedial course designed to prepare community college students for a beginning course in college reading by strengthening foundational reading comprehension skills.

Load Hours. The number of hours a student is enrolled in during a semester. For example, 12 hours is generally considered a full-time load.

Logistic Regression. Logistic regression measures the relationship between the categorical dependent variable and one or more independent variables by estimating probabilities using a logistic function.

Propensity Score. A propensity score is found by using a logistic regression model to compute the conditional probability of a person from the control group being in the treatment group given a composite profile of covariates (characteristics) of a person in the sample (Frye, 2014). This conditional probability is calculated by using the observed characteristics

and assigning the treatment indicator as the dependent variable with those receiving treatment being coded as 1 and those not receiving the treatment as 0.

Propensity Score Matching. Propensity score matching is a technique used to simulate an experimental study. This is achieved by using matched sampling to choose the controls for further study so that the control groups are similar to the treated subjects with respect to background variables measured on all subjects. Propensity score matching mimics the characteristics of randomized controlled trials, thus reducing selection bias (Beal & Kupzyk, 2014).

Retention Rates. The percentage of a school's students who continue at that school the next academic year excluding those that graduate.

Transfer Rates. The percentage of community college students who transfer to a four-year college.

Summary

Community college athletics provides benefits to both the athlete and the college, whether it be potentially higher retention rates or increased enrollment (Ashburn, 2007; Mendoza, Horton, & Mendez, 2012). However, no one has empirically studied what the academic advantages or disadvantages are of being a community college student athlete. This study synthesized data from a community college located in the southeastern United States using propensity score matching to understand the impact that being a community college student athlete has on gender, ethnicity, age, educational goals, if the athlete receives financial aid, overall grade point averages, participation in developmental courses, transfer rates, and credit hours attempted. The findings of this study will impact and expand current

research in community college athletics and will serve as a model for conducting further empirical research.

This chapter began with an overview of community college athletics, including how community college athletics shares governance, how athletic scholarships work at the community college level, the campus setting for athletic programs, and how gender equity is applied. This chapter also discussed the theoretical and conceptual frameworks that guided this study. The research questions, methodology, limitations and delimitations that guided the study were also presented. Finally, important terms applicable to the study were defined. Chapter 2 presents a review of the literature for community college athletics. Chapter 3 explores propensity score matching and the research design used for this study. The presentation of the data and findings are presented in Chapter 4. Finally, Chapter 5 provides a summary of this study along with implications of the research and suggestions for future research.

CHAPTER TWO: LITERATURE REVIEW

Included in this review are the areas of research, the seminal works, and theoretical frameworks found in the literature on community college athletics. The theoretical frameworks chosen for this study are then provided. Lastly, some context for propensity score matching in educational research is given. The chapter ends in a summary.

Context of Community College Athletics Literature

The literature on community college athletics does not reveal many common areas or foci of research. This lack of focused research agendas is problematic to anyone trying to gather information on community college athletics. Additionally, there is no current research base that demonstrates the theoretical frameworks for studying community college athletics. Gaining a theoretical foundation prior to conducting the study was important to ensure that a proper framework was utilized. Thus, a comprehensive examination of all the literature relating to community college athletics was undertaken to gather insight into the body of knowledge on this topic. This integrative literature review sought answers to two basic questions: “What are the areas of research in community college athletics?” and “What theoretical frameworks are used in writing this research?” For this review, 54 articles and 50 dissertations were examined.

Integrative Literature Review

An integrative literature review was chosen as the process for analyzing community college athletics. This involved reviewing the representative literature with the intent of critiquing and synthesizing the information to generate new frameworks and perspectives on the topic (Torraco, 2005). There is a dearth of literature to review on this topic; the first

articles appeared in the late 1970's, and most of the literature has been published in the last 15 years. Thus, this is an emerging topic.

Emerging Topic

Torraco (2005) suggests the benefit in taking a holistic approach to emerging topics is identifying preliminary frameworks to build upon. A review of the literature was conducted that looked for prominent research areas as well as areas of deficiency that may indicate the need for future research. Additionally, any theoretical frameworks used in the literature were examined with the intention of finding a prevailing framework.

Observations

Published research on community college athletics dates back to the late 1970s. The oldest publication date that this search yielded was an overview of a community college athletic program from 1976. Two other articles also appeared in this decade. A total of six articles were published in the 1980s, and four articles were from the 1990s.

However, as community colleges dramatically started to add athletic programs after the year 2000, there was an explosion of research conducted on this area. In fact, 23 articles were published between 2001 and 2010, which almost doubled the number from the previous two decades. There were 18 additional articles published between 2011 and 2016.

Examining the published dissertations and theses shows the same trend occurring as with the articles, as is evidenced in Table 1.

Table 1

Publication Dates of Articles, Dissertations, and Theses

Decade	Number of Articles	Number of Dissertations/Theses
1970s	3	1
1980s	6	2
1990s	4	4
2000s	23	21
2010s	18	22

Inspecting the article, dissertation, and thesis references revealed that most of the cited works were not about community college athletics. The cited works mostly dealt with research about university athletics. The goal in some cases was to show parallels between community college athletic concepts and those of established athletic programs at the university level. It is natural to use available research for this endeavor, but there is also an inherent associative risk with this strategy. For instance, many athletic programs at the university level have access to resources that community colleges cannot hope to provide. Therefore, generalized results gleaned from the study of athletics at the university level are most likely not applicable at the community college level due to the vast difference in athletic funding and the disparity in other physical resources.

An interesting observation emerged concerning the dissertations and theses: Many of the works studied a research problem at the state level, and 15 of the dissertations mentioned specific states as the focus of their topic. The state of California accounted for eight of the 15. All of these states have a sizable number of community college athletic programs. The breakdown by states is given in Table 2.

Table 2

Breakdown of States Represented in Dissertations/Theses

State	Number of Dissertations/Theses
California	8
Mississippi	2
North Carolina	2
Florida	1
Tennessee	1
Texas	1

Research Areas

The collected articles, dissertations, and theses were combined into a single group of results that were sorted using a table method. The main research areas of each individual item were coded and are listed in Table 3. Keep in mind that each piece of research could have multiple or overlapping research areas.

Table 3

Coding Method and Occurrences

Research Areas	Occurrences in Dissertations/Theses	Occurrences in Articles	Totals
Funding issues	17	24	41
Student support and success issues	24	13	37
Gender issues	12	9	21
Support of college mission statement	8	13	21
Academic performance/integrity issues	1	12	13
Leadership/ management issues	6	7	13
Minority issues	7	5	12
College choice (recruitment, increase in enrollment)	3	5	8
Increased pride/visibility of college	2	5	7
Health/well-being of student athlete	2	5	7
Athlete/athletics demographics	3	3	6
Ethical considerations	0	1	1
Totals	85	102	187

Examining the table indicates that the top six areas account for roughly 78% of the occurrences in the literature. These six areas will now be examined further.

Funding Issues. Funding encompasses the financial expenditures of running a community college athletic program. Athletics at the community college level are not a revenue-generating enterprise (Horton, 2009). Funding issues for athletics are an expanding concern for community colleges as this is rarely a stable concept (Byrd & Williams, 2007). The range of issues for the 41 (39.4%) items that mentioned funding are how funding is allocated, how funding is used in the day-to-day operations of athletics, how it is used in conjunction with Title IX, how institutions address the scarcity of funding, how athletics can increase enrollment to thereby justify athletic funding, and how athletics impact local

economies (Mumford, 2006; Chen, 2008; Williams, Byrd, & Pennington, 2008; Bush et al., 2009; Fanelli, 2010). Many of the articles paint a grim picture of funding as inherently unstable, and some articles imply that community college presidents may not be fully aware of how the funding structure for athletics truly works—even though regional accreditation requires that a college president maintain direct oversight and control of athletics programs.

Student Support/Student Success. This research area focuses on the support services and counseling offered to athletes at the community college level and addresses if and how athletics improves retention, graduation, and transfer rates for the athletes. These two ideas were so intertwined in the research, it made sense to link them together as a research area. The 37 (35.6%) results that included student support/student success covered the following areas: how athletics can help motivate the student athletes to achieve academic success, how athletics helps improve retention and graduation, how athletics affects and effects student support services, how the unique needs of athletes are being addressed in the counseling provided by student support services, how colleges are addressing counseling and gender issues, athletics and student success in minority athletes, and how student support staff perceive the importance of athletics. (Knapp & Raney, 1988; Berson, 1996; Kissinger & Miller, 2007; Horton, Jr., 2009; Horton, Jr., 2011; Kissinger, Newman, Miller, & Nadler, 2011; Mendoza, Horton, & Mendez, 2012; Wood & Ireland, 2014; Horton, Jr., 2015). If community college athletics continue to grow, further research will be needed to show the benefits that support services can have for athletes (Storch & Ohlson, 2009).

Gender Issues. As discussed earlier, Title IX had a profound impact on community college athletics. This impact has led to 21 (20.2%) results discussing issues related to gender. It comes as no surprise that most of these results discuss the impact of Title IX, but

some other research areas include the unique needs of female student athletes in student support and retention, the lack of women in positions of leadership in community college athletics, and the ongoing battle of women's programs' achieving full equity to men's even though Title IX was passed over 40 years ago (Castaneda et al., 2005; Jenkins, 2006; Williams & Pennington, 2006; Krug, 2007; Hagedorn & Horton, Jr., 2009; Lawrence et al., 2009; Steinbach, 2010; Mendoza, Horton, Jr., & Mendez, 2012). The pressing funding issues mentioned earlier will continue to be a difficulty for those attempting to achieve gender equity in community college athletics (Staurowsky, 2009).

Athletics as Support of Mission of College. Generally, the mission of a community college is to provide educational opportunities to members of the community that they serve. Athletics as they relate to supporting the mission of the community college accounted for 21 (20.2%) of the results. The purpose and underlying need of this research has been to examine the bottom-line criticism of why community colleges should even decide to offer athletics. Some of these articles attempt to answer directly or indirectly the questions that provide evidence that community college athletic programs help to fulfill the general mission of community colleges (Hagerty, 1976; Fink, & Kirk, 1979; Greene, 1982; Berson, 1996; Williams & Pennington, 2006; Krug, 2007; Hagedorn & Horton, Jr., 2009; Fanelli, 2010). This research provides some empirical evidence that more than just simple expenditures must be considered. However, this line of research lacks any information on the pecuniary expenditures of athletic programs as a variable in the assessment of the overall value to the colleges in fulfilling their missions. Information on athletic scholarship aid is cited earlier, but no hard and comprehensive data is available on what athletic departments actually spend as part of the college's operational costs.

Academic Performance/Integrity Issues. The academic performance of student athletes includes aspects of eligibility, GPA requirements, transcript analysis of student athletes that transfer to four-year institutions, and academic accountability of student athletes. Many of the 13 (12.5%) results examining these issues also mention that athletics can have a negative impact on the general perception of academic integrity of a community college. These perceptions arise from worries that athletics will increase developmental instruction due to the athletes' not being academically prepared for college or that athletes will be steered into fraudulent courses to maintain eligibility (Hagedorn & Horton, Jr. 2009). Some articles attempt to combat this perception by favorably comparing graduation rates of student athletes with those of students in general (McAninch, et al., 1987; Knap & Raney, 1988; Kanter & Lewis, 1991; Bennion, 1992; Horton, Jr., 2009).

Leadership/Management Issues. The difficulties in the leadership and management of a community college athletic program for college presidents and athletic directors accounted for 13 (12.5%) results. Examining the perceptions of college presidents towards athletics was the majority of the focus found in these results, but there was also the attempt to identify, at least in part, the desirable leadership qualities a college president or athletic director should have to lead a successful program (Stokes, 1979; Raeppe, Peery, & Hohman, 1982; Champion, 1990; Williams & Pennington, 2006). There were also tie-ins to the area of mission statement support (Fink & Kirk, 1979; Chen, 2008). This is best exemplified by the Lawrence, Mullin, and Horton, Jr. (2009) observation: "If community college leaders can keep the needs of athletes at the forefront of decision making, the result will be an athletic program that truly supports the mission of the institution and enhances the educational experience for all involved."

Seminal Works

Based on the description of the literature examining community college athletics, it would be tempting to say there are not any seminal works to identify as a beginning point for gaining knowledge in this field. There are, however, several works that are cited frequently in other research. Using *Google Scholar*, a list of the top ten most-frequently cited works was created from the 104 articles and dissertations examined. Table 4 reproduces this list with the authors of each work and the year of publication. The number of citations is based on a *Google Scholar* search conducted in February of 2016.

Table 4

Top Cited Resources on Community College Athletics

Article	Author(s)	Year	Times Cited
Race, interest convergence, and transfer outcomes for black male student athletes	Harper, S.	2009	39
Class and cleats: Community college student athletes and academic success	Horton, Jr., D.	2009	32
A national overview of intercollegiate athletics in public community colleges	Castaneda, C.	2004	27
Support services for two-year college student-athletes	Keim, M.	2004	25
To increase enrollment, community colleges add more sports	Ashburn, E.	2007	19
Student perceptions of the intercollegiate athletic program at a community college	Berson, J.	1996	18
Student services and student athletes in community colleges	Storch, J., & Ohlson, M.	2009	16
Community college presidents' perceptions of intercollegiate athletics	Williams, M., & Pennington, K.	2006	16
Improving student athlete academic success and retention	Hobneck, C., Mudge, L., & Turchi, M.	2003	15
Meeting the challenge of gender equity in community college athletics	Castaneda, C., Katsinas, S., & Hardy, D.	2008	14

The overall number of times these ten works are cited is further proof of the emerging topic status of community college athletics. It should be noted that the Castaneda dissertation that

came in third on this list is a descriptive statistical overview from 2004. The Williams and Pennington piece uses some basic *t*-tests on a small sample size. The other eight use little to no data in supporting their research. This further supports the assertion that a data-driven study is needed.

Theoretical Frameworks

According to Camp (2000), a theoretical framework is defined as “a set of theoretical assumptions that explain the relationships among a set of phenomena” (p. 12). This idea is an extension of Creswell (1994), who posited that there are three levels of theories: grand, middle range, and substantive. Camp delineates each type:

Grand theories are used to explain major categories of phenomena and are more common in the natural sciences. Middle range theories fall somewhere between the working hypotheses of everyday life and grand theories. Substantive theories offer explanations in a restricted setting and are limited in scope, often being expressed as propositions or hypotheses (Camp, 2000, p. 3).

The integrative literature review was examined to find which level of theory was used in the community college athletics articles and dissertations.

Article Theoretical Frameworks. This literature review found no grand theories that were used in any of the research articles examined. Further, there were only four (7.4%) articles that used middle range theories. Critical race theory was used in the examination of black male student athletes (Harper, 2009). An ethnographic study was conducted using a women’s softball team, and the author detailed the theory of setting up her study (Berson, 1996). Marx’s Extended Student Integration model was utilized in examining commitment to graduation in African American male student athletes (Hackett & Sheridan, 2013). Lastly, a

phenomenological framework was used in interviewing student athletes about academic success (Horton, 2009).

The absence of higher-level theoretical frameworks in the articles seems to be a glaring omission from this research area. It may be unnecessary that some grand theory be forced to act as a lens through which to study community college athletics, but surely some middle range frameworks would help researchers guide their efforts in writing articles. Fortunately, there are several mid-range theories found in the dissertation frameworks section.

Camp further delineates between the levels of theory as follows: “If a study cannot trace its roots to a grand theory or to a middle level theory published in a reputable source, but it has a legitimate, clean, rational framework then it is based on a substantive theory” (p. 13). Thus, 21 (38.9%) articles fit Camp’s broad range definition of substantive theories.

The broad range of substantive theory topics include community college presidents’ perceptions of athletics, student athletes’ perceptions of athletics, the effects of GPA on athletics, an analysis of transcripts and credit hours of student athletes, participation of female student athletes, transportation polices for athletic programs, athletics at private junior colleges, gender equity issues, issues for academic counselors of athletes, retention issues, minority issues, concussion management, and athletic identity (McAninch, H., et al., 1987; Knapp & Raney, 1988; Kanter & Lewis, 1991; Keim, 2004; Mumford, 2005; Williams & Pennington, 2006; Kissinger & Miller, 2007; LaVetter & Kim, 2010; Hoffman & Horton, Jr., 2011; Kissinger, Newman, Miller, & Nadler, 2011; Chin & Porter, 2013; Wood & Ireland, 2014; Watson, 2016).

The remaining 33 (61.1%) articles did not appear to have any sort of theoretical framework. That is not to say these articles did not add value or provide questions for potential future research. These articles add value in offering guidelines, future considerations, suggestions, and implications of current behavior. Still, the fact that over half of the selected articles suggested nothing in the way of a theoretical framework clearly suggests that this is a weakness that needs to be addressed in order to advance this topic.

Dissertation and Thesis Theoretical Frameworks. No grand theories or middle range theories were used in the three theses selected for this study. However, grand theories and middle range theories were more prevalent in dissertations than in the articles on this topic. Seventeen (34%) dissertations had a grand or middle range theory as a foundation for the research. Of those 17 dissertations, two grand theories and 27 middle range frameworks were utilized.

Functionalism and Post-positivism were the two grand theories that were found in the dissertations. Functionalism was used in analyzing the community college experience as it relates to athletics (Thies, 2009). A Post-positivism lens was used in exploring the opportunity to compete in athletics as influencing the choice of going to college (Rinke, 2011).

The 27 middle range theories found in the dissertations covered a wide variety of subject areas. Each middle range theory only occurred once with the exception of Institutional Theory and Self-Determination Theory which occurred twice each (Diede, 2005; Majerus, 2016; Thies, 2009; Veloz, 2015). All of the middle range theories found in the dissertations are shown in Table 5.

Table 5

Middle Range Theories Used in Dissertations

Academic Capitalism	Academic Motivation	Attribution Theory
Applied Action Research	Behavioral Approach	Contemporary Approach
Contingency Approach	Feminist Legal Theory	Grounded Theory
Human Capital Theory	Institutional Theory	Intrinsic Motivation
Managerial Professionals Theory	Process Evaluation Theory	Reference Group Theory
Resource Dependency Theory	Self-Determination Theory	Social Equity Theory
Situational Approach	Stratification Theory	Student Choice Theory
Student Engagement Theory	Student Involvement Theory	Theory of Challenge and Support
Theory of Involvement	Transactional Leadership Style	Transformational Leadership Style

There were 30 (66%) the dissertations that used no grand or middle range theories. Most of these 30 dissertations were quantitative studies of a particular aspect of community college athletics. All of the dissertations and theses were considered to have at least a substantive theory since they all answered at least one question based on created research.

Theoretical Frameworks Used in Study

The integrative literature review performed for this study showed only two grand theoretical frameworks guiding dissertation research on community college athletics: Functionalism and Post-positivism. There were 27 middle range theories used in community college athletics dissertations that could also be considered. After carefully considering the grand and middle range theories, two theories were chosen from the integrative literature review in guiding this study. It was desired to have a grand theory as the overall guiding theoretical framework with a middle range theory to explore the specifics of the variables used for the proposed study. With that idea in mind, the grand theory chosen was Positivism. It was decided that this study was simple enough in design and scope that the nuances that

differentiate Positivism and Post-positivism were not worth examining here. Contingency Theory was selected as the middle range theory for this study.

Positivism

Defining Positivism can be a bit tricky as there is not a “one size fits all” explanation and Positivism continues to be employed in different ways across different fields of research (Hassan, 2016). Since a community college was examined for this study, looking at Positivism in terms of organizational theory seemed appropriate. According to Bess and Dee (2008) “Positivism assumes that an objective environment exists outside the boundaries of an organization. Organizational analysts seek to understand as completely and accurately as possible the internal conditions, the external environment, and the interaction between them” (p. 134). There is much literature challenging the assertion that it is possible to truly have an objective environment and seeking understanding is still fraught with bias and philosophical concerns (Howe, 2009). However, Positivism remains popular today for social scientists and educational researchers. The appeal of Positivism is eloquently summarized by the following quote from Hassan (2016) which references the emergence of Positivism in natural science research:

There are numerous valid reasons for positivists to follow the natural sciences as a role model for work in the social sciences. Positivism provides an enormous cultural authority to social scientists, which were previously possessed only by the scientific experts who used to provide regular advice to governments on difficult matters of technical policy-making, from food safety to building standards and so on. Positivist approaches enable social scientists to present their disciplines as sufficiently and rigorously as the scientific experts, which provide them the platform to make strong

claims about the reliability, objectivity and usefulness of the knowledge they have to offer. (p. 320)

While Hassan was referring specifically to social scientists, it is apparent that the same desires exist for educational research to be held as sufficient and rigorous as well.

Further evidence in the justification for using Positivism as a grand theory for this study is found in the following:

As Brennan (2008) points out, “For future higher education research this indicates a need to analyze the operational dimensions of this interaction between external demands and internal goal setting. What is happening in the processes of identifying needs and goals and of coping with them in the daily life of higher education institutions” (p.384)? Examining the literature also seems to suggest that community colleges need to better identify the internal versus external demands of having an athletic program (Hagedorn & Horton, Jr., 2009; Lawrence et al., 2009).

This paragraph perfectly matches the assumptions of Positivism as defined by Bess and Dee on the previous page and thus seemed like a natural fit for the study.

Contingency Theory

Since Contingency Theory is philosophically rooted in Positivism (Bess & Dee, 2008), it was a logical choice as a middle range theory for guiding the study. This study examines the differences between athletes and non-athletes over academic and demographic characteristics, which could impact how decisions are made concerning community college athletics at the administrative level. The essence of Contingency Theory is there is not just one best way to make leadership decisions (Foster, 2006). The organizational applications of Contingency Theory, again from Bess and Dee, are:

The basic premise of Contingency Theory is that organizational effectiveness is contingent on a judicious, rational matching of organizational variables to environmental conditions. Contingency theorists attempt to identify both the environmental variables and organizational elements that can best predict which organizational designs and leadership approaches are likely to be most effective. Leaders can then restructure organizations based on which design is the best fit for their environment (p. 145).

The matching of organizational variables to environmental conditions is the basis for how this study examined the academic and demographic characteristics of athletes and non-athletes.

Using Positivism as a grand theory with Contingency Theory as a supporting middle range theory effectively guided this study and helped generate future research ideas based on the resulting data. Since the study only examined a single community college with no identifying data, it was not problematic in addressing the philosophical objections to Positivistic research. Additionally, Contingency Theory will help guide those in leadership roles as they make decisions on how to manage their organizations as they implement or maintain community college athletic programs.

Propensity Score Matching in Educational Research

There were no research examples found that used propensity score matching in studying community college athletics. However, there were two examples of propensity score matching being used to study athletics at four-year institutions. Routon & Walker (2015) used propensity score matching to examine the impact of athletics on academic outcomes for four-year schools. Using a sample size of over 100,000 students, their results

showed that athletics had a small negative impact on grade point averages. Anderson (2015) examined the effect that athletic success in college football has on attracting students and raising donations. One hundred and twenty NCAA Division I schools were examined, and not surprisingly, schools with higher win totals had lower acceptance rates and higher donation rates.

This study of literature also includes research that examined community college issues using propensity score matching. Frye (2014) looked at retention rates of community college students who took developmental math. Her research included a paragraph listing several studies that used propensity score matching:

Recent higher education studies have used propensity score methods to examine the following: the financial return on completing a graduate degree (Titus, 2007); the effect of initial enrollment on degree completion (Reynolds & DesJardins, 2009); the effectiveness of career academies on influencing career choices (Rojewski, Lee, & Gemici, 2010); and the propensity being placed into remedial coursework when comparing two-year to four-year college students. The association between institutional type, remedial status, and degree completion was also investigated using the propensity matching technique (Attewell, Domina, Lavin, & Levey, 2006) (p. 17 - 18).

Lastly, general education studies using propensity score matching since 2015 include penalties of going to a community college on four-year graduation rates (Dietrich, 2015); comparing parental educational levels with their children (Pingault, Côté, Petitclerc, Vitaro, & Tremblay, 2015); participation in preschool on reading levels (Hogrebe, & Strietholt,

2016); and the impact of service learning at a community college on academic outcomes (Marts, 2016) just to name a few.

Summary

Based on a review of literature, there are six areas accounting for most of the research being conducted in community college athletics: 1) funding issues, 2) student support/student success issues, 3) gender issues, 4) support of college mission statement, 5) academic performance/integrity issues, and 6) leadership/management issues. These areas are each unique, but often the focus of the articles and dissertations overlap into each other.

This review demonstrates, at least currently, a lack of utilization of common frameworks. While most of the articles lack strong frameworks, several middle range theories were found in some the dissertations. These frameworks can provide a foundation for future studies. Developing relevant theoretical frameworks that are utilized in a higher percentage of articles and dissertations will be a defining step towards the future growth and expansion of this research area.

CHAPTER THREE: METHODS

Propensity Score Analysis Overview

In 1983, Rosenbaum and Rubin published an article that would influence research in the social, behavioral, and health sciences for the upcoming decades and is now considered a seminal work (Lane, To, Shelley, & Henson, 2012). The focus of the article was on propensity score matching, a technique which is used to simulate an experimental study. Rosenbaum and Rubin noted that in many medical observational studies, a small group of subjects is exposed to a treatment while a much larger group of control subjects is not exposed to this treatment. This disparity in the sizes of the two groups could lead to complications in analyzing group comparisons. The gold standard of conducting research within medical studies utilizes randomized controlled trials, but the costs associated with conducting these trials are high which often leads to researchers using samplings of the control group for comparisons to the treatment group (Rosenbaum & Rubin, 1983). Sampling in a study can lead to selection bias which threatens validity (Pan, 2015). Rosenbaum and Rubin introduced the idea of using matched sampling to choose the controls for further study so that the control groups are similar to the treated subjects with respect to background variables measured on all subjects. Propensity score matching in essence mimics the characteristics of randomized controlled trials, thus reducing selection bias (Beal & Kupzyk, 2014).

A propensity score estimation is found by using a logistic regression model to compute a conditional probability of a person from the control group being in the treatment group given a composite profile of covariates (characteristics) of a person in the sample (Rojewski, Lee, & Gemici, 2010). This conditional probability is calculated by using the

observed characteristics and assigning the treatment indicator as the dependent variable. Propensity scores range from 0.0 to 1.0, and these scores are used to make matches from each group. Utilizing propensity score matching allowed the researcher to meet the purpose of this study and determine if there is an academic impact of being a student athlete at the studied community colleges.

Once a propensity score has been calculated, different propensity score matching methods can be used to match units (Pan, 2015). Examples of these methods include nearest neighbor matching (which matches a person from each group with the closest propensity score match), caliper matching (which matches a person from each group with the closest propensity score as long as that score is very close), Mahalanobis metric matching (which matches a person from each group using the idea of Mahalanobis distance based on the proximities of the variances), and optimal matching (which uses Mahalanobis distance and a weighted distance metric). (Pan, 2015). Once a method is chosen, the matches proceed across both groups, and if no match is found, the case is discarded and the sample size is reduced (Frye, 2014).

After a matching method is utilized, the researcher must then evaluate the quality of the balance between the covariate variables. This evaluation is done by evaluating each of the following: selection bias using a significance test, standardized bias, and percent bias reduction (Pan, 2015). Graphical representations can also be utilized in addition to these statistical methods in the evaluation process to help visualize the quality.

Finally, an outcome analysis is conducted on the matched data as if it had been done on the entire original data (Pan, 2015). Some studies look at outcome analyses of the data both matched and unmatched to see what differences the matching made.

As with any research method, there are issues with propensity score analysis. Some of these issues include how one assesses the robustness of propensity score analysis, under what conditions propensity score matching is efficient, and how to effectively implement propensity score analysis on complex data (Pen, 2015). Additionally, the consequences of matching with or without replacement must be incorporated into any research design using propensity score matching. Matching with replacement means each unit in the control group can be matched more than once while matching without replacement means that each unit in the control group is matched only once. Matching with or without replacement gives very different matching groups and thus different accuracies in the results (Pan, 2015). Finally, consideration of the sample size ratio is an issue to be considered as some researchers suggest that the control group sample size should be three times larger than the treatment group for better accuracy (Pan, 2015).

Application to Research Topic

Selection bias is not just limited to the social sciences. Research in the field of education also struggles with this concern. Education studies often lack funding to conduct randomized trials and for this reason often employ “after the fact” data for analysis. (Titus, 2007). When looking at past data, it is hard to account for selection bias or even know why a person selected to be in a particular group. Propensity score analysis is an excellent tool in examining “after the fact” data for the reasons mentioned in the overview. This could explain why propensity score analysis has skyrocketed in educational research in the last decade (Frye, 2014).

The study utilized two years’ worth of “after the fact” data for a single community college, thus establishing the relevance of propensity score matching to the study. The

treatment group for the study were the athletes at the community college that participated in the study. The control group were the remaining students at this community college. Due to the large number of variables considered, selection bias could have been a problem since community college athletes generally have different academic and retention backgrounds than non-athletes (Mendoza, Horton, & Mendez, 2012) as well as potentially having different impacts on student support services at a community college (Storch & Ohlson, 2009). Propensity score matching techniques reduced selection bias as a concern and thus was the main reason this method was chosen.

There were over ten times more students in the control group than the treatment group, easily satisfying the three-to-one requirement. Due to the relatively small number of athletes in the control group, the nearest neighbor method was utilized along with selection without replacement. A propensity match tolerance of .005 was utilized rather than the .05 match tolerance that some studies using propensity score matching employ. These more stringent choices were employed to account for the limitations of the small number of students in the treatment group (Pan, 2015).

Population in the Study

The study population consisted of the Fall 2013 through Spring 2015 student cohort at a medium-sized rural community college located in the southeastern United States that offers athletics. The data for this study varies among ethnicity, age, gender, financial aid status, religious beliefs, economic status, class rank, and other demographics. There are varying degrees of academic indicators including enrollment status, completion/transfer rates, academic achievement, and developmental course participation.

The athletes in this study were typical students at this community college. The athletes received no athletic scholarship, no special accommodations for tutoring or other student support services that was not available to all students at this community college. The athletes received no special advising or were allowed to register for courses before their other cohort members.

Construction of the Data Set

The data requested from the participating community college is typical annual data used in institutional planning and research to satisfy federal and state reporting requirements as well as grant applications and program reviews. Both that community college and North Carolina State University participated in the Institutional Research Board (IRB) process.

The institutional data was collected by the participating community college, and the athletes were identified for coding purposes. The software tool SPSS was used for all coding and statistical and data analysis. Dr. Bobbie Frye, a member of this dissertation committee, helped guide the study during the data collection and analysis phase.

Recoding Variables

All selected variables were recoded into one of two types: categorical and continuous. Dummy variables were created for all categorical data like race or remedial course work participation. Table 6 gives the covariates that were used for this study along with how they were coded. Table 7 gives the outcome variables and how they were coded.

Table 6

Covariate Variable Types and Coding Schemes

Variable Name	Type	Coding	
Athlete	Categorical	1 = Yes	0 = No
American Indian/Alaska Native	Dummy	1 = Yes	
African American	Dummy	2 = Yes	
Asian American	Dummy	3 = Yes	
Hispanic	Dummy	4 = Yes	
Hawaiian	Dummy	5 = Yes	
Multiple Races	Dummy	6 = Yes	
Unknown Race	Dummy	7 = Yes	
White	Dummy	0 = Yes	
Age	Continuous		
Gender	Dummy	1 = Male	0 = Female
Take Courses for Enrichment	Dummy	1 = Yes	
Take Courses for Transfer	Dummy	2 = Yes	
Unknown Goal	Dummy	3 = Yes	
Enhance Employment Skills	Dummy	4 = Yes	
Enhance Job Skills	Dummy	5 = Yes	
Obtain an Associate Degree	Dummy	0 = Yes	
Pell Recipient	Dummy	1 = Yes	0 = No

Table 7

Outcome Variable Types and Coding Schemes

Variable Name	Type
College Credits Attempted	Continuous
Developmental Credits Attempted	Continuous
Developmental Math Credits Attempted	Continuous
Developmental English Credits Attempted	Continuous
Developmental English Credits Attempted	Continuous
Transfer to 4 Year College	Categorical
Grade Point Average	Continuous

Data Analysis

The six implementation steps used for this propensity score matching were pre-data screening, covariate identification, propensity score estimation, matching of propensity score, examining match quality, and presenting the study results (Marts, 2016).

Pre-Screening Data

All data was screened for missing values and examined for normality as well as outliers and errors.

Reporting Pre-Matched Differences on Demographic and Academic Variables.

Once the data was screened, the demographic and academic variables were examined for differences. The mean, standard deviation, frequency, and percent were established to describe the athlete and non-athlete groups. Chi-square and *t*-tests were conducted to examine differences between the two groups.

Reporting Pre-Matched Differences on Outcome Variables. Likewise, the outcome variables were examined for differences. The mean, standard deviation, frequency, and percent were established to describe the athlete and non-athlete groups. Chi-square and *t*-tests were conducted to examine differences between the two groups.

Covariate Identification

The covariates were selected based on the available data. Most of the covariates listed in Table 7 were found in other dissertations using propensity score matching that examined community colleges.

Propensity Score Estimation

A propensity score estimation was found using a logistic regression model to compute a conditional probability of a person from the control group being in the treatment group given a composite profile of covariates (characteristics) of a person in the sample (Rojewski, Lee, & Gemici, 2010). This conditional probability was calculated by using the observed characteristics and assigning the treatment indicator as the dependent variable. Propensity scores ranged from 0.0 to 1.0, and these scores were used to make matches from each group.

Propensity Score Match and Selecting

Nearest neighbor matching was utilized. This matched a person from each group with the closest propensity score match. The propensity score distributions were assessed to ensure they were similar across the two groups. Propensity score outliers were discarded.

Common Support. Common support examines the individual characteristics of both the control and treatment groups and then removes those characteristics not in common to both groups (Rojewski, Lee, & Gemici, 2010). The standard way to ensure common support is to use the propensity scores and remove the scores not in common to both groups. The results indicated that there were no characteristics that needed removal.

Assessing the Quality of the Match

Calculation of the Covariate Effects. The demographic and academic variables were examined for differences after the propensity score match. The mean, standard deviation, frequency, and percent were established to describe the athlete and non-athlete groups. Chi-square and *t*-tests were conducted to examine differences between the two groups.

Calculation of the Outcome Effects. The outcome variables were examined for differences after the propensity score match. The mean, standard deviation, frequency, and percent were established to describe the athlete and non-athlete groups. Chi-square and *t*-tests were conducted to examine differences between the two groups.

Sensitivity Analysis. According to Rojewski et al., (2010), “Sensitivity analysis is used to evaluate how analysis of treatment effects might be altered by unmeasured variables” (p.17). Rojewski recommends using the Mantel-Haenszel test which compares the successful number of individuals in the treatment group with an expected number and follows the chi-square distribution. The Mantel-Haenszel test was conducted for this study.

Summary

Data was collected, with the aid of an institutional research department at a medium-sized rural community college located in the southeastern United States that had an athletic program. Athletes and non-athletes from that community college were included in the data set. The athletes in the data set were identified with help from the participating athletic department.

Propensity score matching was utilized to determine if being a community college athlete has any impact on outcome variables like grade point average, developmental course participation, and transfer rates. Propensity score matching helped compare the athletes and non-athletes by creating two roughly equivalent groups on average. Pre and post matching comparisons were compiled for this study.

CHAPTER FOUR: RESULTS

This study examined potential differences in academic outcomes between athletes and non-athletes at the community college level. Propensity score matching was the methodology used to look at academic outcomes including grade point average, developmental coursework, and transferability. The use of propensity score matching allowed for a creation of two balanced groups of students, the treatment and control groups, to better understand the impacts of athletic participation. This chapter contains an overview that describes the study in greater detail, a description of the data analysis, a summary of the study's outcomes and findings, and the conclusion.

Propensity score matching utilizes a variety of covariates to create a purposeful sample of students who are athletes and a sample who are non-athletes. That does not mean that each sample is identical, but rather the samples are equivalent on average (Marts, 2016). Propensity scores are the “conditional probability of a person being in one condition rather than another given a set of observed covariates used to predict a person’s condition” (Rosenbaum & Rubin, 1983, p. 4). This allows the researcher to use the covariates to create a propensity score for each student that allows for matching the scores from each group that are the closest to each other.

Data Analysis

The student record data was collected by the participating community college and the athletes were identified. That data was then checked for missing values and outliers to confirm the data set was complete. There were no missing records or outliers. The final data set contained 7,715 student records from the Fall 2013 through Spring 2015 academic years. These student records included full time as well as part time participants who attempted at

least one credit-bearing class. A student was considered an athlete if that student participated in an athletic program sanctioned by the NJCAA for the participating community college. There were 58 student athletes that were selected for potential inclusion for the study group. This comprised .75% of the students in the dataset.

An initial descriptive examination of covariates indicated that the group of athletes (58) differed from the group of non-athletes (7657). The male treatment group (63.8%, $n = 37$) had a higher percentage than the male control group (35.4%, $n = 2710$) as did the African American control group (44.8%, $n = 26$) compared to the same treatment group (23.4%, $n = 1789$). The treatment group was more likely to get a Pell Grant (53.4%, $n = 31$) than the control group (41.1%, $n = 3149$). The biggest difference between the treatment group and the control group was the long-term goal the student had. Athletes as a group (65.5%, $n = 38$) were far more likely to view transferring to another college as their goal above non-athletes as a group (20.6%, $n = 1580$). Table 8 provides an overview of the demographics and covariates for each group prior to matching.

Table 8

Descriptive Statistics for Treatment and Control Groups

<u>Group Name</u>	<u>Treatment (n = 58)</u>		<u>Control (n = 7657)</u>	
	<i>n</i>	%	<i>n</i>	%
Covariates				
Athletes	58	100%	0	0%
Age	58	100%	7657	100%
Female	21	36.2%	4947	64.6%
Male	37	63.8%	2710	35.4%
Pell Recipient	31	53.4%	3149	41.1%
Work Study Recipient	2	3.4%	8	.1%
American Indian	6	10.3%	324	4.2%
African American	26	44.8%	1789	23.4%
Asian American	0	0%	72	.9%
Hispanic	2	3.4%	622	8.1%
Hawaiian	0	0%	5	.1%
Multiple Races	1	1.7%	202	2.6%
Unknown Race	0	0%	195	2.5%
White	23	39.7%	4448	58.1%
Take Courses for Enrichment	7	12.1%	2000	26.1%
Take Courses for Transfer	38	65.5%	1580	20.6%
Unknown Goal	0	0%	58	.8%
Enhance Employment Skills	0	0%	248	3.2%
Enhance Job Skills	0	0%	55	.7%
Obtain an Associate Degree	13	22.4%	3716	48.5%

The research method implemented for this study is propensity score matching. The analysis was conducted using SPSS version 23. A propensity score estimation is found by using a logistic regression model to compute a conditional probability of a person from the control group being in the treatment group given a composite profile of covariates (characteristics) of a person in the sample (Rojewski, Lee, & Gemici, 2010). This conditional probability is calculated by using the observed characteristics and assigning the treatment indicator as the dependent variable. Propensity scores range from 0.0 to 1.0, and these scores are used to make matches from each group.

Once the propensity scores for each student were calculated, the nearest neighbor method was utilized. The nearest neighbor method matches a person from each group with

the closest propensity score match (Pan, 2015). Once a method is chosen, the matches proceed across both groups and if no match is found, the case is discarded, and the sample size is reduced (Frye, 2014). The case control match tolerance was .005, which is stricter than any other studies this researcher encountered using propensity score matching. This tolerance level was as a response to the relatively low number of athletes in the study.

After matches were made using the propensity score matching method, the quality of the balance between the covariate variables was tested using significance tests (Pan, 2015). Finally, an outcome analysis was conducted on the matched data as if it had been done on the entire original data (Pan, 2015). An analysis of the data was performed on both the matched and unmatched groups to see what differences the matching made.

Logistic regression was conducted to determine which of the independent variables were associated with being an athlete or non-athlete. The independent variables for this part of the analysis were age, male gender, being a Pell recipient, receiving no financial aid, American Indian, African American, Hispanic, multiple races, unknown race, taking courses for enrichment, taking courses to transfer, and having an unknown goal. The results indicated that the overall model of seven predictors (age, male, African American, American Indian, taking courses to transfer, not having any financial aid, and having received a Pell Grant) were statistically reliable in predicting membership in the dependent variable (-2 Log Likelihood = 544.428, Chi-square = 138.431, $p < .001$, and Nagelkerke R Square = .210).

The model correctly classified 99.2% of the cases with two cases being discarded for not having a match within the specified matching tolerance. The model explained 21% of the variance in the dependent variable. Wald statistics were used to test significance. Athletes were 162% more likely to be male, 150% more likely to be African American, 254% more

likely to be American Indian, 345% more likely to take courses for transfer, but are 95% less likely to receive a Federal Pell Grant and 96% less likely to have no financial aid. Table 9 shows the results of the logistic regression for all covariates in the study database.

Table 9

Results of Logistic Regression Covariates in the Model

Covariates	Beta	S.E.	Wald	df	Sig.	Exp(B)	Magnitude
Age	-.205	.051	***16.388	1	< .001	.815	- 18%
Gender (Male)	.963	.283	**11.563	1	.001	2.619	162%
Pell Recipient	-2.970	1.044	**8.097	1	.004	.051	- 95%
No Financial Aid	-3.326	1.046	***10.118	1	.001	.036	- 96%
American Indian	1.263	.482	**6.875	1	.009	3.537	254%
African American	.918	.312	**8.629	1	.003	2.504	150%
Hispanic	-.759	.746	1.033	1	.309	.468	
Multiple Races	-.396	1.033	.147	1	.702	.673	
Unknown Race	-15.847	2202.850	.000	1	.994	.000	
Courses for Enrichment	-.649	.496	1.713	1	.191	.523	
Transfer	1.493	.330	***20.508	1	< .001	4.449	345%
Unknown Goal	-14.428	1817.698	.000	1	.994	.000	
Constant	1.570	1.520	1.067	1	.302	4.807	

* $p < .05$. ** $p < .01$. *** $p < .001$. -2 Log Likelihood = 544.428, Chi-square = 138.431, $p < .001$, Nagelkerke R Square = .210. 99.2% Predicted Correctly.

An analysis of potential differences in the covariate characteristics of the two study groups was performed, both before and after matching. The goal of matching is that there will be fewer statistically significant differences between the covariates after matching has occurred. This creates a more “apples to apples” comparison.

An analysis of variance (ANOVA) was performed for the control and treatment groups before matching. This analysis provided means, standard deviations, F – values, significance levels, and an effect size index (η^2). The covariates examined were age, gender, financial aid status, race, and long-term academic goals. The analysis showed there were significant differences in age, $F(1, 7713) = 21.109, p < .001$; gender, $F(1, 7713) = 20299, p < .001$, not getting any financial aid, $F(1, 7713) = 5.829, p < .05$, and being a work study recipient, $F(1, 7713) = 50.029, p < .001$. Race characteristics were significant for American

Indian, $F(1, 7713) = 5.257, p < .05$; African American, $F(1, 7713) = 14.764, p < .001$ and white, $F(1, 7713) = 8.035, p < .01$. Long-term goals were significant for transfer, $F(1, 7713) = 70.587, p < .001$; getting an Associate Degree, $F(1, 7713) = 15.751, p < .001$ and taking courses for enrichment, $F(1, 7713) = 5.908, p < .05$.

The effect sizes for the significant covariances were small as each η^2 value was less than .01 (Green & Salkind, 2005). This is not surprising given that there were 58 students in the treatment group. Table 10 summarizes the mean characteristics of covariates before propensity score matching.

Table 10

Group Mean and Standard Deviation Characteristics of Covariates Before Propensity Matching

Group Name	Treatment (n = 58)		Control (n = 7657)		F	p	η^2
	M	SD	M	SD			
Age	20.670	2.012	27.090	10.634	***21.109	<.001	.003
Gender (Male)	.640	.485	.350	.478	***20.299	<.001	.003
Pell Recipient	.535	.503	.411	.492	3.608	.058	.000
Work Study Recipient	.035	.184	.001	.032	***50.029	<.001	.006
No Financial Aid	.431	.065	.588	.006	*5.829	.016	.001
American Indian	.103	.307	.042	.201	*5.257	.022	.001
African American	.448	.502	.234	.423	***14.764	<.001	.002
Asian American	.000	.000	.009	.097	.550	.458	.000
Hispanic	.035	.184	.081	.273	1.692	.193	.000
Hawaiian	.000	.000	.001	.026	.038	.846	.000
Multiple Races	.017	.131	.026	.160	.188	.665	.000
Unknown Race	.000	.000	.026	.158	1.515	.218	.000
White	.581	.493	.397	.493	**8.035	.005	.001
Courses for Enrichment	.121	.329	.261	.439	*5.908	.015	.001
Transfer	.655	.479	.206	.405	***70.587	<.001	.009
Unknown Goal	.000	.000	.008	.087	.443	.506	.000
Employment Skills	.000	.000	.032	.177	1.941	.164	.000
Job Skills	.000	.000	.007	.084	.420	.517	.000
Associate Degree	.224	.421	.485	.500	***15.751	<.001	.002

* $p < .05$. ** $p < .01$. *** $p < .001$. Green & Salkind (2005) descriptors for effect size (η^2) are interpreted as .01 – small, .06 – medium, and .14 – large.

An analysis of variance (ANOVA) was performed for the control and treatment groups after matching. Age, $F(1, 55) = 6.632$, $p < .05$ was the only covariate that showed statistical significance. Table 11 summarizes the mean characteristics of covariates after propensity score matching.

Table 11

Group Mean and Standard Deviation Characteristics of Covariates After Propensity Matching

Group Name	Treatment (n = 56)		Control (n = 56)		F	p	η^2
	M	SD	M	SD			
Covariates							
Age	20.730	2.023	23.950	9.319	*6.362	.013	.055
Gender (Male)	.63	.489	.68	.471	.349	.556	.003
Pell Recipient	.554	.502	.607	.492	.325	.570	.003
Work Study Recipient	.000	.000	.000	.000	-	-	-
No Financial Aid	.446	.502	.393	.493	.325	.570	.003
American Indian	.107	.312	.054	.227	1.078	.301	.010
African American	.429	.499	.536	.503	1.279	.261	.011
Asian American	.000	.000	.000	.000	-	-	-
Hispanic	.036	.187	.018	.134	.337	.563	.003
Hawaiian	.000	.000	.000	.000	-	-	-
Multiple Races	.018	.134	.018	.134	.000	1.000	.000
Unknown Race	.000	.000	.000	.000	-	-	-
White	.411	.496	.375	.489	.147	.702	.001
Courses for Enrichment	.125	.334	.125	.334	.000	1.000	
Transfer	.661	.478	.625	.489	.153	.696	.001
Unknown Goal	.000	.000	.000	.000	-	-	-
Employment Skills	.000	.000	.000	.000	-	-	-
Job Skills	.000	.000	.000	.000	-	-	-
Associate Degree	.214	.414	.250	.437	.197	.658	.002

* $p < .05$. ** $p < .01$. *** $p < .001$. Green & Salkind (2005) descriptors for effect size (η^2) are interpreted as .01 – small, .06 – medium, and .14 – large.

A percent share of the sum of means was conducted before and after matching to illustrate the good balance that propensity score matching achieved for comparing the control and treatment groups. A percentage share (between 0 – 100%) is found by taking the mean for the control and treatment groups respectively for each covariate and dividing by the total sum of those two means. This was calculated for each of the covariates before the propensity score matching and after matching. The goal of matching is to create as close as possible a

50/50 percentage ratio. Figure 2 shows the balance before matching while Figure 3 shows the balance after matching.

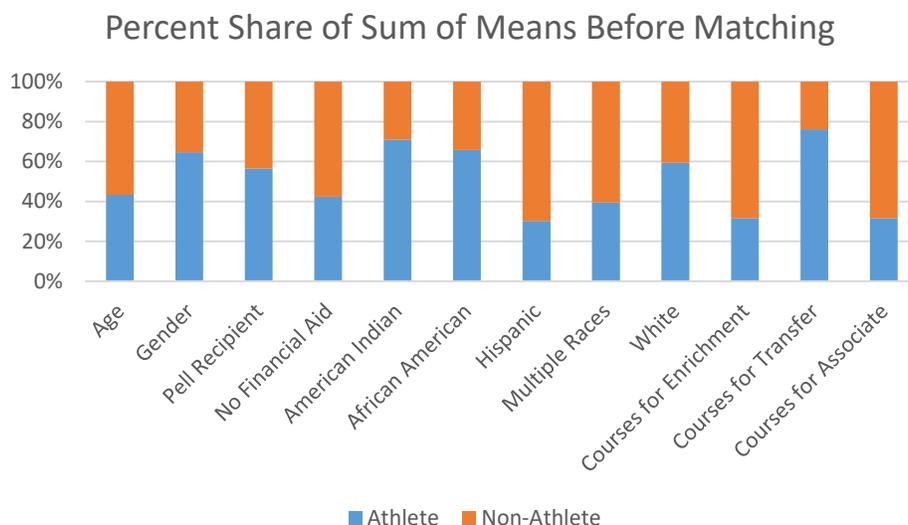


Figure 3. Percentage share (bound by 0 – 100%) of the sum of each covariate mean for the treatment and control group across characteristics of certain covariates before propensity score matching. Notice that the group means are not equally balanced among the covariates in each group.

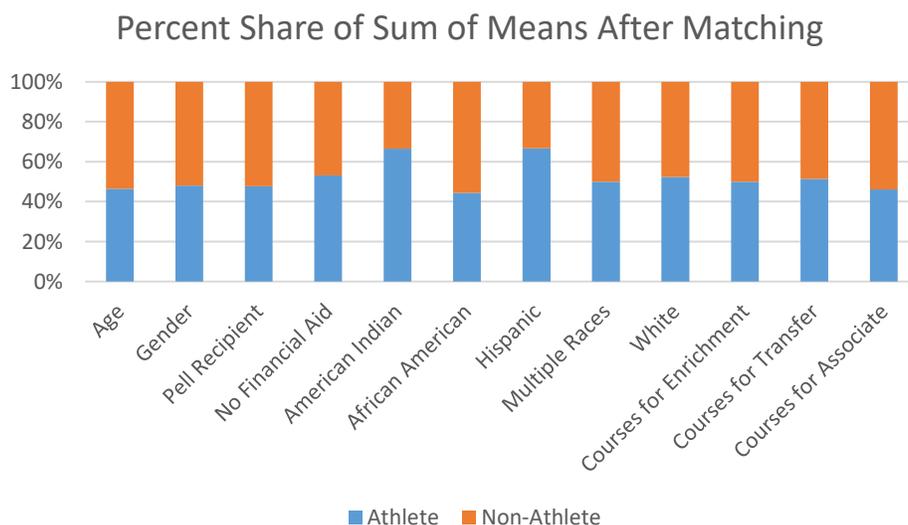


Figure 4. Percentage share (bound by 0 – 100%) of the sum of each covariate mean for the treatment and control group across characteristics of certain covariates after propensity score matching. Notice that the group means are more equally balanced among the covariates in each group.

Table 12 summarizes the percent share of the sum of means.

Table 12

Percent Share of Sum of Means Before and After Matching

<u>Covariates</u>	<u>Before Matching</u>		<u>After Matching</u>	
	Treatment	Control	Treatment	Control
Age	43.28%	56.72%	46.40%	53.60%
Gender (Male)	64.65%	35.35%	48.09%	51.91%
Pell Recipient	56.55%	43.45%	47.72%	52.28%
Work Study Recipient	97.22%	2.78%	-	-
No Financial Aid	42.30%	57.70%	53.16%	46.84%
American Indian	71.03%	28.97%	66.46%	33.54%
African American	65.69%	34.31%	44.46%	55.54%
Asian American	0.00%	100.00%	-	-
Hispanic	30.17%	69.83%	66.67%	33.33%
Hawaiian	0.00%	100.00%	-	-
Multiple Races	39.53%	60.47%	50.00%	50.00%
Unknown Race	0.00%	100.00%	-	-
White	59.41%	40.59%	52.29%	47.71%
Courses for Enrichment	31.68%	68.32%	50.00%	50.00%
Transfer	76.07%	23.93%	51.40%	48.60%
Unknown Goal	0.00%	100.00%	-	-
Employment Skills	0.00%	100.00%	-	-
Job Skills	0.00%	100.00%	-	-
Associate Degree	31.59%	68.41%	46.12%	53.88%

Two-Year Outcomes

After matching, two-year outcomes were analyzed and reported for each group. This analysis indicates what effect being an athlete has on pursuing a degree at the chosen community college. Table 13 shows the results of conducting *t*-tests of the treatment and control groups after propensity score matching. The outcomes of student athletes were significantly different in developmental reading, $F(1, 55) = 59.596, p < .001$; and grade point average, $F(1, 55) = 6.109, p < .05$. Developmental reading had a medium effect size of .106 and grade point average had a small effect size of .025. Table 13 also shows that athletes had a much higher mean for hours attempted than non-athletes, 30.946 to 18.571, but there is no significance due to the high standard deviations for each group. However, the effect size of

.168 indicates that being an athlete has a huge impact on hours attempted and thus indicates a potential area for future research in a longitudinal or cross sectional analysis.

Table 13

Outcomes for T-test of Control and Treatment Groups After Propensity Score Matching

Group Name Variables	Treatment (<i>n</i> = 56)		Control (<i>n</i> = 56)		F	<i>p</i>	η^2
	M	SD	M	SD			
Hours Attempted	30.946	13.227	18.571	14.502	2.172	.143	.168
Developmental Courses	3.570	3.893	2.450	3.727	.981	.324	.022
Developmental English	.320	.664	.410	.708	1.128	.291	.004
Developmental Math	1.710	1.979	1.14	2.013	1.303	.256	.020
Developmental Reading	.450	.829	.040	.187	***59.596	<.001	.106
Grade Point Average	2.198	1.093	1.810	1.349	*6.109	.015	.025

p* < .05. *p* < .01. ****p* < .001. Green & Salkind (2005) descriptors for effect size (η^2) are interpreted as .01 – small, .06 – medium, and .14 – large.

A student who transferred to another college in this data set was a categorical completion outcome. A chi-square analysis was performed to determine what impact being an athlete had on whether the student transferred. Table 14 shows that students in the treatment group had a higher level of transfer rates (71.4%, *n* = 40) than the control group (48.2%, *n* = 27). The results indicated a significant chi-square of 6.278, *p* < .05. To determine the strength of the association between the proportions of the treatment and control groups, Cramér's V score was performed. The Cramér's V score of .237 indicates a moderate association.

Table 14

Chi-Square Results for Transfer Outcomes in Treatment and Control Groups After Matching

Group Name Outcome	Treatment		Control	
	N	%	N	%
Transfer	40	71.4%	27	48.2%

Note: α = .05, Chi-Square = 6.278, Degrees of Freedom = 1, *p* < .05, Cramer's V = .237.

Summary

Chapter 4 presented the outcomes of this study utilizing propensity score matching to determine how athletes at a community college compared to non-athletes using educational outcomes such as GPA, hours attempted, developmental courses attempted, and transferability. Prior to matching, the majority of the individuals in the treatment group (athletes) were African American males taking coursework with the intention of transferring to a four-year school.

The logistic regression model that was utilized to conduct the propensity score matching provided a good fit in determining that seven variables (age, male, African American, American Indian, taking courses to transfer, not having any financial aid, and having received a Pell Grant) were statistically reliable in predicting membership in the dependent variable of being an athlete or non-athlete. Before matching, athletes were 162% more likely to be male, 150% more likely to be African American, 254% more likely to be American Indian, 345% more likely to take courses for transfer, but 95% less likely to receive a Federal Pell Grant and 96% less likely to have no financial aid. After matching, there were no statistical differences in the demographics and covariates between the two groups except for the age of the students.

The study results provided evidence that athletes took more developmental reading courses, had a higher grade point average, and were more likely to transfer to a 4-year school. The students in the two groups did not have a difference in hours attempted, number of developmental English courses attempted, number of developmental math courses attempted, and total number of developmental courses attempted.

CHAPTER FIVE: DISCUSSION

The final chapter provides conclusions, a discussion of the data analysis, and some recommendations for future research and practice. The chapter concludes with a review of the limitations of the study, some recommendations for future research, potential impacts for practice in community college settings, and final conclusions.

Understanding how athletes perform academically in relation to their non-athletic peers is important since the funding for athletic programs is inherently unstable (Byrd & Williams, 2007). Faculty at higher education institutions often perceive student athletes as lacking the educational skills needed to succeed academically (Storch & Ohlson, 2009). If athletes are performing better than their non-athlete peers, then funding can be easily justified. If athletes are performing worse, then utilizing student support services to help athletes can become a top priority for administrators.

The primary purpose of this study was to examine how athletes compared to non-athletes in certain academic outcomes, specifically hours attempted, grade point average, transfer to four-year schools, total number of developmental courses attempted, developmental math courses attempted, developmental English courses attempted, and developmental reading courses attempted. Secondly, the study determined if there was significant difference in the demographics of athletes versus the demographics of non-athletes.

Although there is much research on being a student athlete, and even specifically being a community college student athlete, there is a gap in examining student outcomes at community colleges for athletes. Prior to this study, an exhaustive review of the literature examining community college athletics was conducted and shared along with what areas of

research were most prevalent. Conceptual and theoretical frameworks that supported this research were also shared.

The methodology used for this study was propensity score matching. How this quantitative methodology was conducted, along with analysis and interpretation of the results was discussed. This chapter outlines the major findings of this study. Additionally, the limitations of this study are discussed along with recommendations for future research and practice based on the findings.

Conclusions and Discussion

The research questions developed for this study focused on demographic and academic characteristics of the students who were and were not student athletes. The findings of these research questions provided an understanding of how being a student athlete affected student outcomes like grade point average, transfer rates, hours attempted, and participation in developmental courses.

Research Question 1

Research Question 1 provided a description of the demographic and academic characteristics of the entire population of students who were either student athletes or non-athletes during the Fall 2013 through Spring 2015 academic years. Records of 7,518 students were utilized in this study with 58 (.75%) of the students being student athletes.

White students (57.95%) were the most represented in the overall student makeup at this community college with African Americans being the next largest group (23.53%). The makeup of female students (64.39%) was much higher than male students (35.61%). The top educational goal of this student cohort was to obtain an Associate Degree (48.33%) followed

by taking courses for enrichment (26.01%) and taking courses to transfer to a four-year school (20.97%).

Research Question 2

Research Question 2 sought to describe the demographic and academic characteristics of the athletes and non-athletes in the study during the Fall 2013 through Spring 2015 academic years. The breakdown of the two groups is as follows:

- There was a higher percentage of males in the athlete group (63.8%, $n = 37$) than the non-athlete group (35.4%, $n = 2710$).
- There was a higher percentage of African Americans in the athlete group (44.8%, $n = 26$) than the non-athlete group (23.4%, $n = 1789$).
- Athletes were more likely to get a Pell Grant (53.4%, $n = 31$) than non-athletes (41.1%, $n = 3149$).
- The biggest difference between the athlete and non-athlete groups was the long-term goal the student had. Athletes as a group (65.5%, $n = 38$) were far more likely to view transferring to another college as their main goal above non-athletes as a group (20.6%, $n = 1580$).
- Based on the above, it is not surprising that fewer athletes (22.4%, $n = 13$) had the goal of obtaining an Associate Degree than non-athletes (48.5%, $n = 3716$).

Clearly there are major differences between the athlete and non-athlete groups. These differences justified the use of propensity score matching to create a comparison of “apples to apples” groups.

Research Question 3

Research Question 3 explored if there was a significant difference in demographics and academic characteristics of the athletes and non-athletes prior to propensity score matching. An analysis of variance (ANOVA) was performed for the control and treatment groups before matching. This analysis provided means, standard deviations, F – values, significance levels, and an effect size index (η^2) of the two groups. The covariates that were examined were age, gender, financial aid status, race, and long-term academic goals. The analysis showed there were significant differences before matching in:

- Age, $F(1, 7713) = 21.109, p < .001$.
- Gender, $F(1, 7713) = 20299, p < .001$.
- Not getting any financial aid, $F(1, 7713) = 5.829, p < .05$.
- Being a work study recipient, $F(1, 7713) = 50.029, p < .001$.
- American Indian, $F(1, 7713) = 5.257, p < .05$.
- African American, $F(1, 7713) = 14.764, p < .001$.
- White $F(1, 7713), = 8.035, p < .01$.
- Getting an Associate Degree, $F(1, 7713) = 15.751, p < .001$.
- Taking courses for enrichment, $F(1, 7713) = 5.908, p < .05$.

A logistic regression was conducted to determine which of the independent variables were associated with being an athlete or non-athlete. The variables in question were age, male gender, being a Pell recipient, receiving no financial aid, American Indian, African American, Hispanic, multiple races, unknown race, taking courses for enrichment, taking courses to transfer, and having an unknown goal. The results indicated that the overall model of seven predictors (age, male, African American, American Indian, taking courses to

transfer, not having any financial aid, and having received a Pell Grant) were statistically reliable in predicting membership in the student athlete group. See Table 9 for the full breakdown.

Research Question 4

Research Question 4 explored if there were significant differences in the demographics and academic characteristics of athletes and non-athletes after propensity score matching. An analysis of variance (ANOVA) was performed for the athlete and non-athlete groups after matching. Age, $F(1, 55) = 6.632, p < .05$ was the only covariate that showed statistical significance. This is consistent with the idea that athletes are more traditional aged than non-athletes. Athletic programs recruit student athletes right out of high school to maintain consistency in their athletic development (Hines, 2005).

Research Question 5

Research Question 5 sought to determine if there were differences between the athletes and non-athletes in terms of academic success as measured by hours attempted, grade point average, and successful transfer rate as well as developmental course participation after propensity score matching. Two-year outcomes were analyzed and reported for each group. The outcomes of student athletes were significantly different in:

- Developmental reading, $F(1, 55) = 59.596, p < .001$.
- Grade point average, $F(1, 55) = 6.109, p < .05$.

Developmental reading had a medium effect size of .106 and grade point average had a small effect size of .025. Athletes had a much higher mean for hours attempted than non-athletes, 30.946 to 18.571, but there is no significance due to the high standard deviations for each group.

A student that transferred to another college in this data set was a categorical completion outcome. A chi-square analysis was performed to determine what impact being an athlete had on if the student transferred. Student athletes had a higher level of transfer rates (71.4%, $n = 40$) than the non-athletes (48.2%, $n = 27$). The results indicated a significant chi-square of 6.278, $p < .05$. The Cramér's V score of .237 indicates a moderate strength of association.

Recommendations for Practice and Research

Looking for future best practices is an important aspect of developing and maintaining healthy athletic programs at the community college level. This study demonstrates the viability of student athletes being successful with statistically higher grade point averages along with their higher transfer rates. This study also revealed that student athletes may require greater access to developmental reading courses. Continuing research regarding all aspects of community college athletics is crucial to the continued growth of athletic programs across the country. Especially needed are more quantitative studies that examine community college athletics to supplement the existing literature on this topic.

Recommendations for Practice

Recommendations for practice include creating stable funding for community college athletic programs, understanding the role and impact of student support services, understanding Title IX not just from a legal standpoint, but an ethical one, demonstrating that allowing students access to community college athletics ties into the mission of community colleges, and keep good data for ease of future research.

Recommendation 1. Funding issues for athletics are concerning for community colleges as this is rarely a stable concept (Byrd & Williams, 2007). Some research articles imply that community college presidents may not be fully aware of how the funding structure

for athletics truly works. Since the overall number of community college athletic programs has increased in the last decade, having an understanding of how athletics will be funded is paramount to maintaining a healthy athletic program.

A possible way of creating an understanding would be to compare economics as a driver of change with organizational strategies for change suggested by Chin and Benne (1967). These authors suggest that there are three strategies that organizations use in undertaking change. On the surface it would seem community colleges are employing empirical-rational strategies in making decisions concerning the funding of athletics.

However, viewing the actions of decision makers at community colleges through a normative re-educative strategies' lens may prove more useful. Chin and Benne (1967) say "These strategies build upon assumptions about human motivation different from those underlying the first. The rationality and intelligence of humans are not denied. Patterns of action and practice are supported by sociocultural norms and by commitments on the part of individuals to these norms" (p.91). Examining the sociocultural norms concerning athletics could go a long way to explaining how funding decisions are reached at community colleges. College presidents wanting to have a winner and colleges seeming to be "big time" are two possible examples of these norms.

Recommendation 2. The literature review also found numerous references that focused on the student support services offered to athletes at the four-year college level and how athletics improves retention and graduation rates for those athletes. However, there were only a few such references for community colleges. There were several references in the literature about how athletics can help motivate student athletes to achieve academic success but did not delve into what role student support services played in that success. For example,

two qualitative studies directly interview student athletes for perspectives that contribute to the perception that athletics help improve retention and graduation. The lack of research for community colleges is possibly explained by the general lack of services dedicated to community college athletes specifically. If community college athletics continue to grow, an awareness of the benefits that support services can have for athletes (Storch & Ohlson, 2009) will have to be incorporated into the decision-making process.

One suggestion for framing decisions made in the area of student support and student success of athletes could be conducted with the idea of a social capital framework. Balatti & Falk (2002) posit one of many definitions of social capital as “the resources that are made available to individuals or groups by virtue of networks and their associated norms and trust” (p. 283). By applying this framework, one should be able to show that student athletes are building social capital through their athletic careers, not just with support services but with coaches and other players, with faculty and staff, and with other students in the classroom.

Coaches will tell you that recruiting quality athletes is a key ingredient in developing a successful athletic program. It is just as important to retain those athletes in good academic standing. A high dropout rate is not beneficial to the student athlete or the college. Having a strong student support system is very effective in the recruitment and retention of student athletes (Storch & Ohlson, 2009). Understanding up front that the student athletes who come from low income families will have an increased likelihood of retention issues allows for proactive measures (Mendoza, Horton Jr., & Mendez, 2012). It is also important that the student support professionals understand the unique challenges that working with student athletes can present (Kissinger, Newman, Miller, & Nadler, 2011).

Recommendation 3. The Education Amendments of 1972 contained an important section that changed college athletics dramatically when it was passed into law. The ninth amendment or simply Title IX stated “No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving federal financial assistance” (“Title IX,” 2013). All public community colleges are subject to Title IX and this has led to more opportunities for women to compete in athletics. As of 2003, men’s teams accounted for roughly 51% of the total number of community college athletic teams (Castaneda et al., 2005). Thus, women’s teams accounted for roughly 49%.

On the surface this seems reasonably equitable. Digging deeper by looking at the number of participants, not just the number of teams shows there is still a disparity among the breakdown between men and women. Castaneda et al. showed that only 37% of the participants were women, and that women only accounted for 42% of the athletic scholarships awarded. The biggest reason for this dissonance between equitable number of teams and inequitable number of participants is football. Football programs have large team sizes and award a higher percentage of athletic scholarships.

The research dealing with gender adequately articulated concerns and trends within community college athletics. Decision makers need to be aware of potential inequities concerning gender within their respective athletic programs. Administrators should understand that increased athletic participation for women could affect retention and graduation rates for this group.

Thinking in terms of organizational change and decision making, Title IX is a perfect example of a teleological theory put into practice by the federal government. According to

Van de Ven & Poole (1995), teleology is the “development of an organizational entity proceeds toward a goal or an end state. It is assumed that the entity is purposeful and adaptive; by itself or in interaction with others, the entity constructs an envisioned end state, takes action to reach it, and monitors its progress” (p. 516). Clearly the end state here is gender equity in athletic participation. The federal government gave no specifics in how this was to be accomplished. It was up to the NJCAA and its member institutions to work out a plan for reaching this desired (and legally binding) goal. Tough choices were made at some athletic programs as some men’s programs were cut or ended altogether. The federal government monitors the progress of Title IX and when schools are found in non-compliance, funding is cut, or legal action is taken against the school in question. However, understanding Title IX from an ethical standpoint as well as the legal code is very important for athletic programs at the community college level going forward.

Recommendation 4. Generally, the mission of a community college is to provide educational opportunities to members of the community that they serve. Athletics at the community college level are not a revenue generating enterprise (Horton, 2009). To answer a potential criticism of why community colleges should offer athletics, decision makers will need to directly or indirectly show that athletic programs help fulfill the general mission of their respective community colleges. In doing so, more than just simple expenditures must be considered. The examination of the literature revealed research in the following areas: community college presidents’ perceptions of athletics (Williams & Pennington, 2006), athletes’ perceptions of athletics (Horton, 2009), showing that athletics increases enrollment (Jenkins, 2006), and that athletics help build a sense of community (Lawrence, Mullin & Horton, 2009).

However, the research lacked any information on the pecuniary expenditures of athletic programs at the community college level as a variable in the assessment of the overall value of athletics to the colleges. There is information on athletic scholarship aid, but no hard data on what athletic departments spend as part of the college's costs. With the increase in travel due to higher fuel costs, the increase in building costs and the like, one can't help but wonder what effect this is having on the bottom line at community colleges. Showing how athletics supports the mission of community colleges will be vital in demonstrating its value beyond just finances.

Seashore (2004) put forth a potential research methodology that shows how athletics support a college's mission statement by having a network of supportive relationships to help a student be successful. Seashore offers several types of support systems, many of which community colleges already have in place. These opportunities include role models, helpers, referral agents, and challengers.

Examples of role models include faculty and staff, and for student athletes it can also include coaches and teammates. Coaches are clearly helpers, but it should be noted that faculty often assume this role for periodic instances. Referral agents at a community college would be transfer advisors, financial aid advisors, student services agents, and so on. Lastly, and most importantly, are the challengers to student athletes. Coaches will challenge athletes to perform higher on the playing field but being challenged academically by faculty will allow student athletes to excel in other areas of life. If a community college athlete can transfer to a four-year institution, as this study indicates is more likely to happen, then the transfer component of a community colleges mission statement has been fulfilled.

Recommendation 5. One of the difficulties encountered in conducting this study was in the uncertainty of what data would be useful for analysis. Community colleges with athletic programs can ensure better research using propensity score matching by having easily identifiable covariate variables as well as dissimilar outcome variables to differentiate what variables have significance. Good statistical analysis comes from good data, those community colleges that plan on conducting research on their athletic programs would be well served to check what information is being collected.

Implications for Practice

A propensity score estimation is found by using a logistic regression model to compute a conditional probability of a person from the control group being in the treatment group given a composite profile of covariates (characteristics) of a person in the sample (Rojewski, Lee, & Gemici, 2010). This conditional probability is calculated by using the observed characteristics and assigning the treatment indicator as the dependent variable. Propensity scores range from 0.0 to 1.0, and these scores are used to make matches from the athlete and non-athlete groups.

Once a propensity score has been calculated, different propensity score matching methods can be used to match units (Pan, 2015). Examples of these methods include: nearest neighbor matching which matches a person from each group with the closest propensity score match, caliper matching which matches a person from each group with the closest propensity score as long as that score is very close, Mahalanobis metric matching which matches a person from each group using the idea of Mahalanobis distance based on the proximities of the variances, and optimal matching which uses Mahalanobis distance and a weighted distance metric. (Pan, 2015). Once a method is chosen, the matches proceed across

both groups and if no match is found, the case is discarded and the sample size is reduced (Frye, 2014).

After a matching method is utilized, the researcher must then evaluate the quality of the balance between the covariate variables. This evaluation is done by evaluating each of the following: selection bias using a significance test, standardized bias, and percent bias reduction (Pan, 2015). Graphical representations can also be utilized in addition to these statistical methods in the evaluation process to help visualize the quality.

Finally, an outcome analysis is conducted on the matched data as if it had been done on the entire original data (Pan, 2015). Some studies look at outcome analyses of the data both matched and unmatched to see what differences the matching made.

As with any research method, there are issues with propensity score analysis that must be acknowledged by the researcher. Some of these issues include how one assesses the robustness of propensity score analysis, under what conditions is propensity score matching efficient, and how to effectively implement propensity score analysis on complex data are challenges that must be met (Pan, 2015). Additionally, the consequences of matching with or without replacement must be incorporated into any research design using propensity score matching. Matching with replacement means each unit in the control group can be matched more than once while without replacement means that each unit in the control group is matched only once. The choice of matching with or without replacement gives very different matching groups and thus different accuracy's in the results (Pan, 2015). Finally, considerations of the sample size must be considered as some researchers suggest that the control group sample size should be three times larger than the treatment group for better accuracy (Pan, 2015).

Recommendations for Research

When conducting the literature review for this study, the lack of data driven analysis was surprising. Also, the literature base on community college athletics does not reveal many common areas or foci of research. Further research using a common methodology could shed some insight into what works well for community college athletics and what areas could be improved. The following summary will highlight certain areas of community college athletics that could show valuable insight using data and propensity score matching. Increased scrutiny in these areas could demonstrate the value of community college athletics and help administrators become aware of potential problem spots to allow for proactive solutions.

The recommendations for research include conducting longitudinal studies at individual institutions, doing a statewide examination of community college athletics, looking for differences between the Division I, Division II, and Division III classifications, examining differences between rural and urban community college institutions that sponsor athletics and performing qualitative studies on athletes' experiences.

Recommendation 1. In conducting the literature review for this study, some articles examined how certain community colleges were adding athletic programs to increase enrollment (Ashburn, 2007). One article examined the perceptions of certain community college presidents on how athletics increased enrollment among other things (Byrd & Williams, 2007). None of these articles, however, used inferential statistics to support their claims.

It would be interesting to see if indeed there is any correlation between adding athletic programs and enrollment growth. Conducting a longitudinal study at individual

community colleges could demonstrate if enrollment growth occurred during the installment of athletics or the growth of athletic programs. One potential limitation of this type of study would be accounting for confounding factors of enrollment growth or decline.

One benefit of conducting a longitudinal study that spans the entirety of an athletic program's existence using propensity score matching is the increase in the number of athletes in the control group size. This larger sample could demonstrate correlation for certain outcome variables that would not be shown for a smaller group size like the one used in this study (Pan, 2015).

Recommendation 2. An interesting observation from the literature review for this study is that there are 17 dissertations dedicated to examining community college athletics for the statewide level. Some of the topics include Title IX compliance for California (Beers, 1997), the role of the athletic director in California community colleges (Fields, 1977), several perceptual studies, several examinations of the impact of race on athletics, and several studies on the impact of student support services. There were, however, no studies that used inferential statistics on a large data set to look for correlation of any kind.

Conducting a study using propensity score matching at the state level as either a longitudinal or cross-sectional study would provide some data analysis that is sorely needed for this research topic. Since states often use the same type of data reporting for their respective community colleges within the state system, it should not be difficult to cull together a meaningful data set for analysis.

Recommendation 3. Community college athletic programs are classified into three levels concerning athletic scholarships. Schools that offer scholarship awards covering the full cost of tuition comprise the first level, which is classified as Division I by the NJCAA.

The second level is comprised of programs that offer partial scholarships, which is classified Division II by the NJCAA. Lastly, programs that offer nothing in the way of athletic scholarships are classified as Division III by the NJCAA. California community colleges offer no scholarships based on athletics, which is equivalent to Division III in the NJCAA. Undertaking a statistical analysis of each separate division could lead to interesting results and shed light on the impact that varying levels of financial aid has.

For the Division I level, researchers could use scholarship aid as a matching variable to see if there is any correlation between athletes and non-athletes who receive scholarship aid. Since the amount of scholarship aid varies from state to state and even school to school, scholarship amount could be broken down by scholarship amount using an ANOVA type analysis.

Recommendation 4. In her 2004 dissertation, Cindy Castaneda provided a national overview of athletics in public community colleges (Castaneda, 2004). Castaneda used IPEDS data from 567 community colleges to create this overview. The topics examined included student participation, sport sponsorship, athletic scholarship aid, athletic revenues and expenses, and staffing requirements. This work has been cited over 30 times at the time of this study and has been cited more than any other work on community college athletics.

One interesting aspect of her work was that she used a geographic classification scheme to divide community colleges into rural, urban, and suburban groupings and then reported the differences in the above topic areas. One glaring limitation of the study was that it was summary data. Nothing in the way of correlation was examined, and some of the observations, while interesting, were not examined for potential confounding variables.

Looking for significant differences between rural, urban, and suburban community colleges using propensity score matching would further the research that Cataneda began. It would require delving deeper than what IPEDS data could provide, so future researchers will have to make logistical decisions about how to acquire the numerous data sets. Another consideration is potential differences in the matching variables at the community colleges across these geographical classifications.

Recommendation 5. The literature review for this study indicated very few qualitative studies had been conducted to get insight into the experiences of community college athletes. In 1996, Judith Berson published an article that explored issues student athletes face at a community college (Berson, 1996). In this article, Berson directly interviewed student athletes to see what impact being an athlete had on their college experience.

An interesting follow up to a data driven analysis utilizing Propensity Score matching would be to conduct a qualitative study whose questions were guided by the outcomes of the PSM analysis. For example, using the results of this study, one could ask athletes questions about their desire to continue playing sports past the community college level, what hardships they overcame, what motivates them to succeed in the classroom, and so on. Getting this personal information along with a data analysis would help administrators and coaches alike in designing and running a successful athletic program.

Limitations

There were five recognized limitations within this research. First, there was no control over which students are student athletes at the respective community college. Thus, certain demographics were more prevalent in the data used. For example, there were more

African Americans and males that were athletes as compared to their peers. However, propensity score matching allowed for dividing athletes and non-athletes into statistically comparable groups which alleviated this concern.

Second, participation in community college athletics varies from college to college. Some community colleges offer varying amount of athletic aid and others do not. This could be a huge factor in retention. The community college that participated in this study does not offer athletic aid, so that was not a concern for using propensity score matching to find profiles that were similar with non-athletes.

Third, it is not uncommon for a student athlete at the community college level to enroll as a student for one year, and then become a student athlete the next, or vice-versa. This limitation was not be a problem for this study as athletic rosters were examined for the two-year cohort. If a student was an athlete in one of the two years and not the other, they were labeled accordingly and sorted by the propensity score matching.

Fourth, there was the potential for selection bias in this study. Since there were many variables considered, selection bias could have been a problem due to community college athletes generally having different academic and retention backgrounds than non-athletes (Mendoza, Horton, & Mendez, 2012) as well as potentially having different impacts on student support services at a community college (Storch & Ohlson, 2009). Propensity score matching reduces the problem of selection bias and non-random assignments (Titus, 2007).

The final limitation identified for this study was the chosen research method. As mentioned, propensity score matching reduces the problem of selection bias and non-random assignments but in doing so many students were eliminated from the data analysis. For example, only full-time students were matched since athletes must be full time to be eligible.

Thus, all part-time students were eliminated. Making sure non-athletes are represented in the study is vital. This concern was mitigated by the ability of propensity score analysis to represent the untreated group as part of the analysis (Titus, 2007).

Conclusion

The trend in community college athletics is moving toward more, rather than less, intercollegiate athletics. Placed in its best light, intercollegiate competition that encourages personal development is an integral part of a student's overall educational experience. Sports programs may also attract more students to a community college and enhance pride in the college both on campus and within the community. It seems inevitable, however, that the educational value of athletics in higher education will continue to generate controversy. With the specter of less funding already present or looming on the horizon, it is not clear that community colleges will continue to devote resources to start or expand athletics programs. (Chen, 2008, p. 4)

This quote illustrates the importance of community college leaders assessing their athletic programs to provide evidence of the academic benefits that athletics provides. Employing a Contingency Theory approach will help leaders identify the organizational and environmental variables that shape how athletes perform in the classroom as well as what potential roadblocks they face outside of it. Devoting resources to athletics is easier to justify if empirical data and statistical analysis like Propensity Score Matching are conducted that show positive significance for athletes in academic outcomes like higher grade point averages and transfer rates as this study indicated. By using this combination, community college leaders can demonstrably show the educational value of community college athletics that is based on sound theory and observation.

REFERENCES

- About the CCCAA. (2016). Retrieved from <http://www.cccaasports.org/about/about>.
- About the NWAACC. (2016). Retrieved from <http://www.nwaacc.org/aboutus.php>.
- Alhadeff, L. L. (2014). *An assessment of community college men's basketball players: Antecedents to next-level collegiate recruitment*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Alexander, B. C. (2009). *A descriptive study of intercollegiate athletics in Mississippi's public community and junior colleges*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Ashburn, E. (2007, July 6). To increase enrollment, community colleges add more sports. *The Chronicle of Higher Education*, 53(44). Retrieved from chronicle.com
- Associated Press. (2011). Alabama community colleges cutting sports programs as budgets shrink. *Community College Week*, 23(19), 8.
- Balatti, J. & Falk, I. (2002). Socioeconomic contributions of adult learning to community: A social capital perspective. *Adult Education Quarterly*, 52(4), 281-298.
- Barreno, Y., & Traut, C. A. (2012). Student decisions to attend public two-year community colleges. *Community College Journal of Research and Practice*, 36, 863-871.
<http://dx.doi.org/10.1080/10668920903505007>
- Beal, S. J., & Kupzyk, K. A. (2014). An introduction to propensity scores: What, when, and how. *The Journal of Early Adolescence*, 34(1), 66-92.
- Beers, S. (1997). *The extent to which California community college athletic programs are in compliance with Title IX*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.

- Bennion, S. (1992, Summer). Junior college athletics: Participation opportunities and academic accountability. *New Directions for Institutional Research*, 74, 23-27.
- Berson, J. (1996, March). *Student perceptions of the intercollegiate athletic program at a community college*. Paper presented at the National Association of Student Personnel Administrators, Atlanta, GA.
- Bess, J. L., & Dee, J. R. (2008). *Understanding college and university organization: The state of the system* (Vol. 1). Sterling, VA: Stylus Publishing, LLC.
- Bess, J. L., & Dee, J. R. (2008). *Understanding college and university organization: Dynamics of the system* (Vol. 2). Sterling, VA: Stylus Publishing, LLC.
- Bradley, P. (Ed.). (2011, May 2). Ala. community colleges cutting sports programs as budgets shrink. *Community College Week*, 8.
- Brennan, J. (2008, April 17). Higher education and social change. *Higher Education*, 56, 381-393.
- Brooks, G. (1988). Strong athletic programs: An important part of two-year college's mission. *Journal of the Ohio Association of Two-Year Colleges*, 14(1-2), 35-36.
- Brown, K. (2012). *The study of the perceptions of the personnel and student body of a Division II junior college athletic department's strategic plan as it relates to Title IX*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Brown, R. (1988). *Current status of two-year college athletic programs in non-gender specific and non-football playing schools of the NJCAA*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.

- Burgess, C. D. (2006). *Perceptions of selected community college presidents regarding certain aspects of intercollegiate athletics*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Bush, V. B., Castaneda, C., Hardy, D. E., & Katsinas, S. G. (2009). Athletics in community colleges: A primer. In D.B. Kissinger & M.T. Miller (Eds.), *College student-athletes: Challenges, opportunities, and policy implications* (109-121). Charlotte: Information Age Publishing.
- Bush, V. B., Castaneda, C., Hardy, D. E., & Katsinas, S. G. (2009, Fall). What the numbers say about community colleges and athletics. *New Directions for Community Colleges*, 147, 5-14. <http://dx.doi.org/10.1002/cc.373>
- Byrd, L. A. (2007). *North Carolina community college presidents' and board of trustee chairs' perceptions of intercollegiate athletics*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Byrd, L. A., & Williams, M. R. (2007, Fall). Expansion of community college athletic programs. *The Community College Enterprise*, 39-49.
- California Association of Community Colleges. Commission on Athletics. Research Committee. (1988, April). Report and recommendations on intercollegiate athletics: Effect of 2.0 GPA requirements, status of women's athletics programs, impact of part-time coaches, types of units used to satisfy transfer requirements. *Community College Issues*, 1(5). Retrieved from ERIC database. (ED300046).
- Camp, W. G. (2000). Formulating and evaluating theoretical frameworks for career and technical education research. *Journal of Vocational Education Research*, 26(1), 4-25.

- Campion, W. C. (1990). The national junior college athletic association: A study in organizational accountability. *Community College Review*, 17(4), 47-51.
<http://dx.doi.org/10.1177/009155219001700408>
- Castaneda, C. (2004). *A national overview of intercollegiate athletics in public community colleges*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Castaneda, C., Katsinas, S. G., & Hardy, D. E. (2006). *The importance of intercollegiate athletics at rural-serving community colleges. A policy brief by the Education Policy Center at the University of Alabama for the MidSouth Partnership for Rural Community Colleges*. Retrieved from
<http://ruralccalliance.com/docs/MSPBRIEFATHLETICS.pdf>
- Castaneda, C., Katsinas, S. J., & Hardy, D. E. (2008, Summer). Meeting the challenge of gender equity in community college athletics. *New Directions for Community Colleges*, 142, 93-105. <http://dx.doi.org/10.1002/cc.328>
- Causby, C. (2010). *Title IX compliance at two-year colleges: An analysis of perceived barriers and strategies*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Chang, J. (2002). Student involvement in the community college: A look at the diversity and value of student activities and programs. Retrieved from ERIC database. (ED470922).
- Chen, G. (2008) Athletics in community colleges. *Community College Review*. Retrieved May 10, 2013, from <http://www.communitycollegereview.com/articles/10>

- Chin, N., & Porter, P. (2013). Concussion management in community college athletics: revealing and understanding the gap between knowledge and practice. *Community College Journal of Research and Practice*, 37(6), 409-423.
- Chin, R. & Benne, K. (1967). *General Strategies for Effecting Changes in Human Systems. Organization change: A comprehensive reader*. San Francisco: Jossey-Bass.
- Cigliano, L. M. (2006). *A perceptual study of the impact of athletic programs in selected community colleges in the state of Tennessee*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Cragen, D. E. (2009). *National Junior College Athletics Association student athletes perception of commitment to sport and academics as defined by gender*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches*. Thousand Oaks, CA: Sage Publications.
- Daniel, R. V. (2012). *Perceptions of Title IX's impact on gender equity within intercollegiate athletics: The Mississippi public community and junior colleges*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Diede, M. T. (2005). *Junior college and community college athletic capitalism and the work of athletic trainers*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Fanelli, S. (2010, March). Intercollegiate athletics through the eyes of a two-year college president. *JUCO Review*, 61(7), 2.

- Fernandez, J. (2005). *The effects of athletic participation, expectations about counseling and gender on attitudes toward help seeking behaviors among community college students*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Fink, J. R., & Kirk, A. (1979). Community college athletics: The road less traveled. *Educational Record*, 60(4), 439-443.
- Greene, J. (1982, March). Blitzing athletic abuses. *Community and Junior College Journal*, 52(6), 32-35.
- Felder, D. (1982). *An analysis of the role of the athletic director as perceived by presidents and athletic directors of community colleges*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Fields, M. (1977). *The role of the community college athletic director as perceived by athletic directors, deans, and presidents in California community colleges*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Foster Jr., S. T. (2006). One size does not fit all. *Quality Progress*, 39(7), 54.
- Frye, B. J. (2014). *Using propensity score matching to model retention of developmental math students in community colleges in North Carolina*. ProQuest LLC. Ann Arbor, MI.
- Green, S.B. & Salkind, N. J. (2005). *Using SPSS for Windows and Macintosh: Analyzing and understanding data* (4th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Hackett, C. (2011). *Predictors of commitment to graduation: An application toward African American male student athletes within the California community college system*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.

- Hackett, C. D., & Sheridan, D. A. (2013). Predictors of commitment to graduation: African American male student athletes in the California community college system. *Journal of Applied Research in the Community College*, 20(2), 37-52. Retrieved from <http://0-search.proquest.com.wncln.wncln.org/docview/1640488104?accountid=14968>
- Hagedorn, D. S., & Horton, Jr., D. (2009). Conclusions and parting words from the editors. *New Directions for Community Colleges*, 147, 85-92.
<http://dx.doi.org/10.1002/cc.380>
- Hagerty, J. (1976, April). The community athletic program. *Community and Junior College Journal*, 46(7), 8-9, 24.
- Hall, M. (2007). *A study of a learning community for the community college student-athlete*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Harper, S. R. (2009, Fall). Race, interest convergence, and transfer outcomes for black male student athletes. *New Directions for Community Colleges*, 147, 29-37.
<http://dx.doi.org/10.1002/cc.375>
- Harvey, D. (2009). *From junior college to university: Contributing factors to completion of a bachelors degree for African American scholarship football players*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Hasan, M. N. (2016). Positivism: To what extent does it aid our understanding of the contemporary social world? *Quality & Quantity*, 50(1), 317-325.
- Herrin, S. (2012). *An evaluation of the athletic academic support office and its ability to provide effective support for student-athletes at county college*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.

- Hines, M. (2005). Athletes find a home at North Carolina's community colleges. Retrieved from http://www.nccommunitycolleges.edu/news_releases/CC_Athletics.htm
- Hobneck, C., Mudge, L., & Turchi, M. (2003). *Improving student athlete academic success and retention*. (Thesis). Retrieved from ERIC database. (ED478782).
- Hoffman, J., & Horton, Jr., D. (2011). State gender equity law & athletic participation among community colleges in Washington State. *Community College Journal of Research & Practice*, 35(1/2), 165-178. <http://dx.doi.org/10.1080/10668926.2011.525189>
- Hoffer, A., & Pincin, J. A. (2016). The effects of revenue changes on NCAA Athletic Departments' expenditures. *Journal of Sport & Social Issues*, 40(1), 82-102.
- Holland, D. (2009). *Community college student affairs administrators' perceptions regarding intercollegiate athletics*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Holland, D. & Williams, F. (2010, Spring). Community college student affairs administrators' perceptions regarding intercollegiate athletics and attractiveness of institution. *Journal for the Study of Sports and Athletes in Education*, 4(1), 59-68.
- Horton, Jr., D. (2009). *Comparative study of the persistence and academic success of Florida community college student-athletes and non-athletes students: 2004 to 2007*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Horton, Jr., D. (2009, Fall). Class and cleats: Community college student athletes and academic success. *New Directions for Community Colleges*, 147, 15-27.
<http://dx.doi.org/10.1002/cc.374>

- Horton, Jr., D. (2011, Fall). Developing an institutional culture toward degree attainment for student athletes. *New Directions for Community Colleges*, 155, 27-33.
<http://dx.doi.org/10.1002/cc.455>
- Horton, D. (2015). Between a ball and a harsh place: A study of Black male community college student-athletes and academic progress. *Community College Review*, 43(3), 287-305. doi:10.1177/0091552115578168
- Howe, K. R. (2009). Positivist dogmas, rhetoric, and the education science question. *Educational Researcher*, 38(6), 428–440. Retrieved from
<http://www.jstor.org/prox.lib.ncsu.edu/stable/25592132>
- Iino, K. K. (2014). *An evaluation of the contribution of athletic counselors to the academic success of student-athletes at the California community colleges*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Jenkins, R. (2006). Athletics aren't a luxury at community colleges. *Chronicle of Higher Education*, 52(29), B13.
- Kanter, M., & Lewis, M. (1991). A study of the academic performance of student-athletes in California's community colleges: California Community College Fund for Instructional Improvement. Retrieved from ERIC database. (ED332763).
- Kenny, C. (2013). *Perceptions of women's teams coaches regarding gender equity and Title IX compliance in community colleges*. (Doctoral dissertation). Retrieved from
<http://scholarworks.uno.edu/cgi/viewcontent.cgi?article=2795&context=td>
- Keim, M. (2004). Support services for two-year college student-athletes. *College Student Journal*, 38(1), 36.

- Kissinger, D. B., & Miller, M. T. (2007). Profile of community college athletes in selected sports. *The Community College Enterprise*, 13(2), 51-60.
- Kissinger, D. B., Newman, R., Miller, M. T., & Nadler, D. P. (2011). Athletic identity of community college student athletes: Issues for counseling. *Community College Journal of Research and Practice*, 35(7), 574-589.
- Knapp, T., & Raney, J. (1988). Student athletes at two-year colleges: Transcript analysis of grades and credits. *Community/Junior College Quarterly*, 12,(2), 99-105.
- Knight, A. (2012). *Exploring the relationship between opportunities for students to participate in community college intercollegiate athletics programs and their aspirations to attend college*. Retrieved from <http://digitalcommons.nl.edu/diss/55>
- Krug, M. (2007). From student-athlete to college president: Dr. Donald Cameron champions the need for college athletics. *JUCO Review*, 58(7), 10-11.
- Kuga, D. J. (1996). Governance of intercollegiate athletics: Perceptions of faculty members. *Journal of Sport Management*, 10, 149-168.
- Lane, F., To, Y., Shelley, K., Henson, R. (2012). An Illustrative Example of Propensity Score Matching with Education Research. *Career and Technical Education Research*, 37(3), 187-212.
- Lawrence, H. J., Mullin, C. M., & Horton, Jr., D. (2009, Fall). Considerations for expanding, eliminating, and maintaining community college athletic teams and programs. *New Directions for Community Colleges*, 147, 39-51. <http://dx.doi.org/10.1002/cc.376>
- Lawrence, J., Ott, M., & Hendricks, L. (2009). Athletics reform and faculty perceptions. *New Directions for Higher Education*, 2009 (148), 73-81.

- LaVetter, D., & Kim, H. (2010). Transportation practices in community college athletics. *Community College Journal of Research and Practice*, 34(6), 449-461.
- Libadisos, J. K. H. (2016). *Community college student-athletes' perspectives on the transfer process to a four-year institution*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Lumpkin, A. (2008, January). A call to action for faculty regarding intercollegiate athletics. In *Phi Kappa Phi Forum* (Vol. 88, No. 1, p. 21). National Forum: Phi Kappa Phi Journal.
- Majerus, M. M. (2016). *Factors affecting the academic and athletic self-determined motivation of NJCAA Division III student-athletes: A mixed methods study*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Marts, J. L. (2016). *Understanding student success and institutional outcomes in service-learning coursework at a North Carolina community college: A propensity score study*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Masenda, K. A. (2015). *Academic advising for student athletes at 2-year institutions*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- McAninch, H., et al. (1987). Two-year intercollegiate athletics: Student eligibility, national governance, and CEO involvement. Retrieved from ERIC database. (ED280527).
- McClellan, M. L. (2013). *Lift ev'ry voice: The resounding experiences of black male student-athletes at a California community college*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.

- McCullough, J. (2000). *The economic impact of an athletic program at a rural public community college on the local economy*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Mendoza, P., Horton, D., & Mendez, J. (2012). Retention among community college student-athletes. *Community College Journal of Research and Practice*, 36, 201-219.
<http://dx.doi.org/10.1080/10668921003677183>
- Morris, A., Modica, J., & Miller, M. (2010, Spring). Athletic offerings in private junior colleges. *The Community College Enterprise*, 16(1), 75-88.
- Mounce, M. T. (2015). *A descriptive study of intercollegiate athletics in North Carolina's public community and technical colleges*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Muir, R. L. (2015). *Access and academic success of community college student-athletes in California* (Doctoral dissertation, California State University, Fullerton).
- Mumford, V. E. (2005). A look at women's participation in sports in Maryland two-year colleges. *The Sport Journal*, 8(1), 1-7.
- Mumford, V. E. (2006). Promoting equity and access in 2-year college intercollegiate athletic programs. *Community College Journal of Research & Practice*, 30(3), 213-222.
- Murray Jr., E. (2012). *California community college athletic directors lived experience and perceptions about financing issues with athletic programs*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Nanney, R. C. (2008). *Perceptions of athletic participation: A comparative-case study of two North Carolina community colleges*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.

- Newsome, A. L. (2005). *An assessment of academic support services for student-athletes at community colleges in the state of Texas*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- NJCAA Member Colleges. (2016). Retrieved from http://www.njcaa.org/member_colleges/college-directory.
- Noonan-Terry, C. (2009, May 28). Honing athletic skills, academics at community colleges. *Diverse: Issues in Higher Education*, 26(8), 20.
- Owiesny, C. (1999). *Gender balance in intercollegiate athletics at California community colleges*. (Thesis). Retrieved from http://scholarworks.sjsu.edu/cgi/viewcontent.cgi?article=2889&context=etd_theses
- Paddack, M., DeWolf, R., Covassin, T., & Kontos, A. (2016). Policies, procedures, and practices regarding sport-related concussion in community college athletes. *Journal of Athletic Training*, 51(1), 82-88.
doi:<http://dx.doi.org/prox.lib.ncsu.edu/10.4085/1062-6050-51.2.01>
- Pan, W. (2015). *Propensity score analysis: Fundamentals and developments*. New York: Guilford Publications.
- Phillips, D., & Burbules, N. (2000). *Postpositivism and educational research*. Lanham, MD: Rowman & Littlefield Publishers.
- Pollock, A., Pingley, N. (1986, Winter). An alternative athletic program. *Community College Review*, 14(3), 51-52. <http://dx.doi.org/10.1177/009155218601400309>

- Radlinski, A. (2003). *Women in athletic administration in community colleges: Identification of career paths, strategies and competencies found in preparation for leadership roles in athletics*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Raepple, R., Peery, D., & Hohman, H. (1982). Athletics in community and junior colleges. Retrieved from ERIC database. (ED215709).
- Regan, M., & Cunningham, G. (2013). Analysis of homologous reproduction in community college athletics. *Journal for the Study of Sports and Athletes in Education*, 6(2), 161-172. <https://doi.org/10.1179/ssa.2012.6.2.161>
- Richburg III, C. W. (2013). *An examination of community college black male student athletes' perceptions of student support services and identifying methods for improving service delivery*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Rinke, P. A. (2011). *Community college athletics: The influence of the chance to compete on college choice*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Rojewski, J., Lee, I. H., & Gemici, S. (2010). Using propensity score matching to determine the efficacy of secondary career academies in raising educational aspirations. *Career and Technical Education Research*, 35(1), 3-27.
- Rosenbaum, P.R., & Rubin, D.B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41-55.

- Seashore, C. (2004). Developing and using personal support systems. Retrieved February 19, 2013 from <https://www.ecologyofdesigninhumansystems.com/wp-content/uploads/2013/02/Self-as-Source-Seashore-ODN.pdf>.
- Schulz, K. (2007). *The impact of academic and athletic motivation on the academic achievement of community college student-athletes*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Shrock, D. (2009). *An analysis of northern California community college co-ed track and field athletes' perceptions of their head coaches' leadership styles as compared to the head coaches' self perceived leadership style*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Staurowsky, E. J. (2009, Fall). Gender equity in two-year athletic departments: Part I. *New Directions for Community Colleges*, 147, 53-62. <http://dx.doi.org/10.1002/cc.377>
- Staurowsky, E. J. (2009, Fall). Gender equity in two-year college athletic departments: Part II. *New Directions for Community Colleges*, 147, 63-73. <http://dx.doi.org/10.1002/cc.378>
- Steiner, P., & Milander, H. (1978). Title IX requires equality for female athletes: Changing the emphasis upon community college athletics. *Community College Review*, 6, 30-35. <http://dx.doi.org/10.1177/009155217800600107>
- Steinbach, P. (2010). Two year forecast: Some community college athletic departments are struggling to weather the storm. *Athletic Business*, 34(9), 56-58.
- Stokes, R. (1979). The presidential role in community and junior college athletics. *Educational Record*, 60(4), 431-438.

- Storch, J., & Ohlson, M. (2009, Fall). Student services and student athletes in community colleges. *New Directions for Community Colleges: Vol. 147*, 75-84.
<http://dx.doi.org/10.1002/cc.379>
- Thies, J. C. (2009). *Intercollegiate athletics: The community college experience*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Thiss, P. (2009). *Effects of dedicated academic support services on the persistence rates of California community college student-athletes*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Title IX, Education Amendments of 1972. (2013). Retrieved from
<http://www.dol.gov/oasam/regs/statutes/titleix.htm>
- Titus, M.A. (2007). Detecting selection bias, using propensity score matching, and estimating treatment effects: An application to the private returns to a master's degree. *Research in Higher Education*, 48(4), 487-521.
- Today's NJCAA. (2013). Retrieved on <http://www.njcaa.org/todaysNJCAA.cfm>
- Torraco, R. J. (2005). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review*, 4(X), 1-12.
- Tsitsos, W., & Nixon, H. L. (2012). The Star Wars arms race in college athletics coaches' pay and athletic program status. *Journal of Sport & Social Issues*, 36(1), 68-88.
- Tubb, J. (2013). Our work for a better, stronger NJCAA continues. *JUCO Review*, 65(30), 8.
- Van de Ven, A. & Poole, M. (1995). Explaining development and change in organizations. *The Academy of Management Review*.20(3), 510-540.

- Veloz, O. N. (2015). *Factors that support successful African American male student-athletes at a community college*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Washington, J. B. (2017). *Using background, environmental and non-cognitive behaviors to derive factors that predict participation in a community college minority male mentoring program*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
- Watson, J. C. (2016). The effect of athletic identity and locus of control on the stress perceptions of community college student-athletes. *Community College Journal Of Research & Practice*, 40(9), 729-738. doi:10.1080/10668926.2015.1072595
- White, S. (2011). *Transfer shock and the student athlete*. (Doctoral dissertation). Retrieved from http://sdsu-dspace.calstate.edu/bitstream/handle/10211.10/1219/White_SaBrina.pdf?sequence=1
- Williams, M. R., Byrd, L., & Pennington, K. (2008). Intercollegiate athletics at the community college. *Community College Journal of Research and Practice*, 32, 453-461.
- Williams, M. R., & Pennington, K. (2006, Fall). Community college presidents' perceptions of intercollegiate athletics. *The Community College Enterprise*, 12(2), 91-103.
- Wilson, K. (2011). *A phenomenological study of community college student athletes in high profile sports*. (Thesis). Available from ProQuest Dissertations and Theses.
- Wood, J. L., & Ireland, S. M. Y. (2014). Supporting black male community college success: Determinants of faculty-student engagement. *Community College Journal of Research and Practice*, 38(2-3), 154-165.