

COGNITIVE, LEARNING AND STUDY STRATEGY PREDICTORS OF
STUDENT-ATHLETE ACADEMIC SUCCESS
AND ACADEMIC PROGRESS RATES

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ABSTRACT

The purpose of this research was to explore a range of predictor variables believed to influence the academic success of student-athletes as measured by cumulative grade point averages (CGPA) and academic progress rates (APR). This study included 210 scholarship student-athletes participating in intercollegiate athletics at a National Collegiate Athletic Association (NCAA) limited-resource institution.

Multiple regression analysis found standardized test scores (Test), high school core grade point averages (HSGPA), the Will composite scale of the Learning and Study Strategies Inventory, 2nd Edition (LASSI-II), gender, and generational status (i.e. first-generation or non-first-generation) to be most predictive of student-athlete cumulative grade point averages (CGPA). Independent t-tests were conducted on all predictor variables in the study and found significant differences between males and females on the variables of HSGPA, Test, and CGPA with female student-athletes scoring higher on all of these measures. Significant differences were also found between first-generation and non-first-generation student-athletes on variables of HSGPA, Test, Skill, Will, and CGPA with non-first-generation student-athletes scoring higher on all of these measures. Student-athletes participating in non-revenue sports had significantly higher scores on the HSGPA, Test, and CGPA variables. Logistic regression analyses using found standardized test scores to be the only predictor variable in this study to consistently contribute to the prediction of APR point loss.

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CHAPTER 1

INTRODUCTION

In 1929, the Carnegie Foundation for the Advancement of Teaching published a report on intercollegiate athletics and presented two main issues of concern: “commercialism and a negligent attitude toward the educational opportunity for which a college exists” (Crowley, Pickle & Clarkson, 2006, p. 26). These two issues continue to plague institutions of higher education and the National Collegiate Athletic Association (NCAA) today. In his book, *Beer and Circus*, Murray Sperber (2001) wrote a chilling account of the state of American undergraduate education and attributed its demise to intercollegiate athletics. Many faculty members and administrators within higher education share Sperber’s view (Knight Commission, 2010; LaForge & Hodge, 2011; Oriard, 2012; Ridpath, 2008). In fact, two faculty groups, the Drake Group and the Coalition on Intercollegiate Athletics (COIA), have tried to work with the NCAA to address the declining academic culture on college campuses and on athletic teams in particular (Ridpath, 2008).

Over the past two decades, the NCAA has faced mounting criticism surrounding its mission with respect to educational values and the academic success of student-athletes. The pressure to address low graduation rates and to reform the academic culture of intercollegiate athletics prompted the NCAA to adopt sweeping academic reform initiatives beginning with Proposition 48 in 1986 (LaForge & Hodge, 2011; Petr & Paskus, 2009; Oriard, 2012; Petr & McArdle, 2012). Proponents of NCAA academic reform initiatives point to increases in student-athlete graduation rates and institutional efforts to support student-athlete academic pursuits as

signs that these reform initiatives are working. Opponents of these reforms point to substantial increases in spending, wide-spread problems with student-athletes clustering in majors, and increases in academic misconduct as signs that these reform initiatives are seriously flawed (Gurney, Tan, & Winters, 2010). Another significant concern is the disparate impact specific academic reform initiatives have on particular groups of student-athletes and institutional types.

One of the most controversial NCAA academic reform initiatives involves a metric entitled the Academic Progress Rate (APR). APR is used by the NCAA to measure the academic success of college student-athletes, as well as the academic culture of athletic teams. However, there is very little peer-reviewed research on APR as an academic success metric. APR is viewed as a measure of the academic success of student-athletes and of the academic culture of an institutions; therefore, not meeting minimum APR scores can be a serious blow to the image of a higher education institution (Batley, 2011; Christy, Seifried & Pastore, 2008; O'Bryant, 2012; Oriard, 2012). Further, penalties for not meeting APR benchmarks are serious ranging from reductions to practice time to post-season competition bans. Institutions want to avoid the negative publicity associated with substandard APR scores, as well as penalties imposed as a result of not meeting these standards. For these reasons, studying correlates to student-athlete academic success as measured by cumulative GPA and APR points is beneficial to NCAA Division I member institutions.

The academic success or failure of intercollegiate student-athletes is the subject of debate in the media and in the educational realm. When student-athletes are not graduating, the public perceives higher education institutions as failing these students and the institution's primary mission, which is to provide purposeful academic and learning experiences, to challenge students to think and grow intellectually, and to educate students to be productive members of society and

responsible citizens. Learning is the principal activity of educational institutions and the reason for their existence; therefore, higher-education institutions should be held accountable for the educational experiences and learning of their students including the academic success of student-athletes. The current educational climate and demand for more accountability within higher education is illustrated by the focus on student retention and graduation rates of post-secondary institutions (Kuh & Love, 2000; Pascarella & Terenzini, 2005; Tinto, 2012). Accountability measures including the federal mandate for public institutions to release graduation success rates (GSR) of student-athletes separately from the general student population led to intense criticism of the role of intercollegiate athletics in higher education (La Forge & Hodge, 2011; Le Crom, Warren, Clark, Marolla, & Gerber, 2009; Ridpath, 2010). The release of very low graduation rates of student-athletes, and more specifically, of male student-athletes created a negative perception of intercollegiate athletics culminating in calls for reform (Knight Commission, 2010; LaForge & Hodge, 2011; Paskus, 2012). In response to criticism and concerns expressed by faculty groups, higher education administration, the media, and the public, the National Collegiate Athletic Association (NCAA) set into motion ambitious academic reform initiatives designed to address both initial academic eligibility requirements and low graduation rates of student-athletes competing in Division I intercollegiate athletics. The next section of this chapter will briefly outline the history of NCAA academic reform initiatives including the collection and use of data obtained by the NCAA regarding student-athlete academic success and graduation rates, issues related to APR, and finally the theoretical framework for investigating specific cognitive, learning and study strategy predictors of student-athlete academic success and APR scores.

History of NCAA Academic Reform Initiatives

The NCAA took on the challenge to increase graduation rates of student-athletes with Proposition 48 (Petr & McArdle, 2012). Proposition 48, passed in 1986, increased initial eligibility requirements for incoming freshmen student-athletes (Ridpath, 2008). However, critics of Proposition 48 expressed concerns over the impact of new academic eligibility standards on low-income and minority students especially with regard to increased minimum scores on standardized test scores (Baker & Connaughton, 2003; Bouchet & Scott, 2009). According to Petr and McArdle (2012), Proposition 48 was not based on specific empirical data; therefore, the NCAA commissioned a longitudinal study entitled the Academic Performance Study (APS) to investigate the freshman eligibility question. In 2003, the NCAA created the Academic Performance Program (APP) requiring all Division I institutions to submit academic data on all student-athletes receiving athletic aid. The NCAA continues to use academic data collected from member institutions to examine the influence of academic policies on student-athletes. Using this data, the NCAA found several predictors of student-athlete academic success that have been used to guide academic reform initiatives and eligibility guidelines. Petr and McArdle summarize the findings of the NCAA's research as follows: high school grades are the best predictors of freshman academic success; a model including high school grades and test scores predicts student-athlete success better than using the variables in isolation; a core high school GPA is a better predictor of academic success than overall GPA; certain demographic variables have some predictive power but are less significant when test scores and grades are included in the model; differential impacts on subgroups is expected given the distribution of scores on both high school grades and test scores.

According to Petr and McArdle (2012), the NCAA's research prompted the development of a sliding scale, an increase in the number of core courses prospective student-athletes must complete before college, and an increase in progress toward degree requirements. Increasing academic eligibility guidelines was only the first of many steps toward making NCAA member institutions more accountable for the academic success of their student-athletes. These academic reform measures have been the subject of some controversy given the disparate impact on specific institutional types.

Student-Athlete Graduation Rates

Student-athlete graduation rates have increased significantly since the advent of Proposition 48 and other academic reform initiatives (Hosick & Sproull, 2012; Petr & McArdle, 2012; Wolverton, 2008). According to Petr and Paskus (2009), student-athletes consistently graduate at higher rates than the general student population at Division I institutions. The most significant increase in graduation rates corresponds to student-athlete cohorts beginning in 1995 and 1996 when Proposition 16 was passed increasing the number of core academic courses calculated in a student-athlete's high school GPA (Petr & Paskus, 2009). There is some debate about how student-athlete graduation rates are calculated because only student-athletes receiving athletic aid are included in those calculations (Eckard, 2010). It is also difficult to make direct comparisons between student-athlete graduation rates and the graduation rates of the general student body because student-athletes are required to maintain full-time enrollment and have scholarships offsetting the cost of a college degree. Having financial resources, comprehensive academic support systems, and maintaining full-time enrollment are important factors in completing college both in the general student population and in the student-athlete population. Overall, student-athlete graduation rates have improved; however, some critics believe the

improvement in graduation rates of student-athletes comes at the expense of academic integrity (LaForge & Hodge, 2011; Ridpath, 2008).

Creation of the Academic Progress Rate (APR)

A major part of the NCAA's academic performance program (APP) is a metric entitled the Academic Progress Rate (APR). APR gives member institutions a semester by semester accounting of the academic progress of each student-athlete receiving athletic aid (Christy et al., 2008; Johnson, Wessel & Pierce, 2010; LaForge & Hodge, 2011). According to the NCAA, the goal of APR and other academic reform measures is to positively impact the academic culture of intercollegiate sports; therefore, the NCAA penalizes teams for not meeting the minimum APR score of 930, which has been estimated to equate roughly to a 50% graduation rate (Christy et al., 2008; LaForge & Hodge, 2011; Petr & McArdle, 2012). Penalties for not meeting the minimum APR scores include reductions in scholarships and practice time, post-season competition bans, and even restrictive membership to the NCAA for the entire institution (Petr & McArdle, 2012). These penalties can cause significant damage to an institution's academic reputation and negatively affect student-athletes who remain on the team.

While the purpose of APR is to give teams a more dynamic measure of the academic progression of student-athletes on a particular team, the NCAA deems long term issues with APR scores indicative of more serious problems; consequently, historical penalties for not meeting APR benchmarks are incremental and more generally more severe (NCAA, 2013; Oriard, 2012; Paskus, 2012). Additionally, the NCAA standards for minimum team APR scores are increasing. Beginning with the 2012-2013 academic year, any team failing to meet a four-year APR average of 900 or a 930 average for the last two years will not be allowed to participate in any championship (Hosick, 2012; Paskus, 2012). Teams must then meet a 930

four-year average or a 940 two-year average to avoid penalties and participate in championships during the 2014-2015 academic year. Beginning with the 2015-2016 academic year, teams must meet the 930 four-year average or face a post-season ban on competition (Hosick & Sproull, 2012; NCAA, 2013). The menu of historical penalties includes restricted membership if a team continues to fall below APR benchmarks for three consecutive years (NCAA, 2013). There are also high financial stakes involved in post-season competition not only for individual institutions but for conferences as well.

Issues Related to APR

APR is used by the NCAA as an academic outcome measure; therefore, an understanding of how APR is calculated is necessary to determine the validity of the metric. There are two components of APR, eligibility and retention. Each student-athlete on scholarship earns one eligibility point for meeting all academic eligibility requirements for the semester and earns one retention point for returning to the institution the following semester or graduating. Thus, each student-athlete has the possibility of earning two points each semester to add to the individual team APR calculation. A team's APR score is then determined by the total points possible, i.e. four points per academic year for each student-athlete on scholarship, divided by the total points earned. In order to convert to a whole number, this score is multiplied by 1,000 to make the maximum score possible for a team to be 1,000 (NCAA, 2013; Petr & McArdle, 2012).

APR scores consist of two components, eligibility and retention. The eligibility component of APR encompasses several academic requirements. To be deemed academically eligible a student-athlete must meet the following requirements (See Appendix B) : 1) maintain full-time enrollment 2) earn a minimum of 6 credit hours in the semester immediately preceding

the season of competition 3) freshmen must earn a minimum of 24 credits during the first academic year with at least 18 of those hours earned during the fall and spring terms 4) all undergraduates must earn 18 credits each academic year during the fall and spring terms 5) maintain satisfactory progress toward a degree (PTD) determined by successfully completing 40% of the declared major before the 5th semester of enrollment, 60% before the 7th semester of enrollment, and 80% of all degree requirements before the 9th semester of enrollment 6) maintain a cumulative GPA of 1.8 before the second year of full-time enrollment, 1.9 cumulative GPA before the third year of full-time enrollment, and a 2.0 cumulative GPA for each subsequent year until graduation (NCAA , 2013). The APR retention point is earned each semester the student-athlete returns to the institution, maintains full-time enrollment, or graduates within a five-year time frame (NCAA, 2013). As a metric, APR weights eligibility and retention equally despite the fact that eligibility points are earned by meeting a number of academic requirements each semester and retention points only reflect persistence. Additionally, the retention component of APR could be affected by a range of factors that are not directly related to academics including a student-athlete's dissatisfaction with playing time or the team, personal problems, or simply a lack of fit with the institution. For these reasons, predictors of academic eligibility may be different from predictors of retention.

Determining the academic readiness of student-athletes and other variables that influence APR scores is critical for NCAA Division I member institutions charged with meeting the requirements of NCAA academic reform measures and APR. It has been argued that the use of a sliding scale for initial eligibility creates confusion among coaches who recruit student-athletes and the academic support staff charged with the academic progress and eligibility of student-athletes (Gurney et al., 2010). Those student-athletes who meet NCAA initial eligibility

requirements are called initial qualifiers. According to Campos (2009), less than 0.3% of freshmen do not meet initial eligibility requirements. Arguably, if the NCAA deems a student-athlete academically qualified for participation in intercollegiate athletics, it is reasonable to assume an initial qualifier should be academically ready for college. On the contrary, many initial qualifiers are accepted into higher education institutions with low test scores and, consequently, are required to take and successfully complete a significant number of remedial or developmental courses before being allowed to take courses that count toward a degree (Gurney et al., 2010).

According to the ACT Policy Report (2012), only 17% of students required to take one remedial English course graduated within 6 years, and only 23% of students required to take two math remedial courses graduated within 6 years. Clearly, it takes more time to complete a degree when a student-athlete is required to take a significant number of remedial courses. Additionally, these students must be provided with substantial academic support placing a tremendous financial burden on the institution. With the NCAA's increase in progress toward degree requirements to 40% degree completion before the fifth semester of enrollment, 60% degree completion before the seventh semester of enrollment, and 80% degree completion before the ninth semester of enrollment, at-risk student athletes are continually in jeopardy of losing their eligibility to compete, their scholarships, and their opportunity to obtain a college degree (Gurney, 2009; Gurney et al., 2010; Petr & McArdle, 2012; Ridpath, 2010). Essentially, the NCAA lowered the initial eligibility requirements of students and raised continuing eligibility requirements creating a substantial academic gap that must be mediated for these students to be academically success while spending forty hours or more in athletically related activities such as practice, team meetings, weight training, and athletic travel (Gurney, 2011). Given the pressure

to success both athletically and academically and the pre-college academic deficits many student-athletes possess, academic support personnel must quickly assess barriers to the academic success of student-athletes and identify factors that influence both eligibility and retention. Examining predictors of student-athlete academic success can help academic support staff design interventions to mitigate these risk factors.

Trends in APR Scores

As mentioned previously, APR was first introduced in 2003 to provide a more dynamic measure of the academic progress of student-athletes when compared to graduation rates. In 2006, 99 Division I teams at 65 NCAA member institutions fell below the 925 benchmark. This represents only two percent of the Division I programs posting APR scores (Christianson, 2006). According to the NCAA (“Academic Scorecards,” 2011), APR scores are improving. For the 2010-2011 academic year, the average APR score for Division I teams was 970 representing a three-point increase over APR scores posted for the 2009-2010 academic year. Football and men’s basketball, teams with historically low APR scores, increased their four-year APR averages to 946 and 945 respectively. The most recent APR scores also showed improvement with an overall four-year average 974. Over the past five years men’s basketball APR averages have increased 12 points, women’s track APR averages increased 11 points, men’s track increased 9 points, women’s basketball increased 7 points, and football increased six points (Hosick & Sproull, 2012).

Despite improvements, APR scores for both football and men’s basketball are consistently lower than other sports (Petr & McArdle, 2012). Further, APR scores do not indicate the quality of educational experiences of student-athletes. Not only do female teams consistently post higher APR team scores than male teams, female student-athletes also have

higher cumulative GPAs and graduate at higher rates overall (Feris, Feris, & McDonald, 2004; Sanders & Hildenbrand, 2010). While this trend is similar to the trend within the general college student body population, it is an area of concern for the NCAA and student-athlete academic support staff. However, there is little research on the disparity that exists between male and female student-athlete academic performance.

Another disparity exists with regard to APR scores. Teams from limited-resource institutions and Historically Black Colleges and Universities (HBCU) are the most likely to be penalized for immediate and historical penalties associated with low APR scores (Bouchet & Scott, 2009; Hosick, 2011) suggesting that APR does not account for institutional differences. The NCAA defines limited-resource institutions as those institutions falling into the bottom 15% of all Division I member institutions for resources. Resource levels are determined by the NCAA formula including per capita expenditures on athletics, per capita expenditures for academic for the general student body and average Pell Grant funds among all students (Hosick, 2011). However, the NCAA has recognized this trend and is providing limited-resource institutions and HBCUs financial support, as well as allowing these institutions more time to meet the increasing APR benchmarks. The NCAA Executive Committee also created a pilot grant program to support the academic efforts of limited-resource institutions and HBCUs. This program, entitled Accelerating Academic Success, provides six institutions with up to \$300,000 per year for three years (Hosick, 2013). The NCAA has dedicated some resources to limited-resource institutions through a grant program. The Accelerating Academic Success Program will provide financial resources for these limited-resource institutions; however, simply providing financial resources to these institutions may not mitigate factors precluding student-athlete academic success at these institutions.

Controversies Surrounding APR

The NCAA'S creation and use of APR is the subject of much controversy not unlike previous academic reform initiatives instituted by the NCAA. Following a decade of high profile academic scandals and reports, the NCAA took a controversial step by passing Proposition 48 establishing more stringent eligibility standards for freshman student-athletes (Johnson et al., 2010). Subsequently, a class action lawsuit, *Cureton v. NCAA*, challenged the use of a minimum standardized test score as a determinant for initial eligibility citing disparate discriminatory impact on African American males (Baker & Connaughton, 2003). After a long court battle, the NCAA prevailed despite initial court rulings against the organization; however, citing research and the ability to access longitudinal academic data, the NCAA retracted the minimum standardized test score and replaced it with a sliding scale of standardized test scores and high school core GPA (Gurney et al., 2010; Petr & McArdle, 2012; Petr & Paskus, 2009). Because the sliding scale allows students who score very low on standardized achievement tests to meet initial eligibility requirements, some critics believe the sliding scale lowers the academic bar for Division I intercollegiate student-athletes while the NCAA continues to raise continuing eligibility requirements of student-athletes (Gurney et al., 2010). The debate over the sliding scale brings to the forefront the issue of the predictive validity of standardized test scores as they relate to academic readiness for college and calls into question specifically which factors are positively correlated to the academic success of student-athletes and the loss or retention of APR points.

There are also unintended consequences of the APR program. One argument is that academic integrity is compromised to keep student-athletes eligible resulting in cheating scandals and student-athlete clustering in athlete-friendly majors (Sanders & Hildenbrand, 2010).

In a preliminary study of perceptions of the impact of APR, Christy, Seifried and Pastore (2008) found 64% of respondents believe APR would positively influence student-athlete academic success; however, 32% of respondents, mostly head coaches of nonrevenue sports, thought APR would result in student-athletes being guided into easier courses and majors to protect eligibility. Other critics fear the demands of APR, coupled with the severe penalty structure for teams and institutions, will result in increased pressure on athletic academic advisors and academic support staff leading to an increase in academic integrity issues or compromised academic standards for the sake of meeting eligibility and APR standards (Sanders & Hildenbrand, 2010; Schneider, Ross, & Fisher, 2010)

Initial eligibility guidelines are the same for all NCAA Division I institutions, however, as mentioned previously, limited-resource institutions and HBCUs are penalized for not meeting APR standards at substantially higher rates than other institutions (Bouchet & Scott, 2009; Hosick, 2011). There is no research on the disparate impact of APR on these institutions, but the NCAA has acknowledged this disparity as a problem that needs to be addressed. Additionally, there is very little independent research on APR as a measure of student-athlete academic success and virtually no research on variables predictive of APR scores at institutions most likely to incur penalties associated with APR. Initial eligibility guidelines are the same for all NCAA Division I institutions; therefore, studying the correlation between traditional cognitive measurements used to determine initial eligibility and the academic success of student-athletes at a limited-resource institution as measured by CGPA and the loss or retention of APR points is essential. Additionally, more independent, institutionally specific research needs to be conducted on APR as an academic success metric. Some research suggested that demographic and social factors also aid in the prediction of student-athletes success. For this reason, this

study will use first-generation status as a predictor variable of student-athlete academic success as measured by CGPA and APR scores and examine possible differences between student-athletes based this critical factor. Based on current trends in the academic success of student-athletes, there is also a need to investigate differences in the academic achievement of male and female student-athletes, as well as differences between student-athletes participating in revenue and non-revenue intercollegiate athletics.

Theories of Student-Athlete Academic Success

Scholars have attempted to explain the variations in student-athlete academic performance by investigating demographic, pre-college, and social factors related to academic success (Comeaux & Harrison, 2011). A model using high school core GPA and standardized test scores is useful in predicting freshman college student-athlete GPA (Petr & McArdle, 2012). However, some studies found that in addition to pre-college factors, student-athlete academic success is significantly influenced by other factors including motivation to obtain a college degree, institutional fit, and noncognitive attributes related to learning and study strategies (Comeaux & Harrison, 2011; Gaston-Gayles & Hu, 2009; Umback, Palmer, Kuh, & Hannah, 2006). Johnson, Wessel, and Pierce (2010) investigated the amount of time student-athletes are required to spend each week on athletic pursuits and found that student-athletes in revenue sports were more likely to have lower first-year GPAs compared to student-athletes in non-revenue sports; however, traditional cognitive variables in this study overshadowed sport-related variables.

Several studies, including the study cited by the NCAA as the reason for the creation of the sliding scale, found that high school core GPA is a better predictor of college success than standardized tests (Petr & McArdle, 2012; Schwartz & Washington, 2002). Richardson,

Abraham, and Bond (2012) found that the ACT is a better predictor of college success than the SAT. Additionally, there is a growing body of research indicating the need to use noncognitive measures in college admissions decisions (Bruno, 2007; Gaston-Gayles, 2004; Hoffman & Lowitzki, 2005 Richardson & Abraham, 2009; Robbins et al., 2004). Richardson et al. (2012) conducted a meta-analysis of psychological factors believed to be positively related to academic success. This meta-analysis included 42 noncognitive constructs from five conceptual domains. This research identified a variety of noncognitive constructs correlated to college academic performance. Richardson et al. (2012) found effort regulation and academic self-efficacy, as well as motivational factors were significantly correlated to tertiary GPA. According to the results of this meta-analysis, the most useful noncognitive factors for understanding college student academic performance are personality traits, motivational factors, self-regulatory strategies, student approach to learning tasks, and psychosocial context. Sedlacek (1993) argues that traditional cognitive measures such as standardized test scores and GPA correlate more to the persistence of White college students and are not effective predictors of persistence of non-traditional, African American students. For this reason, Hyatt (2004) suggests noncognitive variables should be included in the evaluation of non-traditional, African American student athletes to identify barriers to persistence.

Given the difference in graduation rates of male, African-American student-athletes and APR scores of teams consisting of primarily African American male student-athletes, an investigation of the relationship between noncognitive variables and student-athlete academic success is appropriate. Further, examining the relationship of noncognitive variables in addition to traditional cognitive variables to student-athlete cumulative GPA and APR scores could add to the understanding of the factors that influence intercollegiate student-athlete academic success

for this unique college student population. A meta-analysis of psychosocial correlates to college student success conducted by Richardson et al. (2012) found strong correlations between noncognitive constructs and college GPA. Specifically, several studies indicate learning and study strategies are incrementally predictive of college student academic success (Cano, 2006). Although college student-athletes have unique experiences during college, using inventories of psychosocial factors such as the Learning and Study Strategies Inventory, 2nd Edition (LASSI-II) can be useful in identifying student-athletes at-risk of struggling academically. Further, measuring specific strengths and weaknesses of individual student-athletes related to learning and study strategies in addition to traditional cognitive measures can be useful in identifying programmatic needs for academic support for at-risk student-athletes.

Expectancy-Value Theory and the LASSI-II

One particular theoretical perspective useful in studying the academic success of student-athletes is the expectancy-value theory. Expectancy–value theory suggests that much variance in an individual’s performance and motivation for achievement related tasks is explained by how he or she expects to perform and the extent to which the task is valued (Eccles et al., 1983; Wigfield & Eccles, 2000). This theory contends that beliefs about how well one will perform influences the amount of effort and persistence a student will exert toward specific tasks. Motivation is a key component of this theory and is often determined by the interaction of ability beliefs and the value the student attaches to the task (Eccles & Wigfield, 2002). Many student-athletes may value athletic pursuits above academic pursuits which, according to this theory, can affect motivation and effort related to academic tasks. Further, the student-athlete’s perception of his or her academic abilities can also affect academic performance. The LASSI-II is a self-reporting inventory that measures a student’s beliefs about how he or she expects to perform on academic

tasks involving learning strategies and skills, how he or she regulates or controls the learning process, and the student's attitude and motivation toward learning or academic tasks. According to the authors, the ten scales of the LASSI-II comprise three components of skill, will, and self-regulation. These components are explained in further detail in the instrumentation section of chapter three. Because this instrument is self-reporting, the LASSI-II has the potential of providing information regarding the student's expectancy beliefs and values with respect to learning and academic tasks.

Other theories attempting to explain variance in college student academic performance consider the importance of psychosocial factors and personality traits. Students with well-developed learning and study strategies and a strong sense of self-efficacy generally outperform students with less-developed learning and study strategies and less-developed self-efficacy (Kuh, Buckley, Bridges, & Hayek, 2006). Overall, the research literature advocates the use of noncognitive factors such as self-efficacy, motivation, personality traits, as well as learning and study strategies in the identification of predictors of academic achievement in college students (Allen, Robbins, & Sawyer, 2010; Hyatt, 2003; Robbins, Allen, Casillas, Peterson, & Le, 2006; Schmitt et al., 2009; Simons & Van Rheenen, 2000; Ting, 2009).

In summary, there simply is not a consensus regarding which variables influence the academic success of NCAA Division I student-athletes. APR has been accepted as a valid, reliable measure of student-athlete academic success and is used by the NCAA to penalize teams and institutions; however, there is very little research investigating APR as an academic success outcome metric or the relationship of various factors on the individual components of APR, eligibility and retention. Researching the relationship of traditional cognitive factors to APR scores, as well as cumulative GPA will provide more information with respect to the validity of

APR as an academic success metric. The academic success of college student-athletes could also be influenced by other factors such as motivation, self-efficacy, learning and study skills. These noncognitive factors have been used in studies to predict college student academic success; therefore, a measure of learning and study strategies that incorporates psychosocial factors including motivation and components of self-efficacy were used in this study to determine which variables are most predictive of student-athletes who are most at-risk of losing APR points. . Determining a model that best predicts student-athletes academic success, as well as the loss or retention of APR points can be used by institutions to analyze these factors in relationship to patterns in recruiting and academic support that need to be addressed. For this reason, APR has the potential to be a useful metric if contributing factors can be identified and addressed in a systematic manner. Examining the usefulness of the LASSI-II as a measure of student-athletes' expectancy and value beliefs is included in this study given the research suggesting the need to extend predictors of academic success beyond traditional cognitive predictors.

Problem Statement

The increased accountability for student-athlete retention and graduation from NCAA Division I member institutions necessitates the development of a model for assessing the degree to which specific factors influence the academic success of this unique student sub-population. Further, an investigation of predictors of student-athletes most at-risk of losing APR points is especially relevant given the assertion that APR is an academic success or academic outcome metric. Currently, a general consensus does not exist with regard to which factors are most predictive of the academic success of student-athletes. There is also a need to study factors influencing the academic success of student-athletes and APR points at limited-resource institutions given the fact that these institutions are penalized for not meeting APR benchmark

more frequently than other NCAA Division I institutions. Additionally, there is a need to extend the range of predictor variables beyond traditional cognitive variables of standardized test scores and high school grade point averages to learning and study strategies believed to influence academic success in college.

Purpose of the Study

The purpose of this study was to investigate factors or a combination of factors that significantly influence the academic success of student-athletes attending a Division I, limited-resource institution. By including APR as a measurement of the dependent variable, academic success, and investigating factors predictive of student-athletes most at-risk of losing APR points, this study can add to the research regarding this new metric. Further, assessing learning and study strategies as predictor variables in addition to traditional academic variables will add to the knowledge of the noncognitive factors that may contribute to the academic success of student-athletes. For this reason, this study incorporated an analysis of learning and study strategy variables as measured by the Learning and Study Strategies Inventory, Second Edition (LASSI-II). The LASSI-II has been used as a diagnostic instrument in college settings since 2002 with demonstrated utility as a diagnostic and prescriptive instrument. Some research indicates the LASSI-II has the ability to differentiate students who are likely to experience difficulty in college. Analyses of group differences are included in this study given the research indicating certain sub-groups of student-athletes are more likely to be academically successful even after controlling for other factors. The primary focus of this study was the investigation of possible cognitive, learning and study strategy predictors of college student-athlete academic success as measured by a generally accepted measure of academic success in college, CGPA and the academic success metric created by the NCAA, APR.

Research Questions

This study examined the predictive power of cognitive, learning, and study strategy variables on student-athlete academic success. The cognitive variables selected for this study were the same variables used to determine initial eligibility of student-athletes participating in NCAA Division I intercollegiate sports i.e. high school core GPA(HSGPA) and standardized test scores (Test). Learning and study strategy variables selected for this study are derived from the ten scales of the Learning and Study Strategies Inventory, 2nd Edition (LASSI-II). The LASSI-II also groups the ten scales into three noncognitive constructs of skill, will, and self-regulation. The skill construct examines the student's learning strategies, skills, and thought processes that help the student identify, acquire, and construct meaning from new information. The will construct measures the student's attitude, motivation, and anxiety toward academic performance, as well as his or her receptivity to learning and willingness to exert the amount of effort necessary to be academically successful. The self-regulation construct measures how the student is able to self-regulate or manage his or her learning process through time management, concentration, and the utilization of study supports such as tutoring, review sessions, and collaborative learning. This study used the skill, will, and self-regulation constructs as learning and study strategy predictors of student-athlete academic success. The goal of this study was to determine the factors or combination of factors that best predict the academic success of student-athletes. For this reason, the following research questions guided the design of the study:

1. Taken in combination, to what degree do demographic, sport, cognitive, learning and study strategy variables predict student-athlete academic success as measured by CGPA?
2. Are there significant differences in variables that predict student-athlete academic success as measured by CGPA for male student-athletes compared to female student-athletes?

3. Are there significant differences in variables that predict student-athlete academic success for first-generation student-athletes compared to non-first-generation student-athletes students?
4. Are there significant differences in variables that predict student-athlete academic success for student-athletes participating in revenue or non-revenue sports?
5. Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR points?
6. Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR eligibility points?
7. Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR retention points?

Significance of the Study

Since the inception of APR, some institutions, such as those colleges and universities classified as limited-resource and non-Bowl Championship Series (BCS) schools, have been penalized for not meeting APR benchmarks at an alarming rate compared to other NCAA institutions. From 2005-2008, 91.3% of the teams penalized were non-BCS teams (Bouchet & Scott, 2009). The majority of teams penalized for not meeting APR benchmarks for the 2011-2012 academic year were limited-resource, non-BCS schools. Subsequently, the NCAA adopted a modified timeline for limited-resource institutions stating the mission of certain institutions is to provide access to higher education for a larger variety of students coupled with the lack of resources to provide comprehensive academic support services may preclude meeting new APR benchmarks (Hosick & Sproull, 2012).

Institutional characteristics of Division I limited-resource institutions put these colleges and universities at a distinct disadvantage with regard to APR compared to institutions with substantial financial resources to provide comprehensive academic support services to student-athletes. Therefore, it is imperative for these institutions to quickly assess the risk factors that may contribute to a student-athlete's inability to meet the academic demands of college level work. By looking at student-athlete academic success through the lens of expectancy-value theory, it is important to assess student-athletes' perceptions of their academic abilities and the value placed on academic enabling behaviors. Developing a model that includes an assessment of learning and study strategies in addition to traditional academic measures will help academic support personnel at NCAA Division I institutions, and more specifically, limited-resource institutions effectively and efficiently evaluate the academic risk of prospective student-athletes and develop support programs that meet the needs of individual student-athletes. Examining cognitive, learning and study strategy factors associated with student-athlete success and the potential loss of APR points could help limited-resource institutions avoid penalties for not meeting APR benchmarks while meeting the specific academic needs of student-athletes.

This study will add to the knowledge of predictors that influence student-athlete academic success as measured by CGPA and APR. Additionally, this investigation will add to the knowledge of the validity of APR as an academic success metric and the use of learning and study strategy variables of Skill, Will, and Self-Regulation as predictors of student-athlete academic success. An examination of differential effects of the predictor variables on certain sub-groups of student-athletes will also be included in this study. Determining which factors are most predictive of the academic success of student-athletes at a limited-resource institutions will help academic support staff analyze APR trends, predict which student-athletes are most at-risk

of having academic difficulty during college or losing APR points, and provide appropriate academic support interventions based on identified student needs.

Study Design and Overview of Methods

Research Methods

Scale analysis for the ten scales of the Learning and Study Strategies Inventory was conducted using SPSS version 21 to determine the reliability of each scale for the population in this study. Based on pre-analysis of the LASSI-II scales, items composing the skill will, and self-regulation constructs of the LASSI-II were selected as possible predictor variables of student-athlete academic success in addition to traditional cognitive variables. The LASSI-II provides raw scores and percentile score equivalents on ten scales measuring three components of learning and study strategies: skill, will, and self-regulation. Multiple regression analysis was conducted to determine the best predictive model for student-athlete academic success as measured by CGPA. NCAA initial eligibility criteria i.e. HSGPA and standardized test scores were used as cognitive predictor variables and the composite scales of Skill, Will, and Self-Regulation were used as learning and study strategy variables. Analyses of group differences on the predictor and criterion variables were conducted with independent t-tests. All predictor variables were examined with respect to the prediction of loss or retention of APR points using logistic regression. To investigate possible differences in variables predictive of the loss of APR eligibility (APR-E) points and APR retention (APR-R) points, additional logistic regressions were also conducted using APR-E point loss or retention and APR-R loss or retention as dependent variables. This investigation was conducted because of the research indicating more variability with APR-E points compared to APR-R point and the suggestion that different factors may be influencing these components in varying ways.

Limitations of the Study

The results of this study may be limited and not generalizable to student-athletes attending NCAA Division II or Division III institutions given the fact that these two divisions have different initial and continuing eligibility standards. The sliding scale for initial eligibility is only used for NCAA Division I. Further, by focusing on student-athletes attending one institution, the results may only be generalizable to student-athletes from similar institutions. A comparison of the population sample and institution in this study was conducted and is reported in chapter four. The instrument used in this study, the Learning and Study Strategies Inventory, 2nd Edition (LASSI-II) has been validated as a useful measure of ten specific noncognitive constructs correlated in previous studies to college student academic success. However, the psychometric properties of the LASSI-II are limited to correlation coefficients of the ten independent scales. The LASSI-II does not provide an overall measurement of learning and study strategies; for this reason, the LASSI-II is diagnostic in nature indicating a student's strengths and weaknesses relative to other students in the normative sample. Students who score below 50th percentile on any scale are in need of some form of remediation or intervention. The LASSI-II is also a self-report instrument subject to the student's ability to effectively read, understand, and respond honestly to each item on the assessment. Differences in college student CGPAs are often found to be significant based on the student's degree path and classification; however, the student-athletes in this study include all student-athletes who participated in intercollegiate athletics regardless of student classification or difficulty of field of study.

Delimitations of the Study

The selected parameters of this study include using data collected from a single, limited-resource institution participating in NCAA Division I intercollegiate athletics. Further,

independent variables included in this study are limited to traditional cognitive variables used by the NCAA to determine initial eligibility of student-athletes and to learning and study strategies found to influence college student success in educational and psychological research studies as measured by the LASSI-II. Data from various studies of student-athlete academic success indicate college student-athlete academic success is also significantly influenced by sport variables such as the culture of the team, level of academic support and other services, and athletic identity; however, the scope of this study focuses on pre-college attributes and the power of these factors to predict academic success as measured by CGPA and APR points of student-athletes on athletic scholarships. Only student-athletes on scholarship are counted in APR calculations and reports.

Statement of Researcher's Relationship to the Study

The researcher works at the institution and with the student population used in this study in the area of academic support. However, data collected in this study were collected through existing databases. Specifically, each student-athlete's high school core GPA and standardized test scores were collected by the researcher from the institution's NCAA eligibility data maintained by the institution's NCAA compliance director. All student-athletes at this institution are assessed each year with multiple educational assessment instruments including the LASSI-II as part of the ongoing process of evaluating student-athlete academic risk. The loss or retention of APR points was obtained from the university's NCAA compliance director after the researcher obtained Institutional Research Board approval from the cooperating institution. Cumulative GPAs were collected from the university registrar. All data on student-athletes were collected and coded without personally identifying students. The researcher has no interest in the results of this study other than the potential of this research to provide information that can

help the researcher and others design effective interventions to ensure student-athlete academic success and aid in the prediction of the loss or retention of APR points at limited-resource institutions.

CHAPTER 2

REVIEW OF THE LITERATURE

This chapter provides an overview of existing literature related to the proposed research questions and theoretical framework. The following literature review provides an overview of NCAA academic reform initiatives including the Academic Progress Rate (APR), an explanation of the theoretical framework for the study, a review of research on specific pre-college demographic and cognitive predictors of college student academic success, and a discussion of current research on learning and study strategies believed to influence college student academic achievement. Additionally, literature specific to student-athlete academic success in college is included in this review followed by a discussion of the justification for extending the research on possible predictors of student-athlete academic success beyond pre-college demographic and cognitive variables to the constructs of skill, will, and self-regulation as measured by the Learning and Study Strategies Inventory, 2nd edition (LASSI-II).

Introduction

College athletics is an integral part of almost every higher education institution in the United States. However, the mere presence of athletics in higher education is controversial given the mission of these institutions and the amount of money spent on these non-academic activities (Ridpath, 2008; Thelin, 1994, 2008; Sperber, 2001; Wolverton, 2008). Students participating in intercollegiate athletics are often seen more as athletes than as students, and the time that student-athletes dedicate to athletics while in college reflects the importance of their athletic

pursuits (Johnson et al., 2010). Student-athletes are a unique sub-culture on college campuses and their success or lack thereof is seen as a reflection of the quality of the institution. In recent years, the academic success of student-athletes has become a primary concern for colleges and universities participating in National Collegiate Athletic Association (NCAA) intercollegiate athletics (Christy et al., 2008; Oriard, 2012; Petr & McArdle, 2012). The NCAA is the organization charged with the well-being of student-athletes participating in intercollegiate athletics at member institutions; therefore, when low graduation rates of student-athletes surfaced following the federal mandate to report student-athlete graduation rates separately from the general student population, the NCAA created a working committee to study the problem and make recommendations for academic reform (Petr & McArdle, 2012). The resulting academic reform initiatives dramatically changed the landscape of college athletics.

NCAA Academic Reform

In 1986, amidst a new culture of accountability in higher education, the NCAA instituted academic reform measures including increases in both initial and continuing academic eligibility standards for student-athletes (Christy, Seifried, and Pastore , 2008; LaForge & Hodge, 2011; Petr & Paskus, 2009). At first, the NCAA increased the minimum score required on standardized tests for initial academic eligibility. However, the use of a minimum score was challenged in court and subsequently rejected by the NCAA in favor of a sliding scale weighting a student's high school grade point average (HSGPA) more than a student's scores on the SAT or ACT (Baker & Connaughton, 2009; Petr & McArdle, 2012). The NCAA claims the creation of a sliding scale to determine initial academic eligibility was based on empirical research supporting the use of HSGPA as a more reliable predictor of college success than standardized test scores (Petr & McArdle, 2012). However, some critics of the sliding scale believe this

method allows student-athletes with very low standardized test scores to become eligible when coupled with inflated high school grades (Gurney et al., 2010). If standardized test scores are reliable measures of academic readiness and predictors of college success, it is possible the use of a sliding scale for initial eligibility will result in an increase in academically at-risk student-athletes participating in intercollegiate athletics effectively widening the gap between initial eligibility standards and the academic standards for continuing eligibility. Conversely, if HSGPA is a reliable measure of academic readiness and predictor of college success, it is possible the use of a sliding scale will increase access to higher education for student-athletes who do not do well on standardized tests without adding to the gap between academic readiness for college and the current, more stringent continuing eligibility rules. Therefore, it is important to understand the degree to which standardized test scores and HSGPAs are predictive of the academic success of college student-athletes.

The Academic Progress Rate (APR)

NCAA academic reform did not stop with eligibility guidelines. In fact, the focus of the most significant change in the academic accountability structure is on member institutions and individual teams rather than on individual student-athletes (LaForge & Hodge, 2011). In order to measure the academic culture of individual teams and institutions, the NCAA created a new metric entitled the Academic Progress Rate (APR). Penalties including loss of scholarships, reduction in practice time and competition, and post-season competition bans, are assessed to teams that fall below minimum APR benchmarks (NCAA, 2011). To avoid these penalties, NCAA member institutions direct precious financial resources to athletic departments for the purpose of enhancing academic support programs for student-athletes (Batley, 2011; Getz & Seigfried, 2012). Since the advent of APR, spending of academic support for student-athletes

has more than doubled (Batley, 2011; Wolverton, 2008). This spending pales in comparison to the increase in overall spending per student-athlete. According to the Knight Commission (2010), the mean athletic spending per student-athlete increased from \$61,218 to \$84,446 at FBS schools from 2005-2008. Academic spending per student-athlete increased from \$11,079 to \$13,349 during the same time period (Knight Commission, 2010). Additionally, NCAA Division I institutions classified as limited-resource institutions are penalized for APR deficits at a much higher rate than institutions with the financial resources to provide extraordinary academic support services to student-athletes (Bouchet & Scott, 2009).

The APR program does not take into account institutional differences that can significantly affect APR scores. Additionally, there are waivers and adjustments to APR scores. Data on waivers and APR adjustments could shed light on the reliability and validity of the APR metric, but these data are not readily available. Generally schools with better financial resources are able to employ compliance personnel to assist with submission of these waivers while limited resource institutions may only have one compliance staff member to serve an entire university athletic department (Kane, Leo & Holleran, 2008; Oriard, 2012; Ridpath, 2010). The number of waivers submitted and approved has the potential to render APR scores unreliable measures of academic success and potential graduation rates (Christy et al., 2008). Despite serious concerns about APR and consequences associated with failing to meet academic standards as measured by APR, there is virtually no empirical research on the use of APR as an academic success outcome metric. Some research has been conducted to investigate the influence of athletic variables on the academic success of student-athletes, but most of this research does not include APR.

Penalties associated with not meeting APR minimum standards are damaging to the institution's reputation and negatively affect the teams and student-athletes (LaForge & Hodge,

2011; Oriard, 2012; Paskus, 2012). To avoid these penalties, institutions must identify variables influencing the academic success of student-athletes as measured by APR. Since limited-resource institutions have been penalized for not meeting APR standards more than other institutions (Bouchet & Scott, 2009; NCAA, 2013) these institutions need to determine the specific variables influencing the loss of APR points, as well as the academic success of individual student-athletes.

For the purposes of this study, traditional cognitive variables used to meet initial eligibility requirements were studied in relationship to the APR points and cumulative grade point average (CGPA). CGPA is a generally accepted measure of academic success in college. Student-athletes beginning their second year of college must maintain a cumulative GPA that equals ninety percent of the institution's GPA required for graduation, and student-athletes beginning their third or fourth year of college must maintain a cumulative GPA that equals ninety-five percent of the institution's GPA required for graduation (NCAA, 2012). The eligibility point of APR appears to measure academic variables because regulations used to determine whether a student-athlete maintains eligibility are clearly academic in nature. Student-athletes must maintain a minimum GPA each semester, successfully complete 18 hours during the fall and spring terms, meet escalating percentages of degree completion, and pass a minimum number of hours during each individual term of enrollment (NCAA, 2012). Conversely, the retention point of APR, which is weighted equally with the eligibility point, is achieved simply by returning to the institution or graduating. The retention point is clearly a measure of persistence.

One of the stated goals of APR is to change the culture of intercollegiate athletics (LaForge & Hodge, 2011; Petr & Paskus, 2009). For this reason, it is important to examine the

perceptions athletic directors, coaches, and athletic academic advisors with regard to the effect APR has had on the culture of athletics. Christy et al. (2008) studied the perceptions of 75 athletic administrators, support staff, and coaches on the impact of APR at their institutions. Sixty-four percent of respondents believed APR will have a positive influence on student-athletes and make head coaches more accountable for recruiting student-athletes who are better prepared for college. Thirty-two percent of respondents expressed very negative feelings and felt APR will not have a positive impact on the culture of athletics. Many respondents were concerned that pressure to meet APR standards may result in an increase in academic fraud or a “watered down” curriculum for student-athletes. The authors also note the concern of disparate or disproportional effects given the extreme variety in institutional types. In their investigation of APR penalties, Bouchet and Scott (2009) found that non-Bowl Championship Series (BCS) institutions, mid-major limited-resource institutions, and HBCUs have been penalized at a much higher rate than BCS institutions. From 2005-2008, 91.3% of the teams penalized because of APR scores were non-BCS teams, and more than 80% of penalties were assessed to teams from limited-resource institutions.

There have been a few empirical studies conducted that includes APR as an academic success outcome. McCall (2011) assessed risk factors related to student-athlete APR points at a NCAA Division I BCS institution. Data were collected on 829 student-athletes from 2003-2009. Predictor variables including gender, race, HSGPA, SAT scores and sport variables such as playing times were compared to APR eligibility points (APR-E) and APR retention points (APR-R). The APR-E point is earned by a student-athlete for maintaining a GPA above the NCAA minimum, passing a minimum of six hours in a semester, passing 18 hours during the fall and spring semesters, and meeting progress-toward-degree (PTD) percentage requirements (NCAA,

2012). PTD requirements include completing 40% of degree requirements before the 5th semester of enrollment, 60% of degree requirements before the 7th semester, and 80% of degree requirements before the 9th semester (Petr & McArdle, 2012). The APR-R point is earned by a student-athlete for graduating or remaining at the university.

McCall (2011) found a significant relationship between gender and lost APR points with male student-athletes more likely to lose eligibility and retention points. African-American student-athletes were more likely to lose APR-E points than student-athletes of other races or ethnicities. A model including both SAT and HSGPA was the strongest predictor for lost eligibility points when race was controlled. Male student-athletes with SAT and HSGPAs one standard deviation below average were 4.67 times more likely to lose APR-E points. For female student-athletes, the only significant predictor of losing APR-E points was the combined model of SAT and HSGPA. Female student-athletes with SAT and HSGPAs one standard deviation below average were 6.69 times more likely to lose APR-E points. SAT and HSGPA were also strong predictors of lost retention points for both male and female student-athletes. Of the sports variables, male student-athletes with no playing time were 2.86 times more likely to lose APR-R points compared to those with relatively high playing time. Of male student-athletes with low playing time the likelihood of losing APR-R points was 3.29 times higher than those student-athletes with high playing time. Based on the results of this study, McCall suggests risk factors of male and female student-athletes should be considered separately.

Johnson et al. (2010) studied 652 student-athletes participating in 19 sports at a large, Division I Midwestern university over a five year period. The purpose of this study was to determine if 10 selected variables were related to and were significant predictors of single year APR scores. Predictor variables examined in this study included gender, race, distance from

home, HSGPA, standardized test scores, major, coaching change, playing time, and winning percentage. These variables were selected based on previous literature on factors believed to predict the academic success of student-athletes. As with the study conducted by McCall (2011), gender was a significant variable both in correlation and in contribution to predicting APR. Controlling for other variables, female student-athletes would have 21.14 points higher on single year APR scores than male student-athletes. Also consistent with McCall (2011), race was significantly correlated with APR. Controlling for other variables, Caucasian student-athletes exhibited an APR score 9.53 points higher than African-American student-athletes. HSGPA was not found to be a significant predictor of APR scores. This finding is surprising considering the weight of evidence suggesting that HSGPA is a stronger predictor of college GPA than standardized test scores. While standardized test scores were significantly correlated with APR, they did not aid in the prediction of APR. The authors suggest that academic variables such as HSGPA and standardized test scores may be more predictive of APR-E points. Because this study did not delineate between APR-E and APR-R points, this hypothesis was not evaluated. Sport type (revenue or non-revenue) had the strongest relationship to APR of the variables examined in this study. Sport type was also found to be a significant predictor of APR scores. Revenue sports would have an APR score of 18.66 points lower than non-revenue sports if all other variables were controlled. Another sport variable, coaching change, was both a significant predictor of APR and strongly correlated with the outcome. According to this study, a change in coaches, positive or negative, has the potential of resulting in an APR score 24.6 points lower than if no change had occurred. Congruent with the McCall study, playing time was significantly correlated to APR scores; however, playing time did not aid in predicting APR in this study. Johnson et al. (2010) believe playing time may only predict APR-R points and is not

a strong enough predictor variable to predict overall APR scores. Finally, winning percentage was found to be significantly correlated with APR and contributed to the prediction of APR scores. From this study, it can be concluded that sport variables are powerfully linked to APR scores at this institution suggesting that the culture of individual teams is measured to some degree by APR.

In a quest to keep student-athletes eligible athletically and meet minimum APR standards, many institutions have dramatically increased the level of spending on academic support services per student-athlete. Batley (2011) investigated the level of spending on academic support services for student-athletes since the advent of APR. The purpose of this study was to determine if there was a statistically significant relationship between the level of spending on academic support services for men's basketball and football student-athletes in Division I and APR scores of these two revenue sports. Twenty-two Division I institutions from two conferences were included in the study. Complete data were collected on expenditures services per student-athletes for the 2007-2008 academic year from 17 of the 22 institutions. This study utilized regression analysis to determine the relationship between the level of spending and the APR scores. Additionally, the quality of the institutions was coded using the mean SAT scores at each institution.

Batley (2011) found a strong relationship between the level of spending per student-athletes and the APR scores for football. That is, lower spending was correlated with lower APR scores, and higher spending was correlated with higher APR scores. The quality of the institutions as measures by the SAT variable was found to be significant for football teams but not for men's basketball teams. For men's basketball, spending on academic services per student was not found to affect APR scores; however, total institutional spending on student services per

student does affect APR scores. This difference may be reflected of the culture of the institution as a whole as opposed to providing academic support services solely through the athletic department on an institution. This finding would have an effect of raising an APR score for men's basketball by about 20 points. The student-faculty ratio of an institution was also found to be predictive of higher APR scores in this study.

The issue of spending related APR is a serious concern to many people in higher education (Knight Commission, 2010; Lawrence, 2013). The burden has fallen to individual institutions to ensure that any gap between a student-athlete's readiness for college and the academic standards for eligibility is mitigated or face substantial penalties; therefore, NCAA member institutions responded by building athletic academic support centers and dramatically increasing the number of academic support personnel to meet the growing academic demands (Wolverton, 2008). The NCAA now mandates that member institutions provide a wide range of academic support services for student-athletes well above the level of academic support provided for regular students on most campuses. Spending by athletic departments for academic support for student-athletes has surged since the implementation of APR (Dunn, 2013; Knight Commission, 2010; Wolverton, 2008). There are concerns whether this increase in spending in athletics is affecting the cost of attending college for the general student body (Berkowitz, 2011; Fulks, 2012; Knight Commission, 2010).

There are also questions about whether an increase in minimum APR standards will mean more increases in spending, academic fraud, and student-athletes clustering in majors (Getz & Seigfried, 2012; O'Bryant, 2012). Other critics of APR argue that those institutions with fewer resources are unfairly disadvantaged by a new system of academic accountability that seems to require significant increases in spending in order to be competitive (Dunn, 2013; Lawrence,

2013; Wolverton, 2008). The answer may lie in the recruiting of academically underprepared student-athletes; however, institutions of higher education are varied not only in financial resources but also in terms of their overall mission. The mission of HBCUs or public, regional institutions may be to provide access to higher education for minority students who are may be academically unprepared for college.

APR has changed the landscape of accountability in intercollegiate athletes and has the potential of being a very useful tool to measure the academic progress of student-athletes. However, to guard against unintended consequences and to provide NCAA member institutions more information regarding this metric and the variables that influence both the eligibility and retention components of APR, more research needs to be conducted. A significant gap in the literature exists with regard to the reliability and validity of APR as a measure of college student-athlete academic success and the cognitive and noncognitive factors that may be predictive of cumulative GPA and APR scores. Additionally, only one study has investigated the differential effects of variables on the two distinctive components of APR, eligibility and retention.

Although there is little research on APR to frame the context of this study, there is abundant research on the academic success of college students. These studies provide useful information for the investigation into determinants of academic success of college student-athletes. College student success has been studied from multiple perspectives and these studies have employed a range of variables. Theories of college student academic progress and persistence provide parameters for research on college student-athlete success especially with regard to the predictive utility of cognitive, learning and study strategy variables in predicting the academic success of student-athletes as measured by APR and CGPA. The next section of this review provides an overview of theories related to college student success and the rationale for

using the expectancy-value theory to study possible predictors of college student-athlete academic success.

College Student Success

Despite increased access to college, many students are having difficulty completing their degrees and realizing their educational goals. There are many concerns surrounding trends in college completion. In their meta-analysis of studies investigating a variety of factors associated with college student success, Richardson et al. (2012) noted a significant trend with females outpacing males in college degree attainment. Titus (2006) found that students from low socio-economic backgrounds are the least likely to graduate from college, and this trend has increased despite increased access to higher education over the past 40 years. The number of college students academically unprepared for college level coursework is also contributing to the problem of college completion. According to the ACT Policy Report (2012), only 25% of high school graduates met all four College Readiness Benchmarks and approximately 28% of those students who took the ACT met any of the College Readiness Benchmarks indicating they were unprepared for first year college courses.

DesJardins, Ahlburg, and McCall (2002) conducted a study of factors contributing to timely degree completion for a large freshman cohort at the University of Minnesota ($N=2,373$). 61% of the total cohort stopped out once during over a 19-term observation. 41% of the cohort graduated with 88% of the graduating students completing their degrees without stopping out. DesJardins, Ahlburg, and McCall (2002) report only 15% of the cohort dropped out due to academic difficulties. Graduation statistics nationwide indicate an increase in the amount of time it takes to graduate with just over half of all students attending college full-time completing in six years (National Center for Higher Education Management Systems [NCHEMS], 2012).

With costs to attend college soaring, timely degree completion is a serious concern for higher education institutions; therefore, investigating variables that positively or negatively influence college success is particularly useful given this context.

Theories of College Student Success

Students come to college with personal attributes, experiences, and varying abilities that influence their success in college. This is true of college student-athletes as well. To examine variables related to college student success, many research studies use predictive models. These models provide insights into possible pre-college attributes of students believed to influence the ability to succeed at the college level. Predictive models generally investigate the predictive power of traditional cognitive measures, background or demographic variables, and more recently, noncognitive variables such as personality traits or learning and study strategies. The consensus of current research suggests certain pre-college attributes are related to academic success but to varying degrees. Academic preparation, as measured by high school GPA and standardized test scores have been found to explain a large amount variance in college GPA and other success outcomes such as retention and graduation (Geiser & Santelices, 2007). However, there still is a significant portion of variance in college student outcomes unexplained by academic factors. To further explain significant variations in college performance, many theories expand the range of pre-college variables to include demographic or social factors as predictors of college student success. It is now widely accepted that students from low socio-economic backgrounds and first generation college students are less likely to be academically successful in college (Pascarella & Terenzini, 2005; Titus, 2006)

Other theories of college student success recognize the importance of what happens to students during college such as the level of student connection and engagement, institutional

commitment, and the level of interaction between faculty and students. The degree to which students participate and engage in the academic and social environment is theorized to significantly influence a student's success in college (Gaston-Gayles, 2004; Gaston-Gayles & Hu, 2009; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006; Tinto, 2012). Engagement during college has the potential to shed light on institutional conditions needed for students to be successful. Pascarella and Terenzini (2005) analyzed the results of many empirical studies investigating factors positively related to academic success in college. From their analyses, Pascarella and Terenzini (2005) concluded that in addition to pre-college attributes student engagement during college and specific institutional conditions are important factors to consider with regard to college student success.

Studies have also shown that academic success is influenced by environmental characteristics and engagement in educationally purposeful activities (Gaston-Gayles & Hu, 2009; Umbach, Palmer, Kuh & Hannah, 2006). Due to the amount of time student-athletes dedicate to their sport, college student-athletes experience college very differently from other college students. Wolverton (2008) found that student-athletes spend more than 40 hours per week on activities related to their sport. Therefore, student-athletes have less time to dedicate to academic pursuits or to develop relationships with others on campus. To further complicate the issue, there is serious concern and evidence that student-athletes are being tracked into many student-athletes are tracked into specific majors in order to maintain eligibility leading to further academic and social isolation (Aries, McCarthy, Salovey, & Banaji, 2004; Oriard, 2012; Ridpath, 2008).

Psychological and educational theories related to college student success investigate a range of student behaviors or conditions predictive of higher levels of academic success as

measured by GPA, retention, and graduation. Students not only come to college with different academic background and abilities, but they also come to college with behavioral traits or characteristics that influence success in college. Most recently, theories of self-regulation, expectancy-value models of motivation, study skills and habits, and goal commitment have broadened the range of investigation into psychosocial factors associated with college outcomes. Robbins et al. (2004) conducted a meta-analysis of 109 studies investigating educational persistence models related to college student success. In these studies, cumulative GPA and retention were used as outcome measures. Studies included in this meta-analysis examined the relationship of psychosocial constructs across both educational and cognitive psychology to academic performance and retention of college students. A variety of psychosocial constructs including academic goals, self-efficacy, and academic enabling behaviors were found to be moderately predictive retention, while self-efficacy and achievement motivation were the strongest predictors of GPA (Robbins et al.).

Expectancy-Value Theory and Academic Success

One broad area of investigation within the psychological literature is the relationship of motivation to college student academic success and persistence. The expectancy-value model of motivation suggests a student's beliefs about his or her ability to do well on a specific activity and the extent to which the student values a specific activity influences choices, persistence, and ultimately performance outcomes (Eccles et al., 1983; Wigfield & Eccles, 2000). The expectancy-value model envisioned by Eccles et al. (1983) views students' expectancies for success, the subjective value placed on tasks, and other achievement related beliefs as important predictors of success and achievement in educational settings. Expectancies are conceptualized as outcome expectancies related to achievement or behaviors associated with achievement, and

values are associated with how specific tasks meet the needs or goals of the individual (Eccles et al., 1983) Within this model there are four components of subjective task values: 1) attainment value refers to the importance of doing well on a specific task; 2) intrinsic value refers to the level of enjoyment the individual gains from successfully completing the task; 3) utility value refers to the degree of usefulness of the task when compared to the individual's future plans; 4) cost value refers to the negative associations related to the task including what has to be given up to do a task and the effort needed to complete the task (Wigfield, 1994).

Ability and expectancy beliefs are included in several theories of motivation. For example, Bandura's theories focus on self-efficacy, but Bandura argues that expectancy-value theories focus too much on outcome expectations while efficacy, or the individual's belief in the ability to accomplish a task, is much more predictive of performance and choice (Bandura, 2012; Wigfield & Eccles, 2000). One important distinction between theoretical models of motivation and self-efficacy is how the various self-beliefs are measured. In general, it appears that the more specific the level of measurement the more predictive the measure is of actual performance or behavior (Wigfield & Eccles, 2000). Another significant part of the expectancy-value theory is the concept of importance or value. Motivation to attain a particular goal is greatly influenced by the value the individual places on the goal in relationship to the costs it requires to be successful in attaining the goal (Eccles, 2005; Eccles & Wigfield, 2002). Intrinsic value and utility value are both important constructs related to this theory. Utility value reflects more extrinsic motivation or reasons for completing a task instead of doing a task for the intrinsic value (Eccles & Wigfield, 2002).

Psychosocial and student behavioral factors are particularly important when studying student-athlete academic success due to the preeminence of athletic identity. Many student-

athletes, particularly male student-athletes, report identifying more as an athlete than as a student (Johnson et al., 2010). Student-athletes with strong athletic identities often do not possess the motivation for academics because they may not value education or believe in their academic capabilities. Therefore, costs associated with academic success in college are very high for student-athletes especially those who come to college academically underprepared. For this reason, the expectancy-value theoretical framework is very useful in examining predictors of student-athlete academic success.

Predictors of College Student Academic Success

Determining factors that aid in the prediction of college student success is a complicated process. Many research studies on college student success use a combination of cognitive and noncognitive variables to predict college student academic outcomes, as well as pre-college demographic variables such as first-generation status. Traditional cognitive factors are defined in educational research as high school grades, class rank, and standardized test scores. Noncognitive factors are defined in psychological theories as attitudes, behaviors, and personality constructs related to achievement or academic success. Educational literature includes measures of student behaviors such as study skills and strategies as noncognitive factors. Some demographic variables such as first-generation status, low socio-economic status, and race are consistently shown to be negatively correlated to academic success in college. First-generation status is generally associated with low socio-economic status with both of these pre-college attributes indicative of negative academic outcomes. While there is no consensus regarding one specific outcome measure of college student success, the majority of studies use freshman GPA because the data are easily obtained. However, there are problems with only using freshman GPA as the only outcome success measure. For this reason, other outcome

measures have been used to indicate college success including cumulative GPA, retention, and graduation. In this study, the cumulative GPA (CGPA) and APR scores were used as measures of college student academic success.

First-Generation Status and College Academic Success

The college experience is distinctly different for first-generation college students compared to college students who have the advantage of having at least one parent or guardian who has successfully navigated the college environment and obtained a bachelor's degree. The most frequently used definition of first-generation college student is an individual from a family where neither the student's parents or guardians has completed a four year baccalaureate degree (Pascarella et al., 2004). Engle and Tinto (2008) found first-generation students have lower graduation rates, are less likely to engage in the academic and social experiences that foster student success in college, and often do not use academic or other support services on campus. According to the Nation Center for Education Statistics Beginning Postsecondary Study, first-generation college students are nearly four times more likely to leave college after the first year compared to non-first-generation students (Engle & Tinto, 2008). Nearly half (43%) of the first-generation college students who attended a four-year institution left college without earning their degrees within a six year period. Sixty percent of the first-generation college students who left college without degrees did so after the first year of enrollment (Jenkins, Miyazaki, & Janosik, 2009). In fact, after six years, 11% of first-generation, low-income students had earned a bachelor's degree compared to 55% of non-first-generation students (Engle & Tinto, 2008). The picture is a little better for first-generation students who began their college careers at four-year institutions. Thirty-four percent of first-generation students who started at a public, four-year

institution earned a bachelor's degree in six years compared to 66% of their non-first-generation peers (Engle & Tinto, 2008).

To complicate matters, first-generation college students are often from low-income, racial minority backgrounds with lower levels of academic preparation for college (Pascarella et al., 2004). It is difficult to separate the first-generation status from the lower socio-economic status because lower levels of education tend to result in financial disadvantages as well. First-generation students are generally older, attend college classes part-time, and do not have outside financial support to assist them during college (Engle & Tinto, 2008). Ting (2003) found first-generation students consistently obtaining lower first-semester GPAs resulting in higher attrition rates than other students. Hoffman (2003) confirmed these results noting that first-generation students are almost twice as likely to drop out of four-year institutions as compared to non-first-generation students. Because of their weak academic backgrounds, many first-generation college students must take remedial courses increasing the time it takes for these students to complete a college degree. Warburton, Bugarin, and Nunez (2001) found first-generation were not likely to take challenging high school courses or enroll in college preparatory courses compared to their non-first-generation peers. Jenkins, Miyazaki, and Janosik (2009) reported first-generation students were less confident in their academic skills, and they were less likely to ask for help from the faculty, students, or support service personnel on campus. In general, first-generation status has been found to be negatively correlated with college completion rates because of the unique challenges facing these students (Pike & Kuh, 2005). First-generation college students are generally less academically prepared, have difficulty integrating into the academic and social fabric of the institution, struggle with multiple obligations outside of college, and feel less confident in their academic ability (Pike & Kuh, 2005). These are

significant obstacles to academic success in college and should be considered in relationship to the academic support structures provided for these students.

Pre-College Cognitive Measures

According to Hareckiewicz, Barron, Tauer, and Elliot (2002), standardized achievement tests i.e. the American College Test (ACT) and Scholastic Assessment Test (SAT), and high school grade point averages (HSGPA) are the most frequently studied pre-college cognitive variables used to predict college student readiness, persistence, and academic success. Almost all colleges and universities use standardized test scores and HSGPA as part of their admissions process. The US News and World Report uses the average standardized test scores of college applicants as a measure of college selectivity. These rankings are used to compare higher education institutions with regard to the quality of the student body. Defining quality of an institution by the average SAT or ACT seems to be contradictory to the trend to de-emphasize standardized testing in admissions decisions. Rothstein (2004) notes the trend to de-emphasize standardized test scores in the admissions process even at very prestigious universities for the purpose of reducing the adverse impact of standardized test scores on underrepresented minority applicants. Geiser and Santelices (2007) also acknowledges this trend citing as an example the University of California's (UC) Eligibility Index for admissions, which gives $\frac{3}{4}$ weight to HSGPA and only $\frac{1}{4}$ weight to the SAT. UC's Eligibility Index is similar to the NCAA's decision to adjust initial eligibility guidelines for student-athletes through the use of a sliding scale giving HSGPA greater weight. However, Camara and Michaelides (2005) argue that HSGPA should not be weighted more heavily than standardized test scores because HSGPA is an unreliable variable due to the lack of common grading standards across high schools and even across courses at the same school.

Most research on the academic success of college students includes a comparison of the predictive utility of the SAT or ACT to the predictive power HSGPA or other variables. A significant body of research has demonstrated that standardized test scores and HSGPA are generally strong predictors of college success (Richardson, Abraham, & Bond, 2012; see also Bridgeman, Pollack, & Burton, 2008; Fleming, 2002; Robbins et al., 2004; Schmitt et al., 2009) with HSGPA found to be the best predictor of four-year college outcomes (Geiser & Santelices, 2007). In a meta-analysis of psychological correlates of college success, Richardson et al. (2012) found measures of HSGPA, SAT, and ACT positively correlated to college academic performance with medium-sized correlation coefficients. The ACT was found to be a stronger predictor of undergraduate GPA than the SAT; however, the authors also identified several non-intellective factors positively correlated with college GPA.

In a study of over 30,000 students from 26 colleges, Bridgeman, Pollack, and Burton (2008) analyzed the predictive power of HSGPAs and test scores on college courses. Data analyses reveal differential effects on various subgroups of students. Researchers in this study found SAT scores to be better predictors of academic success for males in three minority groups and for females in the Asian and African-American groups. In this same study, HSGPA was found to be a better predictor overall with the incremental contribution of SAT scores accounting for less than 10% of the variance. However, when calculating and presenting data from multiple regression coefficients, the authors explain how significant the explanation of variance is when reporting success rates of students. For example, the SAT contributed to less than 10% variance given HSGPA, but that represents a difference between a 16% success rate and a 73% success rate when comparing students with similar HSGPAs.

In addition to identifying cognitive predictor variables, it is also important to specify the outcome measures used in studies related to college student academic success. Freshman GPA is often used in predictive studies related to college student success; however, Hsu and Schombert (2010) contend that freshman GPA is not an appropriate academic success outcome measure given the variance in course difficulty during the freshman year. Higher standardized test scores actually can result in placing students in freshman courses that are more challenging. For example, several institutions use standardized test scores to place students in math and English courses. Therefore, a student with a low SAT Math score might be placed in College Algebra or even a remedial math course while a student with a high SAT Math score might be placed in Calculus II as a freshman. Consequently, freshman course loads can have extreme variability presenting another challenge when using only first year college success outcomes. Mattern, Shaw, and Kobrin (2011) studied the incremental validity of the SAT and HSGPA on first year GPA. Specifically, this study examined the discrepancy of SAT and HSGPA performance and the relationship of the differential prediction of these variables on college success during the first year. Mattern et al. (2011) found students with higher HSGPAs in relationship to their SAT scores were not as successful in college as would be predicted. One explanation of this phenomenon is the lack of consistency in high school grading and course rigor. Mattern et al. (2011) concluded that using both the HSGPA and SAT scores minimizes significant differences in the predictive power of these variables especially for students with discrepant HSGPAs and standardized test scores.

The goal of increasing the diversity of the college student body spurred on more research related to admissions criteria that includes minimum scores on standardized ability or achievement tests (Sedlacek, 1993; Rothstein, 2004; Zwick, 1999). Rothstein (2004) argues

the methods used in many validation studies overestimate the SAT's incremental validity because the SAT is also highly correlated to student background characteristics with these characteristics explaining a large portion of the variance in SAT scores. Conversely, Sackett (2005) found strong positive relationships between standardized tests and academic performance in college when controlling for background factors like socio-economic status. In another study of 737 college students, Coyle, Snyder, Pillow, and Kochunov (2011) found the SAT more predictive of the academic success of high ability students as compared to low ability students. Coyle et al. (2011) hypothesized that noncognitive factors such as motivation, time management, and self-efficacy may be contributing to the differential effects of the SAT on college GPA. Because of the individual limitations of standardized testing and even HSGPA used in isolation, the literature overwhelmingly supports the use of a multi-dimensional approach to college admissions using both SAT/ACT scores and HSGPA as predictors of college success. However, there remains a significant amount of unexplained variance in college success. Geiser and Santelices (2007) note that a 95% confidence band from the correlation coefficient of $r = .79$ using a student's predicted GPA as 3.0 would result in a range between 2.21 to 3.79. For this reason, understanding the complexity of factors that contribute to college student success continues to be the focus of educational research.

With a significant amount of variance in college student academic performance still unexplained, researchers have sought to extend the range of predictive variables in studies especially with minority or non-traditional students. Geiser and Santelices (2007) contend that standardized test scores to be more predictive of the academic success of White students and not as predictive of the academic success of minority students. Geiser and Santelices (2007) used a longitudinal database with a sample of nearly 80,000 students at the University of California.

The outcome measure in this study was not freshman GPA, but rather four-year graduation. The four-year graduation outcome measure was selected because of policy issues at the university and the need for research to be conducted on outcomes beyond freshman GPA. Geiser and Santelices (2007) found HSGPA and SAT II writing scores were the only consistent predictors of the four-year graduation outcome measures. Hoffman and Lowitzki (2005) found the relationship of standardized test scores to academic achievement weaker for minority students, but were still moderately predicative of academic success at a predominantly white institution (PWI).

Learning and Study Strategy Predictors of Academic Success

Noncognitive factors encompass a wide range of constructs from personality traits and attitudes to learning and study habits. Identifying individual differences that influence college success outcomes has led to an increase in the number of empirical studies assessing psychological correlates to academic performance in college. In a meta-analysis of 13 years of research, Richardson et al. (2012) analyzed 50 correlates of GPA including 42 noncognitive constructs believed to be associated with academic performance. The authors selected noncognitive factors from five research domains: personality, psychosocial contextual influences, motivational factors, self-regulatory learning strategies, and students' approaches to learning. Of the personality factors, conscientiousness was found to be the strongest predictor of GPA. Richardson and Abraham (2009) used the Big Five Personality Inventory and the Learning and Study Strategies Inventory (LASSI), in conjunction with prior academic achievement measures to determine to what extent, if any, achievement motivation and conscientiousness influence academic success in college. Conscientiousness and achievement motivation were positively correlated to cumulative GPA after controlling for prior educational background and

achievement. Metacognition, elaboration, critical thinking, and concentration were identified in the meta-analysis as self-regulatory learning strategies found to have significant, positive correlations with college GPA. Other self-regulatory factors found to have small, positive correlates with tertiary GPA in the meta-analysis were time-management, peer learning, and help-seeking. In their meta-analysis, Richardson et al. (2012) confirmed findings of HSGPA, SAT, and ACT as strong predictors of college success all demonstrating medium-sized, positive correlations. Although the correlations of noncognitive factors observed in this meta-analysis were relatively small as compared to the predictive power of traditional cognitive measures, several noncognitive variables emerged as useful measures. Specifically, this meta-analysis reveals performance self-efficacy, effort regulation, grade goal, and academic self-efficacy can be important predictors of college student success.

Robbins, Allen, Casillas, Peterson, and Le (2006) conducted a large-scale study to investigate the predictive validity and utility of self-reported psychosocial factors on college student success. This meta-analysis included 109 studies of 14,464 students from 48 institutions between 1973 and 2002. Within these 109 studies, several theories of persistence and motivation were used to explain how psychosocial factors add to the knowledge of college student success. Effect size calculations for some of the factors were similar to traditional predictors of college success i.e. HSGPA and standardized test scores. In analyzing these studies, the authors found achievement motivation, academic self-efficacy, and academic goals to be incrementally predictive of cumulative GPA in college. Additionally, institutional commitment, social support, academic goals, academic self-efficacy, social involvement, and academic-related skills added significantly to the prediction of persistence and retention of college students participating in these studies. In another meta-analysis, Credé and Kuncel

(2008) investigated the effect of noncognitive factors related to study habits, skills, and attitudes (SHSA) on college student academic success. 2,771 college students from 10 colleges and universities were included in the study. The findings of this study also confirmed the utility of SAT/ACT scores and HSGPA with strong, positive correlations to cumulative college GPA over a four year period. However, study skills and habits as measured by the SHSA inventory were found to provide incremental validity in predicting GPA over and above cognitive predictor variables.

A range of academic enabling behaviors directly related to college student success have been identified in a variety of studies with self-efficacy consistently found to be a strong predictor of the academic success of college students (Choi, 2005). Self-efficacy, as defined by Bandura (1997) is an individual's belief in his or her capacity to perform in a manner that will ultimately lead to goal attainment. Choi (2005) conducted a study to examine the constructs of self-efficacy and self-concept as predictors of college success. 230 undergraduate students participated in the study with a mean age of 20.5 years. The Self-Efficacy Scale (SES), a 23-item assessment of self-efficacy, was administered to all participants yielding measures on two subscales (general and social). Students were also administered the College Academic Self-Efficacy Scale (CASES). CASES measures academic enabling behaviors typically associated with academic success in college. Self-concept was measured with the Academic Self-Concept Scale (ASCS). In this study, both academic self-concept and specific self-efficacy were significant predictors of term grades. Kitsantas, Winsler, and Huie (2008) identified self-regulation as a separate academic enabling behavior strongly correlated with college student success. According to Kitsantas (2002), successful students exhibit self-regulatory behaviors

such as goal setting, self-monitoring, strategic learning, task completion, and skill acquisition, help seeking, environmental structuring, and self-evaluating.

Kitsantas et al. (2008) studied the predictive power of self-regulation, motivation, and measures of prior ability on college student academic performance. 243 students were included in the study. The Motivated Strategies for Learning Questionnaire (MSLQ) was used to assess self-regulation and motivational beliefs. The MSLQ was slightly modified to evaluate self-efficacy and motivational attitudes toward academic tasks. Students' scores on the SAT or ACT and HSGPA were used to evaluate prior ability. GPAs of each participant were obtained after the first and second year of college attendance. HSGPA was found to have the strongest correlation with college success as measured by cumulative GPA. The SAT verbal score also exhibited a strong correlation to college success after the second semester. First-year academic performance was moderately correlated with time and study environment management. Self-efficacy and task value were positively correlated with first-year academic performance but to varying degrees. Results from hierarchical multiple regression analyses self-efficacy accounted for 47% of the variance in students' academic achievement in this study. After the sophomore year, gender emerged as a significant predictor of student success as measured by GPA. Gender differences have been found in other studies measuring motivation and study skills (Marrs, Sigler, & Hayes, 2009).

Consistently, measures of motivation are found to be predictive of college student academic success. While basic academic skills are necessary for college success, motivation provides the drive to focus on academic goals within a new environment. Alarcon and Edwards (2013) hypothesized that motivation, standardized tests, and HSGPA predict university retention. In this study of 584 freshman students, the motivational component was assessed with measures

of conscientiousness and affect. Both ability and motivation were found to influence retention; however, when affectivity was added to the model, conscientiousness was not a strong predictor. The authors postulate the measure of conscientiousness to be an amalgamation of both ability and motivation given the fact that these individuals usually possess academic skills as a result of this very trait. It should be noted that 30% of the sample were first-generation students. It would be useful to determine differences between first-generation students and other groups; however, the sample size was not large enough for this type of analysis. Achievement motivation emerged as one of the strongest predictors of GPA in a meta-analysis conducted by Robbins et al. (2004). In this meta-analysis, the LASSI had the highest bivariate correlation with academic success as measured by GPA. Achievement motivation was defined in Robbins et al. (2004) as the capacity to persist despite academic challenge.

Student-Athlete Academic Success

Student-athletes are often considered non-traditional students because of the unique subculture that surrounds intercollegiate athletics. The role of athletics in higher education has been contested for decades influencing many policies and programs enacted by the National Collegiate Athletic Association (NCAA) and other organizations charged with maintaining the academic integrity of higher education in the United States. As part of the Student Right to Know Act, Federal Law now requires colleges and universities to report graduation rates of students and student-athletes (Mangold, Bean, & Adams, 2003; Petr & Paskus, 2009). The fact that the federal government requires higher education institutions to report the graduation rates of student-athletes separately from the general student population highlights concerns with the academic success of this highly visible sub-population of college students. As a result, many scholars have conducted empirical research on the academic success of student-athletes adding to

the knowledge of the unique challenges and obstacles student-athletes face in pursuit of a college degree while participating in intercollegiate athletics.

Several contradictory views are held with respect to the graduation rates of student-athletes. Ferris, Finster, and McDonald (2004) analyzed the graduation rates of student-athletes over a ten year period and concluded that the federally mandated graduation rate has significant limitations due to the manner in which the rate is calculated. Specifically, only student-athletes who receive an athletic scholarship and are enrolled full time are considered a part of the cohort. It is estimated that non-scholarship athletes and walk-ons constitute almost 50% of student-athletes at most institutions (Petr & McArdle, 2012). Furthermore, the Federal Graduate Rate (FGR) does not take into account transfer student-athletes. Transfer student-athletes are not uncommon as some student-athletes transfer due to dissatisfaction with playing time or in pursuit of better scholarship opportunities (LaForge & Hodge, 2011; Petr & McArdle, 2012). Ferris et al. (2004) found 57.7% of 70,122 scholarship student-athletes graduated, while the FGR of all students at Division I-A schools during this same period was 58.8%. The researchers also conducted a pair-wise analysis comparing the athletic graduation rates with the general student body graduation rates at the same institution. The variation of graduation rate differences was significant across institutional types indicating that graduation rates of student-athletes should be analyzed through an institutional contextual lens or risk over or understating the findings.

In reference to graduation rates and sport success, Ferris et al. (2004) found that as athletic success increases across all sports at an institution, student-athlete graduation rates decrease relative to their cohorts at their respective institutions. Research conducted by Mangold, Bean, and Adams (2003) on the institutional graduation rates of 97 NCAA Division IA institutions competing in both football and basketball used predictive variables associated with

academic ability, academic and social integration, and institutional characteristics. One surprising finding was the negative association between sport success and graduation rates in this study. Both football and basketball success at these institutions had a strong negative association with institutional graduation rates. However, graduation rates of the student-athletes at the institutions in this study were not disaggregated in the analyses. There was also a suggestion that these rates were difficult to compare given the various factors used in the study.

Trends in Student-Athlete Academic Success

Research investigating differences in graduation rates between student-athletes and the general student body dominates the literature; however, there is a growing body of research that has examined differences in graduation rates across sport type, gender, and race. Petr and McArdle (2012) report the graduation rates of certain groups of student-athletes are significantly lower than others and this difference is of great concern to the NCAA. For example, graduation rates of male student-athletes are consistently lower than female student-athletes (Hosick & Sproull, 2012; Johnson et al., 2010; Kane et al., 2008; LeCrom et al., 2009; Petr & McArdle, 2012). While African American male student-athletes graduate at a higher rate than African males in the general student body (50% compared to 38% respectively), overall there is still a significant disparity when comparing the graduation rates of African American student-athletes to the graduation rates of White student-athletes (Petr & McArdle, 2012). According to the NCAA, graduation rates of student-athletes have improved since the implementation of NCAA academic reform measures and are generally higher than the graduation rates of the general student body across institutional types (Petr & McArdle, 2012).

Some critics, however, argue that the manner in which graduation rates are calculated gives a false illusion that student-athletes are graduating at higher rates. In fact, Eckard (2010)

asserts the graduation rates of student-athletes are actually much lower when regression analysis is conducted to account for full-time versus part-time enrollment. The NCAA requires all student-athletes to be enrolled full time in order to participate in intercollegiate athletics while a significant percentage of the general student bodies of many college and universities are part-time students. Data collected in this research suggest that when this bias is removed through regression analysis, the relative graduation rates of football and men's basketball student-athletes are substantially lower than reported. For example, the graduation rates of football student-athletes at 106 major football institutions are merely 3.2 percentile points lower than the general male student body rates. However, when using regression analysis controlling for the part-time enrollment bias, the difference increases to 17.7 percentile points lower for football student-athletes. Unfortunately, the finding was even worse for men's basketball. The difference in the graduation rates of men's basketball student-athletes and the male general student body graduation rate was 22.3 percentile points. When correcting for the part-time enrollment bias, the difference increased to 34.3 percentile points. This study sheds light on the problem with how graduation rates are calculated and communicated. Conversely, Petr and McArdle (2012) argue that the FGR does not account for transfer student-athletes. The NCAA has conducted research on the educational outcomes of student-athletes and found that when considering transfer student-athletes who eventually graduate the rate is almost 20% higher than calculated by FGR (LaForge & Hodge, 2011; Petr & McArdle, 2012). It could be argued that this is also true for transfer students in the general student body; therefore, the FGR for both student-athletes and the general student body may be underestimated given these conditions.

Not unlike the general college student population, female student-athletes tend to be more academically successful than their male counterparts. According to McCall (2011), female

student-athletes average APR scores of 970 compared to average APR scores of 950 for male student-athletes. Male African American student-athletes are more than twice as likely to post 0-2 individual APR scores compared to student-athletes of other ethnicities (McCall, 2012); however, being female has been found to be a more significant positive predictor of college GPA than race (Aries et al., 2004). In one study, high school grades were the only significant predictor of the academic success of at-risk football student-athletes (Maggard, 2007). According to research conducted by the NCAA, lower high school core grades and test scores, transferring from a two to a four year school, being male, and being African American greatly increases the chance of a student-athlete losing both the eligibility and retention APR points (Petr & McArdle, 2012).

Predictors of Student-Athlete Academic Success

Following the federal mandate to report graduation rates of student-athletes separately from the general student body, the NCAA began collecting a range of academic data on student-athletes from all member institutions. This data influenced the NCAA Academic Performance Program (APP) and a series of academic reform measures intended to increase the graduation rates of student-athletes (Petr & McArdle, 2012; Petr & Paskus, 2009). Two NCAA bylaws, Proposition 48 and Proposition 16, attempted to increase the academic profile of student-athletes and reduce the number of student-athletes admitted with test scores well below the academic standards of individual institutions (LeCrom, et al., 2009). Proposition 48 required all freshman student-athletes to obtain a minimum score of 700 combined on the SAT or a 15 on the ACT composite (Johnson et al., 2010). It was during this time that standardized test scores were regarded by most higher education institutions as an objective, valid measurement highly predictive of college student success (Petr & Paskus, 2009).

According to (Petr, & McArdle, 2012), the NCAA began conducting empirical research to determine the impact of Proposition 48 and other academic reform measures on student-athlete academic success. According to the ACT Policy Report (2012), only 5% of African American students met all four college readiness benchmarks. The ACT Policy Report (2012) also indicated that minority and low income students do not take as many college preparatory courses in high school. Since low-income and minority students generally do not perform as well on standardized tests when compared to other groups, the NCAA determined a cut-off score on standardized tests for academic eligibility negatively affects disadvantaged and minority student-athletes. Using longitudinal academic data, the NCAA research teams created several models to predict the academic success of student-athletes. NCAA research consistently found HSGPA to be a stronger predictor of college success than standardized test scores (NCAA, 2009; Petr & McArdle, 2012). As mentioned earlier, the collective effort to analyze longitudinal academic data of student-athletes coupled with findings from their research prompted the NCAA to create a sliding scale for freshman initial eligibility weighting the HSGPA more than standardized test scores (Paskus, 2012; Petr & McArdle, 2012; Petr & Paskus, 2009).

Evaluating the predictive power of specific variables is only effective if outcome measures are well defined. In addition to graduation rates, student-athlete academic success is often measured by GPA, and most often freshman GPA. Johnson et al. (2010) studied the GPA of 674 first-year student-athletes from 2004-2008 and selected academic and demographic variables traditionally used to predict college student GPA and athletic variables such as sport type, coaching change, playing time, and winning percentage as predictors of student-athlete GPA. Of the demographic variables investigated in this study, gender was found to be moderately predictive of first-year GPA. As the authors of this study point out, simply

recognizing a significant relationship between the gender and GPA of student-athletes does not explain why female student-athletes are more successful academically as measured by GPA and graduation rates. Aliprantis, Dunne, and Fee (2011) note the trend for females to outperform males in college is not only seen in the student-athlete population but also in the general student body population across all levels of post-secondary education. In their study, Johnson et al. (2010) found race to be another predictive variable of first-year GPA. The *B* value of $-.26$ of African American student athletes would predict the first-year GPA of this subgroup $.26$ lower than their White counterparts with other variables held constant. African Americans represented only 17.8% of the total sample in this study as compared to 76.1% Caucasian student-athletes. Since this study was conducted at one institution, this percentage may be representative of the total population sample; however, that data was not provided in the study. The findings of this study are consistent with previous studies with respect to the relationship between race and academic success of student-athletes in college (Kane et al., 2008; Sedlacek & Adams-Gaston, 1992). In both cases, race and gender, it is important to understand and use these findings, when appropriate, to design academic support services for student-athletes. This study is significant because it was conducted after the NCAA implemented the sliding scale for freshman initial eligibility.

Johnson et al. (2010) also found ACT scores to be useful in predicting the first-year GPA of student-athletes explaining 16% of the variation in GPAs. This finding is consistent with the literature regarding the predictive validity of standardized tests on student-athlete academic success especially when used in concert with other predictor variables (Burton & Ramist, 2001; Pascarella, Bohr, Nora, & Terenzini, 1995; Petr & McArdle, 2012). HSGPA was also investigated and found to be strongly predictive of college and significantly contributed to the

explanation of the variance. Both HSGPA and standardized test scores indicate a level of academic readiness for college. Assessing levels of academic readiness of student-athletes is particularly important because student-athletes are held to academic standards to maintain eligibility for athletic competition.

With the advent of APR and other academic reform measures, the consequences for failing to meet NCAA academic standards are very serious for institutions as well. Lombardi, Downs, Downs, and Conley created the Student Athlete Pre-Screening Questionnaire (SA-PSQ) to assess a range of academic readiness factors specific to student-athletes. The purpose of this study was to determine if scores on the SA-PSQ provided useful information beyond traditional cognitive and demographic variables that have been linked in previous studies to college student-athlete academic success (Campos, 2009). The SA-PSQ was found to add significantly to the prediction of college student academic success. Overall the model explained approximately 51% of the variance in college student GPA. Campos (2009) also studied a variety of factors related to college student-athlete academic success in a large sample of student-athletes at the University of Texas El Paso over a four year period and found first semester GPA and eligibility status were the most significant predictors of student-athlete retention and graduation.

Other factors believed to affect student-athlete academic success in college are related to the amount of time and effort student-athletes are required to invest in their sport. In their study, Johnson et al. (2010) found that student-athletes participating in revenue sports were more likely to have lower first-year GPAs than student-athletes participating in nonrevenue sports. However, in the prediction equation, the traditional variables were significantly more powerful and overshadowed the sport variables. Contrary to expectations, coaching change was not found to be statistically significant in the equation. Playing time was found to be correlated to student-

athlete GPA, but the correlation was very moderate and did not add to predicting GPA. The data reveal the lower a student-athlete's playing time, the lower the GPA. Contrary to the findings of other studies, winning percentage did not play a role in predicting the GPA of student-athletes in this study.

Other studies have investigated the relationship between specific variables and student-athlete retention. Retention is a critical part of the APR calculation and considered an academic success outcome for college students. However, there is little research specifically devoted to student-athlete retention as compared to the research regarding student-athlete graduation and GPA. Le Crom et.al, (2009) conducted a study to determine the effect of gender, sport type, and scholarship support on the retention of student-athletes. This study included 12,890 student-athletes with 41% participating in individual sports and 58.2% participating in team sports. Thirty-eight percent of the student-athletes received no scholarship aid representing the largest group in the sample in terms of scholarship support. Thirteen percent of the student-athletes in this study received full scholarship support (100% funding for tuition, room and board, textbooks, and other expenses). Again, gender was found to be a significant variable in this study. Females were retained at a higher rate than males (94% and 91% respectively). Chi-square goodness of fit calculations confirmed the significance of this finding given that there were more males not retained and fewer females not retained than expected. Ninety-four percent of student-athletes participating in individual sports were retained, and 92% of student-athletes participating in team sports were retained. Scholarship support was found to have no overall effect on retention; however, sport type was a significant predictor of retention. Since the majority of full scholarship student-athletes participate in team sports, additional analysis was conducted to determine if the level of funding was significant when controlling for sport type.

The chi-square analysis results were similar to the analysis of gender revealing more student-athletes participating in team sports were not retained than would be expected and fewer student-athletes participating in individual sports were not retained than expected. This study found that scholarship support alone is not the only variable that should be considered when investigating factors that contribute to the retention of student-athletes. Further, the authors suggest the need for research on specific sub-groups of student-athletes to add to the knowledge of why female student-athletes are retained at a higher rate than male student-athletes.

Increasingly, studies involving the prediction of student-athlete academic success include noncognitive measures. According to Sedlacek (1993), noncognitive variables predict the academic success of non-traditional college students to a greater degree than traditional demographic or cognitive variables. A student-athlete can be considered a non-traditional college student because of the unique culture that surrounds intercollegiate athletics. Student-athletes are not unlike other college students in that they are confronted with the same developmental and adjustment issues during their college years (Melendez, 2006). However, in addition to the challenges college students face, student-athletes must be able to balance academic expectations with the physical and time demands of their sport (Melendez, 2006; Meyer, 2005).

Sedlacek and Gaston (1992) investigated the predictive validity of several noncognitive variables and SAT scores on student-athlete GPA. 105 freshman student-athletes from a large NCAA IA institution participated in this study. Four scales on the Noncognitive Questionnaire (NCQ), Positive Self-Concept, Strong Support Person, Realistic Self-Appraisal, and Community Involvement, were found to have significant positive correlations with first semester GPAs while SAT math and SAT verbal scores show virtually zero correlation with first semester grades.

There are several limitations with the study. First, the sample is small given the type of regression analyses conducted. Second, there is limited information regarding the validity and reliability of the NCQ. Third, the researchers only looked at a first semester GPA that has not been showed to be as useful in predictive studies as first year GPA or four year academic success outcomes. However, this study is important because it was the first of several studies that looked beyond traditional cognitive measures to predict the academic success of student-athletes.

There have been other studies demonstrating the utility of measuring noncognitive variables within the student-athlete population. Simons and Van Rheenen (2000) investigated several noncognitive variables believed to influence the academic success of student-athletes. The highest correlations with college GPA were three academic preparation variables, two of the athletic variables, and one achievement motivation variables. Females in this study demonstrated the ability to overcome academic deficits and had higher grades than their male counterparts. Simons and Van Rheenen (2000) also found African American student-athletes' grades were lower than their non-African American counterparts. The authors hypothesized that the differential effects as measured by the achievement motivation measure is indicative of student-athletes who are able to overcome the extreme demands on their time and energy because of their academic goals and their motivation to succeed.

Ting (2009), using Sedlacek's Noncognitive Assessment Model, studied the influence of noncognitive measures on first-year academic success of NCAA Division IA student-athletes. Stepwise multiple regressions were conducted using scores on the NCQ and SAT math and SAT verbal scores. In this sample of 109 student-athletes, two NCQ scales, Knowledge in a Field and Demonstrated Community Service, in addition to SAT math scores were found to predict a significant amount of the variance. In all, noncognitive variables as assessed with NCQ scales

explained 20% of the variance in first-year GPA. The author concluded that a model combining SAT scores and noncognitive variables should be used to predict the academic success of student-athletes.

Expectancy-Value Theory and the LASSI-II

Expectancy-Value Theory

As mentioned earlier, the expectancy-value theory is useful in framing an investigation of the academic success of student-athletes because of the nature of the role conflict student-athletes often face during college. Many student-athletes value athletic pursuits and goals academic pursuits and goals; therefore, student-athletes may lack the will to exert the effort necessary to be academic successful. Male student-athletes particularly tend to view themselves primarily as athletes instead of students and have less positive interactions during college compared to their female counterparts (Gaston-Gayles & Hu, 2009). Athletic achievements often overshadow academic achievements of student-athletes especially in certain cultures. The development of academic skills is neglected in favor of the development of athletic skills resulting in lower expectations for academic success. From the perspective of expectancy-value theory, student-athletes' beliefs about their own competence with regard to academic enabling behaviors, skills, and attitudes toward academics in general can determine the degree to which student-athletes are academically successful.

The Learning and Study Strategies Inventory, 2nd Edition (LASSI-II)

The LASSI-II is a measure of learning and study strategies, which have been found to influence the academic success of college students (Richardson & Abraham, 2009). The LASSI has been widely used in college educational settings and has been found to differentiate between low and high achieving students (Marrs et al., 2009). Of all of the LASSI subscales, the

Motivation scale appears to be the strongest predictor of college GPA (Reaser, Prevatt, Petscher, & Proctor, 2007) and Time Management a distant second. The LASSI has been used at the post-secondary level to identify potential barriers to academic success in college. Additionally, the LASSI has utility in providing more prescribed academic support interventions given the individualized nature of the instrument. Academic advisors, counselors, and academic support personnel can use the LASSI in a variety of settings to help students learn more about their personal strengths and weaknesses in the area of learning and study strategies.

The LASSI was designed to assess students' own perceptions of their level of proficiency on a variety of learning and study strategies. For this reason, the LASSI-II can be used to measure student-athlete expectancy beliefs and values related to academic tasks. According to Weinstein and Palmer (2002), the LASSI-II measures "both covert and overt thoughts, behaviors, attitudes, motivations, and beliefs that relate to successful learning in post-secondary educational settings" (p.4). One purpose for using the LASSI-II is to identify students who may struggle academically for various reasons and provide appropriate interventions for those students to help them succeed in college. The authors contend that the LASSI is a diagnostic instrument that can be used to design intervention plans to enhance or improve a student's academic success in college.

The LASSI-II was developed from research centered on strategic learning components of skill, will, and self-regulation. The LASSI scales measure many of the noncognitive constructs that have been correlated to the academic success of college students. The scales of the LASSI-II are: Anxiety, Attitude, Concentration, Information Processing, Motivation, Selecting Main Ideas, Self-Testing, Study Aids, Test Strategies, and Time Management. Each scale is included in one of the three strategic learning components of skill, will, and self-regulation. The skill

component of the LASSI-II includes the scales of Information Processing, Selecting Main Idea, and Test Strategies and measures students' beliefs related to identifying, acquiring, and constructing meaning from new information, as well as students' perceptions of their preparation for assessments or tests. The will component of the LASSI-II is indicative of the value students place on academic tasks as identified by three scales: Anxiety, Attitude, and Motivation. The items from these scales measure the degree to which students are concerned about their performance on academic tasks, their receptivity to learning, their overall interest and attitude toward college, and their willingness to exert the effort require to be successful in college. The self-regulation component of the LASSI-II includes the scales of Concentration, Self-Testing, Study Aids, and Time Management. The research suggests self-regulation or how students manage or control the whole learning process is directly related to academic success in college (Bandura, 1997; Cohen, 2012; Kitsantas et al., 2008). The degree to which students use academic support services such as tutoring, review sessions, and study aids is measured by the scales included in the self-regulation component of the LASSI-II. Also student beliefs about how he or she manages the learning process through the use of time, concentration, and checking understanding are assessed with the items in this component of the LASSI-II.

Summary

The academic success of college student-athletes continues to be a primary concern of NCAA Division I member institutions, faculty groups, the NCAA, and student-athlete academic support professionals. The use of APR as a measure of the academic success of student-athletes has created concern with respect to the validity of this instrument given the highly publicized manner in which these scores are reported. Limited-resource institutions are penalized for not meeting APR benchmarks at a much higher rate than other institutions; therefore, it is important

to study the academic success of student-athletes at a limited-resource institution. As mentioned previously, the NCAA defines a limited-resource institution as an institution whose resources are at the bottom 15% of all Division I, NCAA member institutions. The formula for determining resource level includes per capita expenditures on athletics, per capita educational expenditures for the student body and average Pell Grant funds among all students (Hosick & Sproull, 2012).

Comeaux and Harrison (2011) contend student-athlete experiences are so distinct from the general student body population that current theories on college student academic success are insufficient to explain the variance in student-athlete academic performance. According to Comeaux (2007), there is a lack of understanding with respect to the factors that predict student-athlete academic success. One theory that is particularly useful in studying factors beyond traditional cognitive variables is Eccles et al.'s expectancy-value theory. This theory suggests that much variance in an individual's performance and motivation is explained by how he or she expects to perform on achievement related tasks and the extent to which the task is valued. In essence, beliefs about how well one will perform influences the amount of effort and persistence a student will exert toward specific tasks or goals. Motivation is a key component of this theory and is often determined by the interaction of ability beliefs and the value the student attaches to the task. Many student-athletes may value athletic pursuits above academic pursuits. According to expectancy-value theory, the degree to which student-athletes expect to perform on academic tasks and the value they place on those tasks can significantly affect their academic success.

The Learning and Study Strategies Inventory, 2nd Edition (LASSI-II) has been used to measure college student perceptions of skill, will, and self-regulation. The skill component of the LASSI-II examines students' learning strategies, skills, and thought processes related to identifying, acquiring, and constructing new meaning, as well as how students are able to

demonstrate their mastery of new knowledge on tests or other evaluations. The will component measures the degree to which students are concerned about their academic performance, their receptivity to learning, their attitudes toward the learning process, their interest in college, and their willingness to exert the necessary effort to be academically successful. The self-regulation component of the LASSI-II measures how students self-regulate or manage the learning process by using time effectively, focusing on the task, maintaining concentration, and adjusting learning to meet the demands for a class, assignments, or tests. The ten scales of the LASSI-II focus on thoughts, behaviors, motivational beliefs, and attitudes of students that relate to successful learning in college. Additionally, the will component of the LASSI-II has the potential to measure the degree to which the student-athlete values academics and his or her willingness to exert effort toward academic tasks.

This chapter reviewed literature on the history of NCAA academic reform measures, the development of the NCAA academic success metric, APR, theories related to the academic success of college students, and research on predictors of college student academic success. Because student-athletes are a unique sub-group on college campuses, this literature review also sought to understand the factors that influence the academic success of student-athletes. The weight of the evidence with respect to the academic success of student-athletes suggests a need to extend the range of potential predictor variables for student-athlete academic success beyond traditional cognitive measures. Using the expectancy-value lens, scores from the LASSI-II can extend the range of predictor variables and add to the knowledge of what factors significantly influence student-athlete academic success.

CHAPTER THREE

METHODS

Introduction

The purpose of this study was to examine cognitive, learning and study strategy predictors of college student-athlete academic success at a limited-resource, NCAA Division I institution. This chapter outlines the variables used to study predictors of student-athlete academic success and APR scores, as well as research questions, sampling and population data, data collection and analysis procedures including instrumentation, and an explanation of delimitations and limitations of the study.

Rationale for Inclusion of Predictor Variables

The inclusion of learning and study strategy factors, specifically motivation and self-regulatory factors, as predictors of college student-athlete academic success in this study is based on the expectancy-value theory, which suggests that students' beliefs, behaviors, and attitudes toward academic tasks and the learning process are related to academic success in college. In general, the research demonstrates a range of noncognitive or psychosocial factors are incrementally predictive of college academic success (Richardson et al., 2012; Robbins et al., 2004). Further, there is a need to integrate theories of academic success, persistence, and motivation given the inclusion of APR as an academic success outcome metric. Expectancy-value and motivational theories are particularly salient to student-athlete success given the heightened adjustment issues student-athletes face while competing in Division I intercollegiate athletics and demands on student-athlete time (Melendez, 2006). In keeping with the

expectancy-value theory, if a student-athlete does not value the opportunity he or she has been given to obtain a college degree and is not motivated to do well academically, he or she is not likely to put forth the extra effort needed to be academically successful regardless of previous academic preparation or aptitude.

Research Design

To address the gap in the literature regarding predictors of student-athlete academic success and APR, a quantitative study investigating the predictive power of cognitive, learning and study strategy variables on the dependent variables of academic success as measured by CGPA and APR points was conducted. Independent t-tests were used to determine if statistically significant differences exist between male and female student-athletes, first-generation and non-first-generation student-athletes, as well as revenue and non-revenue student-athletes on variables used to predict student-athlete academic success. This study sought to delineate traditional cognitive, learning and study strategy factors contributing to the academic success of student-athletes as measured by CGPA and APR points while providing information regarding group differences on the predictor variables included in the study.

Predicting which student-athletes are most at-risk of experiencing academic difficulties and losing APR points is important for academic support professionals for the purpose of early intervention. Additionally, limited-resource institutions need to be proactive with respect to determining factors, both institutionally and programmatically, that influence student-athlete academic success and APR point loss or retention. For these reasons, a quantitative study using regression analyses was most appropriate for investigating the statistical relationship between variables and examining the predictive power of these variables on the academic success of student-athletes as measured by CGPA. HSGPA and standardized test scores were used as

cognitive predictor variables in the investigation of correlates to CGPA and APR points. It has been demonstrated both in studies of the general college student body and studies of student-athletes that traditional cognitive measures are strongly correlated to academic success (Bridgeman, Burton, & Pollack, 2008; Burton & Ramist, 2001; Ferris, Finster, & McDonald, 2004; Geiser & Santelices, 2007; Johnson et al., 2010; Paskus, 2012; Petr & McArdle, 2012). Additionally, HSGPA and standardized test scores are used by the NCAA as components of the sliding scale to determine initial academic eligibility of student-athletes participating in NCAA Division I intercollegiate athletics. To measure learning and study strategy variables believed to be related to college student academic success, scores from the Learning and Study Strategies Inventory, 2nd Edition (LASSI-II) were examined as potential predictor variables of cumulative GPA and APR points. The ten scales of the LASSI-II measure noncognitive variables associated with three components of learning and study strategies: skill, will, and self-regulation. A more detailed explanation of the purpose of the LASSI-II, the ten scales comprising this instrument, and the components of skill, will, and self-regulation used in this study as independent variables is included in the instrumentation section of this chapter. Definitions for all variables are included in Appendix A.

A stepwise, multiple regression analysis was selected for this study in order to determine the direction, magnitude, and statistical significance of interactions among multiple variables, as well as the power of the independent variables to predict student-athlete academic success as measured by CGPA (Gall, Gall, & Borg, 2007). A logistic regression analysis was used to determine the variables most predictive of the retention or loss of APR points. Additional logistic regression analyses were conducted for variables predictive of APR-E points retained or lost and for variables predictive of APR-R points retained or lost in order to investigate

differences between these two components of APR. All logistic regression analyses were conducted with the same predictor variables. The following variables were identified as potential factors that may influence student-athlete academic success:

Independent Variables

Three groups of independent variables were used as predictor variables in this study. Cognitive variables used in this study included high school core GPA (HSGPA) and standardized test scores. Both the HSGPA and standardized test scores are used a part of a sliding scale to determine initial eligibility for student-athletes participating in NCAA Division I intercollegiate athletics; therefore, these variables are consistently used in decisions regarding the academic eligibility of Division I student-athletes. Participants were also divided into demographic and sport variables based on gender, first-generation status, and participation in either revenue or non-revenue producing sports. These demographic and sport variables were included in the regression analyses as control variables given the research, which indicates significant differences exist in the academic success of these groups of student-athletes. Finally, scores from the Skill, Will, and Self-Regulation composite scales of the Learning and Study Strategies Inventory, 2nd edition (LASSI-II) were included as measures of learning and study strategies in keeping with the expectancy-value theory, which suggests that a student's beliefs about their academic self-efficacy and the degree to which a student values academic pursuits influences academic success.

Cognitive variables

1. High school core GPA (HSGPA)
2. ACT/SAT scores (Test)

Demographic and sport variables

1. Gender

2. First-Generation Status (Family)
3. Revenue or Non-Revenue Sport (Sport)

Learning and study strategy variables

1. Skill
2. Will
3. Self-Regulation

Dependent variables

The dependent variable for this study is student-athlete academic success as measured by two outcome metrics:

1. Cumulative GPA
2. APR points (APR-E & APR-R)

Research Questions

The following research questions were used to determine the best predictive models of student-athlete academic success and APR point loss or retention. Additionally, research questions were formulated to investigate the differences in predictor variables among specific groups of student-athletes.

1. Taken in combination, to what degree do demographic, sport, cognitive, learning and study strategy variables predict student-athlete academic success as measured by CGPA?
2. Are there significant differences in variables that predict student-athlete academic success as measured by CGPA for male student-athletes compared to female student-athletes?
3. Are there significant differences in variables that predict student-athlete academic success for first-generation student-athletes compared to non-first-generation student-athletes students?

4. Are there significant differences in variables that predict student-athlete academic success for student-athletes participating in revenue or non-revenue sports?

5. Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR points?

6. Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR eligibility points?

7. Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR retention points?

A variety of statistical tests were utilized to answer the aforementioned research questions. An overview of the statistical tests used to answer each research question in the study is provided in Table 1. Additionally, a list of independent and dependent variables used in each analysis is provided in the table below.

Table 1

Research Questions and Data Analysis

Research Questions	Independent Variables	Dependent Variable(s)	Statistical Tests
1. Taken in combination, to what degree do demographic, sport, cognitive, learning and study strategy variables predict student-athlete academic success as measured by CGPA?	GENDER FAMILY SPORT HSGPA TEST SKILL WILL SELF-REG.	CGPA	Multiple regression – used when testing multiple independent variables on one dependent variable
2. Are there significant differences in variables that predict student-athlete academic success as measured by CGPA for male student-athletes as compared to female student-athletes?	Male SAs Female SAs	HSGPA TEST SKILL WILL SELF-REG CGPA	Independent t-tests- used to determine if the means of two groups are statistically different

3. Are there significant differences in variables that predict student-athlete academic success for first-generation student-athletes compared to non-first-generation student-athletes students?	1 st gen. SAs Non-1 st gen.SAs	HSGPA TEST SKILL WILL SELF-REG. CGPA	Independent t-tests- used to determine if the means of two groups are statistically different
4. Are there significant differences in variables that predict student-athlete academic success for student-athletes participating in revenue or non-revenue sports?	Revenue SAs Non-Revenue SAs	HSGPA TEST SKILL WILL SELF-REG. CGPA	Independent t-tests- used to determine if the means of two groups are statistically different
5. Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR points?	GENDER FAMILY HSGPA TEST SKILL WILL SELF-REG.	APR	Logistic regression – used with two or more independent variables and a dichotomous dependent variable
6. Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR eligibility points?	GENDER FAMILY HSGPA TEST SKILL WILL SELF-REG.	APR-E	Logistic regression – used with two or more independent variables and a dichotomous dependent variable
7. Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR retention points?	GENDER FAMILY HSGPA TEST SKILL WILL SELF-REG.	APR-R	Logistic regression – used with two or more independent variables and a dichotomous dependent variable

Instrumentation

The LASSI-II is an 80-item inventory of students' use of learning and study strategies. There are 10 scales measuring three components of strategic learning: skill, will, and self-regulation. Information Processing, Selecting Main Idea, and Test Strategies are the three LASSI-II scales related to the skill component of strategic learning. These scales measure the

student's ability to construct meaning from newly acquired knowledge, ideas, and information and the degree to which the student prepares for and demonstrates the acquisition of new knowledge on tests or exams. The LASSI-II scales that measure the will component of strategic learning are Anxiety, Attitude, and Motivation. These scales attempt to measure a student's receptivity to learning new information, his or her attitude and interest in college-level learning, diligence and self-discipline related to academic tasks, the willingness to exert the effort needed to be academically successful in college, and the degree to which the student becomes anxious about academic performance. Four scales, Concentration, Self-Testing, Study Aids, and Time Management, are related to the self-regulation component of strategic learning. These scales measure a student's ability to manage the learning process including the ability to self-regulate, maintain concentration, to use study support systems such as tutoring or review sessions, and to effectively manage their work and time during college.

Scores on the ten scales of the LASSI-II are standardized scores with percentile score equivalents and national norms; however, because the instrument is intended to be a diagnostic instrument providing information on individual strengths and weaknesses as compared to other college students, there is no total score for either the entire instrument or the three strategic learning components of Skill, Will, and Self-Regulation. The most appropriate use of the LASSI-II is for evaluating strengths and weaknesses in specific areas of learning and study strategies and using the information to develop individual prescriptions for interventions. The LASSI-II can also be used as a pre-post measurement of students participating in programs designed to help students develop learning and study strategies needed to be academically successful in college (Weinstein & Palmer, 2002)

The use of the LASSI-II as a diagnostic measure of learning and study strategies is supported by Cano's (2006) investigation of the psychometric properties of the instrument. Cano found support for the application of the LASSI-II as a measurement of constructs related to academic performance in college. Learning strategies as defined by Weinstein, Husman, and Dierking (2000) are "any thoughts, behaviors, beliefs, or emotions that facilitate the acquisition, understanding or later transfer of new knowledge and skills (p.727). Because the LASSI-II measures constructs of motivation, attitude, and learning strategies, it is a particularly useful assessment for the purposes of this investigation. By investigating the degree to which learning and study strategy factors help explain a proportion of unexplained variance in student-athlete academic success and APR scores in addition to traditional cognitive measures, academic support personnel can use this information to improve the effectiveness of intervention programs.

Institutional Characteristics

All participants in this study attend and participate in intercollegiate athletics at a NCAA Division I institution. This institution is a public, four-year regional institution. Studying student-athletes from this institution is particularly appropriate because both the men's basketball team and the football team have failed to meet APR benchmarks and have been assessed APR penalties including reductions in scholarships, reduction in practice time, and post-season bans. Additionally, this institution is a designated limited-resource institution as defined by the NCAA. The general characteristics of this institution are similar to other limited-resource institutions participating in Division I athletics.

According to data collected from the institution's Office of Institutional Assessment & Research (OIRA), the undergraduate student body demographic is predominantly White.

African Americans account for approximately 28% of students. Fifty-eight percent of undergraduates are female and 42% are male. Retention and graduation rates are significant problems at this institution, and this is particularly true for males and minority students. The six-year graduation rate reported in 2010 was 35%, 32% in 2011, and 29% in 2012. The six-year graduation rate for males is much lower than females at this institution with only 27% of males graduating in six years compared to 42% of females. Thirteen percent of the students who graduated in 2011 attained a bachelor's degree in four years, 28% in five years, and 32% in six years. Eighty-three percent of first time freshman receive financial aid with the average amount of aid reported to be \$5,115. For the 2011 academic year, 48% of students received Pell Grants averaging \$4,835 while 68% of students during the 2011 academic year obtained student loans averaging \$6,570 (IPEDS, 2013).

An analysis reviewing enrollment averages, number of student-athletes on athletic aid, financial aid data, standardized test scores, and graduation rates of student-athletes at 14 other limited-resource institutions, which have been penalized for not meeting APR benchmarks, was conducted to assess the generalizability of this study to other NCAA Division I limited-resource institutions. The following data were obtained from the Integrated Postsecondary Data System (IPEDS, 2013). The estimated total enrollment for the institution where this study was conducted was approximately 9,000 in 2012 for undergraduates and graduates compared to the average estimated total enrollment of 11,000 for the other institutions. The number of student-athletes on athletic aid for the 2011-2012 academic year was 252 compared to the average of 222 for comparative institutions. Sixty-four percent of the students at this institution received federal aid during the 2011-2012 academic year compared to the average of 69% for the other institutions. The average ACT score for the 2011-2012 academic year representing the 25th

percentile was 18 for this institution, which equaled the average of the other institutions; however, the average ACT score for the 75 percentile at this institution was 25 compared to the averages of 22 at the comparable institutions in this analysis. The six-year graduation rate for the 2006 cohort of student-athletes receiving athletic aid at this institution was 56% compared to an average graduation rate for the comparable institutions of 44%. It should be noted that five of the institutions included in this analysis do not field football teams. The number of football student-athletes receiving athletic aid at this institution for the 2011-2012 academic year was 77 compared to an average of 75. The six-year graduation rate for the 2006 cohort of football student-athletes at this institution was 21% compared to an average of 13% at this institutions included in this analysis. The graduation rate for the 2006 cohort of men's basketball student-athletes was 5% compared to an average of 6% for comparable institutions.

The athletic department maintains NCAA Division I membership and fields 16 intercollegiate teams including the following: men's and women's basketball, men's and women's cross country, football, men's and women's golf, men's and women's rifle, softball, women's soccer, men's and women's tennis, men's and women's track and field, and women's volleyball. During the 2012-2013 academic year, 11 of the 16 teams posted team grade point averages above 3.0. Football reported the highest team GPA in recent history at 2.82. This GPA represents an increase in team GPA every semester since the team was first penalized for not meeting minimum APR standards. The men's basketball team was under a post-season ban during the 2012-2013 academic year due to APR penalties resulting from the 2011-2012 academic year. The institution's APR report for 2012-2013 indicated all teams met both single year and multi-year APR benchmarks (NCAA, 2013).

Recently, the NCAA designated this institution a limited-resource institution based on per capita expenditures on athletics, per capita academic expenditures for the general student body and the average amount of Pell Grant funding for all students at the institution (Hosick & Sproull, 2012). Limited resource institutions are now allowed additional time to meet increasing APR demands pending the development and implementation of an academic improvement plan for each team below the 930 benchmark. Unfortunately, this ruling did not help the men's basketball team at this institution escape penalties associated with a four-year APR average below the minimum 925 because the men's basketball team failed to meet conditions of a previous waiver (NCAA, 2013).

Student-athletes at this university are provided academic support services through the academic affairs division of the university. Student-athletes are given priority registration and consideration for individual tutoring; however, tutoring groups may include students who are not student-athletes. Initial assessments of academic skills are given to all student-athletes as part of the academic support services provided for student-athletes. Student-athletes identified as at-risk are provided with individual academic plans. Attendance to tutoring, study hall, academic mentoring, workshops, and other academic support services across campus are monitored using a completely web-based student retention, advising, and tutorial management program. The amount and nature of academic support services is determined by academic support personnel and coaches based on evaluations of student-athlete academic backgrounds, demographic factors, and noncognitive factors as measured by the Learning and Study Strategies Inventory, 2nd Edition (LASSI-II), the institution's student-athlete survey, and the NCAA's Graduation Risk Overview (GRO) metric. Determination of individual student-athlete risk is conducted by the academic support staff in the department of Academic Affairs, not the athletic department.

Sampling Methods

The sample used in this study is from a population accessible to the researcher. Because the researcher is familiar with the institution, the athletics program, and the student-athletes, a convenience sampling method was chosen (Gall et al., 2007). According to Gall, Gall, and Borg (2007), the use of convenience sampling is appropriate for social science research studies. Student-athletes counted in APR calculations for the 2012-2013 academic year who had been assessed with the LASSI-II and had complete academic data available to the researcher (i.e. high school core GPA and standardized test scores) were included in this study. A total of 270 student-athletes were counted in APR calculations for the 2012-2013 academic year, and a total of 210 of those student-athletes had complete academic data available, as well as scores on the LASSI-II. Most of the missing data were from transfer student-athletes without standardized test scores. The student sample included in this study is representative of other students at the institution and student-athletes participating in NCAA Division I athletics. More specifically, the sample is representative of student-athletes attending a limited-resource institution as demonstrated by the institutional analysis reported in the previous section of this chapter.

Data Collection Procedures

All student-athletes deemed eligible to participate in intercollegiate competition during the 2012-2013 academic year were given the LASSI-II as part of the regular assessment program to determine academic support needs for student-athletes at the institution providing a database of learning and study strategy variables. Access to this database was available to the researcher as part of the student-athlete academic support personnel. Additionally, academic data from the NCAA eligibility center was collected on all student-athletes providing data on high school core GPA and standardized test scores for each student-athlete. A concordance table was used to

convert SAT scores to ACT scores (ACT, 2012) to obtain a standardized unit for scores from different standardized tests. Student-athlete demographic data was collected from a student-athlete survey administered to all student-athletes at the beginning of each academic year. All student CGPAs and APR points were collected from the university registrar and the NCAA compliance officer who is responsible for submission of APR score reports. All data was de-identified and coded after collection to ensure complete anonymity of student-athletes included in this study.

Data Analysis

The purpose of this study was to investigate cognitive, learning and study strategy predictors of the academic success of student-athletes as measured by CGPA and APR points earned. Data were analyzed using the SPSS version 21 statistical package. Inferential statistical methods were employed to answer the research questions in this study with the $p < .05$ level of significance used for all analyses. Multiple regression analysis was used to measure the predictive power of cognitive, learning and study strategy factors theorized to influence student-athlete academic success as measured by CGPA. The goal of the multiple regression analysis was to construct a model most predictive of the dependent variable, academic success. Independent t-tests were used to determine whether significant differences existed by gender, generational status or sport type (i.e. revenue or non-revenue). Two teams were identified as revenue producing sports at this institution, football and men's basketball. Logistic regression analysis was used to determine the correlation between the predictor variables and either the loss or retention of APR points. In theory, student-athletes have the potential of earning APR points on a scale of 0-4; however, if a student-athlete does not earn either the eligibility or retention point for the first semester then he or she is no longer eligible for the two remaining APR points

for the next semester. For this reason, the researcher chose to define the APR outcome metric as a dichotomous criterion variable (lost APR points or retained APR points). Therefore, a logistic regression analysis was more appropriate for addressing research questions involving APR points. To extend the analysis, logistic regression was conducted for APR eligibility points (APR-E), as well as APR retention points (APR-R).

Limitations of the Study

This study is limited to student-athletes from a NCAA, Division I limited-resource institution. For this reason, generalizability is limited to similar institutional types. The sample was limited to student-athletes receiving athletic aid because only student-athletes on scholarship are included in APR scores. Another limitation of this study involves the use of a self-reporting instrument, the LASSI-II, as a measure of three of the predictive variables. Additionally, to obtain a sufficient sample size for this study, student-athletes of all classifications (e.g. freshmen and seniors) were included in this study; therefore, examining variance in student-athlete CGPA with respect to classification is not within the scope of this study.

Delimitations of the Study

The selection of independent variables for this study was based on the research suggesting college student-athlete academic success is influenced by noncognitive constructs as well as traditional cognitive constructs. The expectancy-value theory guided the selection of noncognitive constructs related to a student's own beliefs and values with respect to learning and study strategies. The LASSI-II was selected as an instrument because the development of this instrument is based on educational and psychological research and provides measures of ten constructs, which were combined into three composite scales, Skill, Will, and Self-Regulation. The cognitive measures selected as predictor variables, HSGPA and standardized test scores

were chosen because these measures are used by the NCAA to determine the initial eligibility of student-athletes participating in Division I athletics. The demographic and sport variables, gender, first-generational status, and sport type were included in this study because of research suggesting the presence of significant differences among these groups in college graduation rates, CGPA, and APR scores.

The sample included only student-athletes from a limited-resource institution. The decision to study student-athlete academic success and APR scores at a limited-resource institution is based on the research, which reveals NCAA, Division I limited-resource institutions are penalized for not meeting APR benchmarks at significantly higher rates than other NCAA, Division I institutions. The sample also only includes student-athletes on scholarship because of the need to investigate the power of predictor variables on APR points. APR is treated as a dichotomous variable. Because of the need for institutions to determine which student-athletes are most at-risk of losing APR points, it is appropriate to treat APR as a dichotomous variable with student-athletes identified as either having lost or retained the respective APR point. It was also decided to investigate whether or not differences exist in the loss or retention of APR eligibility points and APR retention points. This investigation is based on research suggesting the two components of APR points may, in fact, be measuring different constructs other than academic success.

CHAPTER IV:
PRESENTATION OF THE DATA

Introduction

The purpose of this study was to investigate the variables or combination of variables that significantly influence the academic success of student-athletes participating in NCAA, Division I intercollegiate athletics at a limited-resource institution. Additionally, this study sought to add to the knowledge of APR as an academic success metric, as well as to extend the range of predictor variables beyond traditional cognitive factors such as high school grade point averages (HSGPA) and standardized test scores. This study examined the contribution of learning and study strategy variables to the prediction of student-athlete academic success as measured by cumulative grade point averages (CGPA) and investigated variables expected to predict which student-athletes would lose APR points for academic eligibility or retention. Because the research literature suggests differences in factors impacting the academic success of certain subgroups of student-athletes, data analyses of independent variables included an examination of differences between male and female student-athletes, first-generation and non-first-generation students, and between student-athletes participating in revenue and non-revenue sports.

Data presented in this chapter represent results from descriptive statistical analysis, multiple regression analysis, independent t-tests, and logistic regression analysis for the purpose of determining the best predictive model of student-athlete academic success. The data are organized and presented in three sections: 1) reliability analysis of the Learning and Study Strategies Inventory, 2nd Edition (LASSI-II) for the sample and variables included in this study

including the consolidated variables of Skill, Will, and Self-Regulation; 2) descriptive statistics on the selected student sample; 3) inferential statistics used to answer research questions as outlined in chapter three.

Pre-Analysis

Reliability Analysis

To narrow the scope of this analysis, the ten scales of the LASSI-II were combined into three composite scales: Skill, Will, and Self-Regulation. Reliability analysis was conducted on the ten scales and three composite scales of the LASSI-II to ensure internal consistency of results. The 80 items of the LASSI-II measure student beliefs about the areas of learning and study strategies, which the authors suggest can be combined to measure components of Skill, Will, and Self-Regulation. Reliability coefficients are provided in the LASSI-II manual for the ten scales of the inventory ranging from .73 to .89; however, reliability coefficients are not provided in the manual for a combination of the scales, which make up the constructs of skill, will, and self-regulation. For this reason, the items from each of the scales were combined according to how the authors divided the ten scales into the three constructs. The following section details results of the reliability analysis for each composite scale.

Skill composite scale analysis. There are 24 items included as part of the Skill composite scale with alphas ranging from .89 to .90. Items from the Information Processing, Selecting Main Idea, and Test Strategies scales comprise the Skill composite scale. These items measure student beliefs regarding specific learning strategies and current academic functioning with respect to skills and thought processes believed to help students identify, acquire, and construct meaning for new information, ideas, and procedures.

Cronbach's coefficient alpha for the Skill composite scale was computed to be .90 indicating strong internal consistency for items included in the scale. Reliability coefficients for the items included in the Skill composite scale were very high ranging from .89 to .90; therefore, removing any of these items would not improve the overall internal consistency of the scale. All items were retained for the measurement of the Skill component and in data analyses of this variable as a predictor of the academic success of student-athletes. Table 2 provides descriptions for each item and computed alphas for the Skill composite scale if the item was deleted.

Table 2

Cronbach's Coefficient Alphas for Skill Composite Scale

Skill	Description	Alpha if item deleted
Item 2	I am unable to summarize what I have just heard in lecture or read in a textbook.	.90
Item 3	I try to find relationships between what I am learning and what I already know.	.90
Item 10	During class discussions, I have trouble figuring out what is important enough to put in my notes.	.90
Item 11	To help me remember new principles we are learning in class, I practice applying them.	.90
Item 15	When I am studying a topic, I try to make everything fit together logically.	.89
Item 19	When I take a test, I realize I have studied the wrong material.	.90
Item 21	I have difficulty identifying the important points in my reading.	.90
Item 23	To help me learn the material presented in my classes, I relate it to my own general knowledge.	.90
Item 24	There are so many details in my textbooks that it is difficult for me to find the main ideas.	.89
Item 26	I have difficulty adapting my studying to different types of courses.	.89
Item 27	I translate what I am studying into my own words.	.90
Item 38	When I study for a test, I have trouble figuring out just what to do to learn the material.	.89
Item 44	I try to see how what I am studying would apply to my everyday life.	.90
Item 45	I have trouble understanding exactly what a test question is asking.	.89

Item 50	I try to relate what I am studying to my own experiences	.90
Item 52	I review my answers during essay tests to make sure I have made and supported my main points.	.90
Item 53	When studying, I seem to get lost in the details and miss the important information.	.89
Item 57	It is hard for me to decide what is important to underline in a text.	.89
Item 58	To help me learn the material in a course, I make up possible test questions and try to answer them.	.90
Item 63	I do poorly on tests because I find it hard to plan my work within a short period of time.	.89
Item 64	During a demonstration in class, I can identify the important information I need to remember.	.90
Item 68	When I listen to class lectures, I am able to pick out the important information	.89
Item 73	When completing a problem-solving task, it is difficult for me to pick out the important information	.89
<hr/>		
α Skill Composite		.90

Will composite scale analysis. There are 24 items included in the Will composite scale used in this study. Items selected for inclusion in the Will composite scale were obtained from the Anxiety, Attitude, and Motivation scales of the LASSI-II. The items for this scale measure beliefs and attitudes toward learning, willingness to exert effort to complete academic tasks, interest in college, and the level of anxiety students have regarding academic performance. The Will component of the LASSI-II also measures the student's perspective with regard to diligence, self-discipline, and receptivity to learning new information.

The Cronbach's reliability alpha for the Will composite scale was computed to be .89 indicating strong internal consistency. Reliability coefficients for all items were high ranging from .88 to .90; therefore, removing any of these items would not improve the overall internal consistency of the scale. Item analysis was conducted as each item was added into the scale.

Table 3 provides descriptions for each item and computed alphas for the Will composite scale if the item was deleted.

Table 3

Cronbach's Coefficient Alphas for Will Composite Scale

Will	Description	Alpha if item deleted
Item 6	I am able to study subjects I do not find interesting.	.89
Item 14	I set high standards for myself in school.	.90
Item 17	I only study the subjects I like.	.89
Item 22	When work is difficult, I either give up or study only the easy parts.	.88
Item 29	I get discouraged because of low grades.	.89
Item 30	Even if I am having difficulty in a course, I can motivate myself to complete the work.	.89
Item 35	I feel very panicky when I take an important test.	.89
Item 36	I have a positive attitude about attending my classes.	.88
Item 39	Even if I do not like an assignment, I am able to get myself to work on it.	.88
Item 41	Would rather not be in school.	.88
Item 42	I set goals for the grades I want to get in my classes.	.88
Item 43	I am taking a test, worrying about doing poorly interferes with my concentration.	.88
Item 46	I worry that I will flunk out of school.	.88
Item 48	I do not care about getting a general education; I just want to get a good job.	.89
Item 51	I dislike most of the work in my classes.	.89
Item 56	Even when I don't like a course, I work hard to get a good grade.	.88
Item 61	Even when I am well prepared for a test, I feel very anxious.	.89
Item 65	I am up-to-date in my class assignments.	.88
Item 69	When I am studying, worrying about doing poorly in a course interferes with my concentration.	.88
Item 70	I do not care if I finish college as long as I have a good time.	.89
Item 72	Courses in certain subjects, such as math, science, or a foreign language, make me anxious.	.89
Item 76	In my opinion, what is taught in my courses is not worth learning.	.88

Item 78	I get so nervous and confused when taking an examination that I fail to answer questions to the best of my ability.	.88
Item 80	Even when study materials are dull and uninteresting, I manage to keep working until I finish.	.88
α Will Composite		.89

Self-Regulation composite scale analysis. Thirty-two items from the Concentration, Study Aids, Self-Testing, and Time Management scales of the LASSI-II were included in the Self-Regulation composite scales for this analysis. As explained in chapter two, self-regulation is one of the learning and study strategy variables that has been found to be positively correlated with the academic success of college students. The 32 items included in the LASSI-II Self-Regulation composite scale measure student perceptions of their ability to self-regulate behavior with regard to the whole learning process and perceptions of how they expect to perform on certain academic tasks. Further, students report on their abilities to maintain focus and concentration on academic tasks, and on their ability to employ a range of meta-cognitive processes for the purpose of managing learning demands. Several items ask students to evaluate their willingness to use of study supports within the academic context of college.

The Cronbach's reliability coefficient for the Self-Regulation composite scale was computed to be .93 using all 32 items from the subscales as indicated previously. Scores each of these subscales were combined to create the new scale. These results indicate strong internal consistency with all items used for this scale. Reliability coefficients for all these items were high with all reliability coefficients above .92. For this reason, all items included in this scale were retained for the measurement of the Self-Regulation component and in data analyses of this variable as a predictor of the academic success of student-athletes. Item analysis was conducted as each item was added to the scale. From this analysis, it was concluded that removing any of

these items would not improve the overall internal consistency of the scale. Table 4 summarizes these results.

Table 4

Cronbach's Coefficient Alphas for Self-Regulation Composite Scale

Self-Regulation	Description	Alpha if item deleted
Item 1	I concentrate fully when studying.	.93
Item 4	I find it hard to stick to a study schedule.	.93
Item 7	When I decide to study, I set aside a specific length of time and stick to it.	.92
Item 8	Because I don't listen carefully, I don't understand some course material.	.93
Item 9	I try to identify potential test questions when reviewing my class material.	.93
Item 12	My underlining is helpful when I review test material.	.93
Item 13	When it comes to studying, procrastination is a problem for me.	.93
Item 16	Find it difficult to maintain concentration while doing my coursework.	.93
Item 18	When preparing for an exam, I create questions that I think might be included on the exam.	.92
Item 20	If there is a web site for my textbook, I use the information provided there to help me learn the material.	.92
Item 25	I review my notes before the next class.	.93
Item 28	I put off studying more than I should.	.93
Item 31	I spread out my study times so I do not have to "cram" for a test.	.92
Item 32	My mind wanders a lot when I study.	.93
Item 33	I stop periodically while reading and mentally go over or review what was said.	.93
Item 34	I go to the college learning center for help when I am having difficulty learning the material for a course.	.93
Item 37	I test myself to see if I understand what I am studying.	.93
Item 40	When they are available, I attend review sessions for my classes.	.93
Item 47	To help make sure I understand the material, I review my notes before the next class.	.93
Item 49	I find it hard to pay attention during lectures.	.93
Item 54	I use special study helps, such as italics and headings, which are in my textbook.	.93
Item 55	I am very easily distracted from my studies.	.92

Item 59	I do not have enough time to study because I spend too much time with my friends.	.92
Item 60	To check my understanding of the material in a course, I make up possible test questions and try to answer them	.93
Item 62	I set aside more time to study the subjects that are difficult for me.	.93
Item 66	When I am having trouble with my coursework, I do not go to the instructor for help.	.93
Item 67	I end up “cramming” for every test.	.92
Item 71	I try to find a study partner or study group for each of my classes.	.93
Item 74	After a class, I review my notes to help me understand the material that was presented.	.93
Item 75	If I get distracted during class, I am able to refocus my attention.	.93
Item 77	If I am having trouble studying, I ask another student or the instructor for help.	.93
Item 79	I find that during lectures I think of other things and don’t really listen to what is being said.	.92
α Self-Regulation Composite		.93

Analysis of the composite scales and items on the LASSI-II used to measure the constructs of Skill, Will and Self-Regulation suggests reliable and consistent results from the administration of this instrument with the population sample of student-athletes included in this study. In fact, stronger reliability coefficients were obtained for the Skill, Will, and Self-Regulation composite scales than the reliability coefficients calculated for the separate subscales of Anxiety, Attention, Attitude, Concentration, Information Processing, Motivation, Selecting Main Idea, Study Aids, Test Strategies, and Time Management. Therefore, scores on the new composite scales of Skill, Will, and Self-Regulation were used as predictor or explanatory variables in this study for all analyses measuring the contribution of learning and study strategy variables to the prediction of academic success as measured by CGPA, as well as the loss or retention of APR points.

Sample Characteristics

This study included 210 student-athletes participating in NCAA, Division I intercollegiate athletics at a limited-resource institution in the South Eastern region of the United States. Because this study also investigates APR as a criterion variable, only student-athletes included in the institution's APR cohort were included in this study. A total of 270 student-athletes received athletic aid at this institution during the 2012-2013 academic year; therefore, these student-athletes were included as potential participants in the study. There were 119 female student-athletes and 155 male student-athletes included in the APR cohort. A total of 64 of the athletes from this APR cohort were eliminated from the study because complete data could not be obtained on these student-athletes or the student-athlete was considered a minor. However, only two of the student-athletes who lost APR points were excluded from the study because these students were transfer student-athletes who did not have standardized test scores.

Three categorical variables were included in research questions involving group differences. Therefore, sample characteristics specific to the categorical variables of gender, generational status (i.e. first-generation or non-first-generation), and sport type (i.e. revenue or non-revenue) are provided in the following tables. Table 5 displays frequencies and percentages of student-athletes included in the sample within each category. A total of 114 male student-athletes and 96 female student-athletes, 54% and 46% respectively, were included in this study. There are more male student-athletes receiving athletic aid at this institution; therefore, the slightly higher percentage of males included in the study is representative of the demographic composition of student-athletes on scholarship. Of the student-athletes included in the sample, 111 student-athletes identified as first-generation student-athletes and 99 student-athletes identified as non-first-generation student athletes. First-generation status is defined as neither

parent nor guardian having graduated from college with a bachelor's degree (U.S. Dept. of Education, 1996). Ninety-seven student-athletes participating in the revenue producing sports of men's basketball and football and 113 student-athletes participating in non-revenue producing sports were included in the sample.

Table 5

Frequency and Percent of Student-Athletes in Sample by Category

	GENDER		GENERATIONAL STATUS		SPORT TYPE	
	<i>Male</i>	<i>Female</i>	<i>1st gen.</i>	<i>Non 1st gen.</i>	<i>Revenue</i>	<i>Non-Revenue</i>
Frequency	114	96	111	99	97	113
Percent	54%	46%	53%	47%	46%	54%

Descriptive Statistics

Composite ACT scores or SAT equivalent scores as converted by the ACT 2013 Concordance Table (ACT, 2013), HSGPA, Skill, Will, and Self-Regulation were considered continuous variables in this investigation. The average ACT score was 20.0 with a range of 12 to 28 and standard deviation of 3.16. The average HSGPA was 3.06 with a range of 1.65 to 4.00 and standard deviation of 0.56. The HSGPA represents the GPA calculated by the NCAA for 16 high school core courses required for determination of initial academic eligibility. The average score on the Skill composite scale was 83.6 with a range of 32 to 116 and a standard deviation of 13.49. The average score on the Will composite scale was 87.8 with a range of 36 to 120 and a standard deviation of 14.06. The average score on the Self-Regulation composite scale was 100.6 with a range of 46 to 152 and a standard deviation of 20.11. The average CGPA for this

sample of student-athletes was 3.05 with a range of 1.75 to 4.00 and a standard deviation of 0.60.

Table 6 illustrates the means and standard deviations for the total sample for each of the predictor variables and the criterion variable of CGPA.

Table 6

Psychometric Properties of Predictor Variables and Cumulative Grade Point Average

Variable	Range		Mean	SD	Skew	Kurtosis
	Minimum	Maximum				
HSGPA	1.65	4.00	3.06	0.56	0.393	-0.148
TEST	12	28	20.0	3.16	-0.033	-0.800
SKILL	32	116	83.6	13.49	-0.412	0.625
WILL	36	120	87.8	14.06	-0.601	0.995
SELF-REG.	46	152	100.6	20.11	-0.066	0.002
CGPA	1.75	4.00	3.05	0.60	-0.156	-1.036

Research Questions

Research Question 1

Taken in combination, to what degree do demographic, sport, cognitive, learning and study strategy variables predict student-athlete academic success as measured by CGPA?

A stepwise multiple regression analysis was conducted to provide a measure of the correlations between variables used in this study, to determine the level of significance in the relationship between variable, and to examine the parameters of a predictive model for student-athlete academic success as measured by CGPA. The stepwise method was used as the means of analysis for this research question in order to find a linear combination of predictor variables that correlated most significantly with the criterion variable (Field, 2005). All predictor variables

were entered into the regression analysis. Table 7 provides correlations of all predictor variables and the criterion variable, CGPA.

Table 7

Pearson Correlations for all Predictor Variables and Cumulative Grade Point Average

	CGPA	HSGPA	TEST	SKILL	WILL	SELF-REG.	GENDER	FAMILY	SPORT
CGPA	---	.68	.66	.35	.37	.25	-.33	-.57	-.31
HSGPA		---	.59	.37	.32	.25	-.27	-.59	-.26
TEST			---	.33	.27	.13	-.21	-.58	-.25
SKILL				---	.75	.70	-.10	-.26	-.10
WILL					---	.68	.01	-.22	-.01
SELF-REG						---	-.09	-.07	-.07
GENDER							---	.23	.83
FAMILY								---	.26
SPORT									---

The stepwise regression was conducted by entering all cognitive, learning and study strategy variables into block 1 and entering categorical variables in block 2. The stepwise process constructs models by adding predictor variables with significant correlations through a stepwise process beginning with the predictor variable with the strongest relationship to the criterion variable, CGPA. The stepwise criteria for inclusion in the predictive model was determined to be $p < .05$. The alpha level for removal was $p \geq .10$. In step 1 of the analysis, HSGPA was entered into the equation and was significantly related to the criterion variable, CGPA, $F(1, 208) = 175.14, p < .001$. In model 1, HSGPA explained 46% of the variance of

CGPA, Adjusted $R^2 = .455$. Model 2 explained significantly more of the variance of student-athlete CGPA, R^2 change = .106, $F(2, 207) = 50.07$, $p < .001$. Model 2 explained 56% of the variance in CGPA, Adjusted $R^2 = .559$. Model 3 included the Will component of the LASSI-II in the equation explaining an additional 1.6% of the variance and this increase was significant (R^2 change = .016, $F(3, 206) = 7.60$, $p < .006$. Model 3 explained 57% of the variance in CGPA with HSGPA computed to be the strongest predictor variable ($\beta = .407$). The Test variable was the second strongest predictor variable in this model ($\beta = .386$). The only learning and study strategy variable found to significantly predict the CGPA of student-athletes was the Will variable ($\beta = .132$). The resulting formula from Model 3 for student-athlete academic success ($CGPA = -.236 + (.437 * HSGPA) + (.073 * Test) + (.006 * Will)$) utilizing cognitive, learning and study strategy predictor variables was found to be significant, $R^2 = .57$; $F(3, 206) = 94.2$, $p < .001$, with HSGPA, Test, and Will variables explaining 57% of the variance in CGPA. Table 8 provides results of the regressions and relevant statistics.

Table 8

Coefficients^a - Degrees of Influence of Cognitive, Learning & Study Strategy Variables on CGPA

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	.830	.171		4.868	.000		
HSGPA	.726	.055	.676	13.23	.000***	1.00	1.00
2 (Constant)	.087	.186		0.466	.640		
HSGPA	.471	.061	.439	7.706	.000***	.652	1.53
TEST	.076	.011	.403	7.076	.000***	.652	1.53
3 (Constant)	-.236	.217		-1.087	.278		
HSGPA	.437	.061	.407	7.106	.000***	.625	1.60
TEST	.073	.011	.386	6.844	.000***	.644	1.55
WILL	.006	.002	.132	2.757	.006**	.888	1.13

Note: a. Dependent Variable: Cumulative GPA

* $p < .05$, ** $p < .01$, *** $p < .001$

Two demographic variables contributed significantly to the prediction of the criterion variable, CGPA, in Model 4 and Model 5. In Model 4, gender was entered into the equation and explained an additional 2.3% of the variance, and this increase was significant, R^2 change = .023, $F(4, 205) = 11.92, p < .001$. In Model 5, family was entered into the equation and explained another 1% of the variance, R^2 change = .009, $F(1, 204) = 4.659, p < .001$. Skill and Self-Regulation were included in the analysis but excluded from the models because they did not contribute significantly to the prediction of CGPA. Additionally, the sport variable was not found to significantly contribute to the prediction of the criterion variable. The resulting formula from the stepwise regression analysis including all predictor variables predicting student-athlete academic success ($CGPA = .382 + (.346*HSGPA) + (.062*Test) + (.006*Will) + (-.182*Gender) + (-.149*Family)$) explained approximately 60% of the variance in CGPA (Adjusted $R^2 = .601$) and was significant $F(5,204), = 63.94, p < .001$. Table 9 provides results of the regressions of CGPA on all predictor variables included Model 4 and Model 5.

Table 9

Coefficients^a - Degrees of Influence of Predictor Variables on CGPA

Model	Variables	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	<i>Sig.</i>
		B	Std. Error	Beta		
4	(Constant)	-.013	.221		-0.06	.952
	HSGPA	.395	.061	.368	6.46	.000***
	TEST	.070	.010	.370	6.72	.000***
	WILL	.006	.002	.150	3.19	.002**
	GENDER	-.190	.055	-.159	-3.45	.001**
5	(Constant)	.382	.286		1.34	.183
	HSGPA	.346	.065	.322	5.34	.000***
	TEST	.062	.011	.327	5.61	.000***
	WILL	.006	.002	.148	3.18	.002**
	GENDER	-.182	.055	-.152	-3.33	.001**
	FAMILY	-.149	.069	-.125	-2.16	.032*

Note: a. Dependent Variable: Cumulative GPA

* $p < .05$, ** $p < .01$, *** $p < .001$.

Research question one specifically asked how cognitive, learning and study strategy variables contributed to the prediction of CGPA. The stepwise regression found three cognitive, learning and study strategy variables, HSGPA, standardized test scores, and the Will composite scale of the LASSI-II predictive of CGPA with the final model explaining 57% of the variance in CGPA for the student-athletes in this sample. However, research also suggested gender, generational status, and sport type also influence student-athlete academic success. For that reason, the stepwise multiple regression analysis was conducted in two steps. The first block included all cognitive, learning and study strategy variables as possible predictors, and the second block added gender, generational status, and sport type into the regression analysis. Stepwise regression was conducted with all of these predictor variables and yielded a model predictive of over 60% of the variance in CGPA. Table 10 provides a summary of each step in the regression analysis and the resulting models along with associated change statistics.

Table 10

Stepwise Multiple Regression Model Summary

Model	R	R ²	Adjusted R ²	Std. Error	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.676	.457	.455	.440	.457	175.14	1	208	.000
2	.750	.563	.559	.396	.106	50.07	1	207	.000
3	.761	.578	.572	.390	.016	7.60	1	206	.006
4	.776	.602	.594	.380	.023	11.92	1	205	.001
5	.781	.610	.601	.377	.009	4.66	1	204	.032

At the $\alpha = 0.05$ level of significance there is enough evidence to conclude that the cognitive variables of HSGPA, Test, and the Will composite scale on the LASSI-II are useful as

predictors of CGPA for student-athletes. The predictor variables of Skill and Self-Regulation scores did not significantly contribute to the model. Additionally, demographic variables of gender and family contributed to the model. Both demographic variables were inversely related to the criterion variable, CGPA. Female student-athletes were coded as 0 and male student-athletes were coded as 1; therefore, the inverse relationship indicates being male is predictive of lower CGPAs. Non-first-generation student-athletes were coded as 0 and first generation student-athletes were coded as 1; therefore, the inverse relationship indicates being a first generation student-athlete is predictive of lower CGPAs.

Results indicate both cognitive variables of HSGPA and Test are positively and significantly correlated with the criterion variable, CGPA, indicating student-athletes with higher scores on these variables tend to higher CGPAs. Although both the Skill and Self-Regulation composite scales were positively and significantly related to CGPA, the Will composite scale was the only learning and study strategy variable that contributed to the overall model. Table 10 illustrates the degree of influence each predictor variable included in the models had on the criterion variable, CGPA.

Research Question 2

Are there significant differences in variables that predict student-athlete academic success as measured by CGPA for male student-athletes as compared to female student-athletes?

Independent t-tests were conducted to compare the means of male and female student-athletes for the cognitive predictor variables of HSGPA, Test, and the learning and study strategy variables of Skill, Will, and Self-Regulation. For differences found to be statistically significant, Cohen's D effect size calculations were conducted. Cohen's D is a generally accepted statistical calculation to determine whether a statistically significant difference can also be considered

meaningful (Hemphill, 2003). The difference between the predictor variable of HSGPA for male ($M = 2.92$, $SD = 0.54$) and female ($M = 3.22$, $SD = 0.53$) student-athletes was found to be statistically significant, $t(208) = 3.98$, $p < .001$, $d = 0.55$ with female student-athletes having significantly higher high school grade point averages than male student-athletes. The effect size for this analysis ($d = 0.55$) exceeded Cohen's (1988) convention for a medium meaningful effect size ($d = 0.50$). The difference between the predictor variable of Test for male ($M = 19.4$, $SD = 3.21$) and female ($M = 20.7$, $SD = 2.94$) student-athletes was also found to be statistically significant, $t(208) = 3.10$, $p = .002$, $d = 0.43$ with female student-athletes having significantly higher standardized test scores than male student-athletes. The effect size for this analysis ($d = 0.43$) is interpreted as a small meaningful effect.

Scores on the Skill scale for males ($M = 82.4$, $SD = 12.9$) and females ($M = 85.1$, $SD = 14.1$) were not significantly different, $t(208) = 1.46$, $p = .15$. Differences on the Will scale for males ($M = 87.9$, $SD = 13.7$) and females ($M = 87.7$, $SD = 14.5$) were also not significant, $t(208) = 0.10$, $p = .92$. Similarly, scores on the Self-Regulation scale for males ($M = 87.9$, $SD = 13.7$) and females ($M = 87.9$, $SD = 13.7$) were not significant, $t(208) = 1.34$, $p = .18$. Differences between males ($M = 2.87$, $SD = 0.55$) and females ($M = 3.27$, $SD = 0.58$) for CGPA, were significant, $t(208) = 5.10$, $p < 0.001$, $d = 0.65$ with female student-athletes having significantly higher CGPAs than male student-athletes. Table 11 illustrates results of the independent t-tests for all predictor variables by gender, as well as effect size calculations for variables found to have statistically significant differences at the .05 level of significance. It should be noted that scores lower than 50th percentile on the LASSI-II indicate a need for remediation or intervention for specific skills assessed. Gender differences on all three composite scales of the LASSI-II were not found to be statistically significant.

Table 11

Means and Standard Deviations of Predictor Variables by Gender

Variable N (%)	Overall		Female		Male		Effect Size	Sig. (2-tail)
	Mean	SD	M _f	SD	M _m	SD		
HSGPA	3.06	0.56	3.22	0.53	2.92	0.54	0.55	.000***
TEST	20.0	3.16	20.7	2.94	19.4	3.21	0.43	.002**
SKILL	83.6	13.5	85.1	14.1	82.4	12.9	---	.147
WILL	87.5	13.9	87.1	14.1	87.9	13.7	---	.683
SELF-REG.	100.6	20.1	102.6	20.9	98.9	19.4	---	.180
CGPA	3.05	0.60	3.25	0.62	2.87	0.55	0.65	.000***

Note. HSGPA = high school grade point average. Test = standardized test scores. Skill = skill composite score on LASSI-II. Will = will composite score on LASSI-II. Self-Reg. = self-regulation composite score on LASSI-II. CGPA = cumulative grade point average. Effect size computed as $(M_f - M_m) / \sigma_{\text{overall}}$.

* $p < .05$, ** $p < .01$, *** $p < .001$

Research Question 3

Are there significant differences in variables that predict student-athlete academic success as measured by CGPA for first-generation student-athletes as compared to non-first generation student-athletes?

Independent t-tests were conducted to compare the means of first-generation and non-first-generation student-athletes for the cognitive predictor variables of HSGPA, Test, learning and study strategy variables of Skill, Will, and Self-Regulation. For differences found to be statistically significant, Cohen's D effect size calculations were conducted. First-generation student-athletes scored lower on all predictor variables and the criterion variable, CGPA. Statistically significant differences were found between first-generation and non-first-generation student-athletes for the predictor variables of HSGPA, Test, Skill, and Will. Effect size calculations for the cognitive variables of HSGPA and Test were found to be large, and effect size calculations for the learning and study strategy variables of Skill and Will were also found to

be large. The difference between the means of first-generation and non-first-generation student-athletes on CGPA was also found to be statistically significant. The effect size calculation for this difference was found to be large according to Cohen's (1988) convention for a large effect size.

The difference between mean HSGPAs for first-generation ($M = 2.74$, $SD = 0.47$) and non-first-generation ($M = 3.40$, $SD = 0.43$) student-athletes was found to be statistically significant, $t(208) = 10.5$, $p < .001$, $d = 1.46$ with non-first-generation student-athletes having significantly higher high school grade point averages than first-generation student-athletes. The effect size for this analysis ($d = 1.46$) exceeded Cohen's (1988) convention for a large effect size. Scores on standardized tests were significantly higher for non-first-generation ($M = 21.9$, $SD = 2.82$) than the scores of first-generation ($M = 18.3$, $SD = 2.34$) student-athletes, and this difference was found to be statistically significant, $t(191) = 10.13$, $p < .001$, $d = 1.40$. Levene's test showed unequal variances ($F = 6.26$, $p = .013$); therefore, degrees of freedom were adjusted accordingly from 208 to 191. All subsequent statistics were adjusted given this violation. The effect size for this analysis ($d = 1.40$) was large according to Cohen's convention. The difference between the means of scores on the Skill scale of the LASSI-II for first-generation ($M = 80.3$, $SD = 14.4$) and non-first-generation ($M = 87.4$, $SD = 11.4$) student-athletes was found to be statistically significant, $t(208) = 3.94$, $p < .001$, $d = 1.05$. The effect size for this analysis ($d = 1.06$) was also large. The difference between the means of scores on the Will scale of the LASSI-II was also found to be statistically significant, $t(198) = 3.36$, $p = .001$, $d = 0.97$. The effect size calculation in this analysis ($d = 0.97$) is also considered a large, meaningful effect according to Cohen's convention. Higher scores on the LASSI-II scales indicate areas in which the student generally does not need intervention efforts or remediation

Levene's test was violated in this analysis indicating unequal variances ($F = 6.98, p = .009$). For this reason, the degrees of freedom were adjusted from 208 to 198. All statistics from this analysis were adjusted to account for the unequal variance and used to determine statistical significance. The difference between mean scores on the Self-Regulation scale of the LASSI-II for first-generation ($M = 99.30, SD = 20.87$) and non-first generation ($M = 102.01, SD = 19.23$) student-athletes was not found to be statistically significant, $t(208) = 0.98, p = .330$; therefore, effect size was not calculated. The difference between the means of first-generation ($M = 2.73, SD = 0.52$) student-athletes and non-first-generation ($M = 3.41, SD = 0.46$) student-athletes for CGPA was found to be statistically significant $t(208) = 10.05, p < .000, d = 1.39$. Table 12 provides means and standard deviations for all predictor variables by generational status, as well as effect size calculations for variables with significant differences.

Table 12

Means and Standard Deviations of Predictor Variables by Generational Status

Variable	Overall 210		First- Generation 111 (52.4%)		Non-First- Generation 99 (47.1%)		Effect Size	Sig. (2-tail)
	Mean	SD	M_f	SD	M_n	SD		
HSGPA	3.06	0.56	2.75	0.47	3.40	0.42	1.46	.000***
TEST	20.0	3.16	18.3	2.34	21.9	2.82	1.41	.000***
SKILL	83.6	13.48	80.3	14.4	87.4	11.4	1.06	.000***
WILL	87.5	13.86	84.8	15.7	91.1	11.1	0.98	.001**
SELF-REG.	100.6	20.11	99.3	20.9	102	19.2	---	.330
CGPA	3.05	0.60	2.73	0.52	3.410	0.46	1.39	.000***

Note. HSGPA = high school core grade point average. Test = standardized test scores. Skill = skill score on LASSI-II. Will = will score on LASSI-II. SELF-REG. = self-regulation score on LASSI-II. CGPA = cumulative grade point average. Effect size computed as $(M_f - M_n) / \sigma_{\text{overall}}$. * $p < .05$, ** $p < .01$, *** $p < .001$.

Research Question 4

Are there significant differences in variables that predict student-athlete academic success as measured by CGPA for student-athletes participating in revenue or non-revenue sports?

Independent t-tests were conducted to compare the means of student-athletes participating in revenue and non-revenue sports on the predictor variables of HSGPA, standardized test scores, as well as the learning and study strategy variables of Skill, Will, and Self-Regulation. Football and men's basketball are considered revenue producing sports at this institution. All other sports are considered non-revenue producing sports. This distinction is consistent with how other institutions define revenue and non-revenue producing sports. As mentioned previously, student-athletes participating in revenue producing sports tend to have lower GPAs, and APR penalties are assessed to revenue producing teams at a much higher rate than non-revenue producing sports.

The difference between the means of the predictor variable of HSGPA for student-athletes participating in revenue sports ($M = 2.90$, $SD = 0.54$) compared to student-athletes participating in non-revenue sports ($M = 3.19$, $SD = 0.53$) was found to be statistically significant, $t(208) = 3.90$, $p < .001$, $d = 1.46$ with student-athletes participating in non-revenue producing sports having significantly higher high school grade point averages than first-generation student-athletes. The effect size calculation for this analysis ($d = 0.54$) is interpreted as a medium effect size. The difference between the means of the predictor variable of TEST for revenue ($M = 19.16$, $SD = 3.01$) and non-revenue ($M = 20.75$, $SD = 3.11$) student-athletes was also found to be statistically significant, $t(208) = 3.75$, $p < .001$, $d = 0.55$ with non-revenue student-athletes having significantly higher standardized test scores than revenue student-athletes. The effect size for this analysis ($d = .55$) is interpreted as a medium effect according to

Cohen's convention. Scores on the Skill scale for revenue ($M = 82.15$, $SD = 12.76$) and non-revenue ($M = 84.92$, $SD = 14.02$) student-athletes was not found to be statistically significant, $t(208) = 1.487$, $p = .139$, $d = 1.05$. Scores on the Will scale for revenue ($M = 87.89$, $SD = 13.44$) and non-revenue ($M = 87.66$, $SD = 14.62$) student-athletes was also not found to be statistically significant, $t(208) = 0.114$, $p = .91$. Similarly, scores for revenue ($M = 99.16$, $SD = 19.26$) and non-revenue ($M = 101.79$, $SD = 20.82$) student-athletes on the Self-Regulation scale were not found to be significantly different, $t(208) = .942$, $p = .347$. The difference between the means of revenue ($M = 2.85$, $SD = 0.55$) and non-revenue ($M = 3.22$, $SD = 0.59$) student-athletes for CGPA was found to be statistically significant $t(208) = 4.72$, $p < .001$, $d = 0.66$. Table 13 summarizes these results.

Table 13

Means and Standard Deviations of Predictor Variables by Sport

Variable <i>N (%)</i>	Overall 210		Revenue 97 (46.2%)		Non-Revenue 113 (53.8%)		Effect Size	Significance
	Mean	<i>SD</i>	M_r	<i>SD</i>	M_n	<i>SD</i>		
HSGPA	3.06	0.56	2.902	.5433	3.19	0.53	0.54	.000***
TEST	20.0	3.16	19.16	3.01	20.75	3.107	0.55	.000***
SKILL	83.6	13.5	82.15	12.75	84.92	14.01	---	.139
WILL	87.5	13.9	87.89	13.44	87.66	14.62	---	.709
SELF-REG	100.6	20.11	99.16	19.25	101.8	20.82	---	.347
CGPA	3.05	0.60	2.850	.5463	3.225	0.59	0.66	.000***

Note. HSGPA = high school core grade point average. TEST = standardized test scores. SKILL = skill composite score on LASSI-II. WILL = will composite score on LASSI-II. SELF-REG. = self-regulation composite score on LASSI-II. Effect size computed as $(M_r - M_n) / \sigma_{\text{overall}}$.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Research Question 5

Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR points?

A logistic regression analysis was conducted to investigate the predictive validity of demographic, cognitive, learning and study strategy variables on the loss or retention of APR points for the 2012-2013 APR cohort. The criterion variable, APR, was measured as a dichotomous variable with either APR points retained or lost by individual student-athletes in the 2012-2013 cohort. A total of 28 student-athletes from this cohort lost at least one APR point. Some student-athletes lost both eligibility and retention points; however, for this analysis, student-athletes who lost any APR points were coded as 1 for APR loss and 0 if all APR points were retained. Two student-athletes who lost APR points were excluded from the study for either incomplete academic data or scores from the LASSI-II were not obtained. For the 26 student-athletes included in the study, 20 APR eligibility (APR-E) points were lost and 23 retention points were lost. It should be noted that a total of 48 APR points were lost during the 2012-2013 academic year at this institution; however, three student-athletes who lost points were dual sport participants.

For the purposes of this study, the researcher looked at APR points lost by distinct student-athletes. Of the student-athletes included in the sample, 88% retained all APR points and 12% lost APR points. Of all APR points lost, 54% of the points lost were lost by male student-athletes and 42% were lost by female student-athletes. Of the 144 male student-athletes in the sample, 15 or 13% of males lost at least one APR point. Of the 96 female student-athletes, 11 or 12% lost at least one APR point. Further analysis reveals similar results for APR-E and APR-R points lost by male and female student-athletes. Of all APR-E points lost, 60% of points lost

were lost by male student-athletes and 40% were lost by female student-athletes. Of the 114 male student-athletes, 11% lost at least one APR-E point. Of the female student-athletes, 8% lost at least one APR-E point. Of the male student-athletes, 11% lost an APR-R point, and 10% of female student-athletes lost an APR-R point. The percentage of first-generation student-athletes that lost APR points equaled 21% compared to only 3% of non-first generation student-athletes. For APR-E points, 15% of first-generation student-athletes lost points compared to 3% of non-first-generation student-athletes. This trend continues when comparing APR-R points lost. Of the 111 first-generation student-athletes, 19% lost an APR-R point compared to 2% of the 99 non-first-generation student-athletes who lost APR-R points. The percentage of non-revenue student-athletes that lost APR points totaled 12% compared to 13% of revenue student-athletes. Of the 113 non-revenue student-athletes, 9% lost APR-E points compared to 10% of revenue student-athletes who lost APR-E points. For APR-R points, 11% of non-revenue student-athletes lost APR-R points. This percentage was equal to the 11% of revenue student-athletes who lost APR-R points. Table 14 summarizes these comparisons.

Table 14

Percentage of Student-Athletes within Gender, Generational Status, and Sport Type categories that lost APR points, APR-Eligibility points, and APR-Retention points

	GENDER		GENERATIONAL STATUS		SPORT TYPE	
	Male	Female	1 st gen.	Non-1 st gen.	Revenue	Non-Revenue
APR	13%	12%	21%	3%	13%	12%
APR-E	11%	8%	15%	3%	10%	9%
APR-R	11%	10%	19%	2%	11%	11%

A logistic regression analysis was conducted with APR as the dependent variable, and gender, family (i.e. first-generation or non-first generation), HSGPA, Test, Skill, Will, and Self-Regulation scores used as predictor variables to determine the degree to which demographic, cognitive, learning and study strategy variables aid in the prediction of retention or loss of APR points. The independent variables gender and sport type (i.e. revenue or non-revenue) were strongly correlated, $r^2(210) = .831, p < .001$. Therefore, to avoid a suppressor effect within the regression analysis, the researcher chose to exclude the sport type predictor variable from the equation.

A total of 210 cases were analyzed and the full model was significant, $\chi^2(7, N = 210) = 38.78, p = <.001$. The model accounted for 32 % (Nagelkerke R Square) of the variance in APR points lost or retained. Overall, 88.1% of predictions were accurate using this model; however this percentage represents only a very slight improvement over the null model, which predicted 87.6% of the cases. Additionally, the Hosmer-Lemeshow Goodness of Fit Test (Fagerland & Hosmer, 2012) was found to be significant, $\chi^2(8, N = 210) = 28.65, p < .001$. This statistic suggests the model does not fit the data and does not predict APR point loss better than the null model. Reducing the model to include only the two significant variables, Test and Skill, did not increase the predictive power. In fact, the percentage of cases accurately predicted by the new model decreased to 87.1% compared to null model, which accurately predicted 87.6% of APR points lost. In the reduced model, the Skill composite score no longer significantly predicted APR point loss, and the Test variable increased in predictive power (Wald $\chi^2 = 17.84, p < .001$). These results indicate the model is not useful in predicting APR point loss or retention and is, therefore, rejected.

Analysis of the coefficient values revealed some useful information. Table 15 summarizes these findings. Test was inversely related to APR points lost meaning that as these scores increase the likelihood of losing APR points decreases. The coefficient value for Test ($OR = 0.67$) indicates an increase of one unit is associated with a 33% decrease in the odds of losing APR points, 95% CI [0.525, 0.860]. The coefficient value for the Skill predictor variable ($OR = 1.09$) indicates an increase of one unit is associated with a 9 % increase in the likelihood of losing APR points, 95% CI [1.09, 1.02]. Both the Test variable (Wald $\chi^2 = 9.93$, $p < .002$) and the Skill variable (Wald $\chi^2 = 6.21$, $p < .013$) significantly contributed to the model at the .05 level. The other predictor variables did not meet the .05 level of significance in this analysis.

Table 15

Statistics for Variables Included in the Logistic Regression Model for APR Point Loss

Variable	B	S.E.	Wald	df	p	OR	95% C.I. for OR	
							LL	UL
GENDER	0.398	.515	0.60	1	.439	0.67	0.245	1.840
FAMILY	1.091	.749	2.12	1	.145	2.98	0.686	12.92
TEST	-0.397	.126	9.93	1	.002**	0.67	0.525	0.860
HSGPA	-0.685	.597	1.31	1	.252	0.50	0.156	1.626
SKILL	0.083	.033	6.21	1	.013*	1.09	1.018	1.159
WILL	-0.035	.025	1.99	1	.058	0.97	0.919	1.014
SELF-REG	-0.037	.020	3.45	1	.063	0.96	0.928	1.002

* $p < .05$, ** $p < .01$.

Research Question 6

Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR eligibility (APR-E) points?

A logistic regression analysis was conducted to investigate the predictive validity of demographic, cognitive, learning and study strategy variables on the loss or retention of APR-E

points for the 2012-2013 APR cohort. A total of 20 student-athletes lost at least one APR eligibility point during the 2012-2013 academic year. Two student-athletes who lost APR points were not included in the study; however, neither of those two student-athletes lost APR-E points. Of the student-athletes included in this analysis, 90% retained all possible APR-E points and 10% lost at least one APR-E point.

A logistic regression analysis was conducted with APR-E as the dependent variable, and gender, family (i.e. first-generation or non-first-generation), HSGPA, Test, Skill, Will, and Self-Regulation scores used as predictor variables. A total of 210 cases were analyzed and the full model significantly predicted APR-E point loss, $\chi^2(7, N = 210) = 36.55, p = <.001$. The model explained 34 % (Nagelkerke R Square) of the variance in APR-E points lost or retained. Overall, 91% of predictions were accurate using this model; however this percentage represents no improvement over the null model, which also predicted 91% of the cases. Additionally, the Hosmer-Lemeshow Goodness of Fit Test was found to be significant, $\chi^2(8, N = 210) = 28.65, p < .001$, meaning the model does not predict APR-E point loss better than the null model. Reduction of the model which included four predictor variables (Test, HSGPA, Skill, & Self-Regulation) found to have significant correlations with APR-E point loss in the original model only slightly improved the predictions of APR-E loss. The reduced model predicted 91.9% of the cases compared to the null model which accurately predicted 90.5% of the cases. Therefore, the model was rejected.

Analysis of the coefficient values does offer some information regarding the predictor variables. The Test variable was inversely related to APR- E points lost meaning that as standardized test scores increases the likelihood of losing APR-E points decreases. The coefficient value for the Test predictor variable ($OR = 0.63$) indicates an increase of one unit is

associated with a 37% decrease in the odds of losing APR-E points, 95% CI [0.48, 0.84]. The coefficient value for the HSGPA predictor variable ($OR = 0.21$) indicates an increase in one unit is associated with a 79% decrease in the odds of losing APR-E points, 95% [0.049, 0.904]. Of the cognitive predictor variables, both the Test variable (Wald $\chi^2 = 9.75$, $p < .002$) and the HSGPA variable (Wald $\chi^2 = 4.39$, $p < .036$) were found to significantly contribute to the prediction of the loss of APR-E points. The coefficient value of the Skill predictor variable ($OR = 1.09$) indicates an increase of one unit is associated with a 9% increase in the likelihood of losing APR-E points, 95% CI [1.01, 1.17]. The coefficient value of the Self-Regulation predictor variable ($OR = 0.95$) indicates a decrease of one unit is associated with a 5% decrease in the likelihood of losing APR-E points. Both the Skill variable (Wald $\chi^2 = 4.39$, $p < .036$) and the Self-Regulation variable (Wald $\chi^2 = 4.39$, $p < .036$) significantly contributed to the prediction of the loss of APR-E points at the .05 level of significance. Table 16 summarizes the findings and provides coefficients, associated degrees of freedom, probability values, and the Wald statistic for each predictor variable included in the model.

Table 16

Statistics for Variables Included in the Logistic Regression Model for APR-Eligibility

Variable	B	S.E.	Wald	df	Sig.	OR	95% C.I. for OR	
							LL	UL
GENDER	-0.38	.585	0.42	1	.515	0.68	0.22	2.15
FAMILY	0.36	.808	0.19	1	.659	1.43	0.29	6.95
TEST	-.456	.138	10.87	1	.001**	0.63	0.48	0.83
HSGPA	-1.56	.712	4.88	1	.027*	0.21	0.05	0.84
SKILL	0.09	.037	5.43	1	.020*	1.09	1.01	1.17
WILL	-0.03	.026	1.63	1	.201	0.97	0.92	1.02
SELF-REG	-0.05	.021	5.24	1	.022*	0.95	0.91	0.99

* $p < .05$, ** $p < .01$.

Research Question 7

Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR retention (APR-R) points?

A logistic regression analysis was conducted to investigate the predictive validity of cognitive, learning and study strategy variables on the loss or retention of APR-R points for the 2012-2013 APR cohort. A total of 23 student-athletes included in the study lost at least one APR-R point during the 2012-2013 academic year. Of the student-athletes included in the sample, 89% retained all APR-R points and 11% lost APR-R points.

To determine the degree to which demographic, cognitive, learning and study strategy variables aid in the prediction of retention or loss of APR-R points, a logistic regression analysis was conducted with APR-R as the dependent variable, and gender, family, HSGPA, Test, Skill, Will, and Self-Regulation scores used as predictor variables. A total of 210 cases were analyzed, and the full model significantly predicted APR-R loss, $\chi^2(7, N = 210) = 33.34, p = <.001$. The model accounted for 29 % (Nagelkerke R Square) of the variance in APR-R points lost or retained. Overall, 90% of predictions were accurate using this model; however this percentage represents only a slight improvement over the null model which predicted 89% of the cases. Additionally, the Hosmer-Lemeshow Goodness of Fit Test was found to be significant, $\chi^2(8, N = 210) = 19.75, p = .011$, meaning the model does not predict APR-R point loss better than the null model. For this reason, the model was rejected. Reduction of the model which included two predictor variables (Test & Skill) found to have significant correlations with APR-R point loss in the original model only slightly improved the predictions of APR-R loss. The reduced model predicted 91.9% of the cases compared to the null model which accurately predicted 90.5% of the cases.

Analysis of coefficient values does offer some useful information. The Test variable was inversely related to APR- R points lost meaning that as standardized test scores increases the likelihood of losing APR-R points decreases. The coefficient value ($OR = 0.723$) for the Test predictor variable indicates an increase of one unit is associated with a 28% decrease in the odds of losing APR-R points, 95% CI [0.56, 0.93]. The Test variable (Wald $\chi^2 = 6.41, p < .011$) was found to significantly contribute to the prediction of the loss of APR-R points. The coefficient value of the Skill predictor variable ($OR = 1.08$) indicates an increase of one unit is associated with an 8 % increase in the likelihood of losing APR-R points, 95% CI [1.01, 1.15]. The Skill variable (Wald $\chi^2 = 5.13, p < .023$) significantly contributed to the prediction of the loss of APR-R points at the .05 level of significance. Table 17 summarizes the findings and provides coefficients, associated degrees of freedom, probability values, and the Wald statistic for each predictor variable included in the model.

Table 17

Statistics for Variables Included in the Logistic Regression Model for APR-Retention

Variable	B	S.E.	Wald	df	Sig.	OR	95% C.I. for OR	
							LL	UL
GENDER	-0.34	.543	0.40	1	.528	0.71	0.25	2.03
FAMILY	1.60	.857	3.46	1	.063	4.93	0.92	26.45
TEST	-0.33	.128	6.41	1	.011	0.72	0.56	0.93
HSGPA	-0.29	.610	0.23	1	.635	0.75	0.23	2.47
SKILL	0.08	.034	5.13	1	.023	1.08	1.01	1.15
WILL	-0.06	.026	3.10	1	.078	0.96	0.91	1.01
SELF-REG	-0.02	.021	1.95	1	.163	0.97	0.93	1.01

* $p < .05$, ** $p < .01$.

Summary

The primary purpose of this investigation was to determine the variables or combination of variables most predictive of student-athlete academic success and the loss or retention of APR points. The study included the traditional cognitive variables currently used by the NCAA for determination of Division I initial eligibility, high school grade point averages and standardized test scores, demographic and sport variables traditionally associated with at-risk college students, and learning and study strategy variables. In keeping with the expectancy-value theory suggesting student beliefs about their ability to succeed academically and the degree to which he or she values learning, self-reported scores from the LASSI-II provided a measure of a student's own attitudes and beliefs regarding his or her learning and study strategy skills. The ten scales of the LASSI-II were combined into three composite scales: Skill, Will, and Self-Regulation. Scale analysis was conducted to determine the reliability coefficients of each of the new composite scales. Finally, each research question guided the determination of specific statistical tests chosen for analysis.

This chapter presented results from the data analyses of each statistical test used to answer the research questions of the study. The stepwise multiple regression analysis conducted to answer research question one showed that both cognitive variables, HSGPA and Test, as well as the Will component of the LASSI-II contributed significantly to the prediction of student-athlete CGPA. Of the demographic variables included in the multiple regression analysis, gender and first-generation predictor variables also significantly contributed to the prediction of student-athlete academic success as measured by CGPA.

Because of research indicating male, first-generation, and revenue student-athletes have lower academic success rates in college and are more likely to lose APR points independent t-

tests were conducted to compare the mean differences of these groups of student-athletes. These analyses were conducted to answer research questions two, three, and four. To answer research question 5, a logistic regression was conducted using APR points lost or retained as a binary outcome. The full model predicting APR point loss was found to be statistically significant with standardized test scores contributing the most to the prediction of APR point loss. The Test variable was inversely related to APR point loss with a one-unit increase in standardized test scores reducing the odds of APR loss by 33%. The full model did not meet the Hosmer-Lemeshow Goodness of Fit test and was, therefore, rejected. A reduced model was conducted to better fit the model to the data, but the reduced model was also found to be inadequately fit to the data.

Previous research suggests variables predictive of APR-E points may be different from variables predictive of APR-R points; therefore, logistic regression analyses were also conducted with APR-E points and APR-R points used as dependent variables in separate analyses. Results of the logistic regression analysis for APR-E point retention or loss indicated Test, HSGPA, Skill, and Self-Regulation variables contributed to the prediction of APR-E point retention or loss. Test, HSGPA, and Self-Regulation scores were inversely related to APR-E point loss meaning that as these scores increase the likelihood of losing APR-E points decreases. Results of the logistic regression analysis for APR-R points indicated the only statistically significant predictors of APR-R points in the model were Test and Skill. Again, the full model failed to provide a good fit to the data. The same results were found with the reduced model. Similarly, the full model for APR-R point loss or retention failed to yield a good model based on the Hosmer-Lemeshow Goodness of Fit Test. The Test and Skill variables were the only predictor variables contributing significantly to the prediction of APR-R point loss. The reduced model

using only these two variables failed to produce a model adequately representing the data; therefore, the model was rejected. Chapter V provides information regarding the major findings of the study, implications, conclusions, and recommendations for further study.

Chapter V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The purpose of this study was to investigate the predictive power of cognitive, learning and study strategy predictors on student-athlete academic success and to explore factors most predictive of Academic Progress Rate (APR) point loss or retention. Additionally, the researcher sought to determine if significant differences exist on the predictor variables for specific groups of student-athletes. Analyses of differences were conducted for male and female student-athletes, first-generation and non-first generation student-athletes, and revenue and non-revenue student-athletes. Finally, the researcher sought to understand the degree to which specific factors aid in the prediction of APR point loss and investigated whether these factors were different when predicting APR-Eligibility (APR-E) point loss or APR-Retention (APR-R) point loss.

Determining factors affecting the academic success of student-athletes is especially important for colleges and universities participating in NCAA, Division I athletics. These institutions are penalized when teams have student-athletes on scholarship who do not meet minimum academic standards, and limited-resource institutions are penalized at higher rates when compared to other institutional types. For these reasons, early identification of specific factors predictive of academic difficulty or APR loss is beneficial for student-athlete academic support personnel who are charged with defining risk and designing appropriate intervention plans for student-athletes, as well as NCAA Division I member institutions seeking to improve

the institutional conditions supporting student-athlete academic success. This chapter provides an overview of the research methods used in the study, discusses major findings and conclusions, and offers recommendations for future research and educational practice.

Methods and Procedures

Participants in this study included 210 student-athletes who received athletic scholarships at a single NCAA, Division I, limited-resource institution during the 2012-2013 academic year. There were 114 male student-athletes and 96 female student-athletes in the study. Of the participants in the study, 111 identified as first-generation college students and 99 identified as non-first-generation college students. The sample also included 97 student-athletes who participated in the revenue producing sports of men's basketball and football. There were 113 student-athletes in the study who participated in non-revenue producing sports.

Data were collected from the administration of the Learning and Study Strategies Inventory, 2nd edition (LASSI-II) providing scores on ten scales of learning and study strategies. The ten scales of the LASSI-II were combined into three composite scales of Will, Skill, and Self-Regulation after reliability analysis was conducted on the new scales. The selection of the LASSI-II was based on the expectancy-value theory which suggests student beliefs about academic self-efficacy and the degree to which he or she values academic goals influences academic success. The self-report nature of this instrument provides measures of the student's own perceptions and beliefs regarding learning and study strategies. Demographic, sport, and cognitive predictor variables were included in the study based on previous research suggesting these variables influence the academic success of college student-athletes.

One accepted measure of college student academic success is cumulative GPA. For this reason, one path of analysis used CGPA as the dependent variable in a stepwise multiple

regression analysis with demographic, sport, cognitive, and learning and study strategy variables used as predictor variables. Another path of analysis in this study employed APR as a dichotomous dependent variable for the purpose of determining a logistic regression model predictive of the likelihood of losing APR points. According to Cohen, Cohen, West, and Aiken (2003), logistic regression is often used as the statistical test in epidemiological research to determine risk factors associated with dichotomous variables or binary outcomes. It is beneficial to compare results of these analyses because both dependent variables are used as measures of academic success. Independent t-tests were utilized in this study to compare the means of scores on predictor variables and CGPA between male and female student-athletes, first-generation and non-first generation student-athletes, and revenue and non-revenue student-athletes.

Major Findings and Discussion

Research Question One

Taken in combination, to what degree do demographic, sport, cognitive, learning and study strategy variables predict student-athletes academic success as measured by CGPA?

Summary of data analysis. To determine the best predictive model for the academic success of student-athletes, a stepwise multiple regression analysis was conducted. At the $\alpha = .05$ level of significance, there is enough evidence to suggest that taken in combination, five predictor variables, HSGPA, Test, Will, gender, and family (i.e. first-generation or non-first generation) are useful predictors of CGPA for student-athletes. Variables not included in the predictive model include Skill, Self-Regulation, and sport (i.e. revenue or non-revenue). The final model including all significant predictor variables was found to explain 60% of the variance in student-athlete CGPA. The cognitive variables, HSGPA and standardized test scores, explained the greatest proportion of the variance in CGPA explaining 57% of the variance. The

HSGPA variable was the strongest predictor of CGPA in this analysis. Standardized test scores were also strong predictors of CGPA. These results support previous research findings and the NCAA's assertion that these cognitive measures in combination are consistently correlated with student-athlete academic success as measured by GPA (Paskus, 2009; Petr & McArdle, 2012).

Discussion of findings related to research question one. The only learning and study strategy variable included in the model as a significant contributing factor was the Will composite scale of the LASSI-II. The Will composite scale is comprised of questions related to motivation, anxiety, and attitude. This finding lends support for the expectancy-value theory as it relates to academic success because questions on this scale measure the degree to which students value academic tasks and accomplishments, as well as how well they believe they will perform on academic tasks based on their level of motivation and anxiety. This finding also supports previous research indicating these psycho-social constructs are positively correlated with academic success in college (Alarcon & Edwards, 2013; Allen et al, 2010; Bandura, 2012; Choi, 2005; Cohen, 2012; Credé & Kuncel, 2008; Eccles et al, 1983; Eccles & Wigfield, 2002; Harackiewicz, Barron, Tauer, & Elliot, 2002; Kitsantas et al., 2008; Marrs et al. 2009; Richardson & Abraham, 2009).

In previous research, motivation and conscientiousness were consistently found to be positively correlated with CGPA even when controlling for other factors such as prior educational background and achievement in a meta-analysis of psycho-social correlates of academic success (Richardson et al., 2012). Additionally, the results of the multiple regression analysis in the present study provide support for using the Will composite scale of the LASSI-II as part of a diagnostic protocol to identify risk for academic difficulties in college. In keeping with the results of Credé and Kuncel's (2008) meta-analysis, scores from the Will composite

scale were found to provide incremental validity in predicting CGPA for student-athletes in this study. Alarcon and Edwards (2013) found ability and motivation were both strongly correlated with academic success and retention. In a meta-analysis conducted by Robbins et al. (2004), achievement motivation was consistently found to be one of the strongest predictors of CGPA in college. The findings of this study also support the assertion that measures of achievement motivation can aid in the prediction of academic success in college. Further research should be conducted utilizing the Will composite scale of the LASSI-II to determine appropriate utility related to academic planning and support programming for at-risk student-athletes.

Two demographic variables, gender and family, were also included as significant predictors in the multiple regression model. Male and first-generation college students have been consistently found to have lower CGPAs in college, as well as much lower graduation rates (Aliprantis, Dunne, & Fee, 2011; Hsu, & Schombert, 2010; Pascarella, Pierson, Wolniak & Terenzini, 2004; Schmitt et al., 2009). Similarly, male, first-generation, and those student athletes participating in revenue producing sports have been found to have much lower graduation rates and GPAs compared to their counterparts (Ferris et al., 2004; Gurney et al., 2010; Johnson et al., 2010; Mangold et al., 2003; Petr & Paskus, 2009; Southall, 2012; Wolniak, Pierson, & Pascarella, 2001). For this reason, it was expected that gender and family predictor variables in this study would explain more of the variance in CGPA.

According to data collected by the NCAA, female student-athletes generally outperform their male counterparts as evidenced by higher team APR scores and other research (Petr & McArdle, 2012). One possible explanation for the relatively small amount of variance explained by the demographic variables of gender and family in this study is the level of direct academic support provided through current academic support programs or other structural factors present

internally or externally to the institution. Because these two demographic variables have been consistently linked to lower graduation rates and college student persistence many academic support programs provide targeted interventions for these groups of student-athletes. As suggested by Petr & McArdle (2012), future research should include more information about what happens to student-athletes during college. Specifically, studies of high risk student-athletes who have been able to be successful and graduate despite coming to college with multiple risk factors would be especially beneficial to limited-resource institutions in designing the most efficient and effective academic support programs for this demographic.

As discussed in the literature review, there are many theories related to college student persistence and academic success. This study utilized the LASSI-II to measure student perceptions of specific attitudes and behaviors related to learning and study strategies and identified the Will component as an attitude positively correlated with higher CGPAs. Attitude-behavior interactions are also affected by the student's experiences during college with various structural components of the institution (Cabrera, Nora, & Castaneda, 1993). Although this study was conducted at one institution, there are many organizational and environmental factors that can influence a student-athlete's academic performance. Specifically, team culture and the degree to which academic pursuits are supported by the coach or institution, as well as the availability of comprehensive academic support services can influence the degree to which student athletes are academically successful.

The contribution of both pre-college cognitive variables to the prediction of CGPA in this model supports previous research suggesting these measures must be considered when evaluating the academic risk of student-athletes. It is much more difficult for limited-resource institutions to provide learning specialists and programs specifically designed to alleviate

academic deficits of student-athletes because of the lack of funds. Risk from multiple factors increases the likelihood of academic difficulties and student-athlete attrition. Multiple risk factors were identified through the multiple regression analysis including having low HSGPAs, low standardized test scores, low scores on the Will composite scale, being male, and being a first-generation college student-athletes. When taken in combination, these risk factors are significant considerations for limited-resource institutions and should be used to determine academic support programming and strategies for intervention.

Research Question Two

Are there significant differences in variables that predict student-athlete academic success as measured by CGPA for male student-athletes as compared to female student-athletes?

Summary of data analysis. Differences between male and female student-athletes were found to be significant for two predictor variables and CGPA. On both cognitive predictor variables, HSGPA and Test, female student-athletes were found to have significantly higher scores than male student-athletes. The effect size calculations for these differences were moderately meaningful. The CGPAs of female student-athletes included in this study were significantly higher than the CGPAs of male student-athletes. In summary, it can be concluded from this data that female student-athletes at this university have higher CGPAs than their male counterparts and this difference is statistically significant.

Discussion of findings related to research question two. The significant differences between male and female student-athletes on both pre-college cognitive measures as CGPA support conclusions from other research which suggests females are outpacing males with respect to academic measures including standardized test scores and GPA (ACT Policy Report, 2012, Aliprantis et al., 2011; Bridgeman et al, 2008; DeBerard, Spielmans, & Julka, 2004; Sax &

Harper, 2007). Research on the academic success of female student-athletes compared to male student-athletes consistently shows female student-athletes are graduating at higher rates than male student-athletes and have higher GPAs than male student-athletes (Ferris et al., 2004; Gurney et al., 2010; Johnson et al., 2010; Southall, 2012). It has been suggested in some research that the experiences of female college student-athletes are significantly different from male college student-athletes (Christy et al., 2008; Comeaux & Harrison, 2011; Gaston-Gayles & Hu, 2009; Ridpath, 2010; Sedlacek & Adams-Gaston, 1992). Female teams also consistently obtain higher APR scores, and male teams are penalized for not meeting APR benchmarks at much higher rates than female teams (LaForge & Hodge, 2011; Petr & Paskus, 2009; McCall, 2012). According to Aries et al. (2004), gender as a predictor of academic success in college is even more significant than race. Significant differences were not found in any of the learning and study strategy composite scales between male and female student-athletes. In fact, the mean score on the Will composite scale for females was 87.1 and the mean score for males was 87.9 despite the finding from the multiple regression analysis that the Will composite scale aided in the prediction of CGPA.

The trend for females to outperform their male counterparts in college is not only evident in student-athlete populations but also in the general student body across all levels of higher education regardless of institutional type (Aliprantis et al., 2011). Recognizing these differences does not help explain why these differences exist. In this study, scores from the three composite scales of the LASSI-II did not provide any additional information as to why these differences were found between male and female college students. There are several directions for future research that might help explain why these differences exist between male and female student-athletes. Studies relating masculine theory and the preeminence of the athletic identity for male

student-athletes could explain why female student-athletes are being more successful in college. Another line of inquiry could be related to the societal influences which frame the way in which males are socialized to value athletic pursuits above academic pursuits. The fact that male sports are revenue producing and more commercialized could also be impacting the value males place on athletic endeavors. Male student-athletes are also more likely to aspire to play on the professional level than female student-athletes (Potuto & O'Hanlon, 2007). What is clear is that the differences do exist suggesting the need for more research related to the gender gap in higher education including the gap between the academic performance of male and female student-athletes.

Research Question Three

Are there significant differences in variables that predict student-athlete academic success as measured by CGPA for first-generation college student-athletes as compared to non-first-generation student-athletes?

Summary of the data analysis. Differences between first-generation and non-first-generation college student-athletes were found to be significant for four predictor variables, HSGPA, Test, Skill, and Will, and the dependent variable, CGPA. Non-first-generation student-athletes were found to have significantly higher scores on all measures in this analysis. The effect size estimates for all predictor variables found to have statistically significant differences and CGPA were calculated to be large and meaningful. The scores on both cognitive variables, HSGPA and Test, suggest significant differences in the pre-college preparation and college readiness of first-generation student-athletes. For the Skill and Will measures, first-generation college student-athletes scored significantly lower compared to their counterparts.

Discussion of findings related to research question three. The results indicating first-generation student-athletes score lower than non-first generation student-athletes on all academic measures in this study are not surprising given the abundance of research demonstrating lower retention rates, lower graduation rates, and lower GPAs for first-generation college students compared to non-first-generation colleges students (Engle & Tinto, 2008; Hsu & Schombert, 2010; Kuh et al., 2006; Kuh & Love, 2000; Pascarella et al., 2005; Pike & Kuh, 2005; Ting, 2003; Warburton, Bugarin, & Nunez, 2001). However, differences on two of the LASSI-II composite scales, Will and Skill, indicate first-generation student-athletes in this study do not expect to do well academically and rate their level of motivation for academic tasks lower than non-first-generation student-athletes.

Naumann, Bandalos, and Gutkin (2003) found that self-regulated learning skills, self-efficacy, and study strategies were more predictive of the success of first-generation students as measured by GPA than student ACT scores. Other studies have confirmed that first-generation students generally have lower expectations associated with grades and academic aspirations especially when coupled with uncertainties about their discrete academic skills or abilities (Engle, Bermeo, & O'Brien, 2006; Riehl, 1994). Prospero (2007) found that first-generation college students are more likely to doubt their academic readiness for college and their own individual academic abilities. Ishitani (2003) found attrition rates for first-generation college students were 71% higher when controlling for race, sex, and income than the attrition rates of non-first-generation college students. There are several explanations for these differences including the lack of family support for educational goals, inadequate preparation for college, or the lack of skills related to college success. In general, however, this group of students have difficulty navigating the college environment and often need additional support programming to

help them be successful during college. The results of the present study confirm the special needs of first-generation student-athletes and the need for specific intervention efforts supporting the academic needs of these students.

Research Question Four

Are there significant differences in variables that predict student-athlete academic success as measured by CGPA for student-athletes participating in revenue or non-revenue sports?

Summary of data analysis. Differences between student-athletes participating in revenue and non-revenue producing sports were found to be significant for cognitive predictor variables, HSGPA and Test, and for the dependent variable, CGPA. Student athletes participating in non-revenue producing sports were found to have significantly higher GPAs with the effect size calculation computed to be large and meaningful. Student-athletes in non-revenue sports presented with statistically significantly higher HSGPA and standardized test scores when compared to their counterparts. The effect size calculations for these differences were calculated to be moderately meaningful. Differences in the means of scores on the three composite scales of the LASSI-II were not found to be statistically significant in this analysis.

In the multiple regression conducted for the present student, the sport variable was removed from the predictive model for non-significance. However, results of the independent t-test by sport for CGPA revealed significant differences that cannot be ignored. This study only investigated the academic outcomes of student-athletes for one academic year; therefore, it is difficult to determine if there is a trend for student-athletes participating in revenue-producing sports at this institution to have CGPAs that are consistently lower than student-athletes participating in non-revenue producing sports. It would also be beneficial to conduct an analysis of the CGPAs by sport over several years.

Discussion of findings related to research question four. Previous research suggests student-athletes participating in revenue producing sports are more likely to have lower GPAs, more likely to lose APR points, and less likely to graduate compared to student-athletes participating in non-revenue producing sports (Aries et al., 2004; Batley, 2011; Christy et al., 2008; Comeaux & Harrison, 2011; Ferris et al., 2004; Gurney et al., 2010; Johnson et al., 2010; Kane et al., 2008; Mangold et al., 2003; McCall, 2012; Oriard, 2012; Pascarella et al., 1995; Paskus, 2012; Petr & McArdle). Both HSGPA and standardized test scores are used to determine NCAA, Division I initial eligibility, and these cognitive measures are consistently used by institutions to determine admissions. Results from the independent t-tests used to analyze differences between revenue and non-revenue student-athletes in this study support the contention that student-athletes participating in revenue producing sports score lower on both cognitive measures used to determine academic readiness for college.

Standardized test scores are also used by many institutions to determine placement in remedial level courses. Remedial courses in college do not count as degree applicable hours for degree completion; therefore, student-athletes who begin college with lower scores on standardized tests are required to take more courses than those who meet college readiness standards. According to the ACT Policy Report (2012), only 17% of students required to take only 1 remedial reading course graduate from college. Having to take remedial courses coupled with the demands of participating in a high profile sport put many student-athletes participating in revenue producing sports at increased risk of not meeting degree completion percentages or other academic requirements for maintaining eligibility (Christy et al., 2008; Gurney, 2011; LaForge & Hodge, 2011; Oriard, 2012; Ridpath, 2008; Thelin, 2008).

Other concerns related to the differences in pre-college preparation and lower GPAs for student-athletes participating in revenue sports emanates from the research indicating these student-athletes also must balance greater demands with respect to their sport during college especially when participating in a high-profile sport. Studies indicate student-athletes participating in revenue sports have difficulty integrating into the academic and social systems of the university leading to isolation, stronger athletic identifies and less time to devote to academic pursuits (Comeaux & Harrison, 2011). Student-athletes in revenue sports are also more likely to transfer due to dissatisfaction with playing time or the level of their scholarships (Johnson et al., 2010). According to Petr and Paskus (2009), transferring leads to a decreased probability of academic success and graduation especially among student-athletes in revenue producing sports who have a history of struggling academically. This research and other data led to the NCAA's recent changes in transfer eligibility guidelines (Petr & McArdle, 2012). Johnson et al. (2010) investigated predictors of student-athlete GPA including traditional and athletic variables and found that participating in a revenue sport is negatively correlated with student-athlete GPA; however, traditional cognitive variables and gender overshadowed the athletic variables of sport type, coaching change, playing time and winning percentage. This study confirmed the practice of utilizing traditional cognitive variables in predictive modeling in combination with other variables.

Research Question Five

Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR points?

Summary of data analysis. The present study sought to determine factors or a combination of factors predictive of APR point loss or retention. Predictor variables for this

analysis included gender, family, HSGPA, Test, Skill, Will, and Self-Regulation. The predictor variable, sport, was excluded from this analysis due to collinearity with the predictor variable, gender. Although the full model including all of these variables was found to be significant, $\chi^2(7, 210) = 38.78, p < .001$, the Hosmer-Lemeshow Goodness of Fit test, $\chi^2(8, N = 210) = 28.65, p < .001$, revealed problems with the model's predictive ability. The model only slightly improved on the null model's ability to predict APR point loss or retention.

Despite the full model not adequately fitting the data, it should be noted that the only consistently strong predictor of APR loss in both the original and reduced model was the Test predictor variable. Specifically, the analysis revealed an inverse relationship between standardized test scores and APR loss meaning that as standardized test scores increase the likelihood of losing APR points decreases. The coefficient value for the Test variable ($OR = 0.67$) indicates an increase of one unit in standardized test scores is associated with a 33% decrease in the odds of losing APR points, 95% CI [0.525, 0.860]. For this reason, it is still important to include cognitive measures in future predictive models.

Discussion of findings related to research question five. Logistic regression analysis is often used to assess factors that predict binary outcomes in educational settings. Creating a logistic regression model predictive of the likelihood of losing APR points would be beneficial for NCAA, Division I limited-resource institutions because this information could help identify student-athletes most in need of academic interventions. The significant variables in the full model were Test and Skill; however, neither the full model nor the reduced model using only the Test and Skill variables met the criteria for model fitness.

The Skill variable in both analyses was positively correlated with APR point loss meaning that as scores on the Skill composite scale increased the likelihood of APR point loss

increased. This result is contrary to previous research suggesting students possessing study strategies and skills are more likely to be academically successful (Cano, 2006; Credé & Kuncel, 2008; Kitsantas, 2000; Kitsantas et al. , 2008; Marrs et al., 2009). The LASSI-II is primarily used as a diagnostic instrument with low scores indicating the need for intervention. Therefore, the finding that higher scores on the Skill composite scale were positively correlated to APR loss is contrary to previous research on the LASSI-II suggesting this instrument effectively discriminates between those students who have developed learning and study strategies and those students who lack requisite learning and study strategies predictive of academic success in college (Cano, 2006; Reaser et al, 2007; Robbins et al., 2004; Schutz, Dalton, & Tepe, 2013; Weinsten & Palmer, 2002). The self-report nature of this instrument may have contributed to this finding; therefore, more analysis of the subscales which comprise the Skill composite scales could shed some light on this unusual result. Another possible explanation could be that students who believe they possess the academic skills necessary for success in college are less likely to seek assistance during college compared to students who rate their academic skills as needing improvement. However, this study did not include a measure of the extent to which student-athletes in this study utilized academic support services which could help determine if this hypothesis is true.

Another important observation that could lead to further investigations is the percentage of first-generation student-athletes who lost APR points compared to non-first-generation student-athletes in this sample. This finding is similar to results from previous research on first-generation college students related to college retention and graduation trends (Engle & Tinto, 2008; Pascarella et al., 2004; Pike & Kuh, 2005; Tinto, 1975). Twenty-one percent of first-generation student-athletes in this study lost APR points compared to only 3% of non-first-

generation student-athletes. In addition to the discrepancies found in the independent t-tests on HSGPA, standardized test scores, the Skill composite scale of the LASSI-II and the Will composite scale of the LASSI-II, the difference in the percentage of first-generation student-athletes losing APR compared to non-first-generation student-athletes in this sample confirms the need for early identification and specialized academic support services for this group of student-athletes.

Research Question 6

Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR-E points?

Summary of data analysis. To answer the research question about factors predictive of APR-E point loss, a logistic regression analysis was conducted with APR-E used as the dependent variable. Predictor variables for this analysis included gender, family, HSGPA, Test, Skill, Will, and Self-Regulation. The full model was found to be significant, $\chi^2(7, 210) = 36.55$, $p < .001$ with the Test, HSGPA, Skill, and Self-Regulation predictor variables making significant contributions to the model; however, as with the APR logistic analysis, the Hosmer-Lemeshow Goodness of Fit test, $\chi^2(8, N = 210) = 81.59$, $p < .001$ was found to be significant meaning the model did not fit the data. The reduced model using only the significant predictor variables did not improve these outcomes; therefore, the model was rejected.

Analysis of the significant predictor variables in this regression showed inverse relationships between both cognitive variables and APR-E points lost meaning that as these scores increase the odds of losing APR-E points decreases. The coefficient value for the HSGPA predictor variable ($OR = 0.21$) indicated an increase in one unit is associated with a 79% decrease in the odds of losing APR-E points, 95% [0.049, 0.904]. The coefficient value for the

Test variable ($OR = 0.63$) indicated an increase in one unit is associated with a 37% decrease in the odds of losing APR-E points.

Discussion of findings related to research question six. Maintaining academic eligibility during college requires student-athletes to meet a range of conditions. A complete outline of NCAA continuing eligibility guidelines is provided in Appendix B. A student-athlete can lose an APR-E point for failing to meet any of these conditions. For this reason, APR-E points are subject to more variability. Determining combinations of specific pre-college variables placing student-athletes at risk of not meeting academic eligibility requirements is not only important for coaches and athletic departments held accountable for the academic progress of students and for institutions who want to avoid the public scrutiny of low graduation rates of student-athletes, but also for student-athletes who need to maintain their eligibility to compete and retain their scholarships. Coaches are generally most concerned about keeping their student-athletes on the field of play; however, new accountability measures also hold head coaches accountable for APR scores (NCAA, 2009). These scorecards can affect job opportunities for head coaches. Consequently, more emphasis has been placed on identifying risk factors associated with APR-E points and on the need to design and implement effective intervention strategies for at-risk student-athletes.

In research conducted by the NCAA, HSGPA was found to be the most consistent predictor of academic success for student-athletes as measured by GPA or APR scores (Petr & Paskus, 2009; Petr & McArdle, 2012) and this study also found an increase in HSGPA to reduce the risk of losing APR points including APR-E points. The Test variable was also found in this analysis to significantly predict the loss of APR-E points. This result confirms previous research

suggesting standardized test scores are useful when predicting the academic success of college student-athletes (Burton & Ramist, 2001; Johnson et al., 2010; Pascarella et al., 1995).

The collection and use of academic data for research guided the NCAA's adoption of the sliding scale for initial eligibility, which has been the subject of much controversy (Gurney, 2011; Gurney et al., 2010). The sliding scale does allow for student-athletes with very low standardized test scores to be placed on scholarship and added to the APR cohort. For limited-resource institutions without resources to mitigate these academic deficits, deciding which student-athletes are more likely to be academically successful is imperative. Understanding how a small increase in these cognitive measures contributes to significant reduction in the risk of losing APR-E points is essential for limited-resource institutions in order to properly evaluate not only the individual risk of each student-athlete but also APR risk for teams. In this analysis, the cognitive predictor variables appear to have more utility in predicting APR-E point loss than the learning and study strategy variables. It is understandable that both cognitive predictors would significantly contribute to the prediction of APR-E point loss because both initial and continuing eligibility guidelines are heavily weighted with academic variables and benchmarks.

Research Question 7

Taken in combination, to what degree do demographic, cognitive, learning and study strategy variables predict loss or retention of APR-R points?

Summary of data analysis. The dependent variable for this analysis was the loss or retention of APR-R points. All predictor variables included in both the APR and APR-E analyses were included in the logistic regression. As with both APR and APR-E analyses, the full model was found to be significant, $\chi^2(7, 210) = 33.34, p < .001$; however, according to the Hosmer-Lemeshow Goodness of Fit test, $\chi^2(8, N = 210) = 81.59, p = .011$, the model did not

adequately fit the obtained data and was rejected. The two significant predictor variables in this model were also the Test variable (Wald $\chi^2 = 6.41$, $p = .011$) and the Skill variable (Wald $\chi^2 = 5.13$, $p = .023$). The Test variable was inversely related to APR-R loss; therefore, the coefficient value for the Test variable ($OR = 0.72$) in this analysis indicated an increase of one unit in test scores is associated with a 28% decrease in the odds of losing APR-R points, 95% CI [0.56, 0.93]. The Skill variable was positively related to APR-R loss; therefore, the coefficient value for the Skill variable ($OR = 1.08$) in this analysis indicated an increase of one unit in test scores is associated with an 8% increase in the odds of losing APR-R points, 95% CI [0.56, 0.93].

Discussion of findings related to research question seven. Unlike APR-E points, the retention or loss of APR-R points are only determined by retention defined by the NCAA as returning to the institution the subsequent semester the APR-R point is earned or graduating. If a student-athlete transfers with a 2.6 GPA or higher to another four-year institution the subsequent semester, the retention point is still earned. The measurement of APR-R points is fairly simple; however, the reasons student-athletes are not retained and do not graduate are varied and complex. There is abundant research on college student retention incorporating various theoretical frameworks which has contributed to our knowledge of why students are not retained; however, college retention rates still remain low especially for certain groups of college students. What we do know about retention is that conditions affecting students vary by institutional type and by demographics such as socio-economic status and race (Engle & Tinto, 2008; Pascarella & Terenzini, 2005; Tinto, 2012). Neither of those demographics was included in this research due to the theoretical framework and sample size limitations.

It has been argued that student-athletes have significantly different college experiences attributable to the participation in intercollegiate athletics; therefore, student-athletes make

decisions to leave college for different reasons compared to non-student-athletes (Aries et al., 2004; Comeaux & Harrison, 2011; Ferris et al., 2004; Le Crom et al., 2009; Mangold et al., 2003; Pascarella et al., 1995). Team culture, relationships with coaches, playing time, and other sport-related variables contribute to student-athlete retention (Gaston-Gayles & Hu, 2009; Johnson et al., 2010; Kane et al., 2008; McCall, 2012) Additionally, the institutional fit including the broader campus experiences can influence a student-athlete's decisions to stay at a university (Le Crom et al., 2009; Mangold et al., 2003;). Family factors and finances often play a significant role in retention at the college level (Kuh & Love, 2000; McCall, 2012; Pascarella et al., 2004). For these reasons, predicting student-athlete retention is problematic and complex.

In this analysis, the only two variables found to significantly contribute to the prediction of APR-R points was Test and Skill. The results of this analysis are similar to the results of the analysis including all APR point loss or retention which is understandable. Because of the unique experiences of student-athletes during college, it is suggested to include variables distinctive of those experiences in the analysis of APR-R point loss in future research.

Data Trends

Results of independent t-tests demonstrated significant differences on several predictor variables included in this study. Specifically, female student-athletes presented with higher HSGPAs and standardized test scores compared to their male counterparts, and these differences were significant and moderately meaningful. It is not surprising that scoring higher on these cognitive measures is correlated with higher CGPAs. The difference between female student-athlete CGPAs and male student-athlete CGPAs was also significant and the effect size was large. These differences were not detected on the three scales of Skill, Will, and Self-Regulation. The Will composite scale was the only learning and study strategy variable found to

have any contribution to the prediction of CGPA in the multiple regression analysis. Gender differences in degree attainment have been found in the general student body population with the gap increasing (Sax & Harper, 2007).

While this study did find significant gender differences on all traditional cognitive measures, gender was not found to contribute to the prediction of the loss or retention of APR points. Additionally, when comparing the percentage of APR points lost by gender only 13% of male student-athletes lost APR points compared to 12% of female student-athletes. Sixty percent of all APR-E points were lost by males compared to 40% of female student-athletes; however, only 11% of all male student-athletes lost APR-E points compared to 8% of all female student-athletes. Only 11% of male student-athletes lost APR-R points compared to 10% of female student-athletes. These differences do not seem particularly significant especially given differences found between male and female student-athletes in pre-college cognitive measures and CGPAs. One explanation is the level of academic support provided to male student-athletes to preserve eligibility and APR points (Batley, 2011; Bouchet & Scott, 2009; Christy et al., 2008; Gurney & Weber, 2007). One explanation why limited-resource institutions have been penalized at higher rates compared to other NCAA Division I institutions is because of the lack of financial resources available for academic support services (Bouchet & Scott, 2009; Hosick, 2013; Wolverton, 2008). The scope of this study did not include an evaluation of the level of academic support for male student-athletes compared to female student-athletes or an evaluation of the level of academic support compared to APR point loss. The lack of significant differences between male and female student-athletes associated with APR points lost in this study could be attributable to many other factors including the level of academic engagement of student-athletes by gender during college.

Differences were observed between first-generation student-athletes and non-first-generation student athletes with non-first-generation student-athletes scoring higher on both cognitive measures, as well as the Skill and Will composite scales of the LASSI-II. Non-first-generation student-athletes also had significantly higher CGPAs compared to first-generation student-athletes and the effect size was large. This finding support research suggesting first-generation students face heightened challenges and adjustment issues which negatively influence academic success in college (Pascarella et al., 2004; Pike & Kuh, 2005; Warburton et al., 2001). The family variable (i.e. first-generation or non-first-generation) was also found to significantly predict CGPA in the multiple regression analysis; however, the family variable was not found to be a significant predictor variable for APR point loss in the logistic regression analyses. There was a trend observed in the data with a high percentage of first-generation student-athletes (21%) losing APR points compared to non-first-generation student-athletes (3%) losing APR points. The differences between first-generation and non-first generation are the largest discrepancies observed in APR points lost in the data.

No significant trends were observed in the data when comparing student-athletes participating in revenue or non-revenue producing sports other than significant differences on pre-college cognitive measures, HSGPA and Test, as well as CGPA. However, the sport variable (i.e. revenue or non-revenue) was excluded in the stepwise process of the multiple regression analysis because this variable did not significantly contribute to the model predicting CGPA. Collinearity was observed between the sport and gender variables because all student-athletes participating in revenue sports are male. For this reason, the sport variable was excluded from the logistic regression analyses. There is research which found student-athletes participating in revenue sports are not as academically successful as student-athletes in non-revenue producing

sports (Batley, 2011; Christy et al., 2008; Comeaux & Harrison, 2011; Ferris et al., 2004). There is also research suggesting revenue student-athletes come to college more academically underprepared compared to their non-revenue counterparts (Gurney et al., 2010; Johnson et al., 2010; Kane et al., 2008). The independent t-tests of this sample of student-athletes did confirm previous research regarding these differences with student-athletes participating in non-revenue sports scoring higher on both pre-college cognitive measures and having higher CGPAs compared to student-athletes participating in revenue sports.

Learning and Study Strategy Variables

This study sought to extend the range of predictor variables for student-athlete academic success beyond traditional cognitive measures to aid in the identification of at-risk student-athletes and potential APR point loss. Ability and expectancy beliefs have been studied as potential noncognitive factors influencing the academic success of college students. In fact, several studies have found motivation to have a strong relationship to college student academic success and persistence (Alarcon & Edwards, 2013; Allen et al., 2010; Credé & Kuncel, 2008; Eccles & Wigfield, 2002; Gaston-Gayles & Hu, 2009; Noffle & Robbins, 2007; Richardson & Abraham, 2009; Richardson et al., 2012; Robbins et al., 2004; Schweinle & Helming, 2011).

The expectancy-value model of motivation suggests a student's beliefs about his or her ability to do well on a specific activity and the extent to which the student values a specific activity influence choices, persistence, and ultimately performance outcomes (Wigfield & Eccles, 2000). For student-athletes facing multiple demands for attention and time, the expectancy-value theory offers a useful framework to evaluate the potential influence of noncognitive variables on student-athlete academic success. Psychosocial factors related to student behavior, attitude, and motivation toward academics are particularly important when

studying student-athlete academic success due to the preeminence of athletic identity (Comeaux & Harrison, 2011). Several studies including research the NCAA used to create the Graduation Risk Overview (GRO) model for risk assessment found identifying more as an athlete than a student is a significant risk factor (Gaston-Gayles & Hu, 2009; Johnson et al., 2010; NCAA, 2009b; Paskus, 2012; Petr & Paskus, 2009). For student-athletes with strong athletic identities maintaining focus and motivation for academic pursuits can be challenging especially if they do not value education or believe in their own academic abilities.

The present study utilized the Learning and Study Strategies Inventory, 2nd Edition (LASSI-II) as measures of Skill, Will, and Self-Regulation. These psychosocial factors have been used in various studies involving college student success (Alarcon & Edwards, 2013; Bandura, 2012; Bean & Eaton, 2001; Kitsantas et al., 2008; Marrs et al., 2009; Pintrich, 2004; Richardson & Abraham, 2009; Richardson et al., 2012). In the multiple regression analysis, the only LASSI-II scale found to significantly correlate with CGPA was the Will composite scale. Three subscales of the LASSI-II, Motivation, Anxiety, and Attitude, compose the Will composite scale. Results from the multiple regression analysis conducted in this study support previous research on the utility of noncognitive constructs such as motivation as predictor variables. This finding confirms the value of adding a measure of Will to models predicting student-athlete academic success as measured by CGPA. Overall, however, the LASSI-II did not contribute significantly to the prediction of APR point loss. The LASSI-II is used primarily for diagnostic, prescriptive purposes to aid in the development of intervention strategies and academic planning. From a statistical perspective, the three composite scales of the LASSI were not found to be effective predictor variables in this study with only the Will composite scale significantly contributing to the model for CGPA.

Comparison of Results from Regression Analyses

The academic success of student-athletes was measured with a continuous variable, CGPA, and a dichotomous variable, APR in separate regression analyses. The NCAA uses APR as a measurement of the academic progress of student-athletes and penalizes institutions for not meeting APR benchmarks. There has been very little research on APR as a measure of academic success. From research conducted by the NCAA, it was determined that the APR benchmark of 930 is equivalent to a 50% graduation rate (Petr & McArdle, 2012; Hosick, 2013). However, APR has yet to be established as a reliable, valid measure of academic success with any independent research. There is still concern about the APR-R component of the metric because so many factors influence college student-retention and certain groups and institutional types are more susceptible to lost retention points (McCall, 2012). Retention is not always a clear measure of academic success or failure. In this analysis there was little difference found in the number of APR-R points lost compared to APR-E points lost; however, within-group analysis of first-generation student-athletes revealed a high percentage of these student-athletes lost APR points.

It was expected that variables correlated with increased CGPA would predict a decrease in the loss of APR points. However, the only predictor variable in the study consistently found to significantly decrease the loss of APR points was standardized test scores. The Test variable was also included in the multiple regression analysis as a significant predictor variable for CGPA. As mentioned earlier in the discussion of the results of logistic regression analyses, a one unit increase in HSGPA significantly decreased the odd of losing APR-E points. The HSGPA was also found to be a strong predictor of CGPA. From these results, it is difficult to conclude that APR is a valid measure of academic success especially given the issues of concern with APR-R

points. More research into the metric is needed before the NCAA continues to use punitive measures of enforcement based on this metric.

The fact that certain types of institutions are penalized at much higher rates indicates the metric does not take into account the broad spectrum of factors influencing APR scores. Specifically, certain institutional types and teams have high rates of transfers. Transfer student-athletes are generally at higher risk of APR loss for several reasons. First, there is less time to determine the individual student-athlete's academic strengths and weaknesses. Second, there may be a problem with the institutional fit between the transfer student-athlete, the team, or the institutional cultures. Third, many transfer student-athletes are initial non-qualifiers with significant academic deficits. Fourth, transfer student-athletes often have difficulty meeting degree completion requirements because of differences in academic programs between the two respective institutions. There is very little room for error when student-athletes must meet degree percentages regardless of transferring or changing majors. Finally, transfer student-athletes often transfer for reasons related to their sport rather than for academic reasons. This indicates the transfer student-athlete may have a strong athlete identity which is another risk factor for academic difficulty and loss of APR points.

Implications & Recommendations

Identifying and quantifying academic risk is a complex and complicated process. Creating predictive models for student-athlete success and APR score can be extremely beneficial for NCAA, Division I institutions. Exclusively relying on traditional cognitive predictors such as standardized test scores and HSGPA to make high stakes decisions regarding student-athlete eligibility and recruiting has been criticized for having a disparate impact on specific groups of student-athletes. Additionally, there is some controversy regarding the

predictive validity of standardized test scores in relation to college student academic success. While HSGPA has been extolled as a stronger predictor of college student academic success than standardized test scores, some research found extreme variability and grade inflation diminishing the predictive power of this measure (Mattern, Shaw, & Kobrin, 2011).

The NCAA created a sliding scale based on empirical research suggesting a combination of HSGPA and standardized test scores can best predict student-athlete academic success in college (Petr & Paskus, 2009; Petr & McArdle, 2012). Critics of the sliding scale generally belong to one of two camps. One group of critics see the sliding scale as lowering the bar for student-athletes by allowing student-athletes with very low standardized test scores to qualify for participation in intercollegiate athletics with relatively high GPAs (Gurney et al., 2010). The other group points to research suggesting standardized test scores only moderately predict academic success in college, and these critics see the need to extend the range of factors used to assess the academic readiness of student-athletes claiming standardized test scores are biased and limit the opportunities for minority student-athletes (Sedlacek, 1993; Sedlacek & Adams-Gaston, 1992; Ting, 2009). This study sought to expand the range of variables used to predict student-athlete academic success as measured by CGPA and APR scores for the purpose of reducing the reliance on traditional cognitive measures for quantifying the academic risk of individual student-athletes.

Implications for Practice

Recommendation one. This study does not offer support for eliminating the use of standardized test scores in eligibility decisions or the identification of risk. In fact, standardized test scores explained a significant amount of variance in CGPA and was the only predictor variable found to significantly contribute to the prediction of APR point loss, APR-E point loss,

and APR-R point loss. Further, the learning and study strategy variables investigated in this study did not significantly contribute to the prediction of the academic success of student-athletes with the exception of the Will composite scale found to contribute to the model predicting CGPA. This finding does not mean that these factors are not related in some way to college student-athlete academic success, but the results do not provide evidence that these factors significantly predict CGPA or APR point loss. For these reasons, it is important for NCAA, Division I, limited-resource institutions to consider a student-athlete's scores on standardized test scores as part of any model predicting the loss of APR points or determining the level of risk of student-athletes. Results from the stepwise multiple regression analysis yielded a model for predicting the academic success of student-athletes that included standardized test scores, HSGPA, the Will composite scale of the LASSI-II, gender, and generational status. By using these predictor variables as indicators of academic risk, the level of risk of individual student-athletes can be evaluated.

Additionally, it is recommended for limited-resource institutions to consider the cumulative effect of multiple risk factors as identified in the multiple regression analysis. This is especially important given that APR penalties are related to scores for the entire team. Student-athletes who come to college with multiple risk factors need to have pro-active, structured, comprehensive support programming to mitigate these risks. It is extremely important for limited-resource institutions to evaluate team APR risk by identifying the number of student-athletes on each team who have multiple risk factors. Teams with a large percentage of student-athletes with these multiple risk factors are more likely to have difficulty meeting APR minimum benchmarks.

Recommendation two. Despite extreme differences between male and female student-athletes on both cognitive predictor variables and CGPA, the percentage of male student-athletes losing APR points was nearly identical to the percentage of female student-athletes losing APR points in this study. Based on results from the multiple regression analysis, this finding was unexpected. Gender did not contribute to the prediction of any type of APR point loss. However, it is important to consider the significant differences between male and female student-athletes' CGPA. Cumulative grade point averages are used in admissions decisions for graduate and professional schools; therefore, lower CGPAs can limit options for continuing education beyond the undergraduate level. Because student-athletes must maintain minimum CGPAs in order to meet continuing eligibility guidelines, lower CGPAs should also be considered a risk factor indicating the need for academic support or intervention efforts. The NCAA recommends using term GPAs in addition to CGPAs to manage APR risk (NCAA, 2009).

Recommendation three. Extreme differences were also observed between first-generation and non-first-generation student-athletes on all predictor variables except the Self-Regulation measure. Additionally, the percentage of first-generation student-athletes that lost APR points was considerable compared to the percentage of APR points lost by non-first-generation student-athletes. This finding supports the need for targeted intervention efforts for first-generation student-athletes. Despite observed extreme differences between first-generation and non-first generation student-athletes, the family variable (i.e. first-generation or non-first-generation) was not found to contribute to the prediction of APR loss. It is possible that these student-athletes received special programming or academic support based on the fact that this institution regularly evaluates the academic risk of student-athletes based on the NCAA's GRO metric. If first-generation student-athletes in this sample were identified and specific academic

interventions and supports were provided to these student-athletes, it could be that the risk associated with being a first-generation student-athlete was buffered by successful efforts to mitigate this risk.

Recommendation four. The full model from the multiple regression analysis predicting CGPA supports previous research that male, first-generation student-athletes with lower standardized test scores and HSGPAs are the most likely to have lower CGPAs (Mangold et al., 2003; Southall, 2012;). For this reason, differentiated academic support structures and programs are warranted to ensure the academic success of this group of student-athletes. However, it has been argued that costs associated with providing the needed academic support for these student-athletes to maintain eligibility have placed many institutions in jeopardy (Dunn, 2013; Lawrence, 2013; Thelin, 2008). Spending on academic support services by NCAA, Division I member institutions has more than doubled since the inception of APR (Batley, 2011; Bouchet & Scott, 2009; Dunn, 2013; Wolverton, 2008).

The question of resources needed to meet the academic demands of at-risk student-athletes is especially important to consider in light of the type of institutions that have been consistently penalized for not meeting APR benchmarks. During the 2012-2013 academic year, all teams at the institution used in this study met APR benchmarks; however, during this same time period, 10 of 12 football teams penalized with post-season bans were teams of limited-resource institutions or HBCUs (Kirk, 2014). Limited resource institutions need to consider restricting the number of scholarships available for student-athletes with multiple risk factors by quantifying the APR risk of the entire team. This can be done by creating an institutional model for identifying and quantifying risk. The NCAA's Graduation Risk Overview (GRO) provides a framework for quantifying risk factors (NCAA, 2009b). Based on the availability of resources

needed for academic support, a cap should be placed on the number of scholarships available for at-risk student-athletes by team.

Recommendation five. The results of this study demonstrate the value of fully assessing the academic profile of incoming student-athletes. According to results from this study, a one unit increase in standardized test scores is associated with a 33% decrease in the odds of losing APR points. Therefore, limited-resource institutions can reduce the odds of losing APR points by evaluating APR risk for individual student-athletes through a detailed evaluation of standardized measures. It is unwise to make all decisions based solely on standardized test scores; however, significantly weighting an objective measure of academic achievement that has been shown to reduce APR risk is advisable. According to Gurney (2011), student-athletes are admitted into universities with extremely low test scores and inadequate academic skills creating the need for extraordinary academic support services at institutions already experiencing financial difficulty and overworked staff members. In his article, “*Stop Lowering the Bar for College Athletes*,” Gurney reports his own university spends more than \$2-million annually in academic support services for student-athletes including a host of learning specialists, reading specialists, and tutors for at-risk student-athletes. For limited-resource institutions, the option to merely increase the amount of money spent on academic support does not exist placing these institutions at a distinct disadvantage with respect to meeting APR benchmarks (Bouchet & Scott, 2009).

For limited-resource institutions, efficient, structured academic support programs with targeted interventions in addition to strict guidelines for recruiting and evaluation of team risk is the best way to reduce the risk of not meeting APR benchmarks. For example, pro-active scheduling of tutoring and other academic support services can be beneficial when using

standardized test scores and HSGPAs to evaluate areas of academic deficits. First-generation student-athletes should be provided specialized academic coaching or mentoring to help these students make a successful transition to college. Academic coaching has been found to contribute to the academic success of at-risk student populations including first-generation college students (Bettinger & Baker, 2011). One way limited-resource institutions can provide academic coaches for at-risk student-athletes is to leverage the institution's graduate students from the areas of counseling, psychology, and education. Graduate student interns are generally free help and can provide structured academic mentoring to at-risk student-athletes under the supervision of the academic support staff.

Recommendation six. This study attempted to identify factors beyond traditional cognitive measures that could aid in the prediction of student-athlete academic success; however, the only LASSI composite scale found to be useful in the model predicting CGPA was the Will composite scale. This is not a surprising result given that a student's attitude and motivation with respect to academic should translate into better academic outcomes. Although the predictive validity of the LASSI-II composite scales was limited, the LASSI-II does provide information regarding the need for intervention efforts on scales in which the student scores below the 50th percentile. Using this data, academic support staff can target student-athletes with low academic confidence and motivation toward academic tasks and goals. Suggested interventions include major and career exploration, service learning, and academic coaching. Results from the LASSI-II can help students develop a greater awareness of specific strengths and weaknesses related to learning and study strategies. The LASSI-II is also a diagnostic measure that can help academic support staff match intervention efforts to students with identified needs. The LASSI-II can provide a foundation for planning individual prescriptions

for remediation. Finally, by using the LASSI-II as a pre-post achievement measure, academic support staff can assess the degree of success of intervention efforts.

Implications for Future Research

Recommendation one. The failure of the logistic regression analyses in this study to create a predictive model that met the requirements for goodness of fit for any of the APR predictions is of concern. All logistic regression models were found to be significant but did not adequately fit the data. This result is probably due to the low ratio of APR points retained and lost in this sample. The Hosmer-Lemeshow Goodness of Fit Test may be sensitive to the sample size or the relatively low numbers of APR points lost (Fagerland & Hosmer, 2012). Additionally, the lack of predictive power of the model could be from the limited range of explanatory variables. Specifically, this study did not include measures related to the student-athlete experience during college, nor did the study include sport variables. Future research needs to include larger samples of student-athletes with longitudinal data of both CGPA and APR scores, as well as measures of the student-athlete experience during college.

Recommendation two. Avoiding APR penalties has become a primary concern of NCAA member institutions; therefore, understanding the specific institutional context that affects the academic success of student-athletes is needed. For this reason, it is recommended that institutional specific research to identify the factors most predictive of APR risk be conducted. It would be beneficial for research to be conducted at institutions currently experiencing APR sanctions. While this study focused on an institution that had incurred APR penalties in the past, the current sample of student-athletes were relatively successful academically and none of the teams from which the sample was taken were penalized during the time frame of this study. APR is still a relatively new metric that has not been established as a

valid, reliable measure despite the range of penalties attached to not meeting benchmarks. More research is needed to identify factors predicting APR risk especially research conducted by independent researchers from various institutional types. This information could help institutions create policies with regard to recruiting student-athletes and designing academic support programs for at-risk students.

Recommendation three. There is very little research on APR as a metric and even less research investigating the differential impact of variables on APR-E point loss compared to APR-R point loss. Given the fact that APR-E points are subject to a large number of variables, it is important for future research to look at the differences in eligibility and retention APR point losses. Thomas Paskus (2012) recently wrote a commentary on the quantitative analysis of NCAA academic reform measures. In this commentary, Paskus summarizes data related to APR across all NCAA institutional types. Paskus argues that APR scores have risen across every sport and subgroup examined by the NCAA; however, as Paskus points out APR improvement has not been steady or universal. Of specific concern is the trend for APR scores at HBCUs and limited-resource institutions to have extreme differences in APR scores from year to year. The data outlined by Paskus also points out challenges related to APR-R points may be more nuanced and sport-specific. According to this report, the vast majority of APR-R point losses occur because of transfer student-athletes. The present study did not include an evaluation of transfer status in relation to APR point loss. Therefore, it might be useful to investigate the relationship between transfer status and the loss of specific kinds of APR points.

The NCAA's working Committee on Academic Performance (CAP) has been charged with creating and implementing a plan for higher academic standards both for participation in championships and for the eligibility of individual student-athletes. This committee has

increased the academic standards for student-athletes by modifying the core-course GPA calculation, modifying the sliding scale, and increasing the minimum APR benchmark from 925 to 930 (NCAA, 2013). Given the differential impact of APR on limited-resource institutions, it has been suggested to remove the retention element from APR calculations. However, having student-athletes persist to graduation is an important goal. For this reason, more research on the factors negatively impacting student-athlete retention as calculated by APR-R points is needed. The NCAA Committee on Academic Performance could, however, look at weighting the APR-E point more significantly given the number of academic requirements associated with achieving that APR point as compared to the APR-R point. This may help limited-resource institutions who are adversely affected by the range of sport related variables that may be influencing the ability to retain student-athletes.

Recommendation four. It is recommended that future research include measurements of student academic engagement and other institutional environment factors contributing to the academic success of specific groups of student-athletes to better understand what factors are influencing the loss of retention of APR points. Despite significant differences found on the cognitive predictor variables and the CGPAs between male and female student-athletes, there was virtually no difference in the percentage of males compared to females who lost APR points. This finding suggests the need to research what happens to student-athletes during college. Specifically, it would be beneficial to consider the level of academic support and type of interventions provided for male student-athletes compared to female student-athletes. Additional research should investigate other environmental factors during college that might diminish the academic risk of male student-athletes explaining the non-significant results related to gender

differences and APR scores in this study. The same consideration could be made for studies involving an investigation of first-generation student-athletes and academic success measures.

Recommendation five. This study did not investigate any variables related to student-athlete experiences based on sport. Each team has a culture that may or may not support the academic pursuits of the student-athletes. Several studies indicate a range of sport variables including time dedicated to participation in sport, coaching changes, student-athlete satisfaction with playing time, and other factors directly associated with the type of sport participation could help explain more of the variance in student-athlete academic success. This study also did not examine the presence of academic clustering by majors. Student-athletes clustering in sport-friendly majors can be a significant concern with respect to the quality of education student-athletes receive. It has been argued that student-athletes are guided toward majors with the intent of maintaining eligibility instead of being allowed and encouraged to obtain degrees in which they have legitimate interest (Sanders & Hildenbrand, 2010; Schneider et al., 2010; Upton & Novak, 2008). This could further explain how significantly at-risk student-athletes are able to be successful in college despite coming to college with academic deficits and spending large amounts of time practicing and playing their respective sports.

Recommendation six. It is recommended to investigate the relationship of each of the individual subscales of the LASSI to further delineate which subscales significantly correlate to measures of college student academic success. The instrument does appear to have some utility in providing insight into student's perceptions and beliefs regarding academic enabling behaviors, motivation, and attitudes toward academic tasks; however, developing a scale that is more grounded in expectancy-value theory may prove to be more useful in future research in determining the extent to which a student-athlete's expectancies and beliefs in their own level of

academic competence influencing academic success. The predictive validity and utility of other instruments related to these constructs should be investigated in future research.

The Will composite scale of the LASSI-II in this study was comprised of the Anxiety, Attitude, and Motivation subscales and demonstrated high internal consistency; however, in conducting analysis of scores on the individual subscales, the researcher found a possible suppressor effect between the Anxiety and Motivation subscales. Specifically, many female student-athletes who rated themselves as having high anxiety in relation to their academic performance, which is translated into low scores on the Anxiety scale, also rated themselves as having high motivation. Many male student-athletes rated themselves as having low anxiety leading to high scores on the Anxiety subscale and rated themselves as having low motivation for academic tasks resulting in low scores on the Motivation subscale. These inverse relationships could have impacted the overall score of the Will composite scale meaning that the Will scale could have been more powerful as a predictor variable especially in the analysis of group differences. More scale analysis including a refined measure of the Will construct would be helpful to strengthen the measurement used in this study.

Recommendation seven. Because APR is a team score, more research should be conducted on APR scores by team. It is the team score placing institutions at risk for not meeting APR benchmarks; therefore, risk factors for team scores need to be quantified accordingly. Another consideration should be on the level of spending related to academic support by team and subsequent graduation rates. Future studies should include the analysis of longitudinal data by teams while delineating APR-E loss from APR-R loss. NCAA member institutions are required to keep this data; however, very little independent research has been conducted utilizing these databases.

Recommendation eight. Qualitative research on the student-athlete experience would help enrich the understanding of what happens to student-athletes during college. The demands on student-athletes, the preeminence of the athletic identity, and the level and type of academic challenges could be explored by identifying student-athletes who participate in intercollegiate athletics at a NCAA, DI institution. Exploring the experiences of student-athlete choice of major and the pressure on student-athletes to remain academically eligible could be accomplished with a qualitative or mixed-method research approach. By conducting more in-depth, qualitative research, institutions can gain a better understanding of how the student-athlete experience varies across sport type and specific demographics.

Limitations of the Research

The results of the logistic regression analyses using APR point loss may be attributable to a limitation of the current study. Specifically, the ratio of retained versus lost APR points for student-athletes at these institutions was very low. This low ratio makes predicting the loss of APR points very difficult. For this reason, logistic regression models, while significant, did not meet the criteria for goodness of fit. Increasing the sample size may help increase the accuracy and power of logistic regressions. This study only analyzed the APR loss and academic data of one APR cohort of student-athletes at one institution.

Another limitation of this study is the inability to disaggregate the sample into groups of student-athletes who may have distinctly different risk factors. Future research investigating differences between gender and sport would be useful. Additionally, this research did not include a measure of race or socio-economic status. Both of these measures could provide more information regarding the unique risk for specific groups in relationship to academic success as measured by CGPA and APR.

The sample also included student-athletes at all levels of classification. Cumulative grade point averages are affected by the difficulty and level of coursework; therefore, it would be useful to investigate differences in CGPA for freshmen student-athletes compared to senior student-athletes. Another issue related to a limitation of this study is the lack of consideration of major. Clustering in majors by student-athletes has been observed in previous studies with student-athletes participating in revenue producing sports clustering in relatively easier degree paths (Johnson et al., 2012; O'Bryant, 2012; Paskus, 2012; Ridpath, 2010; Sanders & Hildenbrand, 2010; Schneider et al., 2010). There are many reasons for academic clustering by student-athletes, and there is some research indicating clustering is a common practice found across institutional types. More research is needed to determine the extent of clustering, the impact of clustering on student-athlete academic success, and the reasons why clustering is occurring along sport or demographic lines.

This study did not include a range of variables related to the student-athlete experience during college. It has been argued that traditional theories of college student success are not effective when studying student-athletes because their experiences during college are shaped by their participation in sport (Comeaux & Harrison, 2011). There is a range of variables related to the academic culture of the team, time demands for sport participation, and satisfaction with playing time that were not investigated in this study. Pre-college measures are limited in utility because what happens during college can provide protections and supports for traditionally at-risk student-athletes preventing or mitigating academic difficulties and deficits. Coaching changes and team performance can also influence student-athlete motivation and academic performance (Johnson et al., 2012). Quantitative analysis is limited to providing a broad outline

of what is actually happening during college. Extending research to more qualitative assessments could help improve predictive models in the further.

Significance of the Study

The disparate impact of APR penalties on NCAA, Division I limited-resource institutions is a significant concern for those particular institutions and the NCAA who designed the APR metric. According to Bouchet & Scott (2009), BCS institutions are less likely to be penalized for not meeting minimum APR benchmarks than non-BCS institutions. Further, BCS institutions spent an average of \$34 million more than non-BCS schools on athletics (Batley, 2011; Bouchet & Scott, 2009; Wolverton, 2008). The present study is beneficial because the sample was a specific cohort of student-athletes from a non-BCS institution meaning these student-athletes participated in intercollegiate athletics under the same institutional context. In depth analysis of individual rather than institutional conditions provides information regarding individual conditions predictive of academic difficulty or APR point loss. This study yields information that can be used for diagnostic and prescriptive purposes aiding academic support staff in the design of targeted interventions.

This study adds to the knowledge of factors predictive of the academic success of student-athletes as measured by both CGPA and APR scores. Most importantly, this study attempts to provide a framework for evaluating contributing factors to APR point loss using the expectancy-value theory. Extending the range of variables used to evaluate academic risk is especially important for limited-resource institutions, which must quickly identify areas of academic weakness and design efficient and effective academic support plans. This study examined three newly constructed composite scales from the ten scales of the LASSI-II. Although the Will composite scale was the only learning and study strategy variable to

significantly contribute to the model predictive of CGPA, these results indicate the need to include a measure of student perceptions of motivation and attitude toward academics for evaluation of academic risk. All student-athletes must maintain an acceptable GPA for continuing eligibility and graduation; therefore, understanding the relationship between a combination of factors and CGPA is vital for effective academic planning and interventions. Additional data from subsequent groups of student-athletes would allow for comparative studies to evaluate the utility of the predictor variables used in this study.

This study utilized the same data set and predictor variables to compare results from analyses of CGPA and APR scores. If both outcome variables measure academic success, it was reasoned that variables predictive CGPA would also contribute to the prediction of APR point loss. The only variable found to contribute consistently to all predictive models was standardized test scores. Additionally, this study added to the knowledge of APR-E loss and APR-R loss. Separate logistic regression analyses of APR, APR-E, and APR-R points lost revealed differences between the variables predicting each of these outcomes.

This study revealed the presence of significant differences between male and female, first-generation and non-first-generation, and revenue and non-revenue student-athletes on both pre-college cognitive measures indicating these student-athletes are in need of differentiated academic support. Because these differences were not seen in the APR analyses, it could be possible that the current academic support program and interventions may be successfully mitigating these pre-college differences of at-risk groups in effect masking the APR risk. This study then provides justification for studying within college variables that could explain this result. Differences were also present on the learning and study strategy composite scales most notably between first-generation and non-first-generation student-athletes. Knowledge of these

differences could aid in the development of specific workshops or interventions for this particular demographic.

Summary and Final Thoughts

In general, the power of cognitive measures to predict the academic success of student-athletes overshadowed the contribution of the learning and study strategy variables included in this study. Standardized test scores were found in all analyses to have predictive power with respect to the prediction of CGPA, APR point loss, APR-E point loss, and APR-R point loss. However, the ratio of retained APR points in relationship to lost APR points, as well as the absence of other possible factors including measures of the level of academic support and sport variables limited the predictive validity of the logistic regression models.

For limited-resource institutions, the evaluation of individual risk factors is helpful; however, as recommended by Paskus (2012), teams or institutions facing APR trouble should evaluate the magnitude of risk in the aggregate and make appropriate adjustments to reduce the risk of facing APR penalties. While the individual evaluation of academic risk factors helps academic support personnel create effective and efficient academic intervention plans for at-risk student-athletes, it may be the aggregate risk that adds to the burden of limited staff and resources that significantly contributes to APR point loss. This complex evaluation process takes time and expertise of professionals that many limited-resource institutions do not possess. Institutions need to spend time and resources to evaluate not only the individual risk of student-athletes in terms of academic success and APR scores, but institutions must also manage the APR risk of teams. Recommendations include capping the number of at-risk students on each team, enhancing the academic support structure that evaluates individual and aggregate risk, and supporting the efforts of academic support staff.

The bigger question with respect to APR is whether the metric truly measures what it is intended to measure, that is academic success. If APR is a valid measure of academic success, then the metric should have a strong correlation to CGPA and not just graduation rates, and more specifically, to team GPA since APR is a team score. The goal should not be to graduate a specific percentage of student-athletes regardless of the quality of the academic experiences. Rather, the goal should be for student-athletes to maximize their academic potential in college. A student-athlete's GPA may be a better measure indicating the quality of the educational experience and opportunity rather than graduation rates alone. Additionally, if student-athletes are clustered into majors that are not of interest or applicability to their academic goals, then the quality of education provided to these students is seriously diminished. It has been argued that progress toward degree rules, which are included in APR eligibility rules, negatively influence a student-athlete's choice of major. The goal of any academic reform initiative should have at its core the interest of the student-athlete and not place pressure on those student-athletes to remain eligible at any cost. Essentially, any metric that is used in decisions involving serious penalties to the individual student-athlete, the team, or institution should be held to strict psychometric standards and be subject to scrutiny by independent researchers, not just the NCAA.

A more important question is the institutional response to APR. Avoiding APR penalties has become a prime directive for NCAA, Division I institutions. These penalties damage the academic reputation of the institution and diminish the institution's ability to recruit and compete at this level. The fact that over 90% of APR penalties have been handed down to limited-resource institutions and HBCUs indicates an unequal playing field and this speaks to a greater problem of equity. How can institutions of higher education justify doubling the money spent on academic support for one small group of students at the same time college student debt has

grown exponentially and many students who want to go to college cannot afford to do so? Should institutions spend even more money on a specific group of students many of whom come to college with significant academic deficits and do not even have the desire to be in college or graduate? Rather, for many student-athletes college is a training ground for future athletic pursuits. From an institutional perspective, can this disparity in academic support and financial resources be justified? All of these questions speak to the cultural impact of intercollegiate athletics on the primary purpose of higher education. While the academic success of student-athletes is a worthy goal, each institution must evaluate how to best achieve this goal in light of the overall mission of the institution.

In summary, this study sought to understand the degree to which cognitive, learning and study strategy variables are related to student-athlete academic success at an NCAA, Division I limited-resource institution. This study used pre-college cognitive measures, demographic variables, and scores from the LASSI-II to create a model predictive of student-athlete academic success as measured by CGPA and APR scores. The results were mixed in that the models predicting APR point loss did not fit the data adequately. More research needs to be conducted to investigate other factors predictive of APR point loss at limited-resource institutions. Overall, however, this study did confirm the utility of using a combination of standardized test scores, HSGPA, scores on the Will composite scale of the LASSI-II, gender, and generational status to predict student-athlete academic success as measured by CGPA. Further research needs to include measures of what happens during college to student-athletes especially with regard to the type and level of academic support, as well as the institutional conditions necessary for student-athletes to be successful academically especially at NCAA, Division I limited-resource institutions.

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APPENDICES

Appendix A

Definition of Variables

DEPENDENT VARIABLES	
<i>Cumulative GPA (CGPA)</i>	Grade point averages are calculated for each student-athlete according to institutional guidelines. Cumulative GPA is a variable that is consistently viewed as an academic success outcome measure for college students.
<i>Academic Progress Rate Points (APR-E -& APR-R)</i>	APR-E points are earned by each student-athlete who meets all academic eligibility rules, and APR-R points are earned when the student-athlete is retained or graduates from the institution. This criterion variable will be measured as a dichotomous variable with student-athletes coded as 1 for lost APR points and 0 for no lost APR points.
INDEPENDENT VARIABLES (Traditional Cognitive)	
<i>High School Core Grade Point Average (HSGPA)</i>	This variable is used by the NCAA as part of the sliding scale to determine the initial eligibility status of student-athletes. This continuous predictor variable was obtained from the institution's NCAA compliance director who obtains this information from the NCAA's eligibility database.
<i>Standardized Test Scores</i>	This variable is used by the NCAA as part of the sliding scale to determine the initial eligibility status of student-athletes. This predictor variable was obtained from the institution's NCAA compliance director who obtains this information from the NCAA's eligibility database.
INDEPENDENT VARIABLES (Learning and Study Strategies)	
<i>Skill</i>	This variable is composed of three subscales from the LASSI-II: Information Processing, Selecting Main Idea, and Test Strategies. The skill component measures a student's beliefs about his or her ability to construct meaning from newly acquired knowledge, ideas, and information and the degree to which the student prepares for and demonstrates the acquisition of new knowledge on tests or exams.
<i>Will</i>	This variable is composed of three subscales from the LASSI-II: Anxiety, Attitude, and Motivation. The will component measures a student's receptivity to learning new information, his or her attitude and interest in college-level learning, diligence and self-discipline related to academic tasks, the willingness to exert the effort needed to be academically successful in college, and the degree to which the student becomes anxious about academic performance.
<i>Self-Regulation</i>	This variable is composed of four subscales from the LASSI-II: Concentration, Self-Testing, Study Aids, and Time Management. The self-regulation component measures a student's beliefs about his or her ability to manage the learning process including the ability to self-regulate, maintain concentration, to use study support systems such as tutoring or review sessions, and to effectively manage their work and time during college.

Appendix B

NCAA Academic Requirements at a Glance

ACADEMIC CLASS (Semester of full-time enrollment)	NCAA CONTINUING ACADEMIC ELIGIBILITY REQUIREMENTS
FRESHMAN	<ul style="list-style-type: none"> ✓ Enrolled in 12 credit hours at all times to compete and practice ✓ Must complete a minimum of 6 hours in the previous full time regular academic term ✓ Must complete a minimum of 18 hours during the regular academic year (fall & spring)
SOPHOMORE (entering 3 rd semester)	<ul style="list-style-type: none"> ✓ Must have earned at least 6 credits each semester ✓ Minimum of 18 credit hours must be earned during the fall and spring semesters ✓ Must earn a minimum of 24 credit hours (can use summer school hours to meet 24) ✓ Developmental or remedial hours used to meet 24 credit hour rule cannot be used to satisfy credits toward degree ✓ 90% (1.8 GPA) of minimum cumulative grade point average for graduation each semester
JUNIOR (entering 5 th semester)	<ul style="list-style-type: none"> ✓ Must have earned at least 6 credit hours each semester ✓ Must have earned at least 18 credit hours during the regular academic year (fall & spring) ✓ Must have officially declared a major with paperwork on file in the Registrar's office and entered in Banner system ✓ 95% (1.90 GPA) of minimum cumulative grade point average for graduation each semester ✓ 40% of degree must be completed ✓ Graduation audits must be completed prior to the end of the 6th semester
SENIOR (entering 7 th semester)	<ul style="list-style-type: none"> ✓ Must have earned at least 6 credit hours each semester ✓ Must have earned at least 18 credit hours during the regular academic year (fall & spring) ✓ 100% (2.00 GPA) of minimum cumulative grade point average for graduation each semester ✓ 60% of degree must be completed
5TH YEAR SENIOR (entering 9 th semester)	<ul style="list-style-type: none"> ✓ Must have earned at least 6 credit hours each semester ✓ Must have earned at least 18 credit hours during the regular academic year (fall & spring) ✓ 100% (2.00 GPA) of minimum cumulative grade point average for graduation each semester ✓ 80% of degree must be completed
<ul style="list-style-type: none"> • <i>All student-athletes must be considered in good standing as defined by their major department/college</i> • <i>Once a student-athlete has declared a major, all applicable hours used towards meeting the satisfactory progress requirements must be applicable toward the student's designated degree program</i> 	

Appendix C
Cooperating Institution IRB Approval



201 Bibb Graves

5284

MEMORANDUM

TO: Janet Moore



FROM: 
Secretary, IRB

DATE: February 4, 2014

SUBJECT: Human Subjects Review Board Application

Your proposal submitted for exempt review by the Human Participants Review Protocol for the project titled: **“Cognitive, Learning & Study Strategy Predictors of Student- Athletic Academic Success and Academic Performance Rates”** reviewed and approved. If the project is still in process one year from now, you are asked to provide the IRB with a renewal application and a report on the progress of the research project.

Appendix D

IRB Approval

March 7, 2014
Janet Moore ELPTS
College of Education
Box 870302

Re: IRB#: 14-OR-067 "Cognitive, Learning and Study Strategy Predictors of Student-Athlete Academic Success and Academic Progress Rates"

Dear Ms. Moore:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. You have also been granted the requested waiver. Approval has been given under expedited review category 5 as outlined below:

(5) Research involving materials (data, documents, records or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis)

Your application will expire on March 6, 2015. If your research will continue beyond this date, complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants.

When the study closes, complete the appropriate portions of the IRB Request for Study Closure Form.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research. Sincerely,



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