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Relationships Between Institutional Characteristics and Student Retention and Graduation Rates  
at SACSCOC Level III Institutions

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A dissertation

presented to

the faculty of the Department of Educational Leadership And Policy Analysis

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Doctor of Education in Educational Leadership

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by

Kala Jenea Perkins-Holtsclaw

May 2018

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Dr. Bethany Flora

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Keywords: Student Retention, Graduation Rates, Institutional Characteristics, Persistence

## ABSTRACT

### Relationships Between Institutional Characteristics and Student Retention and Graduation Rates at SACSCOC Level III Institutions

by

Kala Jenea Perkins-Holtsclaw

As the United States struggles to be globally competitive with the number of students completing a college degree higher education leaders continue seeking answers to improving student retention and graduation rates. Decades of research has been conducted on investigating factors that impact student retention and graduation with the majority of that research being centered on student attributes and students' precollege characteristics. Research has been limited on institutional characteristics and their associations with student retention and graduation rates. Therefore the purpose of this study was to examine the extent that specific institutional characteristics predict first-year, full-time, fall-to-fall retention rates and 6-year graduation rates. The sample for this study consisted of 4-year institutions in the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) region that have been granted Level III accreditation status and also report data annually to the Integrated Postsecondary Data System (IPEDS). All data used for this research were publicly available archival data available from IPEDS. Sixteen research questions were investigated about institutional student variables, environment variables, resource variables, financial variables, and interaction variables. Multiple linear regressions were conducted for all research questions, representing the statistical method of analysis.

The findings showed that the most useful predictors for retention rates were students scoring at or above the 75<sup>th</sup> percentile ACT scores, physical library collections, expenditures for academic support, and tuition and required fees. When investigating to what extent institutional characteristics predict 6-year graduation rates the findings showed that 75<sup>th</sup> percentile ACT scores, physical library collections, expenditures for instruction, the percentage of full-time faculty, and cost were the most useful predictors. Findings also showed that student-faculty ratios and the percentage of full-time faculty were not significant predictors for student retention. Some institutional predictor variables may be significant predictors for both retention rates and graduation rates, while other predictor variables may be significant predictors for only one of the criterion variables.

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## DEDICATION

I would first like to dedicate this work to my late grandmother, Charlotte Perkins. She passed away the first semester of this program. Although her passing has been difficult, she has been with me every step of this journey. She always supported me in my endeavors, regardless of how difficult and ambitious they seemed. She believed in me from the very beginning, and I long to make her proud.

I would also like to dedicate this work to my husband Roger and my daughter Angelina. Thank you for your love and support throughout this program. Completing this doctoral program required sacrifice, and I would like to thank you for your willingness to stand by me and for your encouragement when times were tough. Thank you both for believing in me and supporting me every step of the way.

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## CHAPTER 1

### INTRODUCTION

The changing landscape of the American economy, increased competition in the job market, and employers' desire for knowledgeable, skilled workers has resulted in increased interest in higher education by American high school graduates over the last 50 years. The need for students to pursue postsecondary credentials has significantly grown during that time. With the demand for higher education on the rise, many students are pursuing higher education today that may not have considered it in the past. Over a half-century ago, pursuing a postsecondary degree was not viewed as an essential next step for most American high school graduates (Baum, Kurose, & McPherson, 2013).

During that time period in American history, there were many opportunities for students to find jobs that did not require a postsecondary credential to support their families. In 1960 there were 4 million American high school graduates who decided to enroll in postsecondary education. In 2009 the number of American high school graduates enrolling in postsecondary education had grown to 20 million (Baum et al., 2013). This influx in student enrollment has created many challenges for colleges and universities. One of the greatest challenges has been retaining those students through completion of their degree programs. Student retention has been and remains one of the most significant challenges facing institutions in American higher education (Jones & Braxton, 2009).

Despite over 75 years of empirical research devoted to identifying causes that lead to students dropping out and proposing ways to keep students persisting toward graduation, statistics indicate little progress has been made on student retention (Jones & Braxton, 2009). Over 56% of college students who drop out do so before the beginning of their second year, and one fourth of all college students enrolled in 4-year institutions drop out by the end of their first

year (Tinto, 1993, 1999). More than 47% of students who begin a degree program at a 4-year institution fail to earn a degree at that institution (Tinto, 1999). The United States has fallen from first to 16th in the world in the number of students completing college degrees (Joyce, 2010). Research has shown there is not a single reason for student attrition, and determining, as well as overcoming, the factors that lead to student attrition has proven to be difficult tasks for institutional leaders (Tinto, 1999).

Many studies have investigated student attributes as well as institutional characteristics that impact students' decisions to leave an institution before degree completion. Students enter higher education with a variety of educational backgrounds, age groups, and ethnicities. Many students lack the prerequisite skills needed to successfully complete a higher education degree, and institutions may lack the resources students need to persist toward degree completion. Researchers have been trying to determine the impact of institutional characteristics on student performance and retention for many years, as many colleges and universities have the responsibility of helping students from all educational backgrounds, age groups, and ethnicities succeed in their pursuit of a college degree (Toutkoushian & Smart, 2001).

Historically retention research has focused more on studying student attributes and characteristics, rather than institutional behaviors and characteristics that lead to student retention and graduation. Understanding institutional characteristics is important because they impact the experiences of all students, rather than retention strategies that target specific student populations and groups. First-year retention rates and 6-year graduation rates are two common measures by which stakeholders assess the institutional effectiveness of an institution (Gansemer-Topf & Schuh, 2006). As a result institutional leaders are eager to determine if specific institutional behaviors and characteristics have positive implications on retention and graduation rates.

## **Statement of the Problem**

A preponderance of research has focused on the association between student attributes and retention and graduation rates at 4-year colleges and universities. However, recent research has been limited on the institutional characteristics of private 4-year colleges and universities and their associations with student retention and graduation rates. Investigating the association between institutional characteristics and student retention and graduation is an important initiative at most institutions regardless of institutional type.

At many institutions student tuition is a critical component of the institutional budget and many smaller institutions rely on student enrollment and tuition to maintain operations (Barr & McClellan, 2010). As a result institutional leaders are eager to determine how well their specific institutional characteristics can be used to predict student retention and graduation rates.

Therefore, the purpose of this nonexperimental, quantitative study was to examine the extent in which institutional characteristics predict first-year, full-time, fall-to-fall retention rates and 6-year graduation rates for full-time undergraduate students at 4-year colleges and universities that have been granted Level III accreditation status by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC). The independent variables were institutional characteristics as defined by institutional student attributes, environment variables, resource variables, financial variables, and student and faculty interaction variables. The dependent variables were first-time, full-time, fall-to-fall retention rates and 6-year graduation rates of full-time, undergraduate students.



## Research Questions

The research questions of this study were to determine the extent to which specific institutional characteristics predict first-time, full-time, fall-to-fall retention rates and 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions. More specifically, the following research questions were investigated:

1. Is there a significant relationship between a linear combination of institutional predictor variables (25<sup>th</sup> percentile ACT scores, 75<sup>th</sup> percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell grants, and federal student loans) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
2. Is there a significant relationship between a linear combination of institutional environment predictor variables (size, institution type, and cost) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
3. Is there a significant relationship between a linear combination of institutional library resource predictor variables (physical library collections and number of electronic library collections) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
4. Is there a significant relationship between a linear combination of institutional finance predictor variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and the

- criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
5. Is there a significant relationship between a linear combination of institutional interaction predictor variables (student-faculty ratio and percentage of full-time faculty) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
  6. Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional finance predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
  7. Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
  8. Is there a significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
  9. Is there a significant relationship between a linear combination of institutional predictor variables (25<sup>th</sup> percentile ACT scores, 75<sup>th</sup> percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the

- forms of grants/scholarships, Pell grants, and federal student loans) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
10. Is there a significant relationship between a linear combination of institutional environment predictor variables (size, institution type, and cost) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
  11. Is there a significant relationship between a linear combination of institutional library resource predictor variables (physical library collections and number of electronic library collections) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
  12. Is there a significant relationship between a linear combination of institutional finance predictor variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
  13. Is there a significant relationship between a linear combination of institutional interaction predictor variables (student-faculty ratio and percentage of full-time faculty) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
  14. Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional finance predictor variables when predicting 6-

- year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
15. Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
16. Is there a significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

### **Significance of the Study**

Increased accountability from stakeholders and the debate over cost efficiency in higher education has caused many higher education administrators to become more interested in the topics of student retention and graduation in recent years. Some institutional characteristics are beyond the scope of a campus administrator, such as public or private institutional status. However, administrators and campus personnel do have influence over other institutional characteristics such as mission, size, and selectivity (Toutkoushian & Smart, 2001).

Over the years many academics have argued that institutional characteristics should have an influence on student achievement and retention. Tinto (1975) reported that institutional characteristics impacted student retention because student development and integration can be impacted by institutional library resources. Several economists have also compared the impact of institutional characteristics on student achievement to the impact of a business firm's characteristics on the quality of products and services (Toutkoushian & Smart, 2001).

Pascarella (1991) noted the largest number of empirical investigations in higher education has been studying the impact of colleges on student gains. However, the empirical evidence to date is very limited and provides very little guidance for institutional leaders. While some studies found institutional characteristics to contribute to student success, the majority of studies have considered institutional characteristics to contribute very little to student achievement (Toutkoushian & Smart, 2001).

The disconnect among theories on factors affecting student retention and graduation and empirical evidence related to institutional characteristics was the inspiration behind this study. This study seeks to examine to what extent institutional characteristics predict first-year, fall-to-fall retention rates and 6-year graduation rates for full-time undergraduate students at 4-year colleges and universities that have been granted Level III accreditation by Southern Association of Colleges and Schools Commission on Colleges (SACSCOC).

### **Definitions of Terms**

The following definitions of terms are provided on the basis of their use within the context of this study:

First-year student- A first-year student is a student who has completed less than the equivalent of one full year of undergraduate work, which is less than 30 semester hours in a 120-hour degree program or less 900 contact hours (IPEDS, 2016-2017).

4-year institution- A 4-year institution is a postsecondary institution that offers programs of at least 4 years duration or one that offers programs at or above the baccalaureate level. This term includes schools that offer post-baccalaureate certificates only or those that offer graduate programs only. It also includes free-standing medical, law, or other professional schools (IPEDS, 2016-2017).

Full-time undergraduate student- A full-time undergraduate student is a student enrolled for 12 or more semester credits, or 12 or more quarter credits, or 24 or more contact hours a week each term (IPEDS, 2016-2017).

Graduation rate- Graduation rate is the rate required for disclosure and/or reporting purposed under Student-Right-to-Know Act. This rate is calculated as the total number of completers within 150% of normal time divided by the revised adjusted cohort (IPEDS, 2016-2017).

Institutional characteristics- Institutional characteristics is an annual component in the core of the IPEDS system and that is required of all currently operating Title IV postsecondary institutions in the United States and other areas. This component collects the basic institutional data that are necessary to sort and analyze not only the institutional characteristics data, but also all other IPEDS data. Institutional characteristics data are collected for the academic year, which generally extends from September of one calendar year to June of the following year. Specific data elements currently collected for each institution include institution name, address, telephone number, control or affiliation, calendar system, levels of degrees and awards offered, types of programs, application information, student services, and accreditation. The institutional characteristics component also collects pricing information including tuition and required fees, room and board charges, books and supplies and other expenses for release on College Navigator (IPEDS, 2016-2017).

IPEDS- The Integrated Postsecondary Education Data System (IPEDS) is a data collection process conducted by the National Council of Education Statistics that began in 1986 and involves annual institution-level data collections. All postsecondary institutions that have a Program Participation Agreement with the Office of Postsecondary Education, U.S. Department of Education are required to report data using a web-based data collection system. IPED

currently consists of the following components: Institutional Characteristics; 12-month Enrollment; Completions; Admissions; Student Financial Aid; Human Resources composed of Employees by Assigned Position, Fall Staff, and Salaries; Fall Enrollment; Graduation Rates; Outcome Measures; Finance; and Academic Libraries (IPEDS, 2016-2017).

Level III SACSCOC accreditation status- The Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) has defined Level III accreditation status as a classification for member institutions being accredited to offer up to a master's level degree, as the highest degree program offered (SACSCOC, 2017).

Postsecondary education- Postsecondary education is the provision of a formal instructional program whose curriculum is designed primarily for students who are beyond the compulsory age for high school. This includes programs whose purpose is academic, vocational, and continuing professional education, and excludes avocational and adult basic education programs (IPEDS, 2016-2017).

Private institution- A private institution is an educational institution controlled by a private individual(s) or by a nongovernmental agency, usually supported primarily by other than public funds, and operated by other than publicly elected or appointed officials. These institutions may be either for-profit or not-for-profit (IPEDS, 2016-2017).

Retention rate- Retention rate is a measure of the rate at which students persist in their educational program at an institution, expressed as a percentage. For 4-year institutions this is the percentage of first-time bachelors (or equivalent) degree-seeking undergraduates from the previous fall who are again enrolled in the current fall. For all other institutions this is the percentage of first-time degree/certificate-seeking students from the previous fall who either re-enrolled or successfully completed their program by the current fall (IPEDS, 2016-2017).

### Southern Association of Colleges and Schools Commission on Colleges (SACSCOC)-

SACSCOC is the regional body for the accreditation of degree-granting higher education institutions in the Southern states. It serves as the common denominator of shared values and practices among the diverse institutions in Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, Virginia, and Latin America and other international sites approved by the Commission that award associate, baccalaureate, master's, or doctoral degrees (SACSCOC, 2017).

### **Limitations and Delimitations**

This study was limited by the appropriateness of the theoretical framework in determining how well institutional characteristics can predict first-year, fall-to-fall retention rates and 6-year graduation rates. It was assumed that the Integrated Post-Secondary Education Data System (IPEDS) surveys used for data collection were valid and reliable. It was also assumed that the methodology adequately addressed the research questions. In addition, it was assumed that the statistical tests were appropriate and had the power to identify differences in variables if differences were present. It was assumed that the institutions completed the IPEDS surveys accurately and followed the same set of instructions and procedures.

This study was delimited to 4-year colleges and universities that had been granted Level III accreditation status by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) and to institutions that annually report data to IPEDS. The study is also delimited to specific institutional characteristics reported by institutions to IPEDS. The results may be generalizable to 4-year colleges and universities that have been granted Level III accreditation status by the Southern Association of Colleges and Schools Commission on Colleges and that also report data to IPEDS.



## **Overview of the Study**

This study is organized into five chapters. Chapter 1 includes an introduction to the study, presenting the background of the problem, the statement of the problem, the significance of the study, the research questions, limitations and delimitations, and definitions of terms. Chapter 2 is a review of literature presenting dominant theories on student retention, factors affecting student retention, research prescribed ways of improving student retention and graduation rates, and the institutional importance of improving retention and graduation rates. Chapter 3 is an explanation of the research methodology chosen for this study including an introduction, a rationale for choosing a quantitative design, the research questions and null hypotheses, the population, and an explanation of the data collection and data analysis methods. Chapter 4 includes the findings for all of the research questions. The study concludes in Chapter 5 with a summary of the findings and recommendations for practice and future research.

## CHAPTER 2

### LITERATURE REVIEW

The benefits of higher education are significant to individuals and nations alike. In the United States individuals who attend college and complete a bachelor's degree earn over one million dollars more during their lifetimes than individuals with no postsecondary credential. The national benefits of higher education are evident in a range of issues including healthcare, unemployment, voting, poverty, school readiness, volunteerism, and incarceration rates. Over the past several decades the government and numerous organizations have worked to improve access to higher education for all citizens regardless of socioeconomic or ethnic factors (Tinto, 2012).

Between 1980 and 2011 enrollment in higher education more than doubled from 9 million students to 20 million students. Although the United States has been very successful in increasing access to higher education, there has been a gap in translating access to degree completion. Enrollment in higher education dramatically increased between 1980 and 2011. However, the completion rates have only slightly increased during that same period. Slightly over half of the students entering a 4-year institution during those years earned a bachelor's degree from that same institution. Some students took longer than 4 years to complete a degree while other students transferred to a different institution or completely withdrew from higher education (Tinto, 2012). As a result investigating ways to improve student retention and success have become higher institutional priorities.

As graduation rates have declined in both public and private sectors student retention has become a primary concern for institutional leaders (Kalsbeek & Hossler, 2010). Theoretical models dating back to 1970 have been used as valuable tools for improving student retention and

success (Kerby, 2015). Research on student retention has become more important, as institutions compete for the best students and the highest graduation rates (Sandler, 2000).

Empirical and prescriptive literature exists to guide institutional leaders on improving student retention and graduation rates. However, nationally institutions have seen minimal success using existing models (Reason, 2009). The variety of influences that shape a student's decision to leave an institution are boundless; thus, creating an insurmountable challenge for institutional leaders as they attempt to provide students with the academic and student support services needed to retain them year after year. A review of literature exploring the theoretical frameworks of student retention, investigating student and institutional characteristics that impact student retention and discussing ways to improve student retention is presented.

## **Theoretical Frameworks on Student Retention**

### **Classical Theory on Student Retention**

Early theoretical models of student retention were derived from the works of 19<sup>th</sup> and 20<sup>th</sup> century classical, social theorists such as Karl Marx, George Mead, and Emile Durkheim (Kerby, 2015). Social theories such as social alienation and suicide, were investigated in comparison to the isolation, separation, and alienation felt by first-year college students as they transitioned into postsecondary education. As cited in Metz (2004), Marx researched social structures and the transformation of individuals and communities over time that caused social alienation. Meade investigated the concept of the social ideal, and Durkheim's theories on suicide served as the foundation for many prominent student retention models (Metz, 2004).

Durkheim (1997) developed three categories to explain the phenomenon of suicide: egoistic, altruistic, and anomic. Durkheim proposed that egoistic suicide derived from an

individual's lack of successful integration into society, either by intellectual or social reasons (Durkheim, 1997). Altruistic suicide was categorized by an individual's intense integration into society, and anomic suicide resulted from unstable social change (Durkheim, 1997). Each of Durkheim's theories served as a fundamental basis for the earliest student retention research. Theories by Van Gennep, Spady, and Tinto have all been traced back to Durkheim (Metz, 2004).

Expanding on Durkheim's theories, Van Gennep studied individual rites of passage, as people moved from one stage of life to another. Van Gennep wrote that the move across stages was celebrated, or marked, by the presence of socially significant events. Those social events served as evidence of successful integration into the next stage or social setting (Metz, 2004).

Spady (1970) also proposed a theory of student attrition based on Durkheim's suicide research. Although Durkheim focused on an individual's permanent withdrawal from society, Spady focused on student movement from one setting to another. Spady viewed student attrition as the interaction between the individual student and the college environment in which student interests, attitudes, and skills connect with faculty members, administrators, and peers to provide students with successful opportunities to assimilate into the institutional society. Spady suggested that college students have specific goals and characteristics and concluded that academic performance has the potential to heavily influence student behavior (1970). The theories of Spady and Van Gennep were expanded by Vincent Tinto to set the stage for some of the earliest theoretical frameworks of student retention (Metz, 2004).

### **Theoretical Models of Student Retention**

Early theoretical models attempted to explain and measure factors that caused students to withdraw from college before degree completion, and much emphasis was placed on institutional

social structures. Tinto compared Van Gennep's ideas about rites of passage to students who are faced with the navigation of higher education and the need to acclimate to a new environmental setting. Tinto's research focused on the importance of that acclimation to student success and retention (Tinto, 1975). Grosset (1991) claimed that the publication of Vincent Tinto's 1975 Student Integration Model changed the focus of retention research and set the stage for the national dialogue that is ongoing today.

Tinto studied the relationship between student retention and social integration. Tinto's theory on student departure viewed departure as a process that occurs over time as a direct result of students' interactions with their campus environment. Tinto identified two dimensions of integration students develop with an institution, academic integration and social integration (Tinto, 1975). Jones (2010) supported Tinto's definition of academic integration as the level of comfort students exhibit with the academic expectations of the institution.

Tinto (1975) described social integration as the parallelism between students and the social constructs of an institution. Tinto perceived that students receive social rewards such as peer affiliation and social support from faculty and peers through social integration. Tinto's Social Integration Model theorized that students are more likely to graduate if their commitment to the institution increases by socially integrating with the campus community. Tinto proposed that increased academic and social integrations lead students to greater goal and institutional commitment, which positively influences student persistence to graduation (Tinto, 1975). Tinto researched student retention for over 3 decades by investigating the processes that lead to student attrition, the need for students' expectations to be consistent with institutional missions, and the transitions students face as they move from enrollment to graduation (Demetriou & Schmitz-

Sciborski, 2011). Alexander Astin was also a prominent retention theorist in the 1970s and 1980s (Astin, 1975).

Astin (1975) proposed a model of student development that described how students develop during the college experience. Astin identified three key elements that influence students' persistence to graduation. The three elements were student demographics and prior experiences; the environment a student experiences during college years; and student characteristics such as attitude, knowledge, and beliefs (Demetriou & Schmitz-Sciborski, 2011). Morrison (2012) and others continued supporting Astin's quest of understanding the relationship between student characteristics and degree completion (Morrison, 2012).

One of Astin's (1975) most notable theories was the theory of student involvement that documented the relationship between student involvement and student retention. Astin theorized that students' involvement with an institution relates to their learning and retention. The theorist argued that student involvement with the institution relies heavily on the formation of academic relationships and participation in campus activities. Astin later generalized the model to explore the effects of peer groups on individual student development (Astin).

Concluding almost 30 years of research, Astin (2005) proposed that degree completion rates are a primary result of entering student characteristics. The theorist attributed two thirds of the variation found in graduation rates to students' individual characteristics. Astin also found that academic performance, retention, and learning are all positively affected by students' involvement with peers and forming academic relationships with faculty (Salinitri, 2005). The classical and theoretical works of Spady, Astin, and Tinto set the stage for empirical models of student retention.

## **Empirical Models of Student Retention**

In 1980 John Bean developed an empirical model of student retention based on the theoretical models earlier proposed by Spady, Astin, and Tinto. Bean applied theories of organizational behavior to reasons for student retention or student attrition. Bean's (1980) research focused on factors influencing student dropout and compared leaving college to workers leaving jobs in the workforce. Applying the concept of job turnover to higher education, Bean proposed that the reasons for student attrition could be similar to the reasons for employee departure.

Eckles and Stradley (2012) cited Bean as merging Spady's social integration model with Tinto's work on student commitment to develop a causal model of student retention that incorporated student attitudinal variables. If social integration influences student attitudes, then Bean proposed that the decision to stay at an institution would also be affected (Eckles & Stradley, 2012). Bean concluded that student attrition is impacted by student background characteristics, student interactions with the institution, environmental variables, attitudinal variables, and student intention. In 1980 Bean proposed a revised empirical model that revealed socialization with peers as being more influential in retaining students than informal contact with faculty, and that students may play a greater role in their socialization than previous research suggested (Bean, 1980).

Demetriou and Schmitz-Sciborski (2011) cited Bean as continuing to explore the importance of students' background characteristics before entering higher education. The background characteristics on which Bean focused were academic performance, socioeconomic status, distance from home, and student satisfaction. Other researchers also investigated potential influences on student retention and student attrition.

Pascarella and Terenzini (1980) expanded the models of Spady, Tinto, Astin, and Bean to develop empirical models on student retention using academic and social integration as a basis to investigate student intent. The researchers proposed that student attrition could be prevented by implementing well developed institutional interventions if the interventions included the swift identification of high risk students. The empirical evidence showed that interactions between faculty and staff represented the type of institutional interventions that strongly influenced student intent and retention (Pascarella & Terenzini, 1980). In response to social integration theories of student retention, a second wave of retention theories emerged.

### **Multicultural Theories on Student Retention**

The second wave of theories were collectively labeled as multicultural theories on student retention. Proponents of social integration theories placed the onus on students to develop a connection with the institution, whereas, multicultural theories called on the institutions to take the lead in helping students make those connections. Multiculturalists argued that institutions alienated students of color through monocultural practices. Multiculturalists promoted the view of students as members of cultural groups rather than individuals. Multicultural theorists challenged the historical institutional structure by striving to transform institutions into arenas more accepting of diverse populations (Maldonado, Rhoades & Buenavista, 2005).

Stemming from multicultural theories, Gosman, Dandridge, Nettles, and Thoeny (1983) studied the relationship between race and student progression. The researchers sought to provide a better understanding of the differences black and white students face when persisting to degree completion by focusing on implications of racial differences and removing peer and institutional characteristics from the equation. Students at 15 universities participated in the study. The



findings showed that race was a strong factor in students' higher education performance. White student cohorts consistently outperformed black cohorts in regard to progression rates, attrition rates, and the tendency to follow the prescribed path to degree completion.

Other studies emerged after researchers identified the need to investigate multicultural factors and their effect on student retention in underrepresented student populations. Nora (1987) studied a model of student attrition on Chicano students at 2-year community colleges. Nora's model was a spin-off of the Tinto model, which examined seven constructs on student retention rates. Nora identified the constructs as grades, parent's education, encouragement, academic integration, social integration, institutional goal commitments, and retention as the dependent variable. Nora's findings were only minimally supportive of the Tinto model when studied in relation to Chicano students. The results indicated that the relationship between the seven constructs and social integration could not be substantiated. Although the study provided limited insight on the retention of Chicano students, it provided scope for future research on the underrepresented Chicano student population (Nora, 1987).

With institutions continuing to struggle retaining students from underrepresented student populations, some researchers began questioning the relevance of the historically dominant theories of student retention. Maldonado et al. (2005) searched for alternative theories and methods to increase academic support for underrepresented student populations, especially students of color. The researchers provided a theoretical framework for improving retention for students of color. The framework was comprised of the following themes: developing knowledge, skills, and networks; building community ties and commitments; and challenging social and institutional norms. More recent studies have begun investigating how institutional practices and actions impact student retention (Maldonado et al., 2005).

## **Current Theories and Models of Student Retention**

Current theories and models of student retention have moved beyond investigating the reasons for student departure to exploring reasons why students decide to continue enrollment. Past research assumed that knowing why students departed was equivalent to knowing why students decided to stay and succeed. Tinto (2012) proposed that knowing why students departed was not equivalent to knowing why students made the decision to continue enrollment. Tinto suggested that knowing why students left was not necessarily useful in determining ways to help students succeed. Tinto called for institutions to rethink student retention and to convert theoretically appealing concepts into defined institutional action (Tinto, 2012).

Tinto (2012) developed a framework for institutional action to guide institutions through a process of improving institutional practices and behaviors designed to help students succeed. Tinto placed the responsibility more on the institution than on the student. The researcher wrote that once an institution admitted a student, the institutional leaders had accepted responsibility for providing that student with the services and resources needed for success. Tinto developed the framework by investigating research that highlighted institutional conditions shown to increase student success and retention. The review of literature converged on four conditions: expectations, support, assessment and feedback, and engagement (Tinto, 2012).

Research has shown that student success is influenced by the expectations students have of themselves. Institutions should set high expectations for student success that are clear and consistent. Tinto (2012) proposed that higher institutional expectations for students and faculty yield higher success, and lower institutional expectations yield lower success. Once higher expectations have been established, institutions must provide the support students need to succeed (Tinto, 2012).

Tinto (2012) suggested that as students transition from high school to college it is important to provide them with the academic, social, and financial support they need, especially when they are academically underprepared. The researcher conveyed that providing support is important for the duration of the collegiate experience. However, providing support during the first year is most crucial. According to Tinto (2012) during students' first year of college student success is the most questionable and students are also more open to institutional intervention (Tinto, 2012).

Tinto (2012) suggested that students are more likely to be successful when institutions engage in assessment of their programs and services through continuous quality improvement. The researcher noted that institutions can promote student success by making improvements to programs and services as needs and changes are identified. This process has been extremely important during students' first year, as they are continually changing their own behaviors to meet the expectations of the institution (Tinto, 2012).

The fourth condition identified by Tinto (2012) was engagement. Tinto stated that the more students are engaged, both academically and socially, the greater their chances of success. The researcher conveyed that engagement with faculty, staff, and peers helps students develop the academic, social, and emotional support structures needed to be successful and persist to degree completion. Tinto insisted that students are more likely to remain enrolled in college when all four conditions are met by the institutions (Tinto, 2012). However, certain conditions may be more important for specific students, and researchers must not ignore other impacting factors.

Braxton (2008) proposed that colleges and universities need to embrace a scholarship of practice to increase student retention rates. Braxton (2008) corroborated Bean's description of

scholarship of practice as being two-fold: improving administrative practices and developing a knowledge base that is at the appropriate level for administrators. According to Bean a scholarship of practice centers on institutional actions taken to improve student retention. The researcher made significant contributions through empirical research. Braxton (2008) supported Bean's findings that strongly indicated that institutions should avoid staffing entry level, gatekeeper courses with part-time faculty. The researcher's other significant findings conveyed the importance of faculty-student interactions, and described how active learning in the classroom can keep students from departing (Braxton, 2008).

Pascarella, Seifert, and Whitt (2008) researched the correlation between student perceptions of teaching and student success. Pascarella et al. presented new evidence from a longitudinal study of first-year students at a large research university. The researchers stressed the importance of organized and clear classroom instruction and its impact on student retention. Historically research on student perceptions of teaching was limited to specific course achievement. However, new evidence has suggested that instructional organization and clarity may have impacts on more general academic competencies and success, such as student retention and graduation (Pascarella et al., 2008).

Primary theories of student retention have been based on sociology, with the majority of student retention pioneers being sociologists. However, some researchers have taken a different approach to student retention research by investigating the developmental aspects of student retention and success. Demetriou and Powell (2014) proposed that a developmental perspective on student retention would appreciate the changing nature of traditional college students, and would attempt to explain the positive outcomes associated with successful transition from high school to college, college retention, and college graduation. The researchers adapted The

Positive Youth Development (PYD) perspective from adolescent development literature to the study of student retention (Demetriou & Powell, 2014).

The PYD perspective was based on ecological theories of development. Youth development was theorized to occur gradually as a continuing process of human development. As PYD occurred individuals would develop an increased ability to appreciate their environment and to act on that environment. Once the PYD process has been completed, the growth attributes of a healthy person should have been developed. Demetriou and Powell (2014) hypothesized that once students had gone through PYD and were thriving in college, then student success and retention were merely by-products of the interaction between students and their environment.

Theories and models of student retention have evolved and increasingly changed over the past 50 years. Early theories focused on social isolation and the lack of student ability to academically and socially integrate on campus. Many theories focused on student attributes and how student's precollege characteristics could be used to predict collegiate success. Multicultural theories were also investigated as well as the impacts of effective classroom teaching and organization. More emphasis has been placed on institutional action in recent years and what institutions can do to improve student success and retention, including how institutional characteristics impact student retention. As shown by the varying literature and theories successfully identifying factors that impact student retention is not a simple task for institutional leaders.

### **Student Characteristics Impacting Student Retention**

Investigating factors that impact student retention has become a top priority for institutional leaders in recent years. Published research on factors that impact student retention

has centered on several themes. Primarily researchers have examined the relationship between individual student characteristics and successful degree completion; examined factors that lead to student attrition; investigated the design and evaluation of institutional programs created to improve student retention; and explored the relationship between teaching methods and student retention (Murtaugh, Burns, & Schuster, 1999).

Historically retention research has placed much emphasis on the pre-college characteristics of students including cognitive characteristics. However, in more recent years research has been expanded by exploring the effects of non-cognitive factors such as emotional intelligence, academic expectancy motivation, and goal setting as well as student satisfaction.

### **Precollege Characteristics**

Research has shown that individual student characteristics serve as good predictors of student success. Astin (2005) concluded that individual student characteristics play a large role in institutional degree completion rates. Such research has directly influenced the recruitment of students, as Astin attributed two thirds of the variance in institutional graduation rates to differences in individual student characteristics. Many years of research has focused on understanding these individual student characteristics, also referred to as precollege characteristics (Bjerke & Healy, 2010).

Pre-college characteristics have been described as the individual characteristics students possess before entering college. Research has shown that students enter college with a variety of characteristics spanning from academic preparation and academic and social experiences to personal dispositions (Reason, 2005). Characteristics such as family background, skills, abilities,

and prior education have aided in developing each student's goals and commitments. Student goals and commitments are often influenced by family background and ethnicity.

Students from varying ethnic and family backgrounds often have different goals, commitments, and challenges as they prepare and enter higher education. Lee, Donlan, and Brown (2010) conducted a study on understanding the factors that impact American Indian/Alaskan Native students and their persistence in college. The number of American Indian/Alaskan Native students attending college began to rise in the 1970s, as there was more open access to higher education. Despite more students attending college, the vast majority withdrew before completing a degree. The researchers discovered that family obligations and financial difficulties had the greatest impact on student retention for those students (Lee et al., 2010).

Other studies have shown that maintaining an active presence in home communities and cultural events, having family support, overcoming family obligations, and overcoming the lack of precollege academic preparation are all crucial elements for students of various ethnic, family backgrounds to be successful in college (Guillory & Wolverton, 2008; Hlinka, 2017; Lee et al., 2010). For many students the level at which their community and family members value higher education has impacted their initial desire to attend and complete college. Language has also been shown to provide barriers to students and impacting student retention.

Yeh (2004) studied reasons why Asian Pacific American students have high student attrition rates. The results of the study concluded that limited English proficiency played a critical role in determining the success of Asian Pacific American students. Other barriers the researcher identified were higher rates of poverty, lower educational attainment, and illiteracy (Yeh, 2004). While family background and ethnicity have shown to impact student success in

some cases, there are many other precollege characteristics that have dominated student retention research.

Precollege characteristics have been proven to impact student retention and academic success, both directly and indirectly. The precollege characteristics most frequently cited in student retention literature are gender, high school rank, high school grade point average (GPA), and academic aptitude tests such as the American College Test (ACT) and the Scholastic Aptitude Test (SAT) (Bjerke & Healy, 2010). Precollege characteristics have been referred to as at-risk factors when assessing a student's risk of withdrawal (Cochran, Campbell, Baker, & Leads, 2014). Research has shown that precollege characteristics shape students' experiences as they become academically and socially integrated into the institutional environment (Reason, 2005). Differences in students' precollege characteristics have also been investigated in relation to varying institutional types.

Grosset (1991) viewed the Tinto model of social integration as pertaining to baccalaureate degree seeking students at 4-year institutions, and saw the need to research factors affecting student retention for community college students. The researcher considered one general difference in community college students and their 4-year institutional counterparts as being age. The researcher stated that on average community college students are older than 4-year baccalaureate degree seeking students. The researcher conducted a longitudinal study of 667 students at a large urban community college. Findings showed that integration was a larger factor in the retention of younger students than older students; that study skills were the most important factors for older students; and that goal commitment was an important retention factor for both groups. Although student precollege characteristics have dominated retention research



for decades, there are many other variables to consider when thoroughly investigating factors impacting student retention.

Precollege characteristics have never fully represented the reasons why students withdrawal from college before completing a degree program. Precollege characteristics have only accounted for 25% of the variance in students' academic performance in terms of grade point average (Sparkman, Maulding, & Roberts, 2012). As a result researchers have begun investigating the impact of noncognitive factors on student retention and graduation.

### **Emotional Intelligence**

Historically research has shown high school GPA and standardized test scores to be the best predictors of student success. However, in recent years research has garnered opposite results. Current research has shown that high school GPA and standardized test scores do not predict degree completion as well as previously thought (Sparkman et al., 2012). As a result student retention researchers have begun investigating non-cognitive factors such as emotional intelligence that impact student retention and graduation.

Sparkman et al., (2012) defined emotional intelligence as the skillset individuals possess in order to function effectively in the world. Emotional intelligence studies have been used in the business sector for many years. However, emotional intelligence research in higher education has only begun in recent years. Emotional intelligence research in higher education has centered on students' abilities to form relationships and act as independent adults (Sparkman et al., 2012).

As noted in research, when students transition to college life they must form new relationships, adjust old relationships, and become more independent. Researchers have

suggested that students who successfully navigate those emotional and social transitions have greater collegiate success. However, the findings from previous research on emotional and social competencies have been inconsistent (Parker, Summerfeldt, Hogan, & Majeski, 2004).

Parker et al. (2004) researched the transition of students from high school to college and studied the emotional and social impacts on academic achievement. The researchers conducted two studies that produced conflicting results. Emotional intelligence scores showed to be poor predictors of academic success, while several subvariables were found to be moderately good predictors. High intrapersonal, stress management, and adaptability scores were found to be moderate predictors of success, but significantly better predictors than high school GPA or first semester college GPA (Parker et al., 2002).

Parker, Hogan, Eastabrook, Oke, and Wood (2006) further examined the relationship between emotional intelligence and student retention. The researchers recruited freshman participants during the first week of classes and conducted an emotional intelligence assessment. Later, the assessment results were compared between students who persisted into the second year and students who withdrew from the institution. The results revealed that students who stayed enrolled at the institution and persisted into the second year scored significantly higher on the emotional intelligence assessment than the other students (Parker et al., 2006). Although research exists showing a relationship between student retention and emotional intelligence, the inconsistent nature of available research has suggested the need for more conclusive evidence.

### **Academic Expectancy Motivation and Goal-Setting Factors**

Expectancy and goal-setting theories, often used in the business sector, have been applied to higher education for the purposes of studying the impacts of student motivation and goals on

student success and retention. Expectancy theorists have stated that motivation is directly related to the perception that making an effort toward a goal will result in successful completion of that goal. Friedman and Mandel (2009) viewed perceptions as an individual's perceived probability of success based on similar situations and experiences in the past. The researchers used academic expectancy and goal setting theories to predict academic success and student retention.

Goal setting theory has been developed on the premise that students who set goals have a higher probability of achieving those goals when compared to students without established goals. Goal setting theorists have suggested that student success is increased by setting goals that are specific and relevant and when students are challenged, committed, and seeking peer competition. Friedman and Mandel (2009) found that academic expectancy motivation significantly predicted GPA at the end of students' first year in college. Students retained in the second year also reported high levels of peer competition with respect to academic goals and course. The amount of available literature on academic expectancy motivation and goal-setting theory is limited, and the topics should be further investigated.

### **Student Satisfaction**

Researching the impacts of student satisfaction on student retention and student success has been growing in popularity over the past several years. As institutional leaders have sought to determine why students stay or leave an institution many companies have commercialized the process by offering products and services to survey students about their levels of satisfaction. Although identifying ways that students are unsatisfied with the collegiate experience has been useful in guiding institutional change, empirical investigations relating student satisfaction to academic performance and retention have not been consistent (Strahan & Crede, 2015).

Some researchers have found relatively strong relationships between student satisfaction and student success and retention, while others have found relatively weak relationships or no relationships at all. Strahan and Crede (2015) studied 300 institutions to determine whether student satisfaction with college created higher student retention rates and academic performance. Results indicated that student satisfaction with college is multi-dimensional. Student satisfaction exhibited a hierarchical structure and exhibited a moderate relationship with student retention, but showed a relatively weak relationship with academic performance (Strahan & Crede, 2015).

Sanders and Burton (1996) studied the satisfaction of students as it related to their freshman experience at the institution. The researchers used the results of the study to create a freshman retention model. Based on the resulting retention model, the researchers suggested that all institutions need to focus more on student satisfaction and offer services to all students. The researchers contended that more satisfied students are more likely to persist to graduation, and also be better candidates for long-term institutional affiliation (Sanders & Burton, 1996).

Suhre, Jansen, and Harskamp (2007) researched the impact of degree program satisfaction on academic success and student attrition. A gap in literature exists on how student satisfaction with a chosen degree program impacts success and retention. The researchers identified the need for additional empirical investigations to explore the impact of degree program satisfaction. The results of the study showed that academic ability and degree program satisfaction impacted student success. Decreased satisfaction with the degree program showed decreases in student motivation and behavior (Suhre et al., 2007). More empirical evidence is needed to provide conclusive evidence regarding the impact of student satisfaction on student retention and academic success.

## **Financial Aid**

Historically the lack of financial aid has represented enrollment and retention barriers for many students. Although some states have implemented tuition free policies at community colleges, students pursuing a degree at private and public institutions must secure necessary funds to remain enrolled.

Herzog (2005) discussed the role of financial aid in supporting college attendance. There have been federal debates regarding the impact of student loans for many years. Federal student loan limits were heavily debated in 2003 while Congress was discussing the reauthorization of the Higher Education Act. The American Association of Community Colleges adamantly opposed increases to federal student loan limits. On the other hand, the American Council for Education advocated for substantial increases to student loan limits (Dowd & Coury, 2006).

The American Association of Community Colleges argued that borrowing presents under-achieving students with the risk of not being financially stable enough to pay off the loans. However, the flip side of the argument was that student loans make college affordable in the presence of increasing tuition costs (Dowd et al., 2006).

Dowd and Coury (2006) examined the effect of federal student loans on student retention from the first-to-second year of college on a national sample of community college students. The results found that student loans had negative effects on student retention and had no effect on degree completion. Dowd et al. conveyed that the mixed results presented in replicated studies suggest the need for further research on the effects of student loans and financial aid on student retention.

Although decades of research have been dedicated to studying student retention and investigating reasons why students withdraw from college before completing a degree, the vast

majority of research has focused on characteristics and behaviors of students. Few studies have focused on how institutional characteristics and behaviors impact student retention (Chen, 2012).

### **Institutional Characteristics Impacting Student Retention**

Higher education institutional leaders have strived to better understand how specific college characteristics and behaviors impact students, student success, and student retention. Academics have argued that institutional characteristics should have an impact on the different aspects of student success. However, there is little empirical evidence to guide campus leaders on how to implement changes to institutional characteristics and behaviors when attempting to increase student retention and graduation rates (Toutkoushian & Smart, 2001).

A variety of student factors have been well documented in the literature. However, institutional factors have not been widely considered in research (Marsh, 2014). Although more conclusive empirical research is warranted, some research has been presented on the impacts of institutional culture, institutional control, faculty-student interaction, institutional expenditures, and academic libraries on student retention and graduation.

### **Institutional Culture**

Studies have suggested that institutional culture has the ability to affect student perceptions about an institution. Kuh (2001) conveyed that culture impacts almost everything that happens at an institution including, but not limited to, budgeting, fundraising, teaching and learning, and faculty reward systems. Student perceptions of institutional culture have been noted to influence satisfaction and student motivation. However, only a limited amount of

research has focused on the impact of institutional culture on student retention and student success (Kuh, 2001).

Kuh (2001) made some claims about the impact of institutional culture on student retention. Although not supported by empirical evidence, the researcher proposed that institutions that have coherent educational philosophies and value structures and clear expectations on students will have more influence over students in motivating them to succeed. The researcher also made the claim that institutions with cultures that celebrate community have higher student retention rates because students are more satisfied. Additionally, Kuh proposed that institutions with residence halls have more engaging cultures for promoting positive student behavior (2001).

Creating a campus culture that promotes student retention would be multi-dimensional and involve all members of the campus community. More empirical research is needed to fully inform institutional leaders on the impacts of culture on student retention and success.

### **Institutional Quality**

A review of research presented by Pascarella and Terenzini (2005) examined the impact of institutional quality on student retention and graduation rates. Institutional quality was commonly gauged by an institution's admissions selectivity. Studies showed that the institutions with higher student retention and graduation rates had higher admissions requirements. Similarly, institutions with lower admissions standards often yielded lower student retention and graduation rates. Specifically, admissions selectivity was shown to be a positive predictor of 6-year graduation rates (Pascarella & Terenzini, 2005).

Although higher admissions selectivity was shown to provide an advantage to institutions when examining student retention and graduation rates, other research suggested additional institutional characteristics as being more powerful in predicting student success. Pascarella and Terenzini (2005) identified those other institutional characteristics as faculty quality, academic expenditures, and faculty-student ratios. More research is warranted to fully determine the strength of the relationship between institutional quality and student retention and graduation rates.

### **Institutional Control**

Pascarella and Terenzini (2005) reviewed research during the 1990s on the differences of persistence and completion rates of students from private institutions as compared to public institutions. The comparisons consistently revealed that students from private institutions had higher persistence and degree completion rates than students from public institutions when not accounting for students' precollege characteristics. However, when precollege characteristics were considered they were found to have more impact than institutional control parameters (Pascarella & Terenzini, 2005).

Although studies have shown that institutional control may have an impact on student retention and degree completion under certain circumstances, institutional leaders do not have the flexibility to alter institutional control as a means for improving student retention and success. Therefore, focus has been placed on more actionable institutional characteristics in recent years such as faculty-student interactions.



## **Faculty-Student Interactions**

Based on previous research highlighting the importance of academic and social integration, Schmitt and Duggan (2011) stressed the importance of faculty-student interactions. Positive interactions between faculty and students have been known to increase the probability of student retention and student success. Academic advising has been noted as one such positive interaction.

According to Drake (2011) students have greatly benefited from engaging in academic advising. Academic advising has given students the opportunity to build relationships with faculty. In many instances faculty advisors have been given the responsibility of identifying areas where students have disconnected with the institution and helping them reconnect (Drake, 2011). Although the importance of faculty-student interactions seems to be undebatable, a gap exists in empirical research to support anecdotal claims.

## **Expenditures**

Some researchers have examined the impact of allocating institutional expenditures to academic and support activities on student retention and graduation. Many institutional initiatives that have been developed to improve student retention require the recruitment and participation of students (Gansemer-Topf & Schuh, 2003). However, the allocation of institutional library resources represents an institutional behavior that can impact student retention without the need for student participation in the allocation process.

Gansemer-Topf and Schuh (2003) investigated how well allocating expenditures for instruction, academic support, and institutional support influenced student retention rates. The study was conducted on private and public research and doctoral universities, as designated by

the Carnegie classification system. The results of the study showed that increasing expenditures on instruction, academic support, and institutional support had positive impacts on student retention. The additional funds supported students' ability to academically and socially integrate with the campus environment. The researchers noted that future studies are needed to examine the impacts of other areas of expenditures on student retention and graduation rates (Gansemer-Topf & Schuh, 2003).

### **Academic Libraries**

Academic libraries have played integral roles in educating students for many years. It is believed that libraries aid students with academic integration into the institution. As a result libraries have begun playing a larger role in student retention initiatives (Mezick, 2015). However, existing literature has rarely mentioned libraries when connecting student success to campus services.

As student retention research has continued to evolve, libraries have been tasked with demonstrating ways, in which expenditures for resources and services impact student retention and graduation. Mezick (2007) conducted a study using library expenditures and the number of professional library staff to investigate the library's impact on student retention. The results revealed significant relationships among total library expenditures, total library materials expenditures, and serial expenditures in relation to student retention at all institutions in the study. Statistically significant relationships were also found between the number of professional library staff and student retention (Mezick, 2007). Existing literature, although limited, has produced some positive associations between library use and student retention. More research

and empirical evidence is needed to fully understand the impact of library services on student retention, in general.

Although higher education leaders and student retention theorists have considered institutional characteristics to play an important role in understanding and improving student retention, a gap in literature exists to conclusively support those claims. More research is warranted on how institutional characteristics can positively impact student retention and graduation.

### **Improving Student Retention**

Review of literature has shown that many factors affect student retention, and not all students and institutions yield consistent results to the same factors. Conflicting research about the factors affecting student retention has caused institutional leaders to begin implementing programs and processes to improve overall student retention based on some of the most common factors. Implementing freshman experiences, using team and active learning methods, and implementing developmental programs have all been discussed in literature.

Kreie, Headrick, and Steiner (2007) studied the impacts of using a team learning instructional approach on students in an introductory information systems course. The team learning model was based on four principles highlighting proper team formation, discussing student accountability, ensuring that team assignments promote learning and group interaction, and providing frequent and prompt feedback to students. Kreie et al. found that the team learning instructional approach significantly increased student retention over the traditional approach based on lecture. Those findings supported the Tinto model of social integration.

Integrating students into teams encouraged the formation of relationships, which resulted in higher persistence toward graduation (Kreie et al., 2007).

Kvam (2000) investigated the long-term effects of active learning methods in relation to student retention by studying a group of introductory engineering students. The study examined two separate classes of students. One class was taught using traditional lecture methods and the other class was taught using active learning methods. The results suggested that active learning methods helped increase the retention for students with average to below average grades (Kvam, 2000).

Another method institutions have used to improve student retention is offering developmental programs to students who are academically underprepared. The goal of developmental programs has been to provide under-prepared students with the academic skills needed to academically integrate into the institution in hopes of improving student retention rates. Lesik (2007) conducted research on developmental mathematics programs and found that students who participated in developmental mathematics programs were significantly less likely to leave college than students of equal academic preparation that did not participate in such programs.

Tinto (2012) discussed an institution's ability to improve student retention, as a result of intentional, structured, and proactive actions incorporated over a period of time. The researcher conveyed that improving student retention is a result of an institution's investment in functional areas that directly impact students, such as instructional and academic support. Tinto (2012) urged institutional leaders to invest in assessment, invest in program development, and invest in faculty development as ways to improve student retention.

## CHAPTER 3

### RESEARCH METHODS

This quantitative study was designed to provide insight into the relationships between specific institutional characteristics and overall student retention and graduation rates. Many higher education administrators have become more interested in the topic of student retention in recent years due to increased accountability from stakeholders and the debate over cost efficiency in higher education. Pascarella (1991) noted the largest number of empirical investigations in higher education has been studying the impact of colleges on student achievement. However, the empirical evidence to date is limited and provides very little guidance for institutional leaders. While some studies found institutional characteristics to contribute to student success, other studies have considered institutional characteristics to contribute very little to student achievement (Toutkoushian & Smart, 2001).

The purpose of this nonexperimental quantitative study was to investigate to what extent institutional characteristics predict first-time, full-time, fall-to-fall retention rates and 6-year graduation rates for full-time undergraduate students at 4-year colleges and universities that have been granted Level III accreditation status by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC). Archival data were collected through the National Center for Educational Statistics Integrated Postsecondary Education Data System (IPEDS). The sample included Level III accredited SACSCOC institutions who also report to IPEDS on an annual basis. This chapter describes the research questions and null hypotheses, sample, instrumentation, data collection, and the data analysis.

## Research Questions and Null Hypotheses

The research questions of this study were to determine the extent to which specific institutional characteristics predict first-time, full-time, fall-to-fall retention rates and 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions. More specifically, the following research questions were investigated:

1. Is there a significant relationship between a linear combination of institutional predictor variables (25<sup>th</sup> percentile ACT scores, 75<sup>th</sup> percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell grants, and federal student loans) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho1: There is no significant relationship between a linear combination of institutional predictor variables (25<sup>th</sup> percentile ACT scores, 75<sup>th</sup> percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell grants, and federal student loans) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

2. Is there a significant relationship between a linear combination of institutional environment predictor variables (size, institution type, and cost) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

- Ho2: There is no significant relationship between a linear combination of institutional predictor variables environment predictor variables (size, institution type, and cost) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.
3. Is there a significant relationship between a linear combination of institutional resource predictor variables (physical library collections and number of electronic library collections) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
- Ho3: There is no significant relationship between a linear combination of institutional library resource predictor variables (physical library collections and number of electronic library collections) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.
4. Is there a significant relationship between a linear combination of institutional finance predictor variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

- Ho4: There is no significant relationship between a linear combination of institutional finance predictor variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.
5. Is there a significant relationship between a linear combination of institutional interaction predictor variables (student-faculty ratio and percentage of full-time faculty) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
- Ho5: There is no significant relationship between a linear combination of institutional interaction predictor variables (student-faculty ratio and percentage of full-time faculty) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.
6. Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional finance predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?
- Ho6: There is no significant difference in  $R^2$  values between the institutional resource predictor variables and the institutional finance predictor variables when predicting first-time, full-time, fall-to-fall undergraduate



retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

7. Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho7: There is no significant difference in  $R^2$  values between the institutional resource predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

8. Is there a significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho8: There is no significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

9. Is there a significant relationship between a linear combination of institutional predictor variables (25<sup>th</sup> percentile ACT scores, 75<sup>th</sup> percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the

forms of grants/scholarships, Pell grants, and federal student loans) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho9: There is no significant relationship between a linear combination of institutional predictor variables (25<sup>th</sup> percentile ACT scores, 75<sup>th</sup> percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell grants, and federal student loans) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

10. Is there a significant relationship between a linear combination of institutional environment predictor variables (size, institution type, and cost) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho10: There is no significant relationship between a linear combination of institutional environment predictor variables (size, institution type, and cost) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

11. Is there a significant relationship between a linear combination of institutional resource predictor variables (physical library collections and number of electronic library collections) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho11: There is no significant relationship between a linear combination of institutional library resource predictor variables (physical library collections and number of electronic library collections) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

12. Is there a significant relationship between a linear combination of institutional finance predictor variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho12: There is no significant relationship between a linear combination of institutional finance predictor variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

13. Is there a significant relationship between a linear combination of institutional interaction predictor variables (student-faculty ratio and percentage of full-time faculty) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho13: There is no significant relationship between a linear combination of institutional interaction predictor variables (student-faculty ratio and percentage of full-time faculty) and the criterion variable (6-year

graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

14. Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional finance predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho14: There is no significant difference in  $R^2$  values between the institutional resource predictor variables and the institutional finance predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

15. Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho15: There is no significant difference in  $R^2$  values between the institutional resource predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

16. Is there a significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho16: There is no significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

### **Sample**

The sample for this study consisted of 4-year colleges and universities in the SACSCOC region that have been granted Level III accreditation status and who also report to IPEDS. These institutions were selected because SACSCOC accredited institutions are required to show evidence of student achievement annually and provide more in-depth documented evidence on both 5- and 10-year cycles. Level III institutions have been approved by SACSCOC to offer degree programs up to the master degree level (SACSCOC, 2017).

Level III institutions were selected because the study was designed to investigate correlations between institutional characteristics and retention and graduation rates of undergraduate students. Doctoral granting institutions were intentionally not included in this study because a doctoral granting institutional environment may vary greatly compared to institutions that primarily offer undergraduate degree programs. There were 124 institutions included in the sample representing public and private nonprofit schools.

### **Instrumentation**

The data used for this research were publicly available archival data from the National Center for Educational Statistics Integrated Postsecondary Data System (IPEDS). This method of instrumentation was chosen because these data have been annually reported to IPEDS by

participating institutions. All postsecondary institutions that have a Program Participation Agreement with the Office of Postsecondary Education in the U.S. Department of Education are required to report data to the IPEDS web-based data collection system each year. The annual reporting cycle consists of fall, winter, and spring data collection periods. Each IPEDS data report contains explicit instructions and definitions that institutions must follow to ensure the reliability and validity of the database.

### **Data Collection**

Before the data collection process of this study began permission to conduct research was obtained from the Institutional Review Board (IRB) at East Tennessee State University. Upon receiving IRB approval, data were collected from the IPEDS database and housed in Microsoft Excel spreadsheets. All data in the IPEDS database were provided by the National Center for Educational Statistics for public access and availability.

From the IPEDS database 17 independent variables and two dependent variables were manually extracted for the 2015-2016 academic year. These data represent the most recent publicly available IPEDS data for each institution. Permission to use the IPEDS data is available without charge from the IPEDS Data Center website (<https://nces.ed.gov/ipeds/>). All data were collected during the Fall 2017 semester.

### **Data Analysis**

Statistical software was used for all data analyses presented in this study. Research Questions 1-5 were designed to examine to what extent unordered sets of predictor variables for institutional characteristics could predict first-time, full-time, fall-to-fall undergraduate student retention rates. Research Questions 6-8 were designed to examine to what extent selected sets of unordered predictors for institutional characteristics could predict first-time, full-time, fall-to-fall

undergraduate student retention rates over and above other selected sets of unordered predictors. Research Questions 9-13 were designed to examine to what extent unordered sets of predictor variables for institutional characteristics could predict 6-year graduation rates. Research Questions 14-16 were designed to examine to what extent selected sets of unordered predictors for institutional characteristics could predict 6-year graduation rates over and above other selected sets of unordered predictors.

Multiple linear regressions were conducted for each of the research questions. Multiple linear regression was chosen as the statistical method of analysis because multiple linear regressions explain the relationship between one dependent variable and two or more independent, or predictor variables (Green & Salkind, 2017). The significance test for multiple linear regressions must be based on two alternative sets of assumptions, fixed-effect and random-effect assumptions. Random-effect assumptions were chosen for this study because the random-effects model is statistically viewed as being more appropriate for nonexperimental studies (Green & Salkind, 2017). Findings of the data analyses are reported in Chapter 4.

### **Chapter Summary**

The purpose of this study was to examine the extent to which specific institutional characteristics predict first-time, full-time, fall-to-fall undergraduate retention rates and 6-year graduation rates. The sample included 124 colleges and universities that were SACSCOC Level III accredited institutions and who also participated in IPEDS data reporting. Data were collected from the IPEDS publicly available data base. Multiple linear regressions were conducted on all 16 research questions, and the results of these data analyses are presented in Chapter 4. A summary of findings, conclusions, and recommendations for future research are presented in Chapter 5.

## CHAPTER 4

### FINDINGS

The purpose of this study was to investigate the relationships between institutional characteristics and first-time, full-time, fall-to-fall freshman retention rates and 6-year graduation rates at SACSCOC Level III institutions. Specifically the study analyzed institutional student variables, institutional environment variables, institutional library resource variables, institutional finance variables, and institutional interaction variables.

Independent variables of 25<sup>th</sup> percentile and 75<sup>th</sup> percentile ACT scores, gender ratio of males-to-females, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell grants, and federal student loans were categorized as institutional student variables. Institutional environment variables included institution size, institution type, and the cost of tuition and required fees. Institutional library resource variables included the number of physical library collections and the number of electronic library collections. Institutional finance variables included expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support. Institutional interaction variables included student-to-faculty ratio and the percentage of full-time faculty.

In this chapter data are presented and analyzed to answer 16 research questions and 16 null hypotheses. Data were analyzed for 124 institutions that have been granted Level III SACSCOC accreditation status and also reported institutional data to IPEDS during the 2015-2016 data collection cycle. The sample included 28 public institutions and 96 private not for profit institutions. All research questions were analyzed using multiple linear regressions as the quantitative methodology.



## Research Question 1

Is there a significant relationship between a linear combination of institutional predictor variables (25th percentile ACT scores, 75th percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell Grant, and federal student loans) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho1: There is no significant relationship between a linear combination of institutional predictor variables (25th percentile ACT scores, 75th percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell Grant, and federal student loans) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple regression analysis was conducted to evaluate the effect of predictor variables upon the criterion variable, first-time, full-time, fall-to-fall undergraduate student retention rates. The predictors were 25<sup>th</sup> percentile and 75<sup>th</sup> percentile ACT scores, gender ratio of males to females, and the percent of students receiving financial aid disaggregated by grants and scholarships, Pell grants, and federal student loans. The criterion variable was first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities with Level III SACSCOC accreditation status.

As part of the initial analysis the intercorrelations among the predictor variables were assessed for multicollinearity. Collinearity diagnostics identify redundancies among predictor variables if not accounted for could cause an over fit within the model. The assessment indicated

a strong intercorrelation with the predictor variable of 25<sup>th</sup> percentile ACT. That predictor variable produced a VIF value greater than 10 and was removed from the analysis.

The linear combination of the predictor variables was significantly related to the criterion variable, first-time, full-time, fall-to-fall undergraduate student retention rates,  $F(5, 86) = 9.39, p < .001$ . Therefore,  $H_0$  was rejected. The sample multiple correlation coefficient was .59, indicating that approximately 35% of the variance of the first-time, full-time, fall-to-fall undergraduate student retention rates in the sample can be accounted for by the linear combination of strength measures. The regression equation is as follows: Predicted first-time, full-time, fall-to-fall undergraduate student retention rates =  $-.01$  *Gender Ratio Males to Females* -  $.05$  *Percent of Students Receiving Grant or Scholarship Aid* +  $.04$  *Percent of Students Receiving Pell Grant* -  $.01$  *Percent of Students Receiving Federal Student Loans* +  $.02$  *75<sup>th</sup> Percentile ACT Scores* +  $.26$ .

Table 1 presents indices to specify the relative strength of the individual predictors. The beta weights indicate the relative contributions of the variables to the prediction of first-time, full-time, fall-to-fall undergraduate student retention rates at SACSCOC Level III institutions. From the data presented it is evident that the greatest predictor of first-time, full-time, fall-to-fall undergraduate student retention from these institutional characteristics was the 75<sup>th</sup> percentile ACT score. This was the only variable that was significant at the .05 level.

Table 1

*Regression Coefficients, Significance Levels, and Confidence Intervals for Institutional Student Variables when Predicting Student Retention Rates*

Variable	<i>B</i>	$\beta$	<i>t</i>	<i>P</i>
Gender Ratio Males to Females	-.01	-.03	-.25	.806
% Grant or Scholarship Aid	-.05	-.07	-.61	.546
% Pell Grant	.04	.06	.35	.730
% Federal Student Loans	-.01	-.02	-.14	.889
75 <sup>th</sup> Percentile ACT Scores	.02	.62	4.84	.001*

\* Significant at the .05 level; *B* = unstandardized regression coefficient;  $\beta$  = standard coefficient

Table 2 presents indices to indicate the relative strength of the individual predictors. Only the partial correlation between the 75<sup>th</sup> percentile ACT score and the first-time, full-time, fall-to-fall undergraduate student retention rate was significant at the .05 level. On the basis of these correlational analyses, it appears that the most useful predictor is the 75<sup>th</sup> percentile ACT score. In addition to being the only significant predictor at the .05 level and after controlling for all other predictor variables, the 75<sup>th</sup> percentile ACT score had the strongest partial correlation of .46. However, judgements about the relative importance of these predictors are difficult to determine because the predictors are correlated.

Table 2

*The Bivariate and Partial Correlations of Institutional Student Variables with Retention Rates*

Predictors	Correlation between each predictor and the retention rate	Correlation between each predictor and the retention rate controlling for all other predictors
Gender Ratio	-.03	-.03
% Grant or Scholarship Aid	-.06	-.07
% Pell Grant	-.39	.04
% Federal Student Loans	-.26	-.02
75 <sup>th</sup> Percentile ACT Scores	.59*	.46*

\* Significant at the .05 level.

Figure 1 illustrates the plot of the observed cases in relation to the expected regression line and it indicates the overall fit of the model.

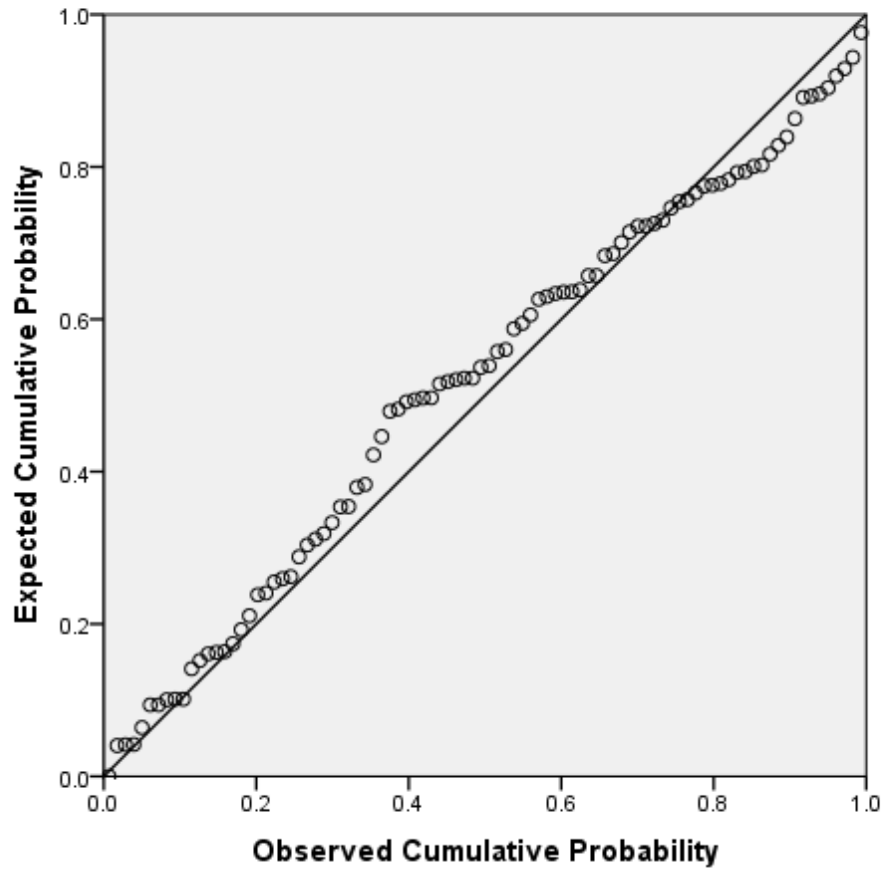


Figure 1. Plot of the first-time, full-time, fall-to-fall undergraduate retention rates regression line for institutional student variables

It appears that there is a relationship between institutional student variables of 75<sup>th</sup> percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell grants, and federal student loans and first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities with Level III SACSCOC accreditation status. The 75<sup>th</sup> percentile ACT scores appeared to have the greatest influence. Institutions with higher 75<sup>th</sup> percentile ACT scores appeared to have higher student retention rates. It should be noted, however, that the model only accounted for 35% of the variance of first-time, full-time, fall-to-fall undergraduate retention rates.

## Research Question 2

Is there a significant relationship between a linear combination of institutional environment predictor variables (size, institution type, and cost) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho2: There is no significant relationship between a linear combination of institutional predictor variables environment predictor variables (size, institution type, and cost) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple regression analysis was conducted to evaluate the effect of the predictor variables upon the criterion variable, first-time, full-time, fall-to-fall undergraduate student retention rates. The predictors were institution enrollment size, institution type, and cost from tuition and required fees, while the criterion variable was first-time, full-time, fall-to-fall undergraduate student retention rates at SACSCOC Level III institutions. As part of the initial analysis the intercorrelations among the predictor variables were assessed for multicollinearity. Collinearity diagnostics identify redundancies among predictor variables if not accounted for could cause an over fit within the model. While there were some dimensions that were moderately intercorrelated, the assessment indicated no critical associations.

The linear combination of predictor variables was significantly related to the criterion variable, first-time, full-time, fall-to-fall undergraduate student retention rates,  $F(3, 109) = 10.84$ ,  $p < .001$ . Therefore, Ho2 was rejected. The sample multiple correlation coefficient was .48, indicating that approximately 23% of the variance of the first-time, full-time, fall-to-fall undergraduate student retention rates in the sample can be accounted for by the linear

combination of strength measures. The regression equation is as follows: Predicted first-time, full-time, fall-to-fall undergraduate student retention rates=  $-2.68 \times 10^{-6} Enrollment\ Size + 6.50 \times 10^{-6} Cost - .17 Institution\ Type + .68$ .

Table 3 presents indices to specify the relative strength of the individual predictors. The beta weights indicate the relative contributions of the variables to the prediction of first-time, full-time, fall-to-fall undergraduate student retention rates. From the data presented, the greatest influences on an institution's first-time, full-time, fall-to-fall undergraduate student retention were cost and institution type. Both of those variables were significant at the .05 level.

Table 3

*Regression Coefficients, Significance Levels, and Confidence Intervals for Institutional Environment Variables when Predicting Student Retention Rates*

Variable	<i>B</i>	$\beta$	<i>t</i>	<i>p</i>
Enrollment Size	$-2.69 \times 10^{-6}$	-.07	-.68	.496
Cost	$6.50 \times 10^{-6}$	.61	5.12	.001*
Institution Type	-.17	-.66	-5.19	.001*

\* Significant at the .05 level; *B* = unstandardized regression coefficient;  $\beta$  = standard coefficient

Table 4 presents indices to indicate the relative strength of the individual predictors. The partial correlations between the cost and the institution type and first-time, full-time, fall-to-fall undergraduate student retention rates were significant at the .05 level. On the basis of these correlational analyses, it appears that the most useful predictor of first-time, full-time, fall-to-fall undergraduate student retention rates is cost as defined by tuition and required fees with a partial

correlation of .44. However, judgements about the relative importance of these predictors are difficult to determine because the predictors are correlated.

Table 4

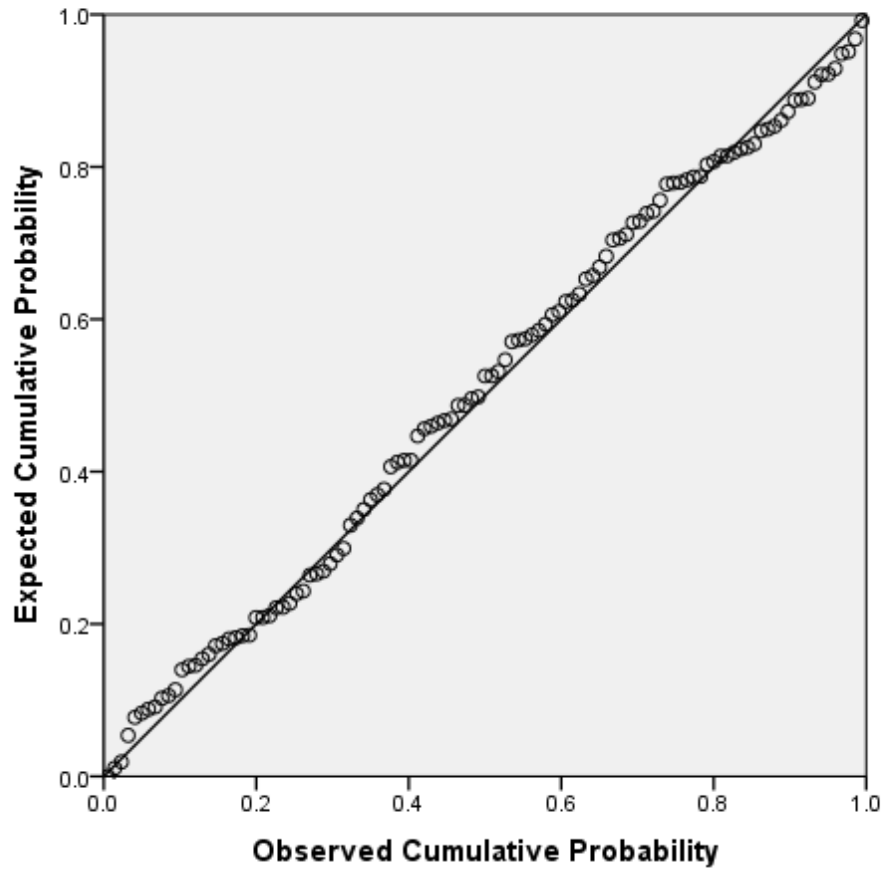
*The Bivariate and Partial Correlations of Institutional Environment Variables with Retention Rates*

Predictors	Correlation between each predictor and the retention rate	Correlation between each predictor and the retention rate controlling for all other predictors
Enrollment Size	.06	-.07
Cost	.16*	.44*
Institution Type	-.21*	-.45*

\* Significant at the .05 level.

Figure 2 illustrates the plot of the observed cases in relation to the expected regression line and it indicates the overall fit of the model.





*Figure 2.* Plot of the first-time, full-time, fall-to-fall undergraduate retention rates regression line for institutional environment variables

It appears that there is a relationship between institutional environment variables of enrollment size, cost from tuition and required fees, institution type, and first-time, full-time, fall-to-fall undergraduate student retention rates at SACSCOC Level III institutions. Cost from tuition and required fees and institution type appeared to have the greatest influences. The higher the cost of an institution resulted in higher student retention rates. It should be noted, however, that the model only accounted for 23% of variance of the first-time, full-time, fall-to-fall undergraduate student retention rates at SACSCOC Level III institutions.

### Research Question 3

Is there a significant relationship between a linear combination of institutional library resource predictor variables (physical library collections and number of electronic library collections) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho3: There is no significant relationship between a linear combination of institutional library resource predictor variables (physical library collections and number of electronic library collections) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple regression analysis was conducted to evaluate the effect of the predictor variables upon the criterion variable, first-time, full-time, fall-to-fall undergraduate student retention rates. The predictors were the number of physical library collections and the number of electronic library collections, while the criterion variable was first-time, full-time, fall-to-fall undergraduate student retention rates at SACSCOC Level III institutions. As part of the initial analysis the intercorrelations among the predictor variables were assessed for multicollinearity. Collinearity diagnostics identify redundancies among predictor variables if not accounted for could cause an over fit within the model. While there were some dimensions that were moderately intercorrelated, the assessment indicated no critical associations.

The linear combination of predictor variables was significantly related to the criterion variable, first-time, full-time, fall-to-fall undergraduate student retention rates,  $F(2, 108) = 15.68$ ,  $p < .001$ . Therefore, Ho3 was rejected. The sample multiple correlation coefficient was .47, indicating that approximately 23% of the variance of first-time, full-time, fall-to-fall

undergraduate student retention rates can be accounted for by the linear combination of strength measures. The regression equation is as follows: Predicted first-time, full-time, fall-to-fall undergraduate retention rates =  $3.23 \times 10^{-7}$  *Total Number of Physical Library Collections* –  $3.54 \times 10^{-8}$  *Total Number of Electronic Library Collections* + .64.

Table 5 presents indices to specify the relative strength of the individual predictors. The beta weights indicate the relative contributions of the variables to the prediction of first-time, full-time, fall-to-fall undergraduate retention rates. From the data presented both the total number of physical library collections and the total number of electronic library collections appear to influence first-time, full-time, fall-to-fall undergraduate student retention rates. Both predictor variables were significant at the .05 level.

Table 5

*Regression Coefficients, Significance Levels, and Confidence Intervals for Institutional Library Resource Variables when Predicting Student Retention*

Variable	<i>B</i>	$\beta$	<i>t</i>	<i>p</i>
Physical Library Collections	$3.23 \times 10^{-7}$	.44	5.20	.001*
Electronic Library Collections	$-3.55 \times 10^{-8}$	-.20	-2.33	.022*

\* Significant at the .05 level; *B* = unstandardized regression coefficient;  $\beta$  = standard coefficient

Table 6 presents indices to indicate the relative strength of the individual predictors. The partial correlation for physical library collections and electronic library collections were significant at the .05 level. On the basis of these correlational analyses, it appears that the most useful predictor of first-time, full-time, fall-to-fall undergraduate student retention rates is the number of physical library collections. After controlling for other predictor variables, the number of physical library collections had the strongest partial correlation of .45. However,

judgements about the relative importance of these predictors are difficult to determine because the predictors are correlated.

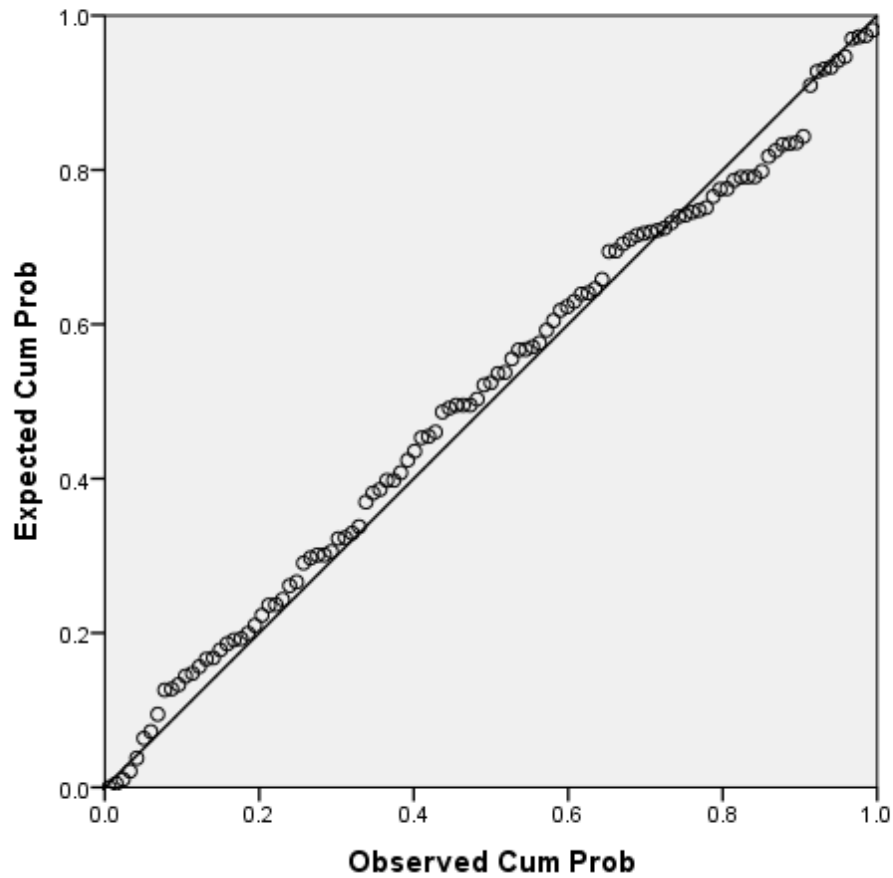
Table 6

*The Bivariate and Partial Correlations of Institutional Library Resource Variables with Retention Rates*

Predictors	Correlation between each predictor and the retention rate	Correlation between each predictor and the retention rate controlling for all other predictors
Physical Collections	.43*	.45*
Electronic Collections	-.18*	-.22*

\* Significant at the .05 level.

Figure 3 illustrates the plot of the observed cases in relation to the expected regression line and it indicates the overall fit of the model.



*Figure 3.* Plot of the first-time, full-time, fall-to-fall undergraduate student retention rates regression line for institutional library resource variables

It appears that there is a relationship between institutional library resource variables of the number of physical library collections, the number of electronic library collections, and first-time, full-time, fall-to-fall undergraduate student retention rates at SACSCOC Level III institutions. Both physical library collections and electronic library collections appeared to influence the retention rates. A higher number of physical and electronic library resources resulted in higher student retention rates. It should be noted, however, that the model only accounted for 23% of variance of first-time, full-time, fall-to-fall undergraduate student retention rates at SACSCOC Level III institutions.

#### **Research Question 4**

Is there a significant relationship between a linear combination of institutional finance predictor variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho4: There is no significant relationship between a linear combination of institutional finance predictor variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple linear regression analysis was conducted to evaluate the effect of the predictor variables upon the criterion variable, first-time, full-time, fall-to-fall undergraduate student retention rates. The predictors were expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support. The criterion variable was first-time, full-time, fall-to-fall undergraduate student retention rates at SACSCOC Level III institutions. As part of the initial analysis the intercorrelations among the predictor variables were assessed for multicollinearity. Collinearity diagnostics identify redundancies among predictor variables if not accounted for could cause an over fit within the model. While there were some dimensions that were moderately correlated, the assessment indicated no critical associations.

The linear combination of the predictor variables was significantly related to the criterion variable, first-time, full-time, fall-to-fall undergraduate student retention rates,  $F(4, 108) = 8.26$ ,  $p < .001$ . Therefore,  $H_04$  was rejected. The sample multiple correlation coefficient was .48, indicating approximately 23% of the variance of first-time, full-time, fall-to-fall undergraduate student retention rates in the sample can be accounted for by the linear combination of strength measures. The regression equation is as follows: Predicted first-time, full-time, fall-to-fall undergraduate retention rates =  $8.27 \times 10^{-6}$  *Expenditures for Instruction* +  $7.34 \times 10^{-7}$  *Expenditures for Student Services* –  $1.21 \times 10^{-5}$  *Expenditures for Institutional Support* +  $3.31 \times 10^{-5}$  *Expenditures for Academic Support* + .62.

Table 7 presents indices to specify the relative strength of the individual predictors. The beta weights indicate the relative contributions of the variables to the prediction of first-time, full-time, fall-to-fall undergraduate student retention rates. From the data presented, it is evident that expenditures for instruction, expenditures for institutional support, and expenditures for academic support all influence first-time, full-time, fall-to-fall undergraduate student retention rates. Each of the three variables were significant at the .05 level.

Table 7

*Regression Coefficients, Significance Levels, and Confidence Intervals of Institutional Finance Variables when Predicting Student Retention Rates*

Variable	<i>B</i>	$\beta$	<i>t</i>	<i>p</i>
Instruction	$8.28 \times 10^{-6}$	.30	2.62	.010*
Student Services	$7.34 \times 10^{-7}$	.01	.13	.895
Institutional Support	$-1.31 \times 10^{-5}$	-.40	-3.29	.001*
Academic Support	$3.31 \times 10^{-5}$	.45	4.18	.001*

\* Significant at the .05 level; *B* = unstandardized regression coefficient;  $\beta$  = standard coefficient

Table 8 presents indices to indicate the relative strength of the individual predictors. The partial correlations between expenditures for instruction, institutional support, academic support and first-time, full-time, fall-to-fall undergraduate retention rates were all significant at the .05 level. On the basis of these correlational analyses, it appears that the most useful predictor is expenditures for academic support. After controlling for all other predictor variables, expenditures for academic support had the strongest partial correlation of .35. However, judgements about the relative importance of these predictors are difficult to determine because the predictors are correlated.

Table 8

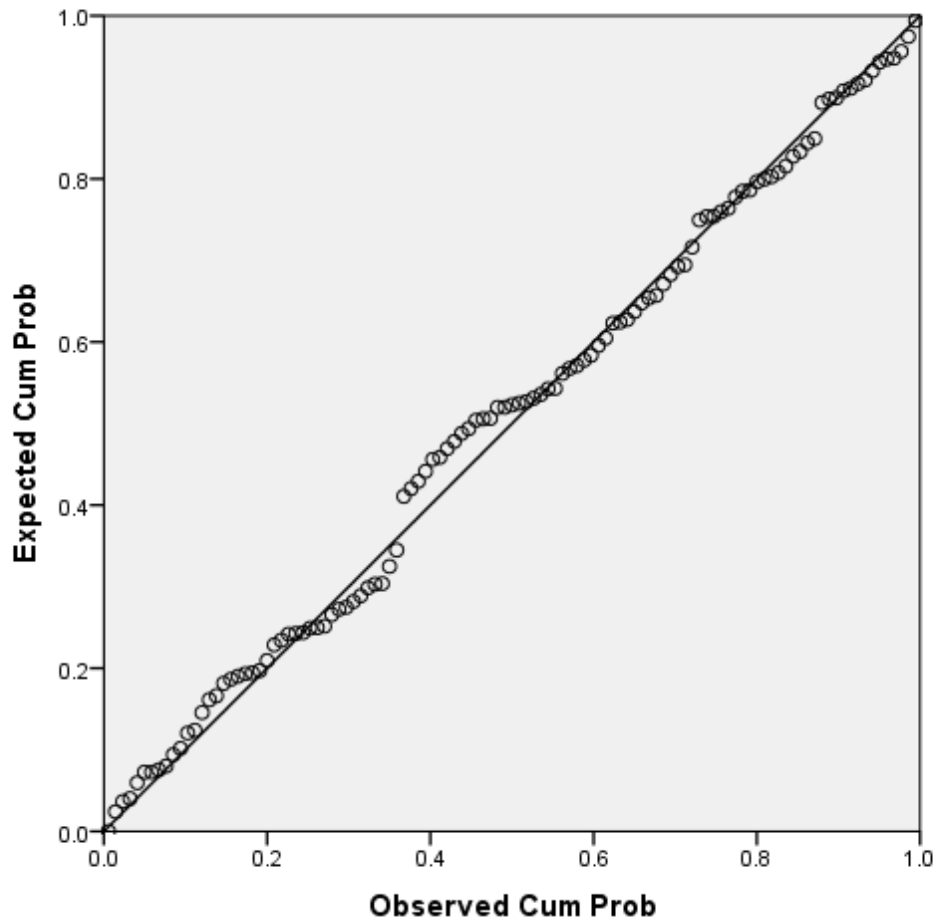
*The Bivariate and Partial Correlations of Institutional Finance Variables with Retention Rates*

Predictors	Correlation between each predictor and the retention rate	Correlation between each predictor and the retention rate controlling for all other predictors
Instruction	.29*	.25*
Student Services	.07	.01
Institutional Support	.05*	-.30*
Academic Support	.37*	.37*

\* Significant at the .05 level.

Figure 4 illustrates the plot of the observed cases in relation to the expected regression line and it indicates the overall fit of the model.





*Figure 4.* Plot of the first-time, full-time, fall-to-fall undergraduate retention rates regression line for institutional finance variables

It appears that there is a relationship between institutional finance variables of expenditures for instruction, student services, institutional support, academic support, and first-time, full-time, fall-to-fall undergraduate retention rates at SACSCOC Level III institutions. Expenditures for instruction, institutional support, and academic support appeared to have the greatest influences. The higher the expenditures in each area resulted in higher student retention rates. It should be noted, however, that the model only accounted for 23% of variance of first-time, full-time, fall-to-fall undergraduate retention rates.

### Research Question 5

Is there a significant relationship between a linear combination of institutional interaction predictor variables (student-faculty ratio and percentage of full-time faculty) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho5: There is no significant relationship between a linear combination of institutional interaction predictor variables (student-faculty ratio and percentage of full-time faculty) and the criterion variable (first-time, full-time, fall-to-fall undergraduate retention rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions

A multiple regression analysis was conducted to evaluate the effect of the predictor variables upon the criterion variable, first-time, full-time, fall-to-fall undergraduate student retention rates. The predictors were student-faculty ratio and the percentage of full-time faculty, while the criterion variable was first-time, fall-to-fall undergraduate retention rates at SACSCOC Level III institutions. As part of the initial analysis the intercorrelations among the predictor variables were assessed for multicollinearity. Collinearity diagnostics identify redundancies among predictor variables if not accounted for could cause an over fit within the model. The assessment indicated there were no critical associations.

The linear combination of the predictor variables was not significantly related to the criterion variable, first-time, full-time, fall-to-fall undergraduate student retention rates,  $F(2, 110) = 2.38, p = .098$ . Therefore, Ho5 was not rejected. From the data presented there appears to be no correlation between using institutional interaction variables of student-faculty ratio and

the percentage of full-time faculty to predict first-time, full-time, fall-to-fall undergraduate retention rates at SACSCOC Level III institutions.

### **Research Question 6**

Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional finance predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho6: There is no significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional finance predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple linear regression analysis was conducted on two sets of unordered predictor variables, institutional library resource variables and institutional finance variables, to evaluate to what extent one set of predictor variables, institutional library resource variables, predict the criterion variable over and above the other set of predictor variables, institutional finance variables. The criterion variable was first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities with SACSCOC Level III accreditation status.

The institutional library resource variables predicted significantly over and above the institutional finance variables,  $R^2$  change = .11,  $F(2, 104) = 8.56$ ,  $p < .001$ . Therefore, Ho6 was rejected. Analysis of the change statistics showed that the institutional library resource variables were better predictors of first-time, full-time, fall-to-fall undergraduate student retention rates than institutional finance variables.

Table 9 presents the change statistics between the models of two unordered sets of predictors. Model 1 shows to what extent institutional finance variables predict the criterion variable, first-time, full-time, fall-to-fall undergraduate retention rates. Model 2 shows to what extent institutional library resource variables predict the criterion variable over and above institutional finance variables.

Table 9

*Change Statistics for Two Unordered Sets of Predictors (Institutional Finance Variables and Institutional Library Resource Variables)*

Predictor Set	<i>R square change</i>	<i>F change</i>	<i>df1</i>	<i>df2</i>	<i>p change</i>
Model 1 (Institutional Finance Variables)	.23	8.00	4	106	
Model 2 (Institutional Library Resource Variables)	.11	8.56	2	104	.001*

\* Significant at the .05 level; *df1* = numerator degrees of freedom; *df2* = denominator degrees of freedom; *p change* = significance of model 2 over and above model 1.

### **Research Question 7**

Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho7: There is no significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple linear regression analysis was conducted on two sets of unordered predictor variables, institutional library resource variables and institutional interaction variables, to evaluate to what extent one set of predictor variables, institutional library resource variables, predict the criterion variable over and above the other set of predictor variables, institutional interaction variables. The criterion variable was first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities with SACSCOC Level III accreditation status.

The institutional library resource variables predicted significantly over and above the institutional interaction variables,  $R^2$  change = .20,  $F(2, 106) = 13.75, p < .001$ . Therefore,  $H_0$  was rejected. Analysis of the change statistics showed that the institutional library resource variables were better predictors of first-time, full-time, fall-to-fall undergraduate student retention rates than institutional interaction variables.

Table 10 presents the change statistics between the models of two unordered sets of predictors. Model 1 shows to what extent institutional interaction variables predict the criterion variable, first-time, full-time, fall-to-fall undergraduate retention rates. Model 2 shows to what extent institutional library resource variables predict the criterion variable over and above institutional interaction variables.

Table 10

*Change Statistics for Two Unordered Sets of Predictors (Institutional Interaction Variables and Institutional Library Resource Variables)*

Predictor Set	<i>R square change</i>	<i>F change</i>	<i>df1</i>	<i>df2</i>	<i>p change</i>
Model 1 (Institutional Interaction Variables)	.05	2.55	2	108	
Model 2 (Institutional Library Resource Variables)	.20	13.75	2	106	.001*

\* Significant at the .05 level; *df1* = numerator degrees of freedom; *df2* = denominator degrees of freedom; *p change* = significance of model 2 over and above model 1.

### Research Question 8

Is there a significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho8: There is no significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple linear regression analysis was conducted on two sets of unordered predictor variables, institutional finance variables and institutional interaction variables, to evaluate to what extent one set of predictor variables, institutional finance variables, predict the criterion variable over and above the other set of predictor variables, institutional interaction variables. The criterion variable was first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities with SACSCOC Level III accreditation status.

The institutional financial variables predicted significantly over and above the institutional interaction variables,  $R^2$  change = .20,  $F(4, 106) = 7.18, p < .001$ . Therefore, Ho8 was rejected. Analysis of the change statistics showed that the institutional finance variables were better predictors of first-time, full-time, fall-to-fall undergraduate student retention rates than institutional interaction variables.

Table 11 presents the change statistics between the models of two unordered sets of predictors. Model 1 shows to what extent institutional interaction variables predict the criterion variable, first-time, full-time, fall-to-fall undergraduate retention rates. Model 2 shows to what

extent institutional finance variables predict the criterion variable over and above institutional interaction variables.

Table 11

*Change Statistics for Two Unordered Sets of Predictors (Institutional Interaction Variables and Institutional Finance Variables)*

Predictor Set	<i>R square change</i>	<i>F change</i>	<i>df1</i>	<i>df2</i>	<i>p change</i>
Model 1 (Institutional Interaction Variables)	.04	2.38	2	110	
Model 2 (Institutional Finance Variables)	.20	7.18	4	106	.001*

\* Significant at the .05 level; *df1* = numerator degrees of freedom; *df2* = denominator degrees of freedom; *p change* = significance of model 2 over and above model 1.

### Research Question 9

Is there a significant relationship between a linear combination of institutional predictor variables (25th percentile ACT scores, 75th percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell grants, and federal student loans) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho9: There is no significant relationship between a linear combination of institutional predictor variables (25th percentile ACT scores, 75th percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell grants, and federal student loans) and the criterion variable (6-

year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple regression analysis was conducted to evaluate the effect of predictor variables upon the criterion variable, 6-year graduation rates. The predictors were 25<sup>th</sup> percentile and 75<sup>th</sup> percentile ACT scores, gender ratio of males to females, and the percent of students receiving financial aid disaggregated by grants and scholarships, Pell grant, and federal student loans. The criterion variable was 6-year graduation rates at 4-year colleges and universities with Level III SACSCOC accreditation status.

As part of the initial analysis the intercorrelations among the predictor variables were assessed for multicollinearity. Collinearity diagnostics identify redundancies among predictor variables if not accounted for could cause an over fit within the model. The assessment indicated a strong intercorrelation with the predictor variable of 25<sup>th</sup> percentile ACT. That predictor variable produced a VIF value greater than 10 and was removed from the analysis.

The linear combination of the predictor variables was significantly related to the criterion variable, 6-year graduation rates,  $F(5, 86) = 30.50, p < .001$ . Therefore,  $H_0$  was rejected. The sample multiple correlation coefficient was .80, indicating that approximately 64% of the variance of 6-year graduation rates in the sample can be accounted for by the linear combination of strength measures. The regression equation is as follows: Predicted 6-year graduation rates = *.03 Gender Ratio Males to Females + .01 Percent of Students Receiving Grant or Scholarship Aid - .25 Percent of Students Receiving Pell Grant + .17 Percent of Students Receiving Federal Student Loans + .03 75<sup>th</sup> Percentile ACT Scores - .33.*

Table 12 presents indices to specify the relative strength of the individual predictors. The beta weights indicate the relative contributions of the variables to the prediction of 6-year



graduation rates at SACSCOC Level III institutions. From the data presented it is evident that the greatest predictors of 6-year graduation rates from these institutional characteristics were the percentage of students receiving Pell grant and the 75<sup>th</sup> percentile ACT score. These were the only variables that were significant at the .05 level.

Table 12

*Regression Coefficients, Significance Levels, and Confidence Intervals of Institutional Student Variables when Predicting Graduation Rates*

Variable	<i>B</i>	$\beta$	<i>t</i>	<i>p</i>
Gender Ratio Males to Females	.03	.06	.78	.435
% Grant or Scholarship Aid	.01	.01	.14	.889
% Pell Grant	-.25	-.25	-2.23	.028*
% Federal Student Loans	.17	.16	1.53	.130
75 <sup>th</sup> Percentile ACT Scores	.03	.69	7.16	.001*

\* Significant at the .05 level; *B* = unstandardized regression coefficient;  $\beta$  = standard coefficient

Table 13 presents indices to indicate the relative strength of the individual predictors. The partial correlations of the percentage of students receiving Pell grant and the 75<sup>th</sup> percentile ACT score were significant at the .05 level. On the basis of these correlational analyses, it appears that the most useful predictor is the 75<sup>th</sup> percentile ACT score. After controlling for all other predictor variables, the 75<sup>th</sup> percentile ACT score had the strongest partial correlation of .61. However, judgements about the relative importance of these predictors are difficult to determine because the predictors are correlated.

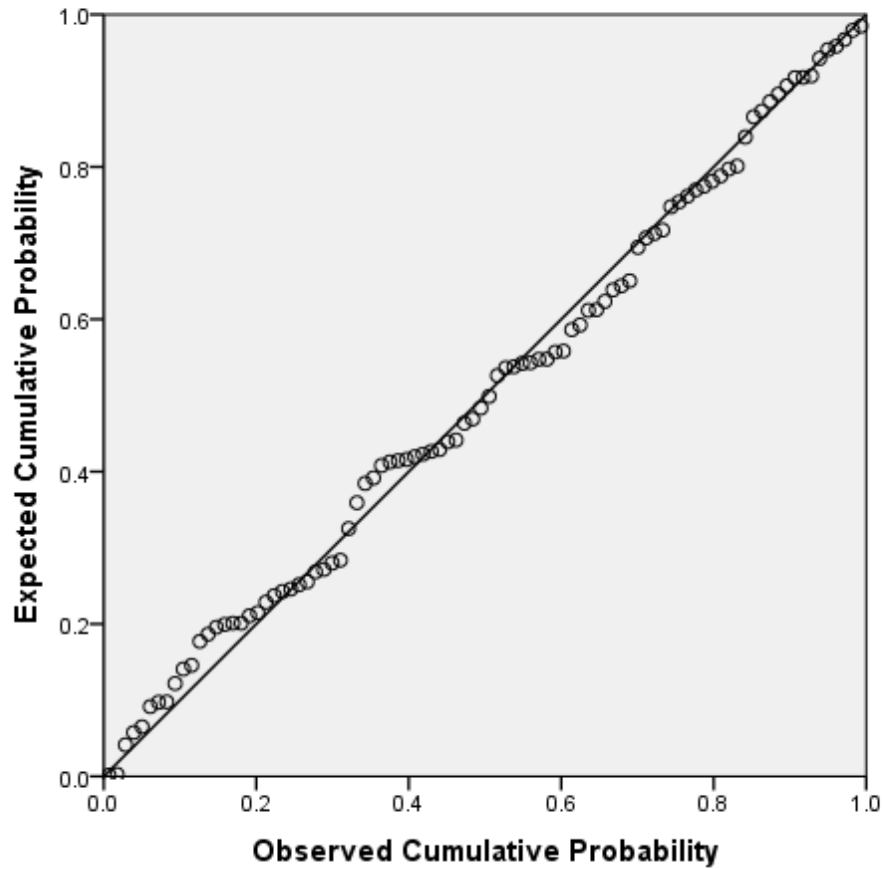
Table 13

*The Bivariate and Partial Correlations of Institutional Student Variables with Graduation Rates*

Predictors	Correlation between each predictor and the retention rate	Correlation between each predictor and the retention rate controlling for all other predictors
Gender Ratio	-.11	.08
% Grant or Scholarship Aid	.03	.02
% Pell Grant	-.60	-.23
% Federal Student Loans	-.28	.16
75 <sup>th</sup> Percentile ACT Scores	.78	.61

\* Significant at the .05 level.

Figure 5 illustrates the plot of the observed cases in relation to the expected regression line and it indicates the overall fit of the model.



*Figure 5.* Plot of the 6-year graduation rates regression line for institutional student variables

It appears that there is a relationship between institutional student variables of 75<sup>th</sup> percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell grants, and federal student loans and 6-year graduation rates at 4-year colleges and universities with Level III SACSCOC accreditation status. The 75<sup>th</sup> percentile ACT scores appeared to have the greatest influence. The higher the institution's 75<sup>th</sup> percentile ACT scores resulted in higher graduation rates. It should be noted, however, that the model only accounted for 64% of the variance of 6-year graduation rates.

### Research Question 10

Is there a significant relationship between a linear combination of institutional environment predictor variables (size, institution type, and cost) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho10: There is no significant relationship between a linear combination of institutional environment predictor variables (size, institution type, and cost) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple regression analysis was conducted to evaluate the effect of the predictor variables upon the criterion variable, 6-year graduation rates. The predictors were institution enrollment size, institution type, and cost from tuition and required fees, while the criterion variable was 6-year graduation rates at SACSCOC Level III institutions. As part of the initial analysis the intercorrelations among the predictor variables were assessed for multicollinearity. Collinearity diagnostics identify redundancies among predictor variables if not accounted for could cause an over fit within the model. While there were some dimensions that were moderately intercorrelated, the assessment indicated no critical associations.

The linear combination of predictor variables was significantly related to the criterion variable, 6-year graduation rates,  $F(3, 109) = 13.80, p < .001$ . Therefore, Ho10 was rejected. The sample multiple correlation coefficient was .53, indicating that approximately 28% of the variance of the 6-year graduation rates in the sample can be accounted for by the linear combination of strength measures. The regression equation is as follows: Predicted 6-year graduation rates =  $-3.50 \times 10^{-6} Enrollment Size + 9.97 \times 10^{-6} Cost - .13 Institution Type + .36$ .

Table 14 presents indices to specify the relative strength of the individual predictors. The beta weights indicate the relative contributions of the variables to the prediction of 6-year graduation rates. From the data presented, the greatest influences on an institution's 6-year graduation rate were cost and institution type. Both of those variables were significant at the .05 level.

Table 14

*Regression Coefficients, Significance Levels, and Confidence Intervals of Institutional Environment Variables when Predicting Graduation Rates*

Variable	<i>B</i>	$\beta$	<i>T</i>	<i>p</i>
Enrollment Size	-3.50 x 10 <sup>-6</sup>	-.06	-.67	.502
Cost	9.97 x 10 <sup>-6</sup>	.68	6.32	.001*
Institution Type	-.13	-.38	-3.19	.002*

\* Significant at the .05 level; *B* = unstandardized regression coefficient;  $\beta$  = standard coefficient

Table 15 presents indices to indicate the relative strength of the individual predictors. The partial correlations between the cost and the institution type and 6-year graduation rates were significant at the .05 level. On the basis of these correlational analyses, it appears that the most useful predictor of 6-year graduation rates is cost, as defined by tuition and required fees, with a partial correlation of .52. However, judgements about the relative importance of these predictors are difficult to determine because the predictors are correlated.

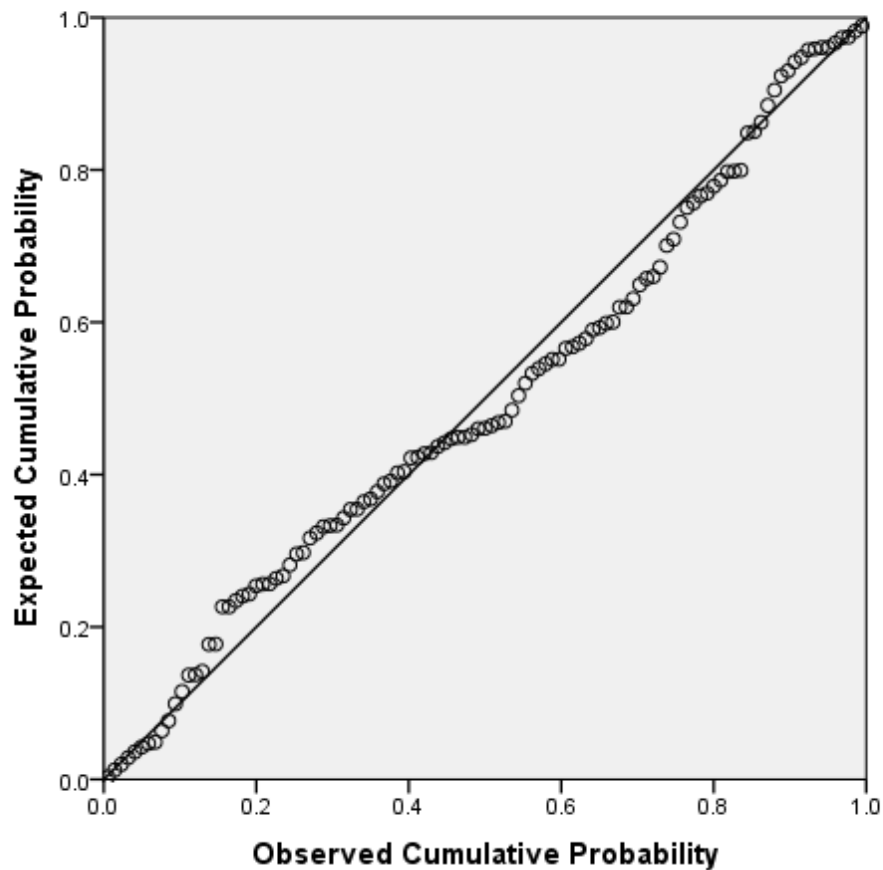
Table 15

*The Bivariate and Partial Correlations of Institutional Environment Variables with Graduation Rates*

Predictors	Correlation between each predictor and the retention rate	Correlation between each predictor and the retention rate controlling for all other predictors
Enrollment Size	-.07	-.06
Cost	.45	.52
Institution Type	.10	-.29

\* Significant at the .05 level.

Figure 6 illustrates the plot of the observed cases in relation to the expected regression line and it indicates the overall fit of the model.



*Figure 6.* Plot of the 6-year graduation rates regression line for institutional environment variables

It appears that there is a relationship between institutional environment variables of enrollment size, cost from tuition and required fees, institution type, and 6-year graduation rates at SACSCOC Level III institutions. Cost from tuition and required fees and institution type appeared to have the greatest influences on graduation rates. Higher institutional costs and attendance at private institutions resulted in higher graduation rates. It should be noted, however, that the model only accounted for 28% of variance of the 6-year graduation rates at SACSCOC Level III institutions.

### Research Question 11

Is there a significant relationship between a linear combination of institutional library resource predictor variables (physical library collections and number of electronic library collections) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho11: There is no significant relationship between a linear combination of institutional library resource predictor variables (physical library collections and number of electronic library collections) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple regression analysis was conducted to evaluate the effect of the predictor variables upon the criterion variable, 6-year graduation rates. The predictors were the number of physical library collections and the number of electronic library collections, while the criterion variable was 6-year graduation rates at SACSCOC Level III institutions. As part of the initial analysis the intercorrelations among the predictor variables were assessed for multicollinearity. Collinearity diagnostics identify redundancies among predictor variables if not accounted for could cause an over fit within the model. While there were some dimensions that were moderately intercorrelated, the assessment indicated no critical associations.

The linear combination of predictor variables was significantly related to the criterion variable, 6-year graduation rates,  $F(2, 109) = 16.20, p < .001$ . Therefore, Ho11 was rejected. The sample multiple correlation coefficient was .48, indicating that approximately 23% of the variance of 6-year graduation rates can be accounted for by the linear combination of strength measures. The regression equation is as follows: Predicted 6-year graduation rates =  $4.63 \times 10^{-7}$



*Total Number of Physical Library Collections* –  $2.65 \times 10^{-8}$  *Total Number of Electronic Library Collections* + .39.

Table 16 presents indices to specify the relative strength of the individual predictors. The beta weights indicate the relative contributions of the variables to the prediction of 6-year graduation rates. From the data presented, the total number of physical library collections appears to influence 6-year graduation rates. The predictor variable was significant at the .05 level.

Table 16

*Regression Coefficients, Significance Levels, and Confidence Intervals of Institutional Library Resource Variables when Predicting Graduation Rates*

Variable	<i>B</i>	$\beta$	<i>t</i>	<i>p</i>
Physical Library Collections	$4.63 \times 10^{-7}$	.47	5.61	.001*
Electronic Library Collections	$-2.65 \times 10^{-8}$	-.11	-1.32	.191

\* Significant at the .05 level; *B* = unstandardized regression coefficient;  $\beta$  = standard coefficient

Table 17 presents indices to indicate the relative strength of the individual predictors. The partial correlation for physical library collections was significant at the .05 level. On the basis of these correlational analyses it appears that the most useful predictor of 6-year graduation rates is the number of physical library collections. After controlling for other predictor variables, the number of physical library collections had the strongest partial correlation of .47. However, judgements about the relative importance of these predictors are difficult to determine because the predictors are correlated.

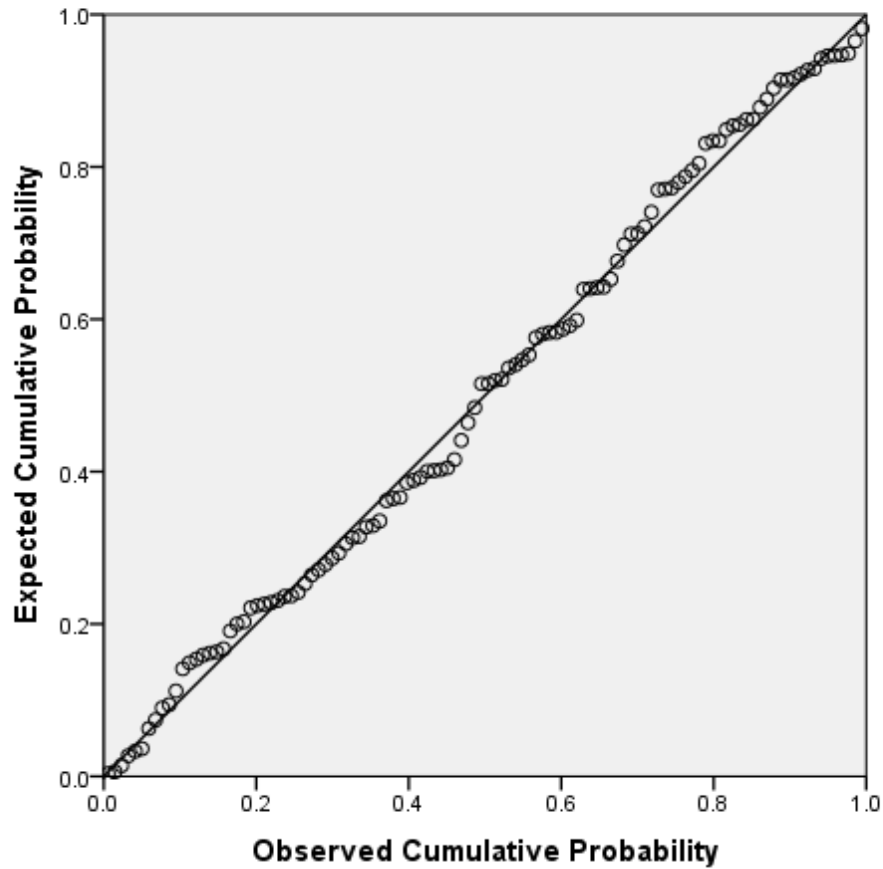
Table 17

*The Bivariate and Partial Correlations of Institutional Library Resource Variables with Graduation Rates*

Predictors	Correlation between each predictor and the retention rate	Correlation between each predictor and the retention rate controlling for all other predictors
Physical Collections	.47*	.47*
Electronic Collections	-.08	-.13

\* Significant at the .05 level.

Figure 7 illustrates the plot of the observed cases in relation to the expected regression line and it indicates the overall fit of the model.



*Figure 7.* Plot of the 6-year graduation rates regression line for institutional library resource variables

It appears that there is a relationship between institutional library resource variables of the number of physical library collections, the number of electronic library collections, and 6-year graduation rates at SACSCOC Level III institutions. The number of physical library collections appeared to influence the graduation rates. Higher numbers of physical library collections resulted in higher graduation rates. It should be noted, however, that the model only accounted for 23% of variance of 6-year graduation rates at SACSCOC Level III institutions.

## Research Question 12

Is there a significant relationship between a linear combination of institutional finance predictor variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho12: There is no significant relationship between a linear combination of institutional finance predictor variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple linear regression analysis was conducted to evaluate the effect of the predictor variables upon the criterion variable 6-year graduation rates. The predictors were expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support. The criterion variable was 6-year graduation rates at SACSCOC Level III institutions. As part of the initial analysis the intercorrelations among the predictor variables were assessed for multicollinearity. Collinearity diagnostics identify redundancies among predictor variables if not accounted for could cause an over fit within the model. While there were some dimensions that were moderately correlated, the assessment indicated no critical associations.

The linear combination of the predictor variables was significantly related to the criterion variable 6-year graduation rates,  $F(4, 108) = 7.69, p < .001$ . Therefore, Ho12 was rejected. The sample multiple correlation coefficient was .47, indicating approximately 22% of the variance of

6-year graduation rates in the sample can be accounted for by the linear combination of strength measures. The regression equation is as follows: Predicted 6-year graduation rates =  $1.30 \times 10^{-5}$  Expenditures for Instruction +  $1.35 \times 10^{-5}$  Expenditures for Student Services –  $4.60 \times 10^{-6}$  Expenditures for Institutional Support +  $1.24 \times 10^{-5}$  Expenditures for Academic Support + .30.

Table 18 presents indices to specify the relative strength of the individual predictors. The beta weights indicate the relative contributions of the variables to the prediction of 6-year graduation rates. From the data presented it is evident that expenditures for instruction influence 6-year graduation rates. Expenditures for instruction was the only predictor variable significant at the .05 level.

Table 18

*Regression Coefficients, Significance Levels, and Confidence Intervals of Institutional Finance Variables when Predicting Graduation Rates*

Variable	<i>B</i>	$\beta$	<i>t</i>	<i>p</i>
Instruction	$1.30 \times 10^{-5}$	.35	2.75	.007*
Student Services	$1.35 \times 10^{-5}$	.18	1.83	.070
Institutional Support	$-4.60 \times 10^{-6}$	-.10	-.83	.406
Academic Support	$1.24 \times 10^{-5}$	.13	1.10	.276

\* Significant at the .05 level; *B* = unstandardized regression coefficient;  $\beta$  = standard coefficient

Table 19 presents indices to indicate the relative strength of the individual predictors. The partial correlations between expenditures for instruction and 6-year graduation rates were all significant at the .05 level. On the basis of these correlational analyses it appears that the most useful predictor is expenditures for instruction. After controlling for all other predictor variables expenditures for instruction had the strongest partial correlation of .26. However, judgements

about the relative importance of these predictors are difficult to determine because the predictors are correlated.

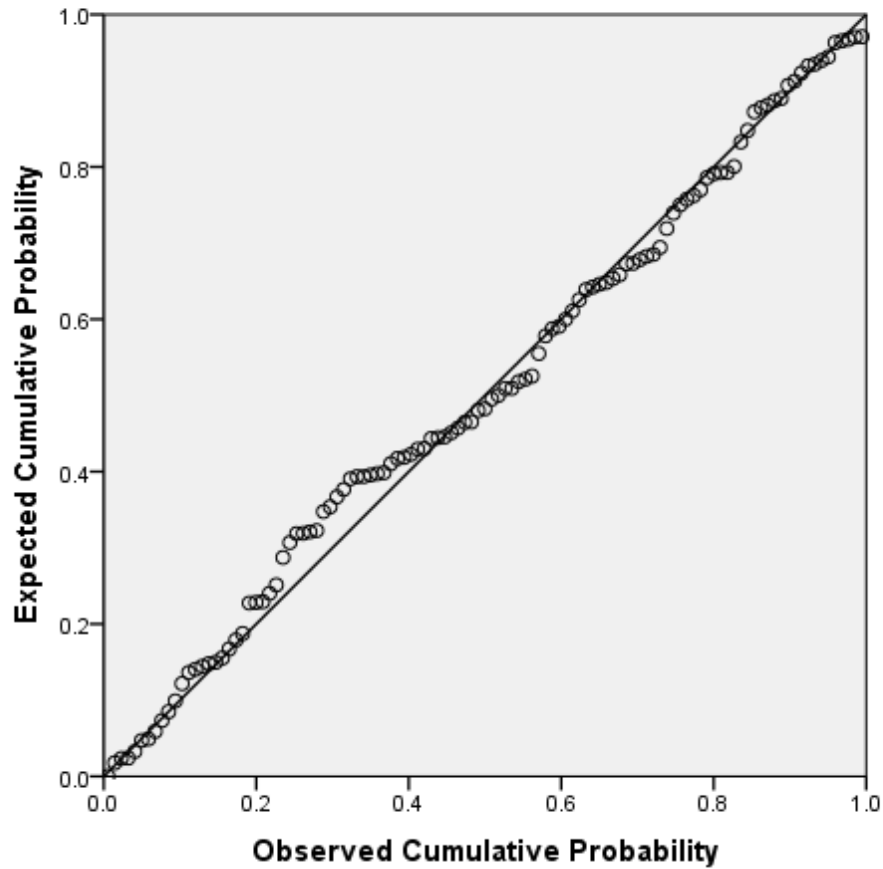
Table 19

*The Bivariate and Partial Correlations of Institutional Finance Variables with Graduation Rates*

Predictors	Correlation between each predictor and the retention rate	Correlation between each predictor and the retention rate controlling for all other predictors
Instruction	.44*	.26*
Student Services	.31	.17
Institutional Support	.28	-.08
Academic Support	.30	.11

\* Significant at the .05 level.

Figure 8 illustrates the plot of the observed cases in relation to the expected regression line and it indicates the overall fit of the model.



*Figure 8.* Plot of the 6-year graduation rates regression line for institutional finance variables

It appears that there is a relationship between institutional finance variables of expenditures for instruction, student services, institutional support, academic support, and 6-year graduation rates at SACSCOC Level III institutions. Expenditures for instruction appeared to have the greatest influence. Higher expenditures for instruction resulted in higher graduation rates. It should be noted, however, that the model only accounted for 22% of variance of first-time, fall-to-fall undergraduate retention rates.

### Research Question 13

Is there a significant relationship between a linear combination of institutional interaction predictor variables (student-faculty ratio and percentage of full-time faculty) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho13: There is no significant relationship between a linear combination of institutional interaction predictor variables (student-faculty ratio and percentage of full-time faculty) and the criterion variable (6-year graduation rates) at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple regression analysis was conducted to evaluate the effect of the predictor variables upon the criterion variable 6-year graduation rates. The predictors were student-faculty ratio and the percentage of full-time faculty, while the criterion variable was 6-year graduation rates at SACSCOC Level III institutions. As part of the initial analysis the intercorrelations among the predictor variables were assessed for multicollinearity. Collinearity diagnostics identify redundancies among predictor variables if not accounted for could cause an over fit within the model. While there were some dimensions that were moderately intercorrelated, the assessment indicated no critical associations.

The linear combination of predictor variables was significantly related to the criterion variable, 6-year graduation rates,  $F(2, 110) = 7.27, p = .001$ . Therefore, Ho13 was rejected. The sample multiple correlation coefficient was .34, indicating that approximately 12% of the variance of 6-year graduation rates can be accounted for by the linear combination of strength measures. The regression equation is as follows: Predicted 6-year graduation rates =  $-.01 \text{ Student-Faculty Ratio} + .15 \text{ Percentage of Full-Time Faculty} + .27$ .



Table 20 presents indices to specify the relative strength of the individual predictors. The beta weights indicate the relative contributions of the variables to the prediction of 6-year graduation rates. From the data presented the student-faculty ratio and the percentage of full-time faculty both appear to influence 6-year graduation rates. The predictor variables were significant at the .05 level.

Table 20

*Regression Coefficients, Significance Levels, and Confidence Intervals of Institutional Interaction Variables when Predicting Graduation Rates*

Variable	<i>B</i>	$\beta$	<i>t</i>	<i>p</i>
Student-Faculty Ratio	-.01	-.30	-3.31	.001*
% Full-Time Faculty	.15	.20	2.17	.032*

\* Significant at the .05 level; *B* = unstandardized regression coefficient;  $\beta$  = standard coefficient

Table 21 presents indices to indicate the relative strength of the individual predictors. The partial correlations for both student-faculty ratio and the percentage of full-time faculty were significant at the .05 level. On the basis of these correlational analyses it appears that the most useful predictor of 6-year graduation rates is the percentage of full-time faculty. After controlling for other predictor variables the percentage of full-time faculty had the strongest partial correlation of .20. However, judgements about the relative importance of these predictors are difficult to determine because the predictors are correlated.

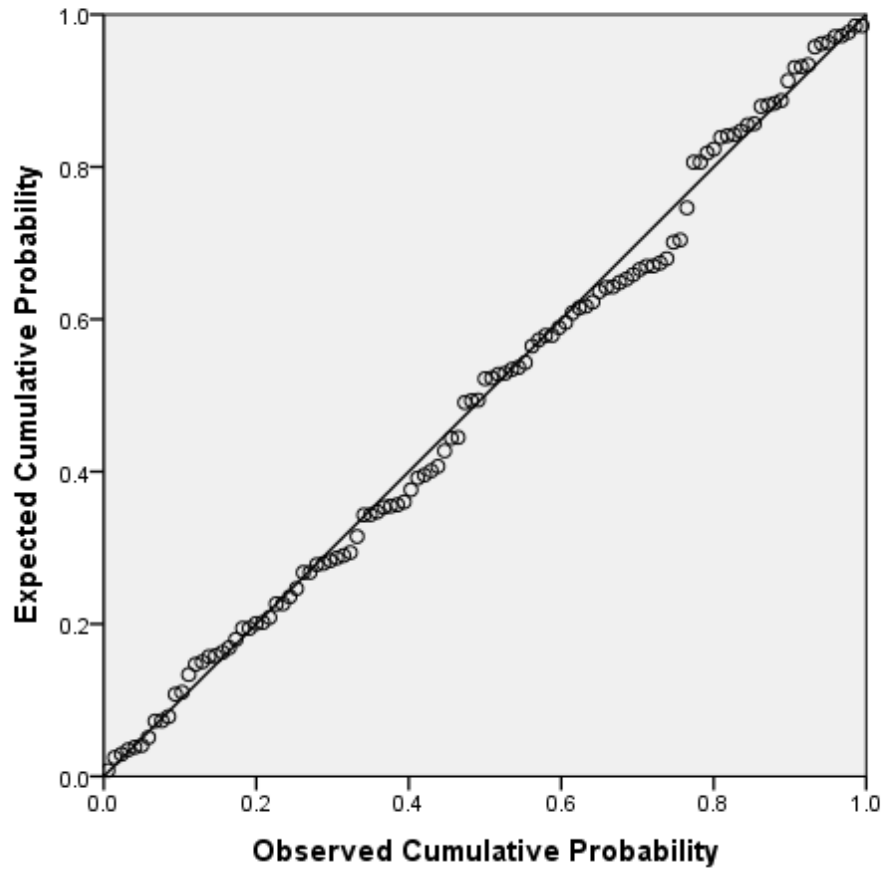
Table 21

*The Bivariate and Partial Correlations of Institutional Interaction Variables with Graduation Rates*

Predictors	Correlation between each predictor and the retention rate	Correlation between each predictor and the retention rate controlling for all other predictors
Student-Faculty Ratio	-.28*	-.30*
% Full-Time Faculty	.17*	.20*

\* Significant at the .05 level.

Figure 9 illustrates the plot of the observed cases in relation to the expected regression line and it indicates the overall fit of the model.



*Figure 9.* Plot of the 6-year graduation rates regression line for institutional interaction variables

It appears that there is a relationship between institutional interaction variables of student-faculty ratio and the percentage of full-time faculty and 6-year graduation rates at SACSCOC Level III institutions. The percentage of full-time faculty appeared to have the greatest influence on the graduation rates. Higher percentages of full-time faculty resulted in higher graduation rates. It should be noted, however, that the model only accounted for 12% of variance of 6-year graduation rates at SACSCOC Level III institutions.

### Research Question 14

Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional finance predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho14: There is no significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional finance predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple linear regression analysis was conducted on two sets of unordered predictor variables, institutional library resource variables and institutional finance variables, to evaluate to what extent one set of predictor variables, institutional library resource variables, predict the criterion variable over and above the other set of predictor variables, institutional finance variables. The criterion variable was 6-year graduation rates at 4-year colleges and universities with SACSCOC Level III accreditation status.

The institutional library resource variables did not predict significantly over and above the institutional finance variables,  $R^2$  change = .01,  $F(2, 104) = .690$ ,  $p = .504$ . Therefore, Ho14 was not rejected. Analysis of the change statistics showed that the institutional library resource variables were not better predictors of 6-year graduation rates than institutional finance variables.

### Research Question 15

Is there a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho15: There is no significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple linear regression analysis was conducted on two sets of unordered predictor variables, institutional library resource variables and institutional interaction variables, to evaluate to what extent one set of predictor variables, institutional library resource variables, predict the criterion variable over and above the other set of predictor variables, institutional interaction variables. The criterion variable was 6-year graduation rates at 4-year colleges and universities with SACSCOC Level III accreditation status.

The institutional library resource variables did not predict significantly over and above the institutional interaction variables,  $R^2$  change = .02,  $F(2, 103) = 1.21$ ,  $p = .302$ . Therefore, Ho15 was not rejected. Analysis of the change statistics showed that the institutional library resource variables were not better predictors of 6-year graduation rates than institutional interaction variables.

### Research Question 16

Is there a significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions?

Ho16: There is no significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions.

A multiple linear regression analysis was conducted on two sets of unordered predictor variables, institutional finance variables and institutional interaction variables, to evaluate to what extent one set of predictor variables, institutional finance variables, predict the criterion variable over and above the other set of predictor variables, institutional interaction variables. The criterion variable was 6-year graduation rates at 4-year colleges and universities with SACSCOC Level III accreditation status.

The institutional finance variables predicted significantly over and above the institutional interaction variables,  $R^2$  change = .10,  $F(4, 103) = 2.80$ ,  $p = .030$ . Therefore, Ho16 was rejected. Analysis of the change statistics showed that the institutional finance variables were better predictors of 6-year graduation rates than institutional interaction variables.

Table 22 presents the change statistics between the models of two unordered sets of predictors. Model 1 shows to what extent institutional interaction variables predict the criterion variable, first-time, fall-to-fall undergraduate retention rates. Model 2 shows to what extent institutional finance variables predict the criterion variable over and above institutional interaction variables.

Table 22

*Change Statistics for Two Unordered Sets of Predictors (Institutional Interaction Variables and Institutional Finance Variables)*

Predictor Set	<i>R square change</i>	<i>F change</i>	<i>df1</i>	<i>df2</i>	<i>p change</i>
Model 1 (Institutional Interaction Variables)	.01	.52	2	107	
Model 2 (Institutional Finance Variables)	.10	2.80	4	103	.030*

\* Significant at the .05 level; *df1* = numerator degrees of freedom; *df2* = denominator degrees of freedom; *p change* = significance of model 2 over and above model 1.

### Chapter Summary

Data analysis and findings from 16 research questions and 16 null hypotheses were presented in this chapter. Data were collected on 124 SACSCOC Level III institutions from the Integrated Postsecondary Data System (IPEDS) and were analyzed using a statistical software program. The summary, conclusions, implications for practice, and recommendations are presented in Chapter 5.

## CHAPTER 5

### SUMMARY, CONCLUSION, AND RECOMMENDATIONS

The purpose of this study was to investigate the relationship between institutional characteristics and first-time, full-time, fall-to-fall undergraduate student retention rates and 6-year graduation rates at SACSCOC Level III institutions. Specifically the researcher analyzed institutional student variables, environment variables, resource variables, financial variables, and interaction variables and how well those variables predicted first-year, full-time, fall-to-fall undergraduate retention rates and 6-year graduation rates at 4-year colleges and universities with Level III SACSCOC accreditation status. This chapter contains a summary of the findings, conclusions, implications for practice, and recommendations for future research.

#### **Summary**

The analysis presented in this study was based on 16 research questions that were reported in Chapters 1 and 3. Each research question had one null hypothesis and all research questions were analyzed using multiple linear regressions for unordered sets of predictors. The total number of participants in the study were 124 SACSCOC Level III institutions.

For research questions 1 through 5 the researcher investigated the relationships between institutional characteristics and first-time, full-time, fall-to-fall undergraduate student retention rates. For research questions 6 through 8 the researcher compared the models of institutional library resource variables, institutional finance variables, and institutional interaction variables to determine if the correlation for one set of the variables was over and above the other sets of variables. For research questions 9 through 13 the researcher investigated the relationships between institutional characteristics and 6-year graduation rates at SACSCOC Level III institutions. For research questions 14 through 16 the researcher compared the models of



institutional library resource variables, institutional finance variables, and institutional interaction variables to determine if the correlation for one set of variables was over and above the other sets of variables.

Research question 1 investigated if there was a significant relationship between a linear combination of institutional student variables (25<sup>th</sup> and 75<sup>th</sup> percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell Grant, and federal student loans) and first-time, full-time, fall-to-fall undergraduate student retention rates at 4-year colleges and universities at SACSCOC Level III institutions. The results of the multiple linear regression showed that the predictor variables, institutional student variables, were significantly related to the criterion variable of student retention rates. The correlational analyses showed that the most useful predictor was the 75<sup>th</sup> percentile ACT score.

Research question 2 investigated if there was a significant relationship between a linear combination of institutional environment variables (size, institution type, and cost) and first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities at SACSCOC Level III institutions. The results of the multiple linear regression showed that the predictor variables, institutional environment variables, were significantly related to the criterion variable of student retention rates. The correlational analyses showed that the most useful predictor was cost, as defined by tuition and required fees.

Research question 3 investigated if there was a significant relationship between a linear combination of institutional library resource variables (the number of physical library collections and the number of electronic library collections) and first-year, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities with SACSCOC Level III

accreditation status. The results of the multiple linear regression showed that the predictor variables, institutional library resource variables, were significantly related to the criterion variable of student retention rates. The correlational analyses showed that the most useful predictor was the number of physical library collections.

Research question 4 investigated if there was a significant relationship between a linear combination of institutional finance variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and first-year, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities with SACSCOC Level III accreditation status. The results of the multiple linear regression showed that the predictor variables, institutional finance variables, were significantly related to the criterion variable of student retention rates. The correlational analyses showed that the most useful predictor was expenditures for academic support.

Research question 5 investigated if there was a significant relationship between a linear combination of institutional interaction variables (student-faculty ratio and the percentage of full-time faculty predicted first-year) and first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities with SACSCOC Level III accreditation status. The results of the multiple linear regression showed that the predictor variables, institutional interaction variables, were not significantly related to the criterion variable of student retention rates.

Research question 6 investigated if there was a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional finance predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions. The

results of the multiple linear regression showed that institutional library resource variables predicted student retention rates significantly over and above institutional finance variables.

Research question 7 investigated if there was a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions. The results of the multiple linear regression showed that institutional library resource variables predicted student retention rates significantly over and above institutional interaction variables.

Research question 8 investigated if there was a significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting first-time, full-time, fall-to-fall undergraduate retention rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions. The results of the multiple linear regression showed that institutional finance variables predicted student retention rates significantly over and above institutional interaction variables.

Research question 9 investigated if there was a significant relationship between a linear combination of institutional student variables (25<sup>th</sup> and 75<sup>th</sup> percentile ACT scores, gender ratio of men to women, and the percentage of students receiving financial aid in the forms of grants/scholarships, Pell Grant, and federal student loans) and 6-year graduation rates at 4-year colleges and universities with Level III SACSCOC accreditation status. The results of the multiple linear regression showed that the predictor variables, institutional student variables, were significantly related to the criterion variable of 6-year graduation rates. The correlational analyses showed that the most useful predictor was the 75<sup>th</sup> percentile ACT score.

Research question 10 investigated if there was a significant relationship between a linear combination of institutional environment variables (size, institution type, and cost) and 6-year graduation rates at 4-year colleges and universities with SACSCOC Level III accreditation status. The results of the multiple linear regression showed that the predictor variables, institutional environment variables, were significantly related to the criterion variable of 6-year graduation rates. The correlational analyses showed that the most useful predictor was cost as defined by tuition and required fees.

Research question 11 investigated if there was a significant relationship between a linear combination of institutional library resource variables (number of physical library collections and the number of electronic library collections) and 6-year graduation rates at 4-year colleges and universities with SACSCOC Level III accreditation status. The results of the multiple linear regression showed that the predictor variables, institutional library resource variables, were significantly related to the criterion variable of 6-year graduation rates. The correlational analyses showed that that most useful predictor was the number of physical library collections.

Research question 12 investigated if there was a significant relationship between a linear combination of institutional finance variables (expenditures for instruction, expenditures for student services, expenditures for institutional support, and expenditures for academic support) and 6-year graduation rates at 4-year colleges and universities with SACSCOC Level III accreditation status. The results of the multiple linear regression showed that the predictor variables, institutional finance variables, were significantly related to the criterion variable of 6-year graduation rates. The correlational analyses showed that the most useful predictor was expenditures for instruction.

Research question 13 investigated if there was a significant relationship between a linear combination of institutional interaction variables (student-faculty ratio and the percentage of full-time faculty) and 6-year graduation rates at 4-year colleges and universities with SACSCOC Level III accreditation status. The results of the multiple linear regression showed that the predictor variables, institutional interaction variables, were significantly related to the criterion variable of 6-year graduation rates. The correlational analyses showed that the most useful predictor was the percentage of full-time faculty.

Research question 14 investigated if there was a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional finance predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions. The results of the multiple linear regression showed that institutional library resource variables did not predict 6-year graduation rates significantly over and above institutional finance variables.

Research question 15 investigated if there was a significant difference in  $R^2$  values between the institutional library resource predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions. The results of the multiple linear regression showed that institutional library resource variables did not predict 6-year graduation rates significantly over and above institutional interaction variables.

Research question 16 investigated if there was a significant difference in  $R^2$  values between the institutional finance predictor variables and the institutional interaction predictor variables when predicting 6-year graduation rates at 4-year colleges and universities that are categorized as Level III SACSCOC institutions. The results of the multiple linear regression

showed that institutional finance variables predicted 6-year graduation rates significantly over and above institutional interaction variables.

### **Conclusion**

The purpose of this study was to investigate if there was a significant relationship between a linear combination of institutional characteristics and first-time, fall-to-fall undergraduate student retention rates and 6-year graduation rates at SACSCOC Level III institutions. The study specifically analyzed institutional student variables, environment variables, resource variables, finance variables, and interaction variables to determine to what extent those variables predicted first-time, full-time, fall-to-fall undergraduate retention rates and 6-year graduation rates at 4-year colleges and universities with Level III SACSCOC accreditation status. The following conclusions were made based on the findings from the data in this study.

1. The most useful predictors when investigating the extent to which institutional characteristics predict first-time, full-time, fall-to-fall undergraduate retention rates were the 75<sup>th</sup> percentile ACT scores, the number of physical library collections, expenditures for academic support, and cost defined as tuition and required fees. These results corroborated the works of Bjerke and Healy (2010), Mezick (2007), Gansemer-Topf and Schuh (2003), and Pascarella and Terenzini (2005). Bjerke and Healy (2010) recognized ACT scores as one of the most commonly cited pre-college student characteristics for predicting retention rates and student success, and Pascarella and Terenzini (2005) discovered that institutions with higher student retention and graduation rates had higher admissions requirements. Mezick (2007)

- proposed that academic libraries and resources aid students with integration into the institution and as a result improves student success. Gansemer-Topf and Schuh (2003) found that increasing expenditures on academic support had positive impacts on student retention.
2. When investigating to what extent institutional characteristics predict first-time, full-time, fall-to-fall undergraduate student retention rates, institutional interaction variables were not significantly related. These findings contradict the works of Tinto (1975) and Astin (1975). Both researchers proposed that academic and social integration were vital to student retention and graduation.
  3. When investigating to what extent institutional characteristics predict first-time, full-time, fall-to-fall undergraduate student retention rates, institutional student characteristics represented the model with the greatest variance of first-time, full-time, fall-to-fall retention rates with 35%. As a result researchers are encouraged to conduct future studies to explore possible confounding variables.
  4. When investigating to what extent institutional characteristics predict 6-year graduation rates the most useful predictors were 75<sup>th</sup> percentile ACT scores, the number of physical library collections, expenditures for instruction, the percentage of full-time faculty, and cost, as defined by tuition and required fees. Similarly to the investigation of the relationship between institutional characteristics and first-time, fall-to-fall undergraduate student retention rates, the findings from the investigation of the relationship between institutional characteristics and 6-year graduation rates were corroborated by Bjerke and Healy (2010), Mezick (2007), and Pascarella and Terenzini (2005). These findings were also supported by Braxton (2008). Braxton

- (2008) supported the findings of earlier researchers indicating that institutions should avoid hiring entry-level, part-time faculty, but should focus on hiring full-time faculty to increase student success.
5. When investigating to what extent institutional characteristics predict 6-year graduation rates findings showed that student-faculty ratios were significant predictors. These findings are supported by the works of Schmitt and Duggan (2011) and Drake (2011). The researchers highlighted the importance of faculty-student interactions and the resulting impact on student success. This study showed that student-faculty ratios are not significantly related to retention rates, but they are significantly related to 6-year graduation rates.
  6. When comparing the retention models in this study institutional library resource variables showed to be a more significant model than finance and student interaction variables.
  7. When comparing the graduation models in this study institutional library resource variables did not show to be a significant model over finance or student interaction variables. Institutional finance variables showed to be a more significant model than student interaction variables or institutional library resource variables.

### **Recommendations for Practice**

The findings and conclusions of this research have enabled me to make the following recommendations for practice regarding institutional characteristics and to what extent they predict first-time, full-time, fall-to-fall undergraduate student retention rates and 6-year graduation rates:



1. The institutional characteristics that represent the most useful predictors for first-time, full-time, fall-to-fall retention rates may not always be the same most useful predictors for 6-year graduation rates. This study showed some institutional characteristics as good predictors for both criterion variables. However, expenditures for academic support only showed as a good predictor for first-time, full-time, fall-to-fall retention rates. Similarly, expenditures for instruction and the percentage of full-time faculty only showed as good predictors for 6-year graduation rates. Institutional leaders should consider investigating ways to improve student retention and graduation rates separately, rather than assuming good practices for one will also positively impact the other.
2. Student interaction variables such as increased student-faculty interaction and low student-to-faculty ratios may not always result in increased student success. This study showed both as having little or no significance when predicting retention and graduation rates. Institutional leaders should investigate the quality of those student-faculty interactions and understand that frequent interaction does not necessarily mean positive interaction.
3. After decades of research on precollege student characteristics and admissions selectivity, the 75<sup>th</sup> percentile ACT score showed as the overall most significant predictor of first-time, full-time, fall-to-fall undergraduate student retention and 6-year graduation rates. While many institutions are considering a “test optional” admissions criteria, institutional leaders should not ignore prior research on the extent to which higher admissions selectivity translates to student success.

4. In an environment of increasing electronic library materials, it is notable that the number of physical library resources showed as significant predictors of first-time, full-time, fall-to-fall student retention rates and 6-year graduation rates, when electronic library resources showed little or no significance at institutions included in this study. Institutional leaders should investigate the impact of physical library resources on student retention and graduation at their own campuses.

### **Recommendations for Further Research**

This study was conducted on 124 institutions that have been granted Level III accreditation status by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC). Additional research should be conducted on a larger sample to produce more generalizable results representing institutions nationwide. This study could be expanded to compare institutional characteristics based on institution status, such as private, not-for-profit, private, for-profit, or public institutional statuses.

Further research should be conducted on the relationship between physical library resources as compared to electronic library resources. In an increasing digital age, it is necessary to investigate the significance that physical library resources have on student success and determine if the push toward more electronic resources is necessary and beneficial.

Finally, researchers should conduct more research to investigate whether significant predictors for student retention also represent significant predictors for graduation rates. Perhaps institutional characteristics that play a role in a student's decision to remain at the institution from freshman to sophomore year are not the same characteristics that support the student through graduation. Researchers should investigate the significant institutional characteristics

for all four years of a baccalaureate degree program and compare those findings to significant predictors for graduation rates.

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