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THE RELATIONSHIP OF ATHLETIC DEPARTMENT EXPENDITURES ON ACADEMIC AND ATHLETIC OUTCOMES

A DISSERTATION APPROVED FOR THE DEPARTMENT OF EDUCATIONAL LEADERSHIP AND POLICY STUDIES

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Abstract

Higher education institutions have been critiqued on the ever-increasing costs of intercollegiate athletic departments with little evaluation on how these expenditures impact athletic outcomes and academic outcomes on an institutional level. This quantitative study explored the relationship between estimated academic expenditures and APR, and recruiting expenditures, game and travel expenditures, facility and equipment expenditures, and coaching compensation expenditures and Directors' Cup total points. The sample for academic expenditures on APR was 176 Division I public institutions from 2011-2017, while the sample for athletic expenditures on Directors' Cup total points was 211 Division I public institutions from 2010-2017. A Hausman test indicated a random-effects regression analysis was appropriate for academic expenditures on APR and a fixed-effects regression analysis was appropriate for athletic expenditures on Directors' Cup total points.

Three random-effects regression models were conducted to evaluate the relationship between estimated academic expenditures and APR. The random-effects models indicated a significant positive relationship between academic expenditures and APR with no additional predictors, with athletic department control variables, and with athletic and institutional control variables.

Recruiting expenditures, game and travel expenditures, facility and equipment expenditures, and coaching compensation expenditures were first evaluated independently with fixed-effects regression on their relationship with Directors' Cup total points. Recruiting expenditures, game and travel expenditures, facility and equipment expenditures, and coaching compensation expenditures each had a significant positive relationship with Directors' Cup total points. When all four expenditure variables were combined in a single fixed-effects model, game

and travel expenditures was the only significant predictor. Game and travel expenditures was still the only significant positive predictor when adding in athletic control variables. Lastly, with both athletic and institutional controls, game and travel expenditures was the only significant predictor. The study supported previous research that found academic expenditures were positively related to APR scores, but conflicts with research that found academic staff as significant. The estimated academic expenditure metric can be used in future research to measure academic spending by athletic departments. With only game and travel expenditures as significant contributor to Directors' Cup standings, it was possible that an extended season when performing well athletically was captured in this study rather than increasing expenditures directly contributing to athletic performance. Therefore, increasing expenditures may not directly lead to an increase in athletic performance.

Keywords: Athletic Expenditures, NCAA, APR, Recruitment Expenditure, Facility Expenditure, Game and Travel Expenditure, Coaching Compensation, Directors' Cup

CHAPTER ONE

INTRODUCTION

In February 2016, the Governor of Louisiana, John Bel Edwards addressed the people of Louisiana on a looming and crippling budget crisis. As part of his address, he proclaimed, "the LSU main campus in Baton Rouge will run out of money after April 30th, as will the Health Sciences Center in Shreveport and LSU Eunice. There is no money left for payroll after those dates…campuses will be forced to declare financial bankruptcy, which would include massive layoffs and the cancellation of classes" (Sentell, 2016, n.p.). By December 2016, the state's budget crisis had a crippling effect on LSU. LSU President King Alexander described how the budget deficit and cuts to higher education spending created challenges of holding onto students and esteemed faculty members (O'Donoghue, 2016). However, no one seemed to tell the athletic department. During the Fall of 2016, the athletic department fired head football coach Les Miles which initiated a $12.9 million buyout clause, promoted Ed Orgeron to head coach for $3.5 million, raised the defensive coordinator's salary to $1.8 million, the highest salary in the country at that position, and hired a new offensive coordinator for $1.5 million (Dellenger, 2016a, 2016b, 2017). As the university faced financial bankruptcy, the athletic department was faced with $19.7 million of expenditures on four football coaches. Indeed, nothing stops LSU football[i].

Since the early 1900s to the modern day, institutions have seen a rise in spending in intercollegiate athletics (Duderstadt, 2000; Jozsa, 2013; Litan et al., 2003; Padilla & Baumer, 1994; Shulman & Bowen, 2001; Thelin, 1996; Thelin & Wiseman, 1989; Tsitsos & Nixon, 2012; Van Rheenen, 2012). Athletic departments have engaged in such expenditures in an attempt to gain a competitive advantage over their respective peers (Duderstadt, 2000; Gerdy, 1997; Padilla

& Baumer, 1994). As observed by Duderstadt (2000), “financial strategy in intercollegiate athletics is strongly driven by competitive pressures. The belief that those who spend the most win the most drives institutions to generate and spend more and more dollars” (p. 136). One of the most visible signs of the growing expenditures has been the rise of coaching salaries (Gerdy, 1997; Hirko et al., 2013; Tsitsos & Nixon, 2012; Yost, 2010). Moreover, the increases in expenditures have been evident in the rise of capital expenditures and ongoing arms race around new athletic facilities (Huml et al., 2018; Shulman & Bowen, 2001; Yost, 2010). As observed by Stephen Ludwig, a Regent Emeritus of the University of Colorado, “It's a never-ending arms race to build shiny objects that appeal to 17-year-olds, so they'll pick us instead of someone else” (Hobson & Rich, 2015, n.p.). Unfortunately, the rise in athletic expenditures has not brought more scrutiny on how these expenditures impact student-athletes. Notably, Jones (2012) observed “this escalation in athletic spending has, surprisingly, not resulted in a substantial increase in empirical research on the impact of college athletics expenditures” (p. 585). Indeed, more studies should address the effects of rising collegiate athletic expenditures.

The increase in athletic department expenditures have been blamed for taking funds away from academic units at an institution (Duderstadt, 2000; Jozsa, 2013). Duderstadt (2000) acknowledged “most intercollegiate athletics programs at most colleges and universities require some subsidy from general university resources such as tuition or state appropriation” (p. 133). Thelin (1996) described how Handford’s 1974 study depicted such a scenario where “the economic constraints facing higher education, combined with the rising costs of intercollegiate athletic programs, meant that eventually athletics and academic programs would be in direct competition for scarce available dollars” (p. 177). Additionally, Desrochers (2013) observed “athletic subsidies are common across all Division I programs, and a portion of athletic budgets

are often funded from other university resources, student fees, or state appropriations" (p. 6). Therefore, the outcomes of these expenditures by athletic departments should be evaluated to determine if these resources have had a significant impact toward student-athlete outcomes. After all, perhaps other academic units might have been able to use these funds more effectively elsewhere to enhance student-athlete welfare.

Importance of Research on Athletic Expenditures

Administrators, educators, and researchers should inspect how the increases in expenditures affect student-athlete outcomes. Claims were made that spending will transition to athletic success, which have resulted in several studies; however, these studies have been relatively few (Jones, 2012; Litan et al., 2003; Orszag & Orszag, 2005). Additionally, many studies have examined variables influencing holistic academic development and growth, but few have evaluated how athletic department expenditures can impact student-athlete academic achievement (Hirko, 2014). With the amount of funds being dedicated towards athletic departments, the influence of these expenditures on student-athletes should be studied.

The topic of expenditures in intercollegiate athletics has been viewed as compelling topic of interest by a variety of stakeholders (Duderstadt, 2000). Duderstadt (2000) explained:

> the sports media fuel the belief that money is the root of all evil in college athletics. And, indeed, the size of the broadcasting contracts for college football and basketball events, the compensation of celebrity coaches, and the professional contracts dangled in front of star athletes make it clear that money does govern many aspects of intercollegiate athletics. (p. 126)

The topic of intercollegiate athletic expenditures prompted studies on: institutional revenue generation (Borland et al., 1992; McEvoy et al., 2013; Sperber, 2000), institutional recruitment

(Jones, 2009; Litan et al., 2003; McEvoy, 2005; Murphy & Trandel, 1994; Toma & Cross, 1998), and enhancing institutional prestige (Clotfelter, 2011; Goidel & Hamilton, 2006; Suggs, 2009b). Although a number of scholars have examined student-athlete academic achievement (Comeaux & Harrison, 2011; Gaston-Gayles, 2003; Paskus, 2012), few have engaged with expenditures acting as a predictor to academic achievement (Hirko, 2014). Similarly, studies that investigated expenditures on athletic performance have evaluated programs or athletic departments and not the direct impact on the student-athlete (Jones, 2012; Litan et al., 2003; Orszag & Orszag, 2005).

Hirko (2014) examined the impact of expenditures on student-athlete achievement by examining athletic department expenditures in the area of academic support. He used the Academic Progress Rate (APR) as the measure of student-achievement and studied spending over a six-year period. Notably, he found expenditures were predictive of an increase in APR scores. Although this study provided guidance towards the relationship of expenditures on achievement, the use of APR excluded a number of student-athletes. LaForge and Hodge (2011) explained that one of the primary problems with the APR was that it only counted student-athletes receiving financial aid. Therefore, any students that chose to participate in varsity sports at their respective institution without an official athletic scholarship were not counted as part of the APR metric.

Outcomes of Interest for this Study

This study seeks to build on previous studies on expenditures and student-athlete outcomes. The two primary outcomes of interest are student-athlete academic achievement and student-athlete athletic success. Therefore, this study will address the relationship of athletic department expenditure on student-athlete academic achievement and athletic success. Ideally, the research will expand on previous findings, generate new questions for discussion, provide

guidance for athletic administrators, and inform the general perception of the impact of various expenditures.

Purpose Statement

The purpose of this study was to examine the relationship between public NCAA Division I institutions' athletic department expenditures and student-athlete academic achievement and athletic performance.

Significance Statement

This research is important to aid in the evaluation of any correlation that might exist between athletic department expenditures and student-athlete outcomes with institutions receiving criticism on the amount of expenditures dedicated to NCAA Division I athletic programs. This research could help inform athletic administrators of the value of the investment in academic support centers. Moreover, this study identifies athletic department expenditures that are related to successful student-athlete academic and athletic outcomes. Finally, this study will help to bridge the gap in literature on areas of expenditures that influence student-athlete's athletic outcomes.

Research Questions

My research was guided by 10 research questions to assess if relationships exist between expenditures and academic and athletic outcomes. The hypotheses were developed through an examination of previous literature in the area. A previous study found expenditures in academic support centers as a positive contributor to academics Hirko (2014). This study sought to expand on this finding by examining a larger contingent of institutions and including institutional and athletic environments.

Previous studies have been mixed on how and if expenditures impact athletic performance. This study selected four major expenditure categories (recruitment, game and travel, facilities, and coaching) in the Knight Commission's College Athletics Financial Information (CAFI) Database to examine within a larger framework of institutional and athletic department controls. Caro (2012) found a relationship existed between strong recruiting classes and athletic success; however, Stevens (2017) was unable to find a correlation between recruiting expenditures and wins. Scharfe (1989) and Magner (2014) each found spending in travel was positively correlated to athletic success. Despite observations and critiques on athletic facility expenditures, few empirical studies have been produced on how and if these expenditures actual contribute in a direct way to athletic success. Huml et al. (2018) observed no relationship between recruiting rankings and facility upgrades, while Welch (2019) found a positive relationship facility upgrades and athletic success. Lastly, coaching salaries have been found to be positively correlated to athletic performance (Colbert & Eckard, 2015) and have been found to have no correlation to athletic performance (Tsitsos & Nixon, 2012). All of these expenditures were examined within a larger framework of institutional and athletic department controls.

The following research questions were addressed in this study.

Research Question 1:

1. Is there a relationship between academic expenditures and academic outcomes?

Hypothesis 1: There is a relationship between estimated academic expenditures and single year averaged APR.

Research Question 2:

2. Is there a relationship between academic expenditures and academic outcomes when controlling for sport variables?

Hypothesis 2: There is a relationship between estimated academic expenditures and single year averaged APR when sport variables are included.

Research Question 3:

3. Is there a relationship between academic expenditures and academic outcomes when controlling for sport and institutional variables?

Hypothesis 3: There is a relationship between estimated academic expenditures and single year averaged APR when sport and institutional variables are included.

Research Question 4:

4. Is there a relationship between recruitment expenditures and athletic outcomes?

Hypothesis 4: There is a relationship between recruitment expenditures and Directors' Cup total points.

Research Question 5:

5. Is there a relationship between game and travel expenditures and athletic outcomes?

Hypothesis 5: There is a relationship between game and travel expenditures and Directors' Cup total points.

Research Question 6:

6. Is there a relationship between facility and equipment expenditures and athletic outcomes?

Hypothesis 6: There is a relationship between facility and equipment expenditures and Directors' Cup total points.

Research Question 7:

7. Is there a relationship between coaching salary expenditures and athletic outcomes?

Hypothesis 7: There is a relationship between coaching salary expenditures and Directors' Cup total points.

Research Question 8:

8. Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes?

Hypothesis 8a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures.

Hypothesis 8b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures.

Hypothesis 8c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures.

Hypothesis 8d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures.

Research Question 9:

9. Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes when controlling for sport variables?

Hypothesis 9a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 9b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 9c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 9d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Research Question 10:

10. Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes when controlling for sport variables?

Hypothesis 10a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 10b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 10c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 10d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Definition of Terms

Academic Achievement – Academic achievement will refer to how well student-athletes perform academically.

Athletic Performance – Athletic performance will refer to how well student-athletes and teams perform in intercollegiate athletic competition.

NCAA Division I – The National Collegiate Athletic Association (NCAA) is viewed as the most prominent athletic association in the United States. The NCAA is a membership association encompassing over 1,000 public and private higher educational institutions. The membership association is divided into three groups of membership based on the size and scope of institutions

and their respective athletic department: Division I, Division II, and Division III. Division I is also broken down into three separate subdivisions based on their sponsorship status of football: Football Bowl Subdivision, Football Championship Subdivision, and No Football.

Football Bowl Subdivision (FBS) – The FBS receives the most media attention and is the most recognizable. Institutional members to this group commit to participate in the sport of football at a high level and ensuring their ability to play football games in larger stadiums. Institutions forgo an official NCAA championship in football to participate in post-season bowl games organized by groups unaffiliated with the institutions.

Football Championship Subdivision (FCS) – The FCS is designed for institutions competing in Division I athletics, but do not want to commit to financing football at the level of institutions affiliated with the FBS. These institutions will compete in a championship designed and organized by the NCAA at the end of the regular season. On occasion, FCS institutions will compete against FBS institutions in football, but their games are almost exclusively held at the FBS institution's home field.

CHAPTER TWO

LITERATURE REVIEW

Expenditures

Colleges have spent heavily in athletics with the hopes of generating money and prestige, recruiting freshmen applicants, and, most importantly, winning (Underwood, 1984). Thelin and Wiseman (1989) observed "the amount of television revenues and gate receipts often conjures the image of university sports programs as money makers. It may be true but usually overlooked is that varsity programs are also money spenders" (p.14). Indeed, academic institutions competing in NCAA Division I Football Bowl Subdivision spent over $8 billion in intercollegiate athletics during the 2016-2017 academic year; a roughly $2.46 billion increase from the 2011-2012 academic year (College Athletics Financial Information Database, 2019). With the vast sums of money being spent in intercollegiate athletics, it should be important to understand why higher education administrators allowed such extravagant expenditures and if selected expenditures did indeed have an impact on athletic and academic outcomes.

Spending for revenue generation. Many colleges and universities engaged and heavily invested in intercollegiate athletics with the hopes of generating additional revenues for their institution (Caro & Benton, 2012; Mittten et al., 2009; Smith, 1988). Higher education administrators viewed intercollegiate athletics as an investment, where increased expenditures in athletics could lead to increased revenues in other areas, such as enrollment (Ingrassia, 2012) and television contracts (McEvoy et al., 2013). McEvoy et al., (2013) identified television contracts, "ticket sales, charitable contributions, and corporate sponsorships" as some of the primary sources of athletic department revenue generation (p. 250). In their study of what contributes to athletic department revenues, McEvoy et al. (2013) found that membership in a BCS conference

was the largest contributing factor in the variance of department generated revenues. Furthermore, they found correlations between athletic department revenue generation and athletic success in football and basketball and increased enrollment. They recognized that membership to a BCS conference provided greater access to revenues. Similarly, Sperber (2000) identified,

> Although more than 300 schools play Division I basketball, the six BCS conferences hog the largest proportion of payout dollars from March Madness. According to a recent analysis of the finances of big-time college sports, the average annual revenue of the BCS conferences was $63 million, whereas the amount for the other twenty-three leagues in Division I averaged less than $3 million per year (p. 219).

Success in football and basketball provided access to bowl games and post-season tournaments. With multimillion-dollar revenues on the line through television contracts and ticket sales of successful athletic teams, higher education administrators were willing to spend large sums in big-time athletics. This act of spending heavily in athletics to increase institutional revenue could be viewed to some as an investment and to others a high-stakes gamble.

Unfortunately, the wheel does not always land on red and the gamble in athletics does not always pay out as very few institutions have seen financial success through athletics (Sperber, 2000). Sperber (2000) observed "historically, and contrary to popular myth, almost all colleges and universities have always lost money on their intercollegiate athletics programs" (p. 220). Despite some pointing towards the discrepancy between revenues and expenditures as indicating a net loss, some researchers proposed the full revenues have not been considered. Borland et al., (1992) determined that a true look at the marginal costs and marginal revenues would provide a better understanding of intercollegiate athletic expenditures. In a case study of the Western

Kentucky University athletic budget, they examined the expenditures in connection to the economic impact and found a net contribution to university revenues. An important aspect, they argued, is the contribution of the athletic department to campus enrollment; which was a key to increasing marginal revenues. However, research on intercollegiate athletics' role on institutional enrollment has yielded mixed results.

Spending for general college recruitment. Universities have pursued and invested in intercollegiate athletics as a method to increase campus enrollment (Ingrassia, 2012; Litan et al., 2003). Various studies have reported a relationship between intercollegiate athletics and enrollment/applications (Jones, 2009; McEvoy, 2005; Murphy & Trandel, 1994; Toma & Cross, 1998). This reported relationship aided the justification by higher education administrators and provided a reason to continue to spend heavily in athletics. Murphy and Trandel (1994) studied the relationship between football records and applications at 55 institutions that participated in the six major football conferences at the time: Atlantic Coast, Big Eight, Big Ten, Pacific Ten, Southeast, and Southwestern. As part of the data collection and analysis, the researchers only evaluated conference winning percentages as a method for controlling strength of schedule. Applicant data and other measures were obtained from *Peterson's Guide to Four-Year Colleges*, and directly from university admissions offices. Due to incomplete data, the researchers performed an ordinary least squares regression on data collected for 42 universities. Their results suggested "that a school that enjoys unusual success on the football field tends to be rewarded with an increase in the number of applications it receives" (Murphy & Trandel, 1994, pp. 267–268). However, Murphy and Trandel (1994) admitted that the data and methods did not allow the researchers to fully control for differences between universities with a moderate effect size.

Toma and Cross (1998) expanded on this study by controlling for differences between institutions by comparing across peer institutions. Additionally, they examined the impact of championships in football and men's basketball at the Division I level between 1979 and 1992. The researchers used *Peterson's Guide to Four-Year Colleges* to collect institutional data on the 30 institutions that won championships. Toma and Cross (1998) reviewed the percent change in applications after schools won a national championship, and the trend data of two years before the championship and the three years after the championship. Furthermore, they compared the changes in applications to self-reported peer institutions; champion institutions reported who they believed their peers were to the researchers. The researchers reviewed the descriptive statistics and suggested that winning a championship in football or men's basketball "appears to translate into a sometimes dramatic increase in the number of admissions applications received both in absolute terms and relative to peer institutions" (Toma & Cross, 1998, p. 651). The study was not performed with statistical methods to determine if the changes in applications was significant. The lack of these methods hinders the overall significance of the study. Moreover, there appeared to be errors in the data. Cleveland State, a peer institution identified for Louisville's 1986 basketball national championship, was listed twice with different three-year averages in applications after the national championship.

McEvoy's (2005) study on athletic performance and applications was heavily influenced by Murphy and Trandel (1994) and Toma and Cross (1998). The study used similar methods to Murphy and Trandel (1994) by examining only conference play among 62 schools between 1994 and 1998 competing in the Atlantic Coast, Big East, Big Ten, Big 12, Pacific Ten, and Southeastern conferences. However, McEvoy (2005) used the *College Handbook* for application data and included three additional team sports: men's basketball, women's basketball, and

volleyball. Schools were categorized on the change in winning percentages and an ANOVA was performed to determine if there was a difference between groups in applications received. McEvoy (2005) found that there were no significant findings for men's basketball, women's basketball, and volleyball; therefore, changes in winning percentages in those sports had no impact on applications received by the institution. A significant increase in the number of applications was found by schools which had a football team increase their winning percentage by at least .250. McEvoy (2005) used this study to validate Murphy and Trandel's (1994) study and conclude that "a significant positive relationship exists between success in NCAA Division I-A college football and undergraduate applications for admission at universities" (pp. 20-21). However, the research may not have actually separated the schools for athletic success. The schools were separated into three different categories: decrease by .25, increase by .25, and no change in winning percentages. Therefore, programs that repeated as undefeated would be categorized with programs that repeated as winless due to both having no change in winning percentage. The study showed no significant impact on applications by programs with no change in winning percentages, which could also suggest that sustained winning and losing may not have an impact on applications.

These studies supporting a positive relationship between athletic success and applications fueled the belief that spending resources to improve intercollegiate athletics would increase the number of students applying to universities, and again, justified the enormous expenditures in athletics from higher education administrators. However, the samples have been relatively small, primarily focused on Division I programs in the modern-day Power 5, have not examined full-seasons, and have been relatively inconsistent. The only consistent measure determined was the influence of football on applications to Division I Power Five institutions. Unfortunately, these

studies could be generalized to support the idea that intercollegiate athletics, in general, are corelated to applications. Other studies investigated the relationship between athletic success and applications and suggested other variables have been responsible in growth and the need for dramatic spending in athletics to increase enrollment was unnecessary.

Peterson-Horner and Eckstein (2015) sought to challenge the perceived relationship by studying the enrollment decisions of students. The researchers used the 2005 follow-up to the 2002 Educational Longitudinal Study to investigate common responses among 12,000 students on factors that led to their respective college choice, and a survey instrument administered to introductory sociology classes at a large flagship institution, a smaller private institution, and a small liberal arts college. These institutions represented NCAA Divisions I and III. The researchers received 427 first-year student responses and conducted 21 follow-up interviews. They found only 11.7% of respondents to the 2005 follow-up survey listed athletics as an important factor, while 45.7% identified athletics as unimportant to their college selection. Peterson-Horner and Eckstein (2015) observed "the only thing less important than intercollegiate athletics is whether the respondent's parent/ parents attended the school" (p. 74). In the survey comparison between institutions, 27% students at the large state flagship felt athletics was very important, while only 18% and 3% felt it was very important at the private FCS institution and small liberal arts Division III institution respectively. Overall, Peterson-Horner and Eckstein (2015) concluded "It is not surprising that university administrators exaggerate the Flutie Factor's efficacy, given the increasingly commercialized and corporatized world of intercollege sports (specifically) and higher education (generally)" (p. 80).

In Litan et al.'s, (2003) study funded by the NCAA, they used data collected from the Department of Education and NCAA institutions to analyze various financial issues facing

athletic departments. As part of the larger study, they specifically reviewed the effects of intercollegiate athletic operating expenditures on university admissions. Through the literature review, they determined there was small evidence to suggest that there may be an effect on applications received. However, they found no evidence that changes in operating expenditures in football and basketball among Division I FBS institutions had an impact on incoming student SAT scores and increased enrollment using panel regressions.

Overall, the literature provided evidence supporting and countering suggestions related to the number of applications received and the academics associated with those students. There seemed to be some acceptance throughout the literature that athletics does play some, even if extremely small, part in recruiting students. Peterson-Horner and Eckstein (2015) conceded in their study "intercollegiate athletics is relatively unimportant to high school seniors making college attendance decisions, although it may still be important to making application decisions" (pp. 73-74). In regards to an affect on increasing enrollment of student with high standardized test scores, Litan et al. (2003) noted "Despite the evidence that athletic success increases applications, the academic literature is divided on whether athletic success is associated with improved student quality" (p. 11). Although the literature has been divided on the issue, college presidents have continued to cite athletics and athletic success as increasing an institution's visibility and applications (Opsahl, 2015; Rolph, 2011). Therefore, the expenditures in athletics could be viewed by administrators as a tool to increase the visibility of the institution, and this visibility returns the initial investment with added revenue in the form of increased applications and enrollment.

Spending for prestige. Institutions invested in intercollegiate athletics in an attempt to grow their prestige and reputation among other institutions (Clotfelter, 2011; Suggs, 2009b;

Sweitzer, 2009; Thelin, 1996). Sweitzer (2009) noted "several institutions have switched conferences for reasons beyond athletics, including the intention of enhancing their prestige" (p. 60). A similar observation was made by Suggs (2009a) who observed "colleges continue to invest heavily in athletics expecting returns not in the form of profit per se but rather in prestige" (p. 20). In this observation, he described Kennesaw State University's pursuit through intercollegiate athletics to be considered a peer institution to the University of Georgia and Georgia State University.

Public perceptions of intercollegiate athletics on a university's reputation was evaluated by Goidel and Hamilton (2006). They studied how athletic success and a national championship affects public perceptions of universities. They surveyed registered voters in Louisiana after Louisiana State University (LSU) won the BCS football national championship in 2004, and again in 2005 after LSU's football team completed a 9-3 season. They found most respondents connected success in athletics to academic quality than just a single national championship. An ordinal logistic regression analysis of responses revealed less-educated respondents were more likely to connect athletic success to academic success. Although a single case-study cannot be used to generalize an entire population, the idea of the public associating athletic success to institutional reputation supported why presidents have continued to spend millions towards athletic success.

Clopton and Finch (2012) surveyed 633 students at 27 BCS institutions from three athletic conferences to gage how they perceive outsiders' views of prestige in association with intercollegiate athletics success. Three multiple, hierarchical regressions were used to determine the predictability of perceptions on academic, athletic, and overall university prestige from athletic success. The analysis revealed that some elements of athletic success (i.e. Directors' Cup

Points Totals) predicted positive perceptions of external academic prestige, but others (i.e. football and men's basketball success) had no significant impact. Clopton and Finch (2012) cautioned that universities that typically appear on the Directors' Cup Points Standings have been known for their academic prestige. Expectedly, athletic success was a strong predictor of perceived athletic prestige. For perceptions of the overall university, men's basketball and football had only a minor impact. The study provided small support that athletics has a positive influence on the perceptions of university and athletic prestige but not academic prestige.

Interestingly, the idea of intercollegiate athletics being used to enhance the prestige of a university has not been solely adopted by the United States. Indeed, other countries have viewed intercollegiate athletics as an opportunity to enhance an intuition's prestige (Chelladurai & Danylchuk, 1984; Onifade, 1993). Chelladurai and Danylchuk (1984) surveyed 90 Canadian intercollegiate athletic administrators on their perceptions of the goals of intercollegiate athletics, and asked the respondents to rank nine different perceived goals. They discovered that the most important goals were transmission of culture, athlete's personal growth, public relations, and prestige with no difference between subgroups (i.e. sex, institution size, and conference affiliation).

Onifade (1993) studied the perceptions of all 45 athletic directors at Nigerian universities with a physical education program. A seven-point Likert-type scale survey was administered with a repeated-measures ANOVA to reveal differences among the various subgroup categories. They found that all the subgroups (age, sex, education, employment, experience) were in agreeance ranking prestige, public relations, athletes' personal growth, and entertainment as the top objectives. Although these older studies cannot be generalized to all international institutions,

they provide insight on how administrators have viewed athletics as an opportunity to increase the reputation of their institution and justify the large expenditures.

Spending "to win." Universities have invested heavily in intercollegiate athletics to maintain a winning program. Gerdy (1997) noted "the pressure to balance athletic department budgets results in an excessive drive to win-at-all-cost. Such a drive results in decisions being made to maximize on-field or court performance at the expense of the best long-term educational interests of the institution and its student-athletes" (p. 10). The rise of coaching salaries has been one of the main areas where the growth of expenditures has been most evident. Thelin and Wiseman (1989) observed, "At several major universities, the head football or basketball coach makes over $100,000 [$200,646.43 in 2017 (Friedman, 2017)] in annual base salary, sometimes more than the university president" (p.22). Meanwhile, Hirko et al., (2013) examined the growth rates of coaching salaries, faculty salaries, tuition, and general costs of instruction 2005 to 2011, and found that coaching salaries, grew the most. Total athletic coaching salaries grew by 67.1% in the FBS and 59.4% in the FCS, while faculty salaries grew 15.8% in the FBS and 14.1% in the FCS. When comparing football coaching salaries to the cost of instruction, the growth in football coaching salaries was between 1.04 to 2.83 times greater than the cost of instruction in all but two conferences in Division I. They noted "where there is big money in athletics, football and total coaching salaries are the recipients" (Hirko et al., 2013, pp. 23–24).

Unfortunately, the rise of expenditures on coaching salaries may not actually lead to an increase in winning. Tsitsos and Nixon (2012) examined if the rising costs of coaching salaries in men's football and basketball led to more success. Through an examination of coaching salaries and top 25 rankings from 2003 to 2009, they observed that a rise in coaching salary in either

men's football or basketball had no impact on athletic success in the short, medium, or long term.

Several researchers investigated the question of how operational expenditures influence on-field success. As part of Litan et al.'s (2003) study for the NCAA, the researchers reviewed revenues and expenditures and compared the data to winning percentages in football and basketball. They found no association existed between operational expenditures and winning percentages. Moreover, they determined winning percentages had no impact on increased operating revenue. However, Jones (2012) saw "a positive, statistically significant relationship between athletics expenditures and team on-field success" for only FBS institutions (p. 601). Jones (2012) used the same EADA data as Litan et al. (2003), but Litan et al. had the support of the NCAA, which provided them greater access to financial data reported to the NCAA. Additionally, Litan et al. only reviewed winning percentages of football and basketball, while Jones expanded his scope to include most sports by examining the NACDA Directors' Cup. Therefore, additional research could clarify if a relationship between expenditures and on-field success existed, and if such a relationship was present in select sports.

Higher education administrators have viewed intercollegiate sports as an opportunity to expand revenue streams of their respective institutions. This perception resonated across higher education which can be viewed through the increased expenditures in intercollegiate athletics. Administrators have supported the expenditures in athletics with the hopes of developing a winning athletic program to help drive: an increase in revenue streams from lucrative television contracts and gate receipts, an increase in new student applications and enrollment, and to expand the distinction, eminence, and prestige of the institution.

Theoretical Framework Behind Increasing Expenditures

Bowen's (1980) revenue theory of cost has been used by Hirko et al. (2013) and McEvoy et al. (2013) in various studies examining institutional revenues and expenditures in intercollegiate athletics. Welch (2009a) noted "Bowen's revenue theory of cost applies directly to the behavior of athletics departments, which spend money on capital and operational strategies to win games and recruit better athletes" (p. 29).

Bowen's revenue theory of costs. Bowen's (1980) revenue theory of costs was developed through an analysis of how and why higher education institutions spend resources. Bowen (1980), in the initial study of higher education revenues, expenditures, and outputs, noted "colleges and universities have no strong incentive to cut costs in quest of profit because they do not seek profit" (p. 15). Similarly, McEvoy et al. (2013) explained "athletic departments are non-profit entities; therefore, all revenue in a given year are expected to be spent" (p. 253). This similarity has allowed researchers to utilize revenue theory of costs to examine the financial aspects of athletic departments.

The foundation of the revenue theory of cost was based on the notion that expenditures are equal to costs. Specifically, Bowen (1980) stated "the basic concept underlying the revenue theory of cost is that an institution's educational cost per student unit is determined by the revenues available for educational purposes" (p. 17). Student unit was developed by Bowen to standardize the differences between types of students (i.e. freshmen, doctorate, full-time, etc.). This standardization allowed for a better comparison between institutions with different functions. As part of the theory, Bowen (1980) developed five laws of higher education costs:

1. The dominant goals of institutions are educational excellence, prestige, and influence.
2. In quest of excellence, prestige, and influence, there is virtually no limit to the amount of money an institution could spend for seemingly fruitful educational ends.

3. Each institution raises all the money it can.
4. Each institution spends all it raises.
5. The cumulative effect of the preceding four laws is toward ever-increasing expenditure (pp. 19 – 20).

These laws demonstrated how in the pursuit of excellence, prestige and influence among peer organizations, institutions will spend all revenues attained. Athletic departments have been critiqued as a similar function of spending all revenues, even revenues not attained, in the pursuit of excellence, prestige, and influence (Suggs, 2009b).

Through an exploration of institutional size on expenditures and dedication of resources, Bowen (1980) noted "growing organizations eventually become subject to three influences that tend to raise unit costs…increasing costs of organizational coordination, possible deterioration of quality of product or services, and increasing costs of student recruitment and student transportation" (p. 192). Particularly of note, in relation to athletic departments, was the possibility of size impacting the quality. For intercollegiate athletic departments, quality can be defined in a variety of manners. Some may say a quality athletic department would be focused on graduating students, while others may say quality would be defined as championships. In any definition of quality, Bowen hypothesized that a loss in quality could be overcome through increased expenditures and noted a loss in quality could occur from being too small and being too large. Therefore, there might be small and large athletic departments with similar expenditures attempting to correct a presumed loss in quality. The increase in expenditures by such athletic departments could be determined as an environmental threat to the excellence, prestige, and influence of other athletic departments prompting them to increase their revenue generation to fuel additional expenditures.

Academic Outcomes

Measuring student-athlete success and achievement: Issues with FGR, GSR, and APR. Academic success has been defined in a multitude of ways, but has generally been focused on factors that impact the academic experience of students (York et al., 2015). York et al. (2015), in their analytic literature review of the term 'academic success,' carefully observed that "the term has been applied with increasing frequency as a catchall phrase encompassing numerous student outcomes" (p.1). They argued "a theoretically grounded definition of academic success…[is comprised of:] academic achievement, satisfaction, acquisition of skills and competencies, persistence, attainment of learning objectives, and career success" (York et al., 2015, p. 9). Comeaux and Harrison (2011) developed a holistic conceptual model of student-athlete academic success, which encompassed the recommendations of York et al. However, many studies have focused on the academic achievement and graduation rates of student-athletes due to the concerns over academic integrity.

Many studies have examined the graduation rates of student-athletes (Eckard, 2010; Ferris et al., 2004; Gaston-Gayles, 2003; Hollis, 2001; Rishe, 2003; Shapiro, 1984). In 1990, all institutions receiving federal funds were required to report the graduation rates for students and student-athletes known as the Federal Graduation Rate (FGR) (LaForge & Hodge, 2011). However, the NCAA developed two new measurements for academic achievement in 2003: the Graduation Success Rate (GSR) and Academic Progress Rate (APR) (Van Rheenen, 2015). Notably, the GSR differed from the FGR by accounting for students who transferred to a different institution or left before graduating while still maintaining academic eligibility. The FGR and GSR were critiqued as not displaying the current academic climate of an institution because those measurements report a six year time period (LaForge & Hodge, 2011). As

described by LaForge and Hodge (2011), “the time lag in measuring graduation rates with both FGR and GSR is problematic in that it does not provide timely feedback about academic success of student athletes” (p. 222). Thus, the information gathered from those metrics provide a snapshot of how the institution was performing six years ago rather than how the institution performs in the present. To assist with providing a current reading of student-athlete achievement, the NCAA developed the APR; which tracked student-athlete eligibility and retention.

LaForge and Hodge (2011) expressed concern over their perceived misuse of the three metrics. One of their primary concerns was how this data does “not account for the unique characteristics of the individual institutions” (LaForge & Hodge, 2011, p. 227). Additionally, the GSR and APR only counted student-athletes receiving financial aid, which could cause potential problems with analysis. As an described by Ferris et al. (2004), “‘equivalency’ sports that do not have a full compliment of scholarships infrequently offer scholarships to their athletes upon initial enrollment (e.g., Track and Field). Instead, most athletes in the equivalency sports earn scholarships only after having competed for one or more years, which excludes them from the measure” (p. 558). Therefore, the APR, in some cases, could be skewed by the lack of freshmen in equivalency sports, such as a lack of representation for women’s crew or men’s baseball.

To provide a better picture of graduation rates with these concerns in mind, Ferris et al. (2004) examined 10 years of graduation rate data at NCAA Division I institutions to determine the viability of graduation rates as a measure of academic performance. They used a pair-wise comparative analysis to compare graduation rates of student-athletes to their non-athlete peers at an institutional level, and observed differences depending on the variables of the institution (i.e. private, regional, etc.); however, they found student-athletes and non-athletes graduate at similar

rates. Overall, there was not a significant variation in student-athlete graduation rate, which was attributed to several factors including academic support services.

The impact of support centers on student-athlete outcomes. Variables that could affect student-athlete academic outcomes have received attention in the academic literature. One of the main areas identified as a method to support student-athletes academically have been academic support centers (Jordan & Denson, 1990). Jordan and Denson (1990) asserted that the time demands on student-athletes can be problematic on their ability to use on-campus resources. Therefore, support centers in the athlete department provided services, such as academic support, drug education, and counselling, at times more accessible to student-athletes.

Gaston-Gayles (2003) performed a mixed methods study to investigate the programs that have been successful and the reasoning for their success. The study focused on all 69 institutions that were affiliated with BCS Conferences and used graduation rates as the measure for academic success; although, based on the study, the measure related more to academic achievement. Gaston-Gayles (2003) observed private institutions known for their academic prestige had the highest graduation rates in each conference. Seven interviews were conducted with directors of academic support centers at four private institutions and three public institutions, which resulted in six themes that contributed to achievement: "reporting lines, institutional size and affiliation, admissions procedures, institutional support and culture, athletic department support and intentional advising" (Gaston-Gayles, 2003, p. 53). Gaston-Gayles acknowledge the limitations of reported graduation rates and recommended future studies include grade-point averages in accessing support centers.

Jordan and Denson (1990) described support centers as providing a assistance to student-athletes that goes beyond simply advising on courses. To provide for the holistic well-being,

support centers should acknowledge the stress placed on student-athletes based on the mental, physical, and emotional demands placed on these students. How student-athletes handle stress related to their unique position in academia has been determined to be a factor effecting academic performance (Hwang & Choi, 2016; Watson, 2005; Watson & Kissinger, 2007). Hwang and Choi (2016) found a student-athlete's social-context, physical well-being, and academics were the most common elements relating to stress. More specifically, student-athletes with lower grades reported higher levels of stress. Student services for student-athletes have been proposed as a way to confront their feelings of stress and provide counseling services (Jordan & Denson, 1990); however, Watson and Kissinger (2007) found that student-athletes are less likely to seek help from counseling services.

Differences between populations of student-athletes. Differences were found in academic achievement between the different populations of student-athletes. Generally, women student-athletes graduated at higher rates than their male peers (Le Crom et al., 2009; Rishe, 2003). In an examination of 12,890 student-athletes representing eight schools apart of a mid-major Division I athletic conference, Le Crom et al. (2009) found that women held a retention rate of 94%, while men were retained at 91%. Similarly, Rishe (2003) compared graduation rates among 252 Division I schools from 1993 to 1997 and found women student-athletes were graduating at 67.51% with men student-athletes graduating at 52.46%. Interestingly, these rates outpaced women and men nonstudent-athletes at 57.21% and 52.46% respectively.

Additionally, differences were present between race and ethnicity (Rishe, 2003). Rishe reported that, from 1993 to 1997, white women student-athletes had the highest graduation rates at 68.52%. Additional gender and racial factors were reported as 58.86% for Black women student-athletes, 55.56% for White male student-athletes, and 43.32% for Black male student-

athletes. Harper (2018), in a more recent study of Black male student-athlete graduation rates in the Power Five conferences, found only three universities were graduating Black male student-athletes at the same rate as the total student-athlete population. Furthermore, only one institution, the University of Miami, graduated Black male student-athletes at a rate higher than the total student-athlete population; however, the university was graduating student-athletes at the lowest rate in the Atlantic Coast Conference at only 62%. These studies highlighted the inequality that exists among student-athletes receiving financial aid; as the GSR was only collected from student-athletes receiving aid.

Some studies found differences in academic performance metrics based on sport participation, such as individual vs team sport and revenue vs nonrevenue sport. As noted by Paskus (2012), "academic challenges are more nuanced and sport specific than we previously realized" (p. 43). Le Crom et al. (2009) observed that student-athletes participating in "individual sports were more likely to be retained at the institution (94.0% retention rate) than their team sport counterparts (92.0% retention rate)" (p. 17). Through an examination of APRs, Paskus (2012) observed that sport participation in a single semester underperformed in APR in comparison to sports participating in both semesters. Paskus (2012) contributed this to the amount of time student-athletes spend preparing and training for athletic contests while in season, and the lack of "consequences for losing eligibility before an off-season semester" (p. 45). However, the type of sport should also be considered, such as revenue and non-revenue. Rishe (2003) explained "the non-revenue athletes come to college with better academic preparation and, coupled with less financial pressures to turn professional in their sport of choice, are able to graduate with greater frequency" (p. 415). Student-athletes, based on their differences

in sports, gender, and ethnicity, faced unique challenges that impact their academic performance, such as stereotype threat.

NCAA Accelerating Academic Success Program. The NCAA developed several mechanisms to confront the academic disparity between HBCUs and predominately white institutions. In 2012, the NCAA Board of Governors established the Accelerating Academic Success Program (AASP) to provide grants to support academic initiatives among limited-resource Division I institutions (*Accelerating Academic Success Program*, 2020). The NCAA, as of August 2016, distributed 16 multiyear grants and 31 single year grants (*AASP Grants for Schools*, 2020). Multiyear, or comprehensive grants, have been limited to $300,000 per year and $900,000 over a maximum three-year period. Single year, or initiatives grants, have been limited to a maximum of $100,000 for a single year.

Theories related to academic success. Astin's (1984) theory of student involvement was defined as "the quantity and quality of the physical and psychological energy that students invest in the college experience" (p. 528). Benefits identified with student involvement range from the development of leadership skills to gains in their overall cognitive abilities (Astin, 1993; Dugan, 2006; Gellin, 2003; Strapp & Farr, 2009). The theory was used in several studies to examine student-athletes' engagement with the campus environment, and impact on their educational outcomes. Pascarella et al. (1999) sampled 2,755 students as part of the National Study of Student Learning and determined there was insufficient evidence to condemn athletic participation as inherently bad for cognitive development. However, in similarity with a finding in Rishe's (2003) study, the sub population of male student-athlete in football and basketball "had end-of-second-year writing skills scores that were significantly lower than those of nonathletes" (Pascarella et al., 1999, p. 13). They hypothesized that the time commitment to

these sports took most of the physical and psychological energy which left the students little time to devote back towards other academic experiences.

Mithaug's (1996) equal opportunity theory was used for Holli's (2001) investigation of academic services offered by student-athlete support centers. Mithaug (1996) stated "every member of society deserves an optimal chance of securing the good in life," which is a collectivity responsibility (p. 1). Holli used this theory as the framework to justify the existence of student-athlete support centers. They explained support centers "assist student athletes to have the capacity to engage in opportunity" and these centers "help students athletes to overcome obstacles created by participation in intercollege athletics" (Hollis, 2001, p. 267). Hollis determined that although support centers were meant to enhance opportunity, the only significant predictor was access to summer school program. As part of this finding, support center budget, human resources and space were not significant predictors of graduation rates. Hollis summarized that institutions should provide services to address the inequality of grade school preparation for higher education, such as summer school.

Guiding Conceptual Framework

Ryan (2004) developed a conceptual framework, based on student persistence models, that added an expenditure levels and patterns component. Within Ryan's initial study, they examined the relationship between expenditures and persistence to degree attainment; specifically, expenditures related to instruction, academic services, and student services. Instructional and academic support expenditures were found to be positive predictors of student retention even after controlling for other retention variables. However, expenditures in support services was found to have no significant contribution to student retention.

Through a similar inquiry, Webber and Ehrenberg (2010) studied expenditures on student services, instruction, academic support, and research. They found student service expenditures had a positive impact on graduation. Of particular interest, they concluded that expenditures in student services, which covers tutoring, psychological services, and other services commonly found in athletic department academic support units, "matter more for schools that have lower graduation and persistence rates than they do for schools that have higher graduation and persistence rates" (Webber & Ehrenberg, 2010, p. 956). As both Webber and Ehrenberg (2010) and Ryan (2004) recognized that subcategories of expenditures within these large IPEDS identifiers maybe contributing to student persistence, Ryan's conceptual framework of expenditures within student persistence models may provide some insight into how expenditures within athletic department student support services may impact student-athlete academic success.

This study used a conceptual framework modeled after Ryan's (2004) research. Ryan (2004) observed how resources were part of a larger institutional environment that impacted student persistence and attrition. In similar circumstances, student-athlete persistence, attrition, and athletic development is developed in a larger institutional structure that encompasses both institutional and athletic department environments. These interactions led to the construction of the conceptual frameworks illustrated in Figure 2.1 and Figure 2.2. The model in Figure 2.1 was built on three hypotheses and tested through random-effects panel regression. The model in Figure 2.2 was built on seven hypotheses and tested through fixed-effects panel regression.

Figure. 2.1

Conceptual Framework for Academic Expenditures on Academic Achievement

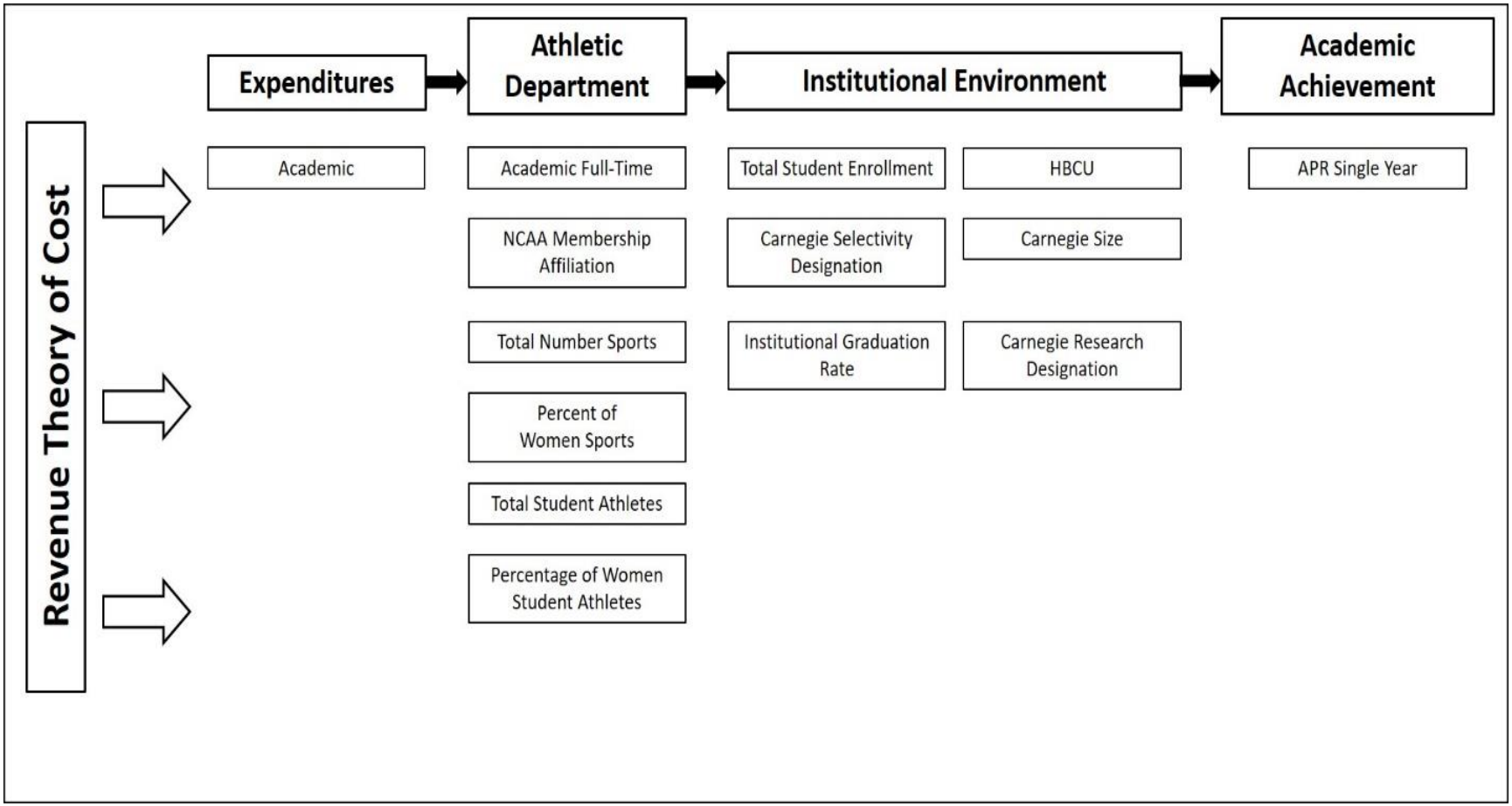
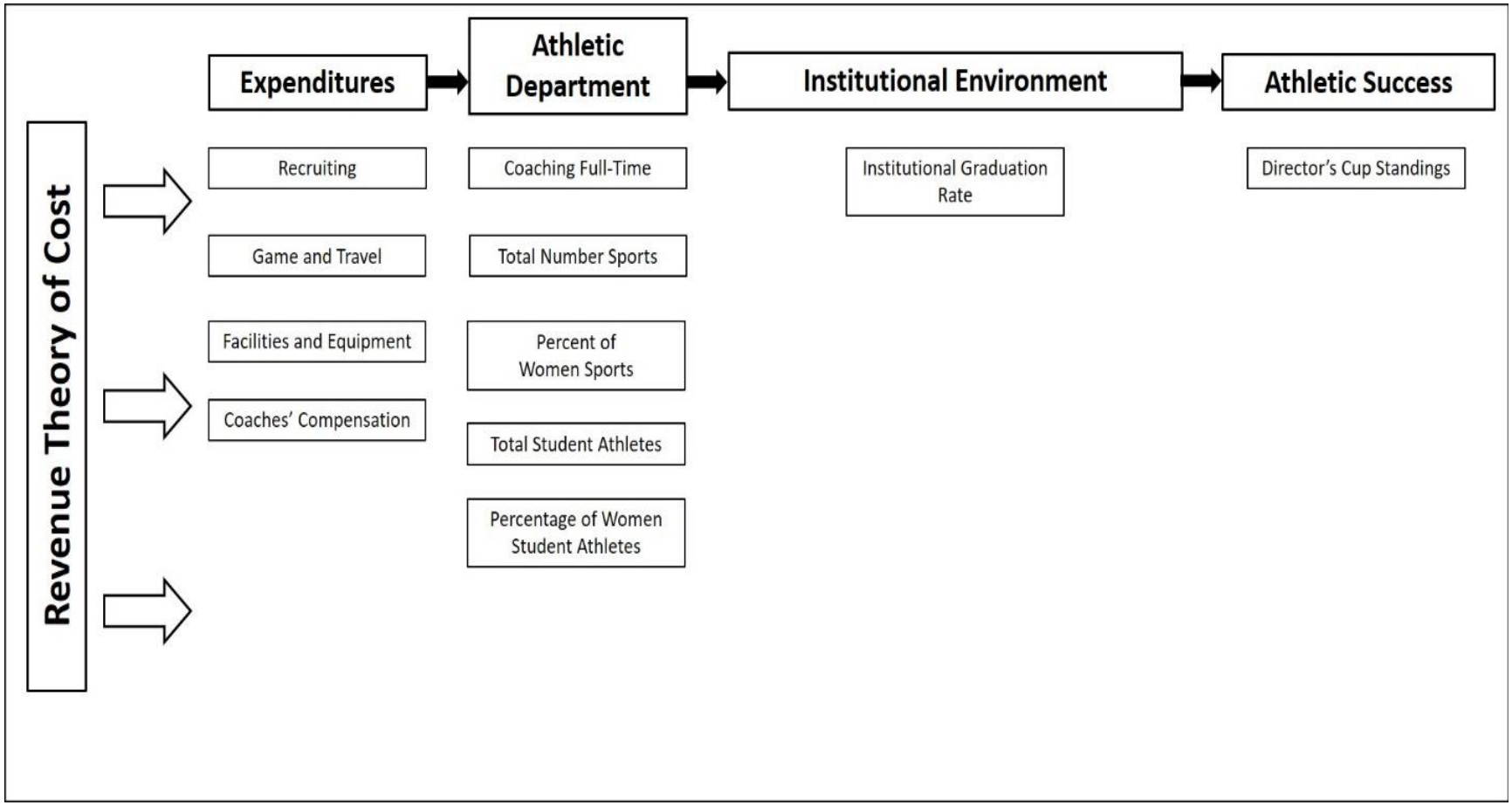


Figure. 2.2

Conceptual Framework for Athletic Expenditures on Athletic Success



CHAPTER THREE

Methodology

Sample

NCAA Division I public institutions were sampled from the 2010-2011 to 2016-2017 academic years. The availability of financial information from these years, particularly for academic expenditures, was limited and impacted the sample size and collection. Financial information for university faculty and staff at public universities and colleges have been commonly published by state financial offices for public accountability and local news sources completing Freedom of Information Act (FOIA) requests; however, reporting varied based on several issues such as reporting source (i.e. government website, state newspaper database) and government requirements (i.e. South Carolina does not disclose public salaries beneath a certain threshold).

The Knight Commission on Intercollegiate Athletics' College Athletics Financial Information (CAFI) Database collected self-reported collegiate athletic financial data and provided numerous reports. The data available in the CAFI was limited to public institutions, which restricted the available sample from an initial 351 academic institutions to 231 public Division I institutions.

From 231 public Division I institutions, convenience sampling was used further to remove institutions that had changed their NCAA divisional membership from 2010-2017 and the size of the sample was reduced to 213 public institutions. Convenience sampling allowed the researcher to select the participating institutions based on the availability and accessibility of the respective data (Etikan et al., 2016). The intimal sample of 213 public Division I institutions comprised of all three football subdivisions of the NCAA Division I membership and

represented small regional institutions and large state flagships from across the United States. The sample was further reduced based on the availability of data related to the research question. The sample size for research questions relating to academic performance was reduced to 176 public institutions (n = 176) from 2011-2017, while the sample size for research questions relating to athletic performance was reduced to 211 public institutions (n=211) from 2010-2017.

Measures and Data Collection Sources

Estimated academic expenditure data. At the time of this study, there were no reporting mechanisms for athletic department expenditures on academic support. Athletic department academic expenditures were estimated based on the athletic department composition percentage of academic department units. This estimated academic expenditure data was used as the proxy measure to gage athletic department expenditures in academic affairs.

To obtain the estimated academic expenditure data, athletic department staff directories were collected through their respective athletic department websites. Historical staff directories were obtained through the internet archive 'Way Back Machine,' to access athletic department staff directories from previous years. The entire staff directory was copied into Microsoft Excel with the process repeated for the 2010-2016 academic years. The academic support department was counted to determine the number of employees listed as part of the academic unit. The entire staff list was counted by ordering the entire staff directory by their occupational title and selecting the "Remove Duplicates." This allowed titles, fax numbers, general e-mail addresses, etc. to be sorted at the bottom of the list with only staff information at the top. The bottom section without staff information was deleted so only the athletic department staff remained. The Excel count feature was then used to determine the number of cells that contained staff data to determine the number of overall athletic department administrative staff. When necessary, the

data count was subtracted by one (1) to account for a heading of the complete dataset. Staff listed under sports headings (i.e. Football, Soccer) and faculty athletic representatives were removed from the counts as they did not fall under the description of *Support and Admin Compensation w/Severance* provided by the Knight Commission (College Athletics Financial Information Database, 2019).

A percentage of academic support personnel from the total staff was developed by dividing the total academic support personnel number by the total number of administrative staff. The academic support personnel ratio was then multiplied by the Support and Admin Compensation w/Severance expenditure data obtained from the Knight Commission's CAFI database (2019), which was used as the estimated academic expenditure data.

Recruiting expenditure. The recruiting expenditure was obtained from the CAFI dataset which adjusted for price inflation. The Knight Commission described recruiting expenses refer to "spending on transportation, lodging, meals, and other personnel and administrative expenses relating to recruitment of prospective student-athletes" (Knight Commission on Intercollegiate Athletics, 2020, n.p.).

Game and travel expenditure. The game and travel expenditure was obtained from the CAFI dataset which adjusted for price inflation. The Knight Commission noted "game expenses relate to competition expenses other than travel. Travel relates to spending on transportation, lodging, meals, and incidentals related to preseason and regular season competition" (Knight Commission on Intercollegiate Athletics, 2020, n.p.).

Facilities and equipment expenditure. The facilities and equipment expenditure was obtained from the CAFI dataset which adjusted for price inflation. The Knight Commission stated "facility expenses include debt service, leases, and rental fees for athletic facilities. This

includes overhead and administrative expenses. Equipment expenses includes spending for items provided to teams, including in-kind equipment" (Knight Commission on Intercollegiate Athletics, 2020, n.p.).

Coaches salary expenditure. The coaching salary expenditure was obtained from the CAFI dataset which adjusted for price inflation. The Knight Commission defined this variable as "coaches compensation includes bonuses and benefits, but not severance payments. This category includes direct payment and bonuses to coaches from the institution and from a third party" (Knight Commission on Intercollegiate Athletics, 2020, n.p.).

Academic full-time staff. The academic full-time staff number was derived by counting the number of academic support personnel for each athletic department. Then, the count was subtracted by the number of personnel not considered full-time for the purposes of this study. Graduate assistants, volunteers, and other staff that had titles indicating they were temporary were considered part-time.

APR. The academic progress rate (APR) was collected by the NCAA to assess the success of student-athletes progressing through their respective higher education programs. Single year APRs were collected from NCAA reports. APRs were used in previous research to access the academic achievement of student-athletes (Hirko, 2014; Le Crom et al., 2009).

For this study, single year APR scores were collected. The single year data was publicly available on the NCAA website, which was downloaded in CSV format.

APR was accessed and published by the NCAA per-sport. To transform the per sport measure into an institutional measure, the APR scores of all the sports at an institution were added and divided by the total number of sports to create an institutional average APR score. However, APR scores which were not reported by the NCAA, where the APR for a team is not

published due to small team roster sizes that might compromise the anonymity of academic records of student-athletes, were not calculated as part of the institutional average. The average APR for institutions was completed for the annual score.

Athletic department size and scope. Athletic department sport size was based on the number sports reported within the EADA dataset. However, most institutions only self-reported a total track and field student-athlete participation count and did not differentiate between cross county, indoor track and field, and outdoor track and field. Thus, the APR reports were used to determine which institutions participated in cross country. Due to APR reporting, indoor and outdoor track and field could not be differentiated, so indoor and outdoor were combined in the sport count as a single sport – track and field. The cross country and track and field count from the APR data was added to the sport count from the EADA dataset to determine the total number of sports offered. The total number of sports sponsored was also broken into a percentage of women's sports sponsored. The percentage was calculated by dividing the number of women's sports by the total number of sports. Additionally, the total student-athlete population and percentage of women student-athletes for each institution was collected from the EADA dataset. The NCAA membership affiliation was supplied by the Knight Commission CAFI dataset. Institutions classified as Football Bowl Subdivision (FBS) were classified into two additional groups: Power Five/BCS and Group of Six. The resulting NCAA membership affiliation was broken into three dummy variables: FBS – Power Five/BCS, Football Championship Subdivision, and No Football.

Institutional characteristics. The institution's graduation rate was collected from the IPEDS dataset. Additional IPEDS data was used to attain the institution's Carnegie

Classification selectivity, research designation, and enrollment size. Institutional HBCU status was also attained.

Learfield Directors' Cup. The Learfield Directors' Cup was the variable for athletic achievement. The Learfield Directors' Cup ranked institutions based on the athletic performance of institutional teams at NCAA events. The standings were listed on the National Association of Collegiate Directors of Athletics website and were publicly available. The final standings lists were downloaded and copied into an EXCEL file. The total points accumulated by institutions in a given year was used as the athletic performance dependent variable.

Variable Summary. The following variables were used in answering the research questions and listed in Table 3.1.

Dependent Variables. Two dependent variables were used to gage academic achievement and athletic achievement.

- *Single year averaged APR*. The data was attained from the NCAA website for each sport, which was then averaged together to create an institutional level metric. This dependent variable was only used in academic achievement research questions.
- *Learfield Directors' Cup total points*. The data was attained from the NACDA website. It measured the total points accumulated by each institution by their respective on-field success in various athletic contests. This dependent variable was only used in athletic achievement research questions.

Expenditure Variables. The following expenditure variables were used to answer the research questions:

- *Estimated academic expenditure*. The data was attained from the CAFI dataset by multiplying the academic support personnel ratio with the Support and Admin

Compensation reported expenditure data. This independent variable was only used in academic achievement research questions.

- *Recruiting expenditure*. The data was self-reported by institutions and attained from the CAFI dataset. This independent variable was only used in athletic achievement research questions.
- *Game and travel expenditure*. The data was self-reported by institutions and attained from the CAFI dataset. This independent variable was only used in athletic achievement research questions.
- *Facilities and equipment expenditure*. The data was self-reported by institutions and attained from the CAFI dataset. This independent variable was only used in athletic achievement research questions.
- *Coaches salary expenditure*. The data was self-reported by institutions and attained from the CAFI dataset. This independent variable was only used in athletic achievement research questions.

Athletic Department Variables. The following athletic variables were used to answer the research questions:

- *Total academic full-time staff*. The data was attained by counting the number of academic staff on each institution's respective athletic website. The full-time count excluded those with temporary titles (i.e. volunteer, graduate assistant).
- *Total coaching full*-time staff. The data was attained from the EADA dataset.
- *Total number of NCAA sponsored sports*. The data was attained from the EADA dataset.
- *Percentage of NCAA women's sports*. The data was attained by creating a percent of women's sponsored sports in relation to the total sports according to the EADA dataset.

- *Total number of student-athletes*. The data was attained from the unduplicated count from the EADA dataset.
- *Percentage of women student-athletes*. The data was attained by creating a percent of women student-athletes based on the total unduplicated number of student-athletes and the total unduplicated number of women student-athletes.
- *NCAA membership affiliation*. The data was attained from the EADA dataset.

Institutional Variables. The following institutional variables were used to answer the research questions:

- *Institutional graduation rate*. The data was attained from the IPEDS dataset.
- *HBCU*. The data of HNCU identification was attained from the IPEDS dataset.
- *Carnegie Classification undergraduate profile selectivity (institutional selectivity)*. The data was attained from the IPEDS dataset.
- *Carnegie Classification research designation*. The data was attained from the IPEDS dataset.
- *Carnegie Classification enrollment size*. The data was attained from the IPEDS dataset.

Table 3.1

Variable Descriptions

Variable Name	Description	Transformation	Source
ACAEXPT	Estimated academic expenditure	Natural log Z Scored	Knight Commission CAFI dataset support & admin expense multiplied by the percent of academic staff based on archived staff directories
RCRUTEX	Recruiting expenditures	Natural log Z Scored	Knight Commission CAFI dataset recruiting expenditure
GMTRVLEX	Game and travel expenditures	Natural log Z Scored	Knight Commission CAFI dataset game & travel expenditures
FACELEQEX	Facilities & equipment expenditures	Natural log Z Scored	Knight Commission CAFI dataset facilities & equipment expenditures
COACHEX	Coaches compensation	Natural log Z Scored	Knight Commission CAFI dataset coaches compensation expenditures
ACAFTSF	Total academic full-time staff	Z Scored	Historical athletic department staff directory
COACHFT	Total coaching full-time staff	Z Scored	EADA
APR1YR	Single year APR average	Z Scored	NCAA
DCUPFS	Learfield Directors' Cup final standing	Z Scored	Learfield Directors' Cup website
SPTST	Total number of NCAA sports sponsored	Z Scored	EADA
SPTSWP	Percentage of NCAA women's sports sponsored	Z Scored	EADA
SAT	Total number of student-athletes	Z Scored	EADA
SAWP	Percentage of women student-athletes	Z Scored	EADA

(continued)

Variable Name	Description	Transformation	Source
NCAAM	NCAA membership affiliation	Dummy Coded G6/BCS: 0=no 1=yes FCS: 0=no 1=yes NF: 0=no 1=yes	EADA
INTGR	Institutional graduation rate	Z Scored	IPEDS
HBCU	HBCU	Dummy Coded 0=no 1=yes	IPEDS
LessSelective	Carnegie Undergraduate Profile Selectivity – Institutions Considered Less Selective	Dummy Coded 0=no 1=yes	IPEDS
MoreSelective	Carnegie Undergraduate Profile Selectivity – Institutions Considered More Selective	Dummy Coded 0=no 1=yes	IPEDS
CCResearchDes	Carnegie Classification Research designation	Dummy Coded 0=nonresearch 1=Research	IPEDS
CCSize	Carnegie Classification Enrollment Size	Dummy Coded 0=Small/Medium 1=Large	IPEDS

Methods

For this study, the nature of the variables indicated a panel regression was necessary based on the longitudinal nature of the data (Rabe-Hesketh & Skrondal, 2012). Particularly, to address the research questions based on longitudinal repeated measures, fixed-effects and random effects panel regression were chosen. Fixed-effects panel regression has been often used with panel data to investigate causal inference (Brüderl & Ludwig, 2015). Indeed, Brüderl and Ludwig (2015) observed "panel data are especially useful for applying FE models because, due to their richness, they allow many relevant social science questions to be investigated" (p. 328). Random-effects panel regression has been used in psychology, education, and kinesiology (Rabe-Hesketh & Skrondal, 2012). The primary difference between the two methods was if the subject-specific effects were time variant or invariant .(Greene, 2003; Rabe-Hesketh & Skrondal, 2012; Schmidheiny, 2020). Fixed effects, as described by Rabe-Hesketh and Skrondal (2012), should be used "where unobserved between-subject heterogeneity is represented by fixed subject-specific effects" while random effects "is represented by subject-specific effects that are randomly varying" (p.228). A Hausman test was conducted to aid in selecting the appropriate model (Greene, 2003; Rabe-Hesketh & Skrondal, 2012). Although only public institutions that participated in NCAA Division I athletics were included, more power was gained by increasing the number of observed years (Hofmann, 1997).

Data merge and financial data natural log transformation. The data was downloaded from different sources (i.e. Knight Commission database, IPEDS, EADA) and merged into a single EXCEL file. Headers and columns were color coated to help maintain order of the data. All financial data was transformed to the natural log (Lütkepohl & Xu, 2012). The transformation to the natural log aided in the linearity and distribution of the data (Jones, 2012;

LaLonde, 2005; Lütkepohl & Xu, 2012; Ryan, 2004). Other studies that investigated the how expenditures impact areas of higher education, such as graduation rates and Directors' Cup standings, transformed financial data to the natural log (Jones, 2012; Litan et al., 2003; Ryan, 2004). The data was then imported into IBM-SPSS version 25.

Missing data. Missing data was present throughout the data set. Notably, many cases were missing involving the number of staff employed by athletic departments from the 2010-2011 academic year. Heck et al. (2014) noted "missing data can be a problem in multilevel applications, depending on the sampling design underlying the data set, the extent to which the data are missing at each level, and whether or not the data can be assumed to be missing at random" (p. 22). For the analysis of athletic department expenditures on athletic performance, two institutions were eliminated based on missing data. For the analysis of estimated athletic department academic expenditures on single year scores APR, the entire 2010-2011 academic year was removed in addition to institutions where consistent academic staffing could not be determined. Newton and Rudestam (1999) explained how researchers can "become suspicious if a large amount of data are missing from a certain variable, because it cannot be assumed that the missing data are representative of the remaining data" (p. 156). Indeed, one could presume that large state institutions with sizable budgets may employ more academic personnel within their athletic department, however, that institutions could be an outlier that employs more or less than their cohorts. With the academic staff count as a necessary variable to estimate the academic expenditures, institutions missing with missing data in this category were removed. Other databases (i.e. IPEDS, EADA) were consistent in their reporting of data.

Z score all independent variables. Z scoring, defined by Newton and Rudestam (1999), was "a transformation of a normal probability distribution in such a way that the mean of the

distribution will be 0 and the standard deviation will be equal to 1" (p. 41). On the topic of standardization, Kim and Ferree (1981) observed "psychologists, dealing with arbitrarily scaled attitude items, tend to standardize; economists, dealing with dollars, tend not to" (p. 187). For this study, the variables were standardized in an effort to place the variables on the same scale (Kim & Ferree Jr., 1981). To better work with the data, all independent variables were z scored.

Analysis. The purpose of this quantitative study was to examine the relationship between athletic department expenditures on academic and athletic outcomes. Particularly, the study examined how estimated athletic department academic expenditures related to institutional averaged single year APR scores, and how recruitment, game and travel, facility and equipment, and coaching salary expenditures related to Directors' Cup points accumulation. Fixed-effects and random-effects panel regression modeling for the overarching research area (ie. academic expenditures and athletic expenditures) was chosen based on the results of the Hausman test. The Hausman test indicated random-effects would fit the academic research data better while fixed-effects would better suit the athletic research data. Additionally, multiple studies on how expenditures impact athletic performance previously used fixed-effects modeling (Jones, 2012; Litan et al., 2003).

Procedures

For each primary research area, a null model of the dependent variable on the respective independent expenditure(s) variable was examined. Then, additional explanatory variables related to the athletic department were introduced to evaluate the relative strength of the expenditure(s) variable. Lastly, institutional variables, when appropriate, were included with athletic department variables and expenditure variables. The analysis was conducted over the

2012-2017 fiscal years for the examination of academic outcomes, while the athletic outcomes were conducted over the 2011-2017 fiscal years.

Academic Outcome. Stata version 14 was used to analyze the data (Rabe-Hesketh & Skrondal, 2012; Schmidheiny, 2020). The averaged institutional APR was the sole dependent variable for each research question. The Hausman test indicated that random-effects model would best fit the data. The dataset contained 176 public institutions (n = 176) from fiscal years 2012-2017 (i.e. academic years 2011-12 through 2016-17).

Research Question 1: *Is there a relationship between academic expenditures and academic outcomes?*

Hypothesis 1: *There is a relationship between estimated academic expenditures and single year averaged APR.*

The independent variable for the first research question was the estimated academic expenditure. The base random-effects panel regression model mathematical notation was estimated as:

$$\text{Yearly Averaged APR}_{it} = \delta_0 + \alpha_1 \text{ Estimated Academic Expenditures}_{it} + \varepsilon_{it}$$

Research Question 2: *Is there a relationship between academic expenditures and academic outcomes when controlling for sport variables?*

Hypothesis 2: *There is a relationship between estimated academic expenditures and single year averaged APR when sport variables are included.*

The independent variables for the second research question was the estimated academic expenditure and athletic department variables. The time variant athletic department variables were athletic department academic full-time staff, total number of sports offered, percentage of women's sports, total student-athletes, and percentage of women student-athletes. The time

invariant athletic department variable was conference affiliation as a dummy variable. The base random-effects panel regression model mathematical notation was estimated as:

$$\text{Yearly Averaged APR}_{it} = \delta_0 + \alpha_1 \text{ Estimated Academic Expenditures}_{it} + \alpha_2 \text{ Academic Full-Time Staff} + \alpha_3 \text{ Total Sport}_{it} + \alpha_4 \text{ Percentage of Women's Total Sport}_{it} + \alpha_5 \text{ Total Student-Athletes}_{it} + \alpha_6 \text{ Percentage of Women Student-Athletes}_{it} + \beta_1 \text{ Power6/BCS}_{it} + \beta_2 \text{ FCS}_{it} + \beta_3 \text{ No Football}_{it} + \varepsilon_{it}$$

Research Question 3: *Is there a relationship between academic expenditures and academic outcomes when controlling for sport and institutional variables?*

Hypothesis 3: *There is a relationship between estimated academic expenditures and single year averaged APR when sport and institutional variables are included.*

The independent variables for the third research question was the estimated academic expenditure and athletic department variables. The time variant athletic department variables were athletic department academic full-time staff, total number of sports offered, percentage of women's sports, total student-athletes, and percentage of women student-athletes. Graduation rate was the single time variant institutional predictor. The time invariant athletic department variable was conference affiliation as a dummy variable. Most institutional time invariant variables were dummy variables developed from the Carnegie Classification. These variables included the institution's selectivity, size, and research designation. Additionally, the institution's status as an HBCU was included as a dummy variable. The base random-effects panel regression model mathematical notation was estimated as:

$$\text{Yearly Averaged APR}_{it} = \delta_0 + \alpha_1 \text{ Estimated Academic Expenditures}_{it} + \alpha_2 \text{ Academic Full-Time Staff} + \alpha_3 \text{ Total Sport}_{it} + \alpha_4 \text{ Percentage of Women's Total}$$

$Sport_{it} + \alpha_5$ Total Student-Athletes$_{it} + \alpha_6$ Percentage of Women Student-Athletes$_{it} + \alpha_6$ Graduation Rate$_{it} + \beta_1$ Power6/BCS$_{it} + \beta_2$ FCS$_{it} + \beta_3$ No Football$_{it} + \beta_4$ HBCU$_{it} + \beta_5$ CC Less Selective$_{it} + \beta_6$ CC More Selective$_{it} + \beta_7$ CC Size$_{it} + \beta_8$ CC Research Designation$_{it} + \varepsilon_{it}$

Athletic Outcome. Stata version 14 was used to analyze the data (Rabe-Hesketh & Skrondal, 2012; Schmidheiny, 2020). The Directors' Cup total points was the sole dependent variable for each research question. The Hausman test indicated that fixed-effects model would best fit the data. This followed with previous studies that used fixed-effects to examine expenditures on athletic outcomes (Jones, 2012; Litan et al., 2003; Orszag & Orszag, 2005). The dataset contained 211 public institutions (n = 211) from fiscal years 2011-2017 (i.e. academic years 2010-11 through 2016-17).

Research Question 4: *Is there a relationship between recruitment expenditures and athletic outcomes?*

Hypothesis 4: *There is a relationship between recruitment expenditures and Directors' Cup total points.*

The independent variable was the recruitment expenditure. The base fixed-effects panel regression model mathematical notation was estimated as:

Directors' Cup Total Points$_{it} = \beta_0 + \beta_1$ Recruitment Expenditure$_{it} + \gamma i + \eta t + \varepsilon_{it}$

Research Question 5: *Is there a relationship between game and travel expenditures and athletic outcomes?*

Hypothesis 5: *There is a relationship between game and travel expenditures and Directors' Cup total points.*

The independent variable was game and travel expenditure. The base fixed-effects panel regression model mathematical notation was estimated as:

Directors' Cup Total Points$_{it}$ = β_0 + β_1 Game and Travel Expenditure$_{it}$ + γi + ηt + ε_{it}

Research Question 6: *Is there a relationship between facility and equipment expenditures and athletic outcomes?*

Hypothesis 6: *There is a relationship between facility and equipment expenditures and Directors' Cup total points.*

The independent variable was facility and equipment expenditure. The base fixed-effects panel regression model mathematical notation was estimated as:

Directors' Cup Total Points$_{it}$ = β_0 + β_1 Facility and Equipment Expenditure$_{it}$ + γi + ηt + ε_{it}

Research Question 7: *Is there a relationship between coaching salary expenditures and athletic outcomes?*

Hypothesis 7: *There is a relationship between coaching salary expenditures and Directors' Cup total points.*

The independent variable was coaching salary expenditure. The base fixed-effects panel regression model mathematical notation was estimated as:

Directors' Cup Total Points$_{it}$ = β_0 + β_1 Facility and Equipment Expenditure$_{it}$ + γi + ηt + ε_{it}

Research Question 8: *Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes?*

Hypothesis 8a: *There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures.*

Hypothesis 8b: *There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures.*

Hypothesis 8c: *There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures.*

Hypothesis 8d: *There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures.*

The independent variables were all athletic expenditures. These included recruitment expenditures, game and travel expenditures, facility and equipment expenditures, and coaching salary expenditures. The base fixed-effects panel regression model mathematical notation was estimated as:

$$\text{Directors' Cup Total Points}_{it} = \beta_0 + \beta_1 \text{ Recruitment Expenditure}_{it} + \beta_2 \text{ Game and Travel Expenditure}_{it} + \beta_3 \text{ Facility and Equipment Expenditure}_{it} + \beta_4 \text{ Coaching Salary Expenditure}_{it} + \gamma i + \eta t + \varepsilon_{it}$$

Research Question 9: *Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes when controlling for sport variables?*

Hypothesis 9a: *There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.*

Hypothesis 9b: *There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.*

Hypothesis 9c: *There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.*

Hypothesis 9d: *There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.*

The independent variables were recruitment expenditures, game and travel expenditures, facility and equipment expenditures, and coaching salary expenditures. Only time variant predictors could be included in a fixed-effects model (Rabe-Hesketh & Skrondal, 2012); therefore, only time variant athletic department variables were included in the model. These athletic department variables were athletic department total full-time coaching staff, total number of sports offered, percentage of women's sports, total student-athletes, and percentage of women student-athletes. The base fixed-effects panel regression model mathematical notation was estimated as:

$$\text{Directors' Cup Total Points}_{it} = \beta_0 + \beta_1 \text{ Recruitment Expenditure}_{it} + \beta_2 \text{ Game and Travel Expenditure}_{it} + \beta_3 \text{ Facility and Equipment Expenditure}_{it} + \beta_4 \text{ Coaching Salary Expenditure}_{it} + \beta_5 \text{ Total Full-Time Coaching Staff} + \beta_6 \text{ Total Sport}_{it} + \beta_7 \text{ Percentage of Women's Total Sport}_{it} + \beta_8 \text{ Total Student-Athletes}_{it} + \beta_9 \text{ Percentage of Women Student-Athletes}_{it} + \gamma i + \eta t + \varepsilon_{it}$$

Research Question 10: *Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes when controlling for sport variables?*

Hypothesis 10a: *There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.*

Hypothesis 10b: *There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.*

Hypothesis 10c: *There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.*

Hypothesis 10d: *There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.*

The independent variables were recruitment expenditures, game and travel expenditures, facility and equipment expenditures, and coaching salary expenditures. The athletic department variables were athletic department total full-time coaching staff, total number of sports offered, percentage of women's sports, total student-athletes, and percentage of women student-athletes. The sole institutional variable was graduation rate, as other institutional variables were time invariant. The base fixed-effects panel regression model mathematical notation was estimated as:

$$\text{Directors' Cup Total Points}_{it} = \beta_0 + \beta_1 \text{ Recruitment Expenditure}_{it} + \beta_2 \text{ Game and Travel Expenditure}_{it} + \beta_3 \text{ Facility and Equipment Expenditure}_{it} + \beta_4 \text{ Coaching Salary Expenditure}_{it} + \beta_5 \text{ Total Full-Time Coaching Staff} + \beta_6 \text{ Total Sport}_{it} + \beta_7 \text{ Percentage of Women's Total Sport}_{it} + \beta_8 \text{ Total Student-Athletes}_{it} + \beta_9 \text{ Percentage of Women Student-Athletes}_{it} + \beta_{10} \text{ Graduation Rate}_{it} + \gamma i + \eta t + \varepsilon_{it}$$

CHAPTER FOUR

RESULTS

Chapter three described the methods, variables, and procedures of the study. This chapter provides the findings for the following research questions:

Research Question 1:

1. Is there a relationship between academic expenditures and academic outcomes?

- Hypothesis 1: There is a relationship between estimated academic expenditures and single year averaged APR.

Research Question 2:

2. Is there a relationship between academic expenditures and academic outcomes when controlling for sport variables?

- Hypothesis 2: There is a relationship between estimated academic expenditures and single year averaged APR when sport variables are included.

Research Question 3:

3. Is there a relationship between academic expenditures and academic outcomes when controlling for sport and institutional variables?

- Hypothesis 3: There is a relationship between estimated academic expenditures and single year averaged APR when sport and institutional variables are included.

Research Question 4:

4. Is there a relationship between recruitment expenditures and athletic outcomes?

- Hypothesis 4: There is a relationship between recruitment expenditures and Directors' Cup total points.

Research Question 5:

5. Is there a relationship between game and travel expenditures and athletic outcomes?

- Hypothesis 5: There is a relationship between game and travel expenditures and Directors' Cup total points.

Research Question 6:

6. Is there a relationship between facility and equipment expenditures and athletic outcomes?

- Hypothesis 6: There is a relationship between facility and equipment expenditures and Directors' Cup total points.

Research Question 7:

7. Is there a relationship between coaching salary expenditures and athletic outcomes?

- Hypothesis 7: There is a relationship between coaching salary expenditures and Directors' Cup total points.

Research Question 8:

8. Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes?

- Hypothesis 8a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures.
- Hypothesis 8b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures.
- Hypothesis 8c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures.
- Hypothesis 8d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures.

Research Question 9:

9. Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes when controlling for sport variables?

- Hypothesis 9a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.
- Hypothesis 9b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.
- Hypothesis 9c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.
- Hypothesis 9d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Research Question 10:

10. Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes when controlling for sport variables?

- Hypothesis 10a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.
- Hypothesis 10b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

- Hypothesis 10c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.
- Hypothesis 10d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

The following dependent variables were used to answer the research questions:

- *Single year averaged APR*. The data was attained from the NCAA website for each sport, which was then averaged together to create an institutional level metric.
- *Learfield Directors' Cup total points*. The data was attained from the NACDA website. It measured the total points accumulated by each institution by their respective on-field success in various athletic contests.

The following expenditure variables were used to answer the research questions:

- *Estimated academic expenditure*. The data was attained from the CAFI dataset by multiplying the academic support personnel ratio with the Support and Admin Compensation reported expenditure data.
- *Recruiting expenditure*. The data was self-reported by institutions and attained from the CAFI dataset.
- *Game and travel expenditure*. The data was self-reported by institutions and attained from the CAFI dataset.
- *Facilities and equipment expenditure*. The data was self-reported by institutions and attained from the CAFI dataset.

- *Coaches salary expenditure*. The data was self-reported by institutions and attained from the CAFI dataset.

The following athletic variables were used to answer the research questions:

- *Total academic full-time staff*. The data was attained by counting the number of academic staff on each institution's respective athletic website. The full-time count excluded those with temporary titles (i.e. volunteer, graduate assistant).
- *Total coaching full*-time staff. The data was attained from the EADA dataset.
- *Total number of NCAA sponsored sports*. The data was attained from the EADA dataset.
- *Percentage of NCAA women's sports*. The data was attained by creating a percent of women's sponsored sports in relation to the total sports according to the EADA dataset.
- *Total number of student-athletes*. The data was attained from the unduplicated count from the EADA dataset.
- *Percentage of women student-athletes*. The data was attained by creating a percent of women student-athletes based on the total unduplicated number of student-athletes and the total unduplicated number of women student-athletes.
- *NCAA membership affiliation*. The data was attained from the EADA dataset.

The following institutional variables were used to answer the research questions:

- *Institutional graduation rate*. The data was attained from the IPEDS dataset.
- *HBCU*. The data of HBCU identification was attained from the IPEDS dataset.
- *Carnegie Classification undergraduate profile selectivity (institutional selectivity)*. The data was attained from the IPEDS dataset.
- *Carnegie Classification research designation*. The data was attained from the IPEDS dataset.

- *Carnegie Classification enrollment size*. The data was attained from the IPEDS dataset.

The study used STATA version 14 to analyze the data. The relationship between estimated academic expenditures and single year averaged APR was investigated through random-effects panel regression. The relationship between multiple athletic expenditures and Directors' Cup total points was examined through fixed-effects panel regression. The following provides the results of the panel regression.

Expenditures on Academic Performance

Hausman Test

Table 4.1

Hausman Test for Academic Performance

	Coefficients			
	(b) Fixed	(B) Random	(b-B) Difference	S.E.
Estimated academic expenditure	9.390	8.061	1.329	1.414
X^2	0.88			
p	0.347			

Initially, a Hausman test was conducted to determine the appropriateness of a random effects model over a fixed effects model (Greene, 2003). The null model was run as a fixed effects model and a random effects model in STATA. The models were saved and compared in a Hausman test. The Hausman test ($X^2 = 0.88$, $p = 0.347$) was not significant which indicated a random effects model would be a better fit over a fixed effects model (Greene, 2003). Therefore, all research questions were investigated through random effects regression.

Research Question 1: Is there a relationship between academic expenditures and academic outcomes?

Hypothesis 1: There is a relationship between estimated academic expenditures and single year averaged APR.

A single predictor model was created to examine the first research question. A random effects regression was conducted on 176 institutions over six years on single year APR with estimated academic expenditures as the single predictor.

Table 4.2

Estimated Academic Expenditure on APR Average

Coefficients	Estimate	SE	z	*p*
Intercept	974.159	1.367	712.43	0.000
Estimated academic expenditure	8.061	1.113	7.24	0.000
σ_u	17.0364			
σ_ϵ	15.271			
ρ	.554			
Model Summary				
R^2 Overall	0.095			
Wald χ^2	52.41	p = 0.000		

The R^2 of the first model indicated that the model explained approximately 9% of the overall variability ($R^2 = 0.095$). The Wald χ^2 test ($\chi^2 = 52.41$, $p < 0.000$) indicated the inclusion of the single predictor was an improvement to an intercept only model. The estimated academic expenditure was a significant positive predictor of an institution's single year APR average ($\beta = 8.061$, $p < 0.000$) in the single predictor model.

Research Question 2: Is there a relationship between academic expenditures and academic outcomes when controlling for sport variables?

Hypothesis 2: There is a relationship between estimated academic expenditures and single year averaged APR when sport variables are included.

The second model exploring the relationship between the estimated academic expenditures and institutional single year APR included continuous variables academic full-time

staff, total sports, percentage of women's sports, total number of student-athletes, percentage of women student-athletes, and nominal dummy coded variables related to NCAA sub divisional affiliation. The R^2 of the second model indicated that the model explained approximately 15% of the overall variability ($R^2 = 0.152$). The Wald χ^2 test ($\chi^2 = 79.72$, $p < 0.000$) indicated the inclusion of variables maintained the model's overall fit to the data.

Table 4.3

Estimated Academic Expenditure with Athletic Variables on APR Average

Coefficients	Estimate	SE	z	*p*
Intercept	976.925	2.811	347.48	0.000
Estimated academic expenditure	7.861	1.896	4.15	0.000
Power 6/BCS	-9.019	3.741	-2.41	0.016
FCS	-2.788	3.784	-0.74	0.461
No football	3.119	5.149	0.61	0.545
Academic full-time staff	-0.969	1.906	-0.05	0.959
Total sports	-1.269	2.148	-0.59	0.555
Percentage of women's sport	-1.536	1.470	-1.04	0.296
Total student athletes	5.219	2.364	2.21	0.027
Percentage of women student-athletes	3.030	1.373	2.21	0.027
σ_u	16.063			
σ_ϵ	15.197			
ρ	.528			
Model Summary				
R^2 Overall	0.152			
Wald χ^2	79.72	$p = 0.000$		

When athletic variables were included in the model, estimated academic expenditure was still a significant positive predictor of an institution's averaged single year APR ($\beta = 7.861$, $p < 0.000$). Additionally, the total number of student athletes ($\beta = 5.219$, $p = 0.027$) and the percentage if women student-athletes ($\beta = 3.030$, $p = 0.027$) were positive predictors.

Interestingly, Power 6/BCS membership was a negative predictor of an institution's averaged single year APR ($\beta = -9.019$, $p = 0.016$).

Research Question 3: Is there a relationship between academic expenditures and academic outcomes when controlling for sport and institutional variables?

Hypothesis 3: There is a relationship between estimated academic expenditures and single year averaged APR when sport and institutional variables are included.

The third model exploring the relationship between the estimated academic expenditures and institutional single year APR included all the variables in the second model and included institutional characteristic variables. These variables included graduation rate, HBCU status, and Carnegie classifications of selectivity, size, and research designation. The R^2 of the third model indicated that the model explained approximately 32% of the overall variability ($R^2 = 0.322$). The Wald χ^2 test ($\chi^2 = 182.17$, $p < 0.000$) indicated the inclusion of variables maintained the model's overall fit to the data.

Table 4.4

Estimated Academic Expenditure with Athletic and Institutional Variables on APR Average

Coefficients	Estimate	SE	z	*p*
Intercept	977.376	3.953	247.26	0.000
Estimated academic expenditure	6.385	1.860	3.43	0.001
Power 6/BCS	-7.772	3.469	-2.24	0.025
FCS	3.523	3.466	1.02	0.309
No football	1.039	4.588	0.23	0.821
Academic full-time staff	0.300	1.841	0.16	0.871
Total sports	-0.191	1.945	-0.10	0.922
Percentage of women's sport	-1.261	1.332	-0.95	0.344
Total student athletes	0.624	2.247	0.28	0.781
Percentage of women student athletes	1.939	1.311	1.48	0.139
HBCU	-35.784	5.331	-6.71	0.000
Carnegie classification: less selective	-3.521	2.963	-1.19	0.235
Carnegie classification: more selective	0.297	2.59	0.11	0.909
Carnegie classification: size	-0.926	2.886	-0.32	0.748
Carnegie classification: research designation	2.405	2.505	0.96	0.337
Graduation rate	1.453	1.786	0.81	0.416
σ_u	12.839			
σ_ϵ	15.190			
ρ	0.417			
Model Summary				
R^2 Overall	0.322			
Wald χ^2	182.17	p = 0.000		

In the final model, estimated academic expenditure was the only significant positive predictor of an institution's averaged single year APR ($\beta = 6.38$, $p = 0.001$). The total number of student athletes ($\beta = 0.624$, $p = 0.781$) and the percentage of women student-athletes ($\beta = 1.939$, $p = 0.139$) were no longer statistically significant predictors. Power 6/BCS membership

continued to be a negative predictor of averaged APR scores (β = -7.772, p = 0.025). Additionally, Historically Black Colleges and Universities held a negative relationship with averaged single year APR scores (β = -35.784, p < 0.000).

Expenditures on Athletic Performance

Hausman Test

Table 4.5

Hausman Test for Athletic Performance

	Coefficients			
	(b) fixed	(B) random	(b-B) Difference	S.E.
Recruitment expenditure	-5.474	6.031	-11.507	
Game & travel expenditure	50.452	65.856	-15.405	
Facility & equipment expenditure	1.654	2.527	-0.872	
Coaching salary expenditure	-4.404	70.320	-74.724	3.339
X^2	234.05			
p	0.000			

A Hausman test was conducted to determine the appropriateness of a random effects or fixed effects model (Greene, 2003). The null model was run as a fixed effects model and a random effects model in STATA. The fixed effects and random effects models were compared through a Hausman test. The Hausman test (X^2 = 234.05, p < 0.000) was significant which indicated a fixed effects model would be a better fit over a random effects model (Greene, 2003). Therefore, all research questions were investigated through fixed effects regression.

Research Question 4: Is there a relationship between recruitment expenditures and athletic outcomes?

Hypothesis 4: There is a relationship between recruitment expenditures and Directors' Cup total points.

A single predictor model with only recruitment expenditures was created to examine the research question. A fixed effects regression was conducted on 211 institutions over seven years on Directors' Cup total points with recruitment expenditures as the single predictor.

Table 4.6

Recruitment Expenditure on Directors' Cup Total Points

Coefficients	Estimate	SE	t	*p*
Intercept	226.340	1.636	138.35	0.000
Recruitment expenditure	15.586	7.658	2.04	0.042
σ_u	285.090			
σ_ϵ	62.875			
ρ	.954			
Model Summary				
R^2 Overall	0.560			
F	4.14	p = 0.042		

The recruitment expenditure single predictor model had an overall good fit to the data (F = 4.14, p = 0.042) and explained approximately 56% of overall variability (R^2 = 0.560). Recruitment expenditure was a significant positive predictor of an institution's Directors' Cup total points (β = 15.586, p = 0.042) in the single predictor model.

Research Question 5: Is there a relationship between game and travel expenditures and athletic outcomes?

Hypothesis 5: There is a relationship between game and travel expenditures and Directors' Cup total points.

A single predictor model with only game and travel expenditures was created to examine the research question. The model fit the data (F = 33.13, p = 0.000) and explained 66.9% of overall variability (R^2 = 0.669). Game and travel expenditures was a significant positive

predictor of an institution's Directors' Cup total points ($\beta = 46.212$, $p < 0.000$) in the single predictor model.

Table 4.7

Game and Travel Expenditure on Directors' Cup Total Points

Coefficients	Estimate	SE	t	*p*
Intercept	226.340	1.618	139.92	0.000
Game & travel expenditure	46.212	8.028	5.76	0.000
σ_u	259.633			
σ_ϵ	62.169			
ρ	.946			
Model Summary				
R^2 Overall	0.669			
F	33.13	p = 0.000		

Research Question 6: Is there a relationship between facility and equipment expenditures and athletic outcomes?

Hypothesis 6: There is a relationship between facility and equipment expenditures and Directors' Cup total points.

The facility and equipment expenditures single predictor model had an overall good fit to the data ($F = 4.89$, $p = 0.027$) and explained approximately 50% of overall variability ($R^2 = 0.507$). Facility and equipment expenditures was a significant positive predictor of an institution's Directors' Cup total points ($\beta = 12.100$, $p < 0.000$) in the single predictor model.

Table 4.8

Facility and Equipment Expenditure on Directors' Cup Total Points

Coefficients	Estimate	SE	t	*p*
Intercept	226.340	1.636	138.39	0.000
Facility & equipment expenditure	12.100	5.472	2.21	0.000
σ_u	288.138			
σ_ϵ	62.856			
ρ	.955			
Model Summary				
R^2 Overall	0.507			
F	4.89	p = 0.027		

Research Question 7: Is there a relationship between coaching salary expenditures and athletic outcomes?

Hypothesis 7: There is a relationship between coaching salary expenditures and Directors' Cup total points.

The coaching salary single predictor model had an overall good fit to the data (F = 12.81, p = 0.0004) and explained approximately 67% of overall variability (R^2 = 0.676). Coaching salary expenditure was a significant positive predictor of an institution's Directors' Cup total points (β = 35.566, p < 0.000) in the single predictor model.

Table 4.9

Coaching Salary Expenditure on Directors' Cup Total Points

Coefficients	Estimate	SE	t	*p*
Intercept	226.340	1.636	138.82	0.000
Coaching salary expenditure	35.566	9.938	3.58	0.000
σ_u	237.707			
σ_ϵ	62.661			
ρ	.948			
Model Summary				
R^2 Overall	0.676			
F	12.81	p = 0.0004		

Research Question 8: Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes?

Hypothesis 8a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures.

Hypothesis 8b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures.

Hypothesis 8c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures.

Hypothesis 8d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures.

The multiple expenditure model had an overall good fit to the data ($F = 8.42$, $p = 0.000$) and explained approximately 65% of overall variability ($R^2 = 0.659$). Although all four expenditure variables were significant positive predictors in their respective single predictor models, only game and travel expenditures remained a significant positive predictor of Directors' Cup total points ($\beta = 50.452$, $p < 0.000$). The other three expenditure variables were not determined to be significant predictors, but interestingly, recruitment expenditures ($\beta = -5.475$, $p = 0.547$) and coaching salary expenditures ($\beta = -4.404$, $p = 0.763$) had negative coefficients.

Table 4.10

All Expenditures on Directors' Cup Total Points

Coefficients	Estimate	SE	t	*p*
Intercept	226.340	1.619	139.79	0.000
Recruitment expenditure	-5.475	9.088	-0.60	0.547
Game & travel expenditure	50.452	11.265	4.48	0.000
Facility & equipment expenditure	1.655	6.048	0.27	0.784
Coaching salary expenditure	-4.404	14.602	-0.30	0.763
σ_u	262.610			
σ_ϵ	62.227			
ρ	.947			
Model Summary				
R^2 Overall	0.659			
F	8.42	p = 0.000		

Research Question 9: Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes when controlling for sport variables?

Hypothesis 9a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 9b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 9c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 9d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

The model, exploring the relationship between multiple athletic expenditures and Directors' Cup total points while controlling for sport variables included coaching full-time staff, total sports, percentage of women's sports, total number of student-athletes, and percentage of women student-athletes, maintained a good fit to the data as indicated by the F-test ($F = 3.87$, $p = 0.0001$). The R^2 of the model indicated that the model explained approximately 64% of the overall variability ($R^2 = 0.644$).

Table 4.11

All Expenditures and Sport Variables on Directors' Cup Total Points

Coefficients	Estimate	SE	t	*p*
Intercept	226.340	1.621596	139.58	0.000
Recruitment expenditure	-4.993	9.277026	-0.54	0.591
Game & travel expenditure	50.808	11.3153	4.49	0.000
Facility & equipment expenditure	1.758	6.064907	0.29	0.772
Coaching salary expenditure	-4.485	15.21307	-0.29	0.768
Total full-time coaches	2.818	9.620196	0.29	0.770
Total sports	-1.968	13.64427	-0.14	0.885
Percent women's sports	-1.425	8.91101	-0.16	0.873
Total student-athletes	-1.754	10.33484	-0.17	0.865
Percentage of women athletes	-5.183	5.573676	-0.93	0.353
σ_u	262.728			
σ_ϵ	62.321			
ρ	.947			
Model Summary				
R^2 Overall	0.644			
F	3.87	p = 0.0001		

There was little change among the relationship of the four expenditure variables on Directors' Cup total points when including sport variables. Game and travel expenditures remained the only significant positive predictor of Directors' Cup total points ($\beta = 50.808$, $p < 0.000$). Recruitment expenditures ($\beta = -4.993$, $p = 0.591$), facility and equipment expenditures ($\beta = 1.758$, $p = 0.772$), and coaching salary expenditures ($\beta = -4.485$, $p = 0.768$) were not significant predictors of Directors' Cup total points. None of the control sport variables were significant.

Research Question 10: Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes when controlling for sport variables?

Hypothesis 10a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 10b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 10c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 10d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

The final model exploring the relationship between multiple athletic expenditures and Directors' Cup total points included all the sport control variables from the previous model and added institutional graduation rate. The R^2 indicated the model explained approximately 50% of the overall variability ($R^2 = 0.507$). Additionally, the F-test ($F = 3.69$, $p = 0.0001$) determined the model maintained a good fit to the data.

Table 4.12

All Expenditures and Sport and Institutional Variables on Directors' Cup Total Points

Coefficients	Estimate	SE	t	*p*
Intercept	226.340	1.621	139.64	0.000
Recruitment expenditure	-4.853	9.274	-0.52	0.601
Game & travel expenditure	51.544	11.322	4.55	0.000
Facility & equipment expenditure	2.257	6.072	0.37	0.710
Coaching salary expenditure	0.639	15.622	0.04	0.967
Total full-time coaches	3.968	9.650	0.41	0.681
Total sports	-1.348	13.645	-0.10	0.921
Percent women's sports	-1.779	8.911	-0.20	0.842
Total student-athletes	-2.388	10.340	-0.23	0.817
Percentage of women athletes	-4.542	5.589	-0/81	0.417
Graduation rate	-18.416	12.859	-1.43	0.152
σ_u	268.395			
σ_ϵ	62.295			
ρ	0.949			
Model Summary				
R^2 Overall	0.507			
F	3.69	P = 0.0001		

Game and travel expenditures maintained its consistency of being a positive significant predictor of Directors' Cup total points ($\beta = 51.544$, $p < 0.000$). Recruitment expenditure was maintained as a negative and nonsignificant predictor ($\beta = -4.853$, $p = 0.601$). Additionally, facility and equipment expenditures were a positive predictor but not significant ($\beta = 2.257$, $p = 0.710$). Noticeably, coaching salary expenditures became a positive predictor but was still not significant ($\beta = 0.639$, $p = 0.967$). The sport control variables, in addition to the added institutional graduation rate, were not significant predictors in the model.

CHAPTER FIVE

DISCUSSION

Chapter four provided the major findings of the study. This chapter will articulate how the findings interact and expand upon the existing academic literature and potential NCAA policy implications. A small summary discussion follows each research question. A larger discussion on academic outcomes and athletic outcomes occurs at the end of each section.

Academic Outcomes

Summary. The estimated academic expenditure was a significant positive predictor of institutional averaged APR across all three research questions. The estimated academic expenditure decreased from the single variable model ($\beta = 8.061$, $p < 0.000$) to the full model ($\beta = 6.38$, $p = 0.001$). When athletic department and institutional control variables were incorporated into the overarching model, estimated academic expenditures continued to be a positive predictor. The third overarching model including both athletic and institutional control variables, identifying as Power6/BCS or HBCU were found to be significant negative predictors of institutionally averaged APR.

Research Question 1: Is there a relationship between academic expenditures and academic outcomes?

Hypothesis 1: There is a relationship between estimated academic expenditures and single year averaged APR.

The initial model that examined the viability of the estimated academic expenditure indicated that there was a positive relationship with institutionally averaged APR ($\beta = 8.061$, $p < 0.000$). In the single predictor model, an institution received approximately eight institutionally averaged APR points for every one standard deviation in expenditures. Therefore, the hypothesis

of a relationship was accepted. This supported previous literature that indicated academic support centers supported the academic outcomes of student-athletes (Jordan & Denson, 1990). Interestingly, the initial result held possible future research implications.

Future research could use this estimated academic expenditure metric to measure academic spending by athletic departments. Indeed, it has been difficult to isolate an academic expenditure as it has not been a requirement for institutions to report the data (Hirko, 2014). While the EADA reported a wide variety of athletic budget variables, academic variables have been absent. The initial result of the expenditure variable, derived from the percent of academic staff on athletic department salary budget reported by the Knight Commission, holding a significant positive relationship with the academic variable was promising for the development of future studies.

Research Question 2: Is there a relationship between academic expenditures and academic outcomes when controlling for sport variables?

Hypothesis 2: There is a relationship between estimated academic expenditures and single year averaged APR when sport variables are included.

The second model, which expanded on the first by including athletic department variables, indicated that athletic expenditures continued to be a significant positive predictor of institutionally averaged APR ($\beta = 7.861$, $p < 0.000$). For every one standard deviation in expenditures, an institution received approximately eight institutionally averaged APR points. Even with the addition of eight athletic department control variables, the relationship between academic expenditures and APR remained positive and statistically significant. Therefore, the hypothesis of a relationship when controlling for sport variables was accepted.

Interestingly, both Power6/BCS (β = -9.019, p = 0.016) and FCS (β = -2.788, p = 0.461) membership were negatively related with APR while No Football (β = 3.119, p = 0.545) membership was positively related. Although only Power6/BCS membership was significant, this result suggested that football may negatively pull an institution's averaged APR down. Indeed, Johnson et al., (2012) observed football, in addition to men's basketball and baseball, have been among the lowest team APR scores.

Research Question 3: Is there a relationship between academic expenditures and academic outcomes when controlling for sport and institutional variables?

Hypothesis 3: There is a relationship between estimated academic expenditures and single year averaged APR when sport and institutional variables are included.

The third model on academic outcomes contained athletic and institutional variables. Athletic expenditures were still a significant positive predictor of institutionally averaged APR (β = 6.38, p = 0.001). The final model indicated that for every one standard deviation in expenditures, an institution received approximately six institutionally averaged APR points. The hypothesis of a relationship between estimated academic expenditures and single year averaged APR when sport and institutional variables were included was accepted.

Academic expenditure as a contributor to APR. The significant impact of estimated academic expenditures seemed to support previous research in the area. Hirko (2014) found expenditures in academic support services was a significant contributor to increasing APR scores among Division I institutions. Hirko (2014) observed "Spending more money on tutoring expenses is an increasing trend in athletic academic support, and…is particularly useful in improving APR scores in the most high profile sports of baseball, men's basketball, football, and

women's basketball" (p.29). Indeed, the results of this study suggested that higher estimated expenditures in academics related to higher institutional APR scores.

Full-time academic staff as not a significant variable. The number of full-time academic staff members was not a significant contributor to averaged institutional APR scores. This finding conflicted with a conclusion from Bouchet and Scott (2009) who examined APR and expenditure differences between BCS and non BCS institutions, and observed "Although academic success has been shown not to necessarily benefit from more money, the hiring of more tutors and learning specialists does benefit schools with larger budgets" (n.p.). However, the finding of this study was similar to a previous study which found the number of full-time staff was positively related to single sport (Football, Men's basketball, and Women's basketball) APR but was not significant (Stokowski et al., 2017). Additionally, Campbell and Andrew (2009) found no difference in APR between institutions employing a learning specialist and those that did not have a learning specialist on staff. This research contributed to an additional finding that staffing levels in academic sectors of athletic departments do not seem to hold a significant relationship to APR scores; however, more studies are needed in this area.

HBCU's negative relationship with APR. This study indicated there was a significant negative relationship between APR institutional averages and historically black colleges and universities (HBCU). The results of this study suggested that classifying as an HBCU would result in a loss of roughly 35 institutionally averaged APR points ($\beta = -35.784$, $p < 0.000$). Therefore, HBCUs, based on this study, would begin a season at a disadvantage academically.

Table 5.1

Average Estimated Expenditure 2012-2017

	n	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017
Average estimated academic expenditure	176	$529,397.22	$583,417.83	$602,803.59	$636,283.80	$679,636.55	$719,386.09
Average estimated expenditure of PWI	162	$563,543.12	$619,872.17	$640,754.41	$678,041.84	$721,408.27	$762,208.59
Average estimated expenditure of HBCU	14	$134,280.29	$161,589.07	$163,658.43	$153,083.57	$196,278	$223,868.57

Notably, as part of the selection process for NCAA Accelerating Academic Success Program (AASP) grants, the AASP selection committee took the following into consideration: "presidential oversight, involvement of key staff, goals identified by the school, the school's ability to match grant funds, demonstrated sustainability of the initiative, the school's history in the NCAA Division I Academic Performance Program and the school's infractions history" ("AASP grants for schools," 2020, n.p.). As illustrated by Table 5.1, the average estimated academic expenditures for HBCUs were well below the total average and even further below the average for PWIs. Additionally, PWIs generate more revenue than HBCUs (Elliot & Kellison, 2019). Importantly, "HBCUs are earning significantly less revenue compared to their peer institutions, consequently putting them on path to limited resources and a financial disadvantage" (Elliot & Kellison, 2019, p. 37). Therefore, the stipulation that institutions match up to $100,000 to $300,000 yearly grants may be difficult to achieve based on the averaged estimated academic expenditure which could hinder academic achievement. This could be problematic based on the results of this study indicating a statistically positive relationship between estimated expenditures and institutionally averaged APR scores.

Power6/BCS negative relationship with APR. In this study, Power6/BCS affiliation was a significant negative predictor of institutionally averaged APR ($\beta = -7.772$, $p = 0.025$). This seemed to conflict with other studies which concluded or theorized a positive relationship between Power6/BCS affiliation and APR (Bouchet & Scott, 2009). In a similar line of investigation, others found a positive relationship between single team athletic success and APR (Bailey, 2017; Whisenant et al., 2013). Importantly, this study differed from other studies by keeping expenditures and APR on an institutional level by averaging single year APR schools at

an institution. An institutional average was used because academic departments do not solely focus on one particular sport but provide support for all student-athletes across all sports.

Bouchet and Scott (2009) observed BCS institutions had larger athletic budgets and had fewer academically penalized teams when compared to non-BCS institutions. Their study acknowledged that academic support budgets could vary between institutions and "no in-depth numbers are available for how much individual schools spent on academics compared to other expenditures" (Bouchet & Scott, 2009, n.p.). Bailey (2017) examined the APR scores of the top and bottom eight NCAA Division I sports teams during the 2012-2013, and found that teams finishing among the top eight were scoring statistically significant higher APR scores than their bottom eight counterparts. Similarly, Whisenant et al. (2013) observed men's basketball teams which made the annual March Madness Tournament had statistically significant higher APRs than teams not being selected.

This study seemed to suggest, on a pure institutional level, FCS and No Football institutions may perform better than Power6/BCS institutions in APR scores. Institutions that identified as a Power6/BCS started -7.72 institutionally averaged APR points behind non-Power6/BCS institutions. FCS and No Football membership were positively related to institutionally averaged APR but was not statistically significant. Although the finding may suggest a negative relationship between Power6/BCS membership and institutionally averaged APR scores, a different study focusing on this relationship is needed.

Athletic Outcomes

Summary. Recruitment ($\beta = 15.586$, $p = 0.042$), game and travel ($\beta = 46.212$, $p < 0.000$), facility and equipment ($\beta = 12.100$, $p < 0.000$), and coaching salary ($\beta = 35.566$, $p < 0.000$) expenditures were each a significant positive predictor in single predictor models on Directors'

Cup Points. However, once the expenditures were combined into a full expenditure only model, only game and travel expenditures ($\beta = 50.452$, $p < 0.000$) remained as a significant positive predictor. Facility and equipment expenditures ($\beta = 1.655$, $p = 0.784$) remained positive but was not significant, while recruitment expenditures ($\beta = -5.475$, $p = 0.547$) and coaching salary expenditures ($\beta = -4.404$, $p = 0.763$) were not significant negative predictors.

When athletic variables were introduced into the model, game and travel expenditures ($\beta = 50.808$, $p < 0.000$) remained a significant positive predictor of Directors' Cup total points. The other expenditures did not vary much from their coefficient estimates in the expenditure only model. Additionally, none of the introduced athletic variables were significant. The last model that included both institutional and athletic variables saw growth of the game and travel expenditure ($\beta = 51.544$, $p < 0.000$). The other expenditures remained non-significant in the model, but coaching salary expenditures ($\beta = 0.639$, $p = 0.967$) became positive.

Research Question 4: Is there a relationship between recruitment expenditures and athletic outcomes?

Hypothesis 4: There is a relationship between recruitment expenditures and Directors' Cup total points.

The model that examined recruitment expenditures indicated there was a significant positive relationship with Directors' Cup total points ($\beta = 15.586$, $p = 0.042$). In this model, an institution received approximately 16 Directors' Cup total points for every one standard deviation in recruitment expenditures. The hypothesis, there is a relationship between recruitment expenditures and Directors' Cup total points, was accepted.

The initial finding indicated a possible positive relationship between recruitment expenses and points accumulated in the Directors' Cup. In greater scope, the initial finding could

be viewed as a soft suggestion that increases in recruiting expenditures could improve the performance of an athletic team. However, the possible relationship between recruitment expenditures athletic outcomes has been mixed (Caro, 2012; Stevens, 2017).

Caro (2012) found some relationship between recruiting class strength and athletic success among BCS institutions, and argued "for programs in these conferences, and really for all programs across conferences, it stresses the importance of making a significant investment in recruiting budgets to drive success on the field" (p. 151). Stevens (2017) examined Division III baseball programs and found no correlation between recruiting expenditures and wins. Additionally, a media article was published examining the differences between recruitment expenditures among Division I FBS institutions and highlighted large disparities within and between conferences with few to no patterns emerging (Daughters, 2015).

Research Question 5: Is there a relationship between game and travel expenditures and athletic outcomes?

Hypothesis 5: There is a relationship between game and travel expenditures and Directors' Cup total points.

The single predictor model found a statistically significant positive relationship between game and travel expenditures and Directors' Cup total points ($\beta = 46.212$, $p < 0.000$). For every one standard deviation in game and travel expenditures, an institution received approximately 46 Directors' Cup points. The hypothesis, there is a relationship between game and travel expenditures and Directors' Cup total points, was accepted.

Unfortunately, at the time of this study, there were few studies that examined game and travel expenditures on athletic outcomes. Scharfe (1989) found women's NAIA teams which spent more on team travel in volleyball and basketball had a better athletic performance.

Interestingly, the third sport they examined, softball, showed no significant difference in various expenditures and athletic performance. Similarly, Magner (2014) found a positive statistically significant relationship between EADA operations expenses, a metric that includes game and travel expenditures, and Directors' Cup standings.

These studies provided some support that a relationship may exist between game and travel expenditures and athletic outcomes. Indeed, the early observation from this study suggested that without any control variables, there was a positive and significant relationship with institutional athletic success.

Research Question 6: Is there a relationship between facility and equipment expenditures and athletic outcomes?

Hypothesis 6: There is a relationship between facility and equipment expenditures and Directors' Cup total points.

The model examining facility and equipment expenditures on Directors' Cup total points found a significant positive relationship ($\beta = 12.100$, $p < 0.000$). For every one standard deviation in expenditures, an institution received approximately 12 Directors' Cup total points. The hypothesis, there is a relationship between facility and equipment expenditures and Directors' Cup total points, was accepted.

Scholars previously observed a rise in expenditures on new athletic facilities (Huml et al., 2018; Shulman & Bowen, 2001; Yost, 2010). Unfortunately, there have been few empirical studies on how these facility expenditures impact metrics of athletic performance (Huml et al., 2018). Huml et al. (2018) found no significant relationship between football and men's basketball recruiting rankings and completed facility upgrades. Welch (2019) found a positive

statistically significant relationship between facility upgrades on a football team's home winning percentage.

The initial finding from this study seemed to suggest a possible relationship between facility and equipment expenditures and institutional athletic success. This would possibly expand on Welch's (2019) single sport finding and suggest more sports may receive some level of boost from facilities and equipment. While facility upgrades may not have a statistically significant impact on top level recruits (Huml et al., 2018), they may have some impact on athletic success when not accounting for other athletic, institutional, or expenditure variables.

Research Question 7: Is there a relationship between coaching salary expenditures and athletic outcomes?

Hypothesis 7: There is a relationship between coaching salary expenditures and Directors' Cup total points.

The last single predictor model found coaching salary expenditures had a significant positive relationship on Directors' Cup total points ($\beta = 35.566$, $p < 0.000$). For every one standard deviation in expenditures, an institution received approximately 36 Directors' Cup total points. The hypothesis, there is a relationship between coaching salary expenditures and Directors' Cup total points, was accepted.

The possible relationship between coaching salary expenditures and athletic success has been examined by multiple scholars (Colbert & Eckard, 2015; Tsitsos & Nixon, 2012). Colbert and Eckard (2015) found "coach pay and team performance…are positively correlated and that the pay–ratings relationship is statistically significant in multivariate models that include relevant control covariates" (p. 348). However, Tsitsos and Nixon (2012) found no correlation between coaches' salaries and athletic success in football and men's basketball.

The initial finding suggested that coaching salaries, on an institutional level, seemed to positively impact their final standings in the Directors' Cup. Indeed, coaches that exceed expectations in college football were compensated more (Soebbing et al., 2016). Institutions may spend more on coaches that lead their respective teams to playoff and championship appearances, which directly translates to more points in the Directors' Cup standings. Therefore, the result might reflect successful coaches being compensated at higher rates than their peers.

Research Question 8: Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes?

Hypothesis 8a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures.

Hypothesis 8b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures.

Hypothesis 8c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures.

Hypothesis 8d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures.

In the multiple expenditure model, no significant relationship was found between recruitment expenditures ($\beta = -5.475$, $p = 0.547$), facility and equipment expenditures ($\beta = 1.655$, $p = 0.784$), and coaching salary expenditures ($\beta = -4.404$, $p = 0.763$) on Directors' Cup total points. The model still found a positive statistically significant relationship of game and travel expenditures on Directors' Cup total points ($\beta = 50.452$, $p < 0.000$). An institution received approximately 50 Directors' Cup total points for every one standard deviation in game and travel expenditures.

Hypothesis 8b, there is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures, was accepted. The findings failed to accept hypothesis 8a, hypothesis 8c, and hypothesis 8d.

The findings indicated game and travel expenditures were the largest, and only significant, contributor to Directors' Cup total points. Interestingly, all other expenditures were not significant predictors with two, recruiting and coaching salary, becoming negative. The finding seemed to suggest that when accounting for other expenditures, game and travel expenses significantly outweigh any other expenditure variables.

Research Question 9: Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes when controlling for sport variables?

Hypothesis 9a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 9b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 9c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 9d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

When adding athletic control variables, game and travel expenditures were maintained as a significant positive predictor of Directors' Cup total points ($\beta = 50.808$, $p < 0.000$). For every one standard deviation in game and travel expenditures, an institution would gain approximately

50 Directors' Cup points. Recruitment expenditures (β = -4.993, p = 0.591), facility and equipment expenditures (β = 1.758, p = 0.772), and coaching salary expenditures (β = -4.485, p = 0.768) were not significant predictors. Additionally, none of the athletic control variables were significant.

Hypothesis 9b, there is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables remained as the only hypothesis to be accepted. The findings failed to support hypothesis 9a, 9c, and 9d.

There was little change in the significance of game and travel expenditures as the primary predictor for Directors' Cup total points. It seemed the inclusion of athletic variables had little impact on the influence of the expenditures. Interestingly, the total sports variable did not hold a relationship with Directors' Cup total points. An initial assumption could have been institutions with more sports would have more opportunities to score Directors' Cup points and naturally spend more on game and travel expenditures. However, with total sports having no significant impact within the model, the finding suggested game and travel may have more to do with the number of competitions rather than number of sports.

Research Question 10: Is there a relationship between recruiting, game and travel, facility and equipment, and coaching salary expenditures and athletic outcomes when controlling for sport variables?

Hypothesis 10a: There is a relationship between recruitment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 10b: There is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 10c: There is a relationship between facility and equipment expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

Hypothesis 10d: There is a relationship between coaching salary expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables.

The last model included controls for both athletic department and institutional variables. Game and travel expenses continued to be a significant positive predictor of Directors' Cup total points ($\beta = 51.544$, $p < 0.000$). An institution gained approximately 51 Directors' Cup points for every one standard deviation in game and travel expenditures. Coaching salary expenditure became a positive predictor but was even less significant when compared to the athletic controls only model ($\beta = 0.639$, $p = 0.967$). Recruitment expenditures continued to be a nonsignificant negative contributor ($\beta = -51.544$, $p < 0.000$), while facility and equipment expenditures maintained a positive nonsignificant relationship ($\beta = 2.257$, $p = 0.710$).

Hypothesis 10b, there is a relationship between game and travel expenditures and Directors' Cup total points when including additional athletic expenditures when controlling for sport variables, was accepted. The findings failed to support hypothesis 10a, 10c, and 10d.

In the final model, game and travel expenses was the only significant predictor. When using Directors' Cup standings to evaluate the relationship of expenditures to athletic outcomes, game and travel expenditures should be considered and accounted for in future research. Indeed,

the longitudinal analysis indicated a significant relationship between institutions which spent the most on game and travel and positive performance in the Directors' Cup standings.

Expenditures on Directors' Cup standings. The results found, independently, each expenditure examined contributed to Directors' Cup standings. These findings seem to support previous research that examined the impact of expenditures on Directors' Cup standings. Jones (2012) found a significant positive relationship between total expenditures and Directors' Cup total points from FY 2007 – FY 2010 using a fixed-effects regression analysis. Magner (2014) similarly found a positive relationship between operational expenditures, a similar metric to the Knight Commission's games and travel expenditure, and Directors' Cup standings from FY 2008 – FY 2012. Lawrence et al., (2012) examined the FY 2007 and found a positive relationship between various expenditures in Division I and the single year Directors' Cup standings. The findings of this study seemed to support past research on the general importance and relationship of expenditures; however, some additional findings and conclusions from these previous studies did not seem to be supported in this study's findings.

Lawrence et al. (2012) concluded, in part, "given the scoring structure of the Directors' Cup, it is logical that those institutions investing in many sport programs, including women's would see an impact on their point totals" (p. 219). This conclusion was, in general terms, unsupported by several of the metrics from this study. Total sports ($\beta = -1.348$, $p = 0.921$) and percentage of women's sports ($\beta = -1.779$, $p = 0.842$) were not significantly related to performance in Directors' Cup total points. The findings from this study could support a slight alternative that institutions which were strategic in their investments found success rather than those that offer as many sports as possible with little investment.

For example, the EADA dataset indicated there were only 62 women's gymnastics Division I teams compared to 349 men's basketball and 347 women's basketball teams in 2017. Institutions investing more in women's gymnastics may see a greater return in Directors' Cup points than those investing in basketball simply by the nature of having to compete against fewer institutions. Certainly, this phenomenon should be studied further to gain a greater understanding of efficiency spending and capitalizing on Directors' Cup points.

Magner (2014) examined the EADA dataset on operational expenditures and suggested "the amount of money invested in aspects that directly affect the student athlete and their performance such as weight rooms, travel arrangements, and equipment are predictors for Directors' Cup standings" (p.45). The findings from this study supported expenditures in travel arrangements, as game and travel expenditures were significant in this study ($\beta = 2.257$, $p = 0.710$), however, it did not support weight rooms and equipment as facility and equipment expenditures were not a significant predictor ($\beta = 51.544$, $p < 0.000$).

CAFI vs EADA. The comparison of this study against previous studies that relied on the EADA dataset provided an interesting comparison. With various differences in the data categories, the CAFI database allowed for an additional insight on expenditures. The CAFI database allowed for facilities and equipment to be measured independently rather than as part of the EADA's operational expenditures. Certainly, some similarities between the two remain. The CAFI and the EADA both measure recruitment expenditures and coaching salaries; however, the differences provide an opportunity for researchers to triangulate results of studies in new ways that could perhaps open new insights into revenues and expenditures of intercollegiate athletics.

Game and travel expenditures as only significant predictor in full model. Although it was initially surprising to see how impactful game and travel expenditures were in the models, it

seemed logical from an applied standpoint. As a season progressed each year, the athletically successful teams were likely to participate in post-season competition. Therefore, teams that qualified for additional competition would be, theoretically, likely to spend more on additional travel when compared to institutions that did not qualify for post-season competition.

For example, institutions' football teams that participated in Division I FBS and finish the season with a six win and six loss record or a five win and seven loss record in some rare cases, may be invited to an additional game at a neutral sight. This additional game could help the team score more Directors' Cup points and they would, by this nature, spend more on game and travel compared to those that did not participate in a bowl game. Additionally, those institutions that were selected for the four-team playoff would extend their season by an additional game; with the winners of the semifinal having to extend their season by an additional game. These extra games would certainly increase the amount of travel expenses the teams incurred.

As Directors' Cup points were based on teams performing well and continuing to travel and compete beyond the regular season, game and travel seemed to have a clear relationship. Therefore, the results did not necessarily support the notion that institutions should increase their game and travel expenditures to obtain a higher Directors' Cup standing. Instead, the results seemed to support the idea that athletically successful teams will travel more. As these teams continue to travel and compete beyond the conclusion of the regular season, they will gain more Directors' Cup total points. More studies would be needed on a sport level to examine the impact on scores and other competitive metrics.

Spending "to win." This study explored the possible relationship between various athletic expenditures and athletic success, in part, to gage higher education administrators' investments into athletics for the perceived benefits of generating revenue, college recruitment,

prestige, and winning intercollegiate athletic contests. Indeed, an article in *Athletic Business* claimed "it's in the schools' best interests to invest heavily in keeping their athletic facilities up to date, as revenue generated from sports remains the lifeblood of many colleges and universities" (Horne, 2019). With only game and travel expenditures as the only significant positive predictor of Directors' Cup standings, higher education administrators should consider increasing expenditures based on need rather than desire for perceived benefits.

This study failed to find a significant relationship, in the overall model, between several key expenditures and athletic success. From an institutional standpoint, investing in coaching salaries, recruitment, and facilities were not related to Directors' Cup performance when controlling for athletic and institutional variables. The notion of generating revenue, increasing college recruitment and applications, and gaining prestige has been built on a foundation of having a successful athletic program. Therefore, expenditures, particularly in coaching salaries and facility expenditures which increase annually, become difficult to justify when no relationship was apparent to athletic success in the full model. Continued participation in the athletics arms race should be carefully evaluated based on the institution's mission. As observed by the former Drake Group President Dr. Gerald Gurney, the facilities arms race and ever growing capital expenditures "has nothing whatsoever to do with the mission of a university" (Hobson & Rich, 2015, n.p.). The results of this study illustrated that spending heavily in intercollegiate athletics in the hopes of creating and maintaining a successful athletic program which can generate positive outcomes for the institution maybe more of a gamble than an investment. A gamble that has rarely paid-off.

Certainly, it could still be possible that relationships may exist on a sport level. This study simply did not find evidence that spending in three key areas made an impact in Directors'

Cup standings, while the fourth area could be viewed as a residual effect based on the nature of the Directors' Cup. In summation, higher education administrators should be wary of heavy expenditures in intercollegiate athletics and should consider if the investment is needed and how it should be incorporated into the overall plan and mission of the university.

Limitations

Public institutions were selected based on access to published financial records of universities. One of the major problems in analyzing financial records of athletic departments was the lack of availability of published financial records for private universities (Litan et al., 2003). Some NCAA Division I members were private institutions, which limited access to data; and by extension, the overall sample size and scope of the study. The nature of private intuitions limited the generalizability of this study's findings. Various academically reputable institutions, such as Stanford University, Vanderbilt University, and Northwestern University were omitted from this study. The military academies privatized their athletic departments and were eliminated from the study (Schrotenboer, 2017). Therefore, any results cannot be applied to private universities.

Additionally, the study only examined institutions participating in NCAA Division I athletics. With most NCAA institutions participating in Divisions II and III, the findings cannot be generalized towards the entire NCAA membership. Moreover, the results should not be generalized towards institutions that participate in other athletic associations; such as the National Association of Intercollegiate Athletics and National Junior College Athletic Association.

The largest limitation to this study was the availability and access to athletic department financial data. Indeed, Suggs (2009b) observed, "the lack of complete and consistent data on

finances of intercollegiate sports has become a concern in its own right" (p.11). The EADA provided limited self-reported expenditures (Jones, 2012). The Knight Commission worked tirelessly to expand the availability of financial data; however, data was limited to self-reporting public institutions. A primary problem with this data set was that it was "difficult or impossible to authenticate" (Gonyea, 2005, p. 75). Financial records were obtained from the institution directly, but the accounting may be reported differently based on institutional practices and existing government regulations. Other studies used Freedom of Information Act (FOIA) requests with some public institutions ignoring or refusing to share their financial information (Hirko, 2014). Therefore, conclusions were limited based on the difficulty in verifying the financial information obtained.

The study also encountered a limitation for the number of institutional level variables available to judge athletic performance. Numerous variables were available and have been used on the individual sports level to gage athletic performance. However, only two viable measures for the institutional level were found: the Learfield Directors' Cup and the Capital ONE Cup. Unfortunately, the Capital ONE Cup was limited in the data available, difficulty to attain, as not all the years were available, and did not provide as robust of a measure due to few institutions scoring on their metrics.

At times, complete athletic department staff information was difficult to attain. Numerous athletic department staffs were unavailable for the 2010-2011 academic year, which limited the number of cases. Additionally, although it could be assumed by the nature of keeping an updated contact list, there were no guarantee's the athletic departments were actively updating their listed directories on their respective websites. The nature of this self-reported data may have created instances where athletic department staff were over or underrepresented. That is, some athletic

departments may have failed to report various individuals who were employed in entry level roles, and only report those who were middle or top management. On the opposing end, other athletic departments may have overreported by including individuals in their directory who perhaps would not fall under athletic administration, such as volunteer field/facilities managers.

Validity and Reliability

Importantly, validity and reliability were evaluated for this study. Creswell (2014) described validity as checking the accuracy of the findings and reliability as the consistency of the approach (p. 201). Financial information, as self-reported data, may suffer from validity and reliability (Gonyea, 2005). Notably, institutions may interpret expenditures differently, where an athletic expense at one institution may not be associated with athletics at another. Indeed, reporting errors could occur with complex items (Gonyea, 2005, p. 77). The self-reported data was viewed as an internal validity threat, which Creswell (2014) defined as "experimental procedures, treatments, or experiences of the participants that threaten the researcher's ability to draw correct inferences from the data about the population in an experiment" (p. 244).

CHAPTER SIX

CONCLUSION

Purpose Statement

The purpose of this study was to examine the relationship between public NCAA Division I institutions' athletic department expenditures and student-athlete academic achievement and athletic performance.

Summary of Findings

Academic Outcomes. A random-effects regression model was used to examine the relationship between estimated athletic department academic expenditures and institutionally averaged APR scores among 176 public institutions from 2011-2017. In the model, there was a significant positive relationship between estimated academic expenditures and institutionally averaged APR. When athletic control variables were introduced in the model, there was still a positive significant relationship between academic expenditures and Directors' Cup standings. Finally, with both institutional and athletic department explanatory variables included in the model, estimated academic expenditures were still a significant positive predictor to APR scores.

The results supported previous literature that found a relationship between academic expenditures and APR scores (Hirko, 2014). Additionally, when full-time academic staff was included as a control variable, there was no significant relationship between full-time staff and APR. This may suggest full-time staff that were paid more may have provided better guidance to attaining higher APR rates; however, this would need to be tested in a follow-up study. HBCUs were also found to hold a statistically significant negative relationship with APR. With HBCUs as low resource institutions and academic expenditures as a positive predictor of APR, the NCAA should find ways to increase aid for academic spending. Lastly, Power6/BCS institutions

were found to hold a statistically significant negative relationship with APR. Additional studies would be needed to fully explore this finding; however, the base assumption is the big-time nature and commercialism of Division I Power 6/BCS athletics may have a negative effect on APR.

Athletic Outcomes. A fixed-effects regression model was used to examine the relationship between recruiting expenditures, game and travel expenditures, facilities and equipment expenditures, and coaches' compensation expenditures and Directors' Cup total points among 211 public institutions from 2010-2017. Recruiting expenditures, game and travel expenditures, facilities and equipment expenditures, and coaches' compensation expenditures were each a significant positive predictor in the single predictor models on Directors' Cup total points. However, in the model with all expenditure variables on Directors' Cup total points, only game and travel expenditures were a significant positive predictor. Game and travel expenditures remained as the only significantly positive predictor when including both institutional and athletic department variables.

The results seemed to support other studies that previously found a correlation between various athletic expenditures and Directors' Cup standings. The CAFI dataset developed by the Knight Commission provided several unique measurements that allowed for a greater understanding of expenditures on athletic performance. Game and travel expenditures as the only significant positive predictor of Directors' Cup standings may highlight the relationship between extended seasons when performing well athletically (i.e. playoffs) and Directors' Cup standings rather than an indication of how increasing expenditures in hotels and general competition could potential lead to higher Directors' Cup standings.

Implications

Academics. Similarly to Ryan (2004) and Webber and Ehrenberg (2010), this study found a positive link between expenditures in student support centers and academic outcomes. In practice, institutions should increase spending in academic support centers to aid in the academic wellbeing of student-athletes. With a statistically significant positive relationship between estimated academic expenditures and APR, institutions that were estimated to be spending more on academic support centers were achieving higher APR scores among their sport teams. From a budgeting perspective, academic centers should not be considered an afterthought among intercollegiate administrators but should be fully funded to meet the academic needs of the student-athletes.

The results of this study suggest Power 6 public institutions should carefully monitor the academic welfare of their student-athletes. This study found a significant negative correlation between membership in a Power 6, formerly BCS institutions, and institutionally averaged APR, which may result from an increased pressure to win among these big-time athletic institutions. Power 6 public institutions should consider methods to increase APR scores through appropriate budgeting of academic centers, providing additional supports (i.e. additional tutors, academic mentors, psychological services), and coaches emphasizing the importance of academics.

This study identified HBCUs at a significant disadvantage in the institutional APR metric. This disadvantage was fully recognized in a simple comparison of averaged estimated academic expenditures between PWIs and HBCUs where in the 2016-17 academic year alone HBCUs' academic budget was roughly 29% of PWIs' academic budget. The NCAA has attempted to correct this disparity through AASP grants, but the grants arguably fall well short. The NCAA should consider removing the matching stipulation of the yearly grants based on the

enormous disparity between the current estimated academic budgets and lack of revenue generated when compared to peer institutions (Elliot & Kellison, 2019).

Athletics. The study found game and travel expenses as the only significant predictor of Directors' Cup standings. The relationship between game and travel expenses and athletic success should be evaluated further to determine if this is a lagged effect from successful teams traveling more during post-season competition. Notably, this challenged commonly held assumptions of the significance of coaching salaries, recruiting, and facility expenditures. Higher education and intercollegiate athletic administrators should be cautious when considering increasing expenditures in these areas in the pursuit of athletic success as the results of this study may suggest other unobserved factors were more important to Directors' Cup standings. Expenditures should be assessed based on institutional, student, and community needs rather than perceived benefits.

Future Research

Future studies could examine differences between the CAFI dataset and EADA dataset. Previously, Jones (2012) examined and found no significant differences between the EADA reported expenditures and USA Today reported expenditures on Directors' Cup standings. With the CAFI dataset relatively new with few studies using the dataset, at the time of this publishing; studies should determine if there are significant differences between institutional reporting for the different datasets.

A similar future study could be conducted on NCAA Divisions II and III. The Directors' Cup has been awarded to Division II and III institutions. With the different dynamics and scale of these Divisions, it would be interesting to see how expenditure variables reported by the

EADA, as the CAFI does not collect Division II and III data, relate to Directors' Cup performance.

While there have been some examinations of expenditures on individual sport performance, many sports, predominately the non-revenue Olympic, have not been examined. Future studies could examine the relationship between expenditures in other sports and positive performance outcomes. Additionally, different expenditures may influence different outcomes in sports. Recruiting expenditures may have a different impact on Olympic sports in comparison to their revenue sport counterparts; especially with a more consistent offering among the Division I membership of football and basketball in comparison to women's gymnastics and men's wrestling.

The significant relationship between the estimated academic expenditures and APR holds promise for future studies on athletic department academic expenditures. With few current options on obtaining athletic department academic expenditures, the data derived could be used in future studies to evaluate potential relationships with FGR and GSR scores to triangulate the impact of academic expenditures on academic performance metrics. Additionally, the academic expenditure could be used in a study to examine the relationship between expenditures and student-athlete academic honor rolls, and to appraise if there are diminishing returns on academic expenditures.

Significance Statement

This research was important in the continued assessment of correlations between various athletic department expenditures and student-athlete outcomes; especially with continued criticism on the amount of expenditures dedicated to NCAA Division I athletic programs. The research highlighted how expenditures in recruiting, facilities and equipment, and coaching

compensation were not as significant as game and travel expenditures on Directors' Cup standings. Importantly, this research provided additional evidence of how resources are important to academic outcomes. Indeed, a positive relationship between estimated academic expenditures and APR suggested institutions that spent more on academics performed better academically. Lastly, this study provided more evidence on the effects of expenditures on athletic department outcomes.

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[i] …except Alabama. Based on the author's experiences as a south Louisiana native, LSU graduate, and partaker in the Saturday night tradition. *2019 update: Gott'em. GEAUX TIGERS