FACTORS AFFECTING STUDENT PERSISTENCE

AT PUBLIC RESEARCH UNIVERSITIES

IN OKLAHOMA

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Abstract:

Prior studies have demonstrated that most college dropouts happen at the transition to the third semester of college. Using a state dataset that includes student data for the 2013-2014 time span in the state of Oklahoma, the researcher examined the validity of students' background characteristics, high school performance, and financial aid status in predicting first-year college performance and persistence beyond the second semester of college.

Data from 116,991 degree-seeking first-year students enrolled at research universities in Oklahoma from fall 2013 to fall 2014 were entered in the SPSS software for data analyses, which include both multiple linear regression and multiple logistic regression.

The researcher finds that students' enrollment status and federal Perkins loans do not yield strong predictions of how students will perform academically or whether they will return to the second year of college. For tuition waivers, the associations with college performance and persistence are stronger, but still not significant. In contrast, spring GPA, Oklahoma's Promise, high school grade point average, American College Testing scores, and gender are useful for predicting persistence to the third semester, and have a strong association with their college performance.

These findings might reflect current efforts by the Federal Government, State agencies, institutions and schools to promote student success, help them pay college tuition, and increase students' pre-college performance.

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CHAPTER I

INTRODUCTION

Over the past 40 years, student persistence has been considered by researchers

and policy makers to be an important topic (Astin, 1984; Bank, Slaving, & Biddle, 1990;

Bean, 1985; Pascarella & Terenzini, 2005; Spady, 1971; Tinto, 1975). This is especially

true for college administrators and admission officials. Retaining students from

orientation to graduation increases institutions' prestige as a place where they can rely on

for the qualifications they need for future careers. Moreover, being able to predict the

success of potential students at the point of admission can help institutions improve their

ability to admit those most likely to persist (Willingham, Lewis, Morgan, & Ramist,

1990). In addition, tuitions and fees are an important financial source for the operation of

institutions. For these reasons, maintaining high enrollment is critical for an institution's

survival in the competitive higher education marketplace (Penn, 1999).

This dissertation was a correlational study of the relationships between students'

background knowledge, pre-college preparation, financial factors, college performance

and their persistence beyond the second semester at college. The study was based on pre-

existing data on record at the Oklahoma State Regents for Higher Education about

students enrolled at the two research universities in Oklahoma. This chapter describes the

background of the study, identifies the problem of the study, highlights its significance,

and presents an overview of the methodology employed. The chapter concludes with the delimitations of the study and the definition of special terms used in the study.

Background of the Study

It is useful to briefly describe the socio-economic development occurring during the time period for the pre-existing data used in this study. Following the economic downturn striking the whole country in the late 2000s which made many people in Oklahoma unemployed, the period 2012-2013 witnessed a continued recovery of the economy (Oklahoma State Regents of Higher Education, 2013). The state-wide GDP in 2012 was determined at slightly above the pre-recession peak of 2008 (Rickman, 2012), and was projected to grow rapidly in 2014 and 2015. Meanwhile, the employment growth gained a year-on-year increase of 1.8 percent in 2012 and 1.4 percent in 2013 (State Regents of Higher Education, 2013). However, higher education tuition continued to rise every year. In 2013, an average full-time Oklahoma student had to pay \$200.13 more per year than in 2012, and \$430.13 more per year than in 2011 (State Regents of Higher Education, 2013).

Statement of the Problem

Research demonstrates that of all the full time students nationwide enrolled in the fall of 2003 for a bachelor's degree, only 4 percent attained a degree or certificate at their first institution and 20 percent transferred elsewhere without a degree by June 2006 (Wine, Janson, & Wheeless, 2011). Seven percent of these students left their first institution without a degree or certificate and did not enroll anywhere else within the next three years (Wine et al., 2011). The dropout rate in this case was 27 percent and the equivalent rate for 2-year public institutions was 45 percent (Wine et al., 2011). In another study, 36 percent of all the

2003-2004 post-secondary students did not persist by June 2009 (Ross et al., 2012). These students did not earn a degree or were no longer enrolled in a postsecondary institution.

In Oklahoma, Figure 1.1 shows that within a 10-year period from 1997-1998 to 2006-2007, first-year students' dropout rate decreased from 9.7 percent to 9.4 percent at the research universities, but increased from 21.3 percent to 24.1 percent at the regional universities, and increased from 32.8 percent to 34.5 percent at the community colleges (Oklahoma State Regents for Higher Education, 2009).

Figure 1.1. First-Year Persistence Rates within State
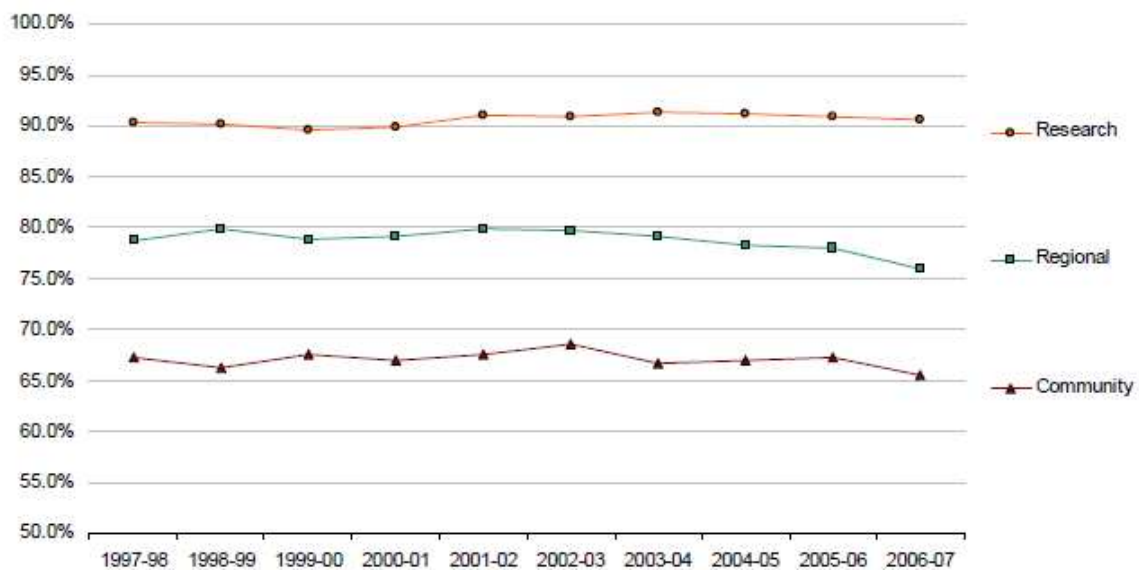
Note. From data reported to Oklahoma State Regents for Higher Education (2009).

Research indicates that student persistence is an important issue for many reasons. First, persistence to the second year of college is a significant predictor of student graduation (Horn & Carroll, 1998; Levitz, Noel & Richter, 1999). Therefore, students who persist beyond the first year of college are more likely to finish the undergraduate program than

students who drop out. Second, statistics of an institution's retention rate are used by the Federal Government to measure the effectiveness of that institution (Seidman, 2004). Third, institutions' retention and graduation rates are factors used to decide their eligibility to receive federal funding (Astin, 1997) and also factors used in college ranking (Morse & Brook, 2015). Fourth, whether or not students persist at college not only affects the students themselves, it also affects institutions and the nation as a whole. For students, being able to persist and finish college gives them opportunities to use their knowledge and skills to better serve people around; it also brings them an economically sufficient life. According to Pennington (2004), over the course of their life, on average a college graduate earns one million dollars more than a person who only has a high school diploma. For institutions, in addition to the above reasons, a high rate of students not returning to college after the first year harms their reputation and financial status. Moreover, as a public good they have the function to help more students succeed. For the nation, the country is facing a critical shortage of professional labor. If the current situation continues, by the year 2020 there will be a shortage of 14 million college-level working adults (Carnevale & Desrochers, 2002).

Prior research also pointed out potential barriers to student persistence such as the lack of financial resources and academic preparation, personal problems and inadequate faculty development (Oklahoma State Regents for Higher Education, 2002). However, specific research on the persistence and retention patterns of colleges and universities in Oklahoma is limited. For these reasons, additional research into the relationships between college students' background characteristics, pre-college preparation, financial factors, college performance, and student persistence will hopefully contribute to the existing literature on student persistence in Oklahoma.

Statement of Purpose

Previous research studies show that students' high dropout rates happen at the transition to the first semester of their second year of college (Nora, Barlow, & Crisp, 2005; Oklahoma State Regents for Higher Education, 2002). Because higher education institutions are still looking for factors that can potentially increase students' academic success, identifying factors that can predict their academic performance and persistence at this transition has is important than ever. This research study, which was based on data from 16,991 students entering OU and OSU from fall 2013 to fall 2014, reflects one more attempt to serve this purpose. By using multiple linear and logistic regression, this study examined whether there are significant associations between students' college performance and their background characteristics, high school performance, financial factors, using pre-existing data from the student database at Oklahoma Regents for Higher Education. Equally important, the study also explored how these factors are related to their persistence beyond the second semester at college.

Professional Significance of the Study

By examining the background characteristics, pre-college preparation, financial factors, and college performance of full-time and part-time degree-seeking first-year students at the two research universities in Oklahoma, this study examined the relationships between these factors and Oklahoman college students' persistence. A prediction equation for Oklahoma's student persistence was reached, which will hopefully contribute to the literature on student persistence in Oklahoma.

It is also hoped that this proposed study will make a contribution to the body of knowledge in student persistence. While there have been many reports on student persistence from Oklahoma State Regents for Higher Education, such reports have relied primarily on surveys of administrators and teachers. With such limited research on persistence in Oklahoma, this study will hopefully begin to fill the gap by providing knowledge regarding the factors that influence college student persistence in Oklahoma.

Researchers indicate that those students with a high pre-college academic performance will persist through to the end of their first year in college (Barefoot, 2000; Ishitani, 2006). It is true that high school grade point average (GPA) has a very strong influence on student persistence (Astin & Oseguera, 2005; Atkinson & Geiser, 2009; Hoffman & Lowitzki, 2005; Martinez, 2011, Stewart, 2010). Research also indicates that the American College Testing (ACT) and the Scholastic Assessment Test (SAT) are strongly correlated with college persistence (Astin, 1993; Burton & Ramist, 2001; Stewart, 2010). However, pre-college preparation is not the only factor to affect student persistence. First of all, some students with good performance at high school still struggle to persist or drop out within the first year of college. Moreover, other factors such as student characteristics and financial factors might also contribute to student success at college (Astin & Oseguera, 2005; Atkinson & Geiser, 2009; Cofer & Somers, 2000; Feldman, 1993; Hagedorn, Maxwell, & Hampton, 2002; Pascarella & Terenzini, 1991; Stewart, 2010; Tinto, 1993).

Overview of Methodology

This study employed quantitative methodology to analyze data and interpret the results. The intent of the research was to examine the relationships between students'

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persistence and factors such as high school GPA, standardized test scores, and first-semester

college GPA at public research universities in Oklahoma. In other words, the study attempts

to discover if any significant connections exit between these factors and student persistence.

To serve this purpose, the study aims to create prediction equations reflecting the persistence

pattern for future students in Oklahoma by determining which, if any, factors predict student

persistence at college.

The research questions for this study were guided by the framework for student

success (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006). To prepare for and succeed in

college, students navigate through a wide path to success, starting with precollege

experiences, via financial aid and student engagement, and ending up with college grades and

graduation. Based on this framework, the study explored the association between students'

background characteristics, pre-college performance, financial aid status, college

performance and student persistence, and employed multiple linear regression for second

semester academic performance and multiple logistic regression for student persistence.

The design used in this study was correlational research because correlational studies

are useful in predicting one variable from a list of other variables. First, correlation

coefficients between pairs of independent variables were used to check multicollinearity.

Next, the correlation coefficients between cumulative second semester GPA and the set of

predictors decided the association of each predictor and student performance in the second

semester. Similarly, the correlation coefficients between student persistence and the set of

predictors decided the association of each predictor and student persistence beyond the

second semester. In addition, the regression coefficients shaped prediction equations for

students' college performance and persistence. In summary, correlational research allows the

researcher to decide if one variable is correlated with any other variables (Gay, Mills &

Airasia, 2009) and helps the researcher to predict an outcome (Creswell, 2008). They do not

imply causation, but a high correlation could lead to prediction (Gay et al., 2009).

Research Questions

  This study extended the current body of knowledge on college student persistence by

examining the relationship between student persistence during the first three semesters of

college from fall 2012 to fall 2013 and students' demographic, background and academic

factors. The study relied on correlational methodology, examining pre-existing data on

record at the Regents' Office. The following research questions guided this study:

1. Do students' background characteristics (gender, age, ethnicity/race, enrollment
   status) predict their persistence beyond the first year at public research universities in
   Oklahoma?

2. Does students' high school academic performance (high school GPA and ACT test
   scores) predict their persistence beyond the first year at public research universities
   in Oklahoma?

3. Does students' financial status (financial aid) predict their persistence beyond the
   first year at public research universities in Oklahoma?

4. Does students' college performance (first-semester GPA, second-semester
   cumulative GPA) predict their persistence beyond the first year at public research
   universities in Oklahoma?

   The following null hypotheses were tested:

1. Students' background characteristics (gender, age, ethnicity/race, enrollment status) do not predict their persistence beyond the first year at public research universities in Oklahoma.

2. Students' high school academic performance (high school GPA and ACT test scores) does not predict their persistence beyond the first year at public research universities in Oklahoma.

3. Students' financial status (financial aid) does not predict their persistence beyond the first year at public research universities in Oklahoma.

4. Students' college performance (first-semester GPA, second-semester cumulative GPA) does not predict their persistence beyond the first year at public research universities in Oklahoma.

It should be noted that this is an overview of the methodology and the full description of the methodology of the study will follow in Chapter Three.

Delimitations

For the specific purpose of this study, the sample was limited to degree-seeking first-year students at the two research universities in Oklahoma. For this reason, the results of this study may not be generalized to a larger population of university students, and they may or may not apply to outreach students or students in their junior and senior years. Similarly, the data reflected the period of fall 2013 to fall 2014. As a result, the findings of the study may not be generalized to a larger population of students during this specific time, and they may or may not be indicative of future applicants.

Another boundary of this study is the fact that data were collected for student characteristics, pre-college preparation, financial factors and college academic performance. It was recognized that numerous other factors may also affect student persistence. These include, but are not limited to, students' communication and behavior skills, and contact with professors (Pascarella & Terenzini, 1980; Tinto, 1975, 1987), attendance, institutional environment (Astin, 1984, 1999; Spady, 1971), and adequate support from and satisfaction with institutions. However, these factors are beyond the scope of this study.

The correlational design only shows that one variable can be predicted from another variable. One problem was the possibility that a third variable could impact the two variables without there being a causal relationship between the three. For that reason, a high correlation between two variables does not necessarily lead to the cause-and-effect relationship between these variables (Gay et al., 2009). In addition, the limitation in the generalizability of the findings was another problem with correlational research. The findings applied only for the targeted group, but these correlational findings may or may not apply for other groups or situations.

Definitions of Key Terms

Following is the definition of special terms used in this study:

Attrition: Attrition is used to describe degree-seeking first-year students who are admitted to an institution and do not return for one or more semesters.

Dropout: Dropout is used to describe students whose initial goal was to complete a degree but did not complete it.

Full-time degree-seeking first-year student: A full-time degree-seeking first-year student is a first-year student enrolled in an institution for at least 12 credit hours per semester for a degree.

Persistence: Students' "progressive reenrollment in college, whether continuous from one term to the next or temporarily interrupted and then resumed" (Pascarella & Terenzini, 2005, p. 374). For the purpose of this study, persistence refers to a student who enters an institution as a full-time or part-time student and remains in that same institution beyond the second semester. Persistence is a student-focused measurement.

Retention: Retention describes students' continued enrollment from term to term until degree completion (Austin, 1993). Retention is an institution-focused measurement.

Standardized test: A standardized test is a test that is designed, administered, scored and interpreted in a predetermined, standard manner. The most common standardized tests for college admissions are the American College Testing (ACT) and the Scholastic Assessment Test (SAT).

Traditional age student: A traditional age student is a college student younger than 24 years of age (Bradburn & Carroll, 2002).

Summary

This chapter provided an outline of the problem to be studied in this research, which is student persistence, with a focus on the background in Oklahoma and the overview of the methodology. Chapter One also pointed out the delimitation of the study and indicated its contribution to the body of current knowledge on persistence. The chapter concluded with the

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definition of the terms used specifically in this study. Chapter Two will present an overview

of existing literature on student persistence, including the theories that shaped the persistence

process over the past 40 years and a comprehensive discussion of the variables that affect

college student persistence. Chapter Three will describe the methodology employed in

carrying out the study, including the sample chosen for the data collection process, the

research design and data analysis, and the variables of the study. Chapter Four will

summarize the results of the data analysis and present the findings. Chapter Five will discuss

the findings and make recommendations for further studies.

CHAPTER II

LITERATURE REVIEW

College student persistence has been an issue of interest to researchers, university

administrators, and government officials considering the first studies which started in the

1970's (Astin, 1984; Spady, 1971; Tinto, 1975). Research into the relationship between

college students' persistence and their background as well as academic performance

continued to develop in later years and into the early years of the twenty-first century

(Astin, 1999; Bank, Slaving, & Biddle, 1990; Bean, 1985; Pascarella & Terenzini, 2005).

The purpose of this literature review is to provide an overall picture of the current

literature on students' persistence to the second year of college. This includes the theories

that have been developed over the past 40 years to explain the process of persistence.

This review will also examine prior articles on how students' background characteristics,

financial factors, and college experience affect persistence.

The Search Process

In the search for relevant related studies, three main databases were used: Digital

Dissertations, Education Abstract Full Text ERIC, and ProQuest. All the search was done

via Oklahoma State University library website using the following key words: *college*

persistence, college retention, achievement and college persistence, college success,

student success in college, attrition, student persistence at colleges and universities in Oklahoma, nontraditional students in college, and *pre-matriculation variables and college persistence*. In addition, other related articles were searched from online journals: *American Educational Research Journal, College Student Journal, Community College Review, Community College Journal of Research and Practice, Interchange, Journal of Applied Research in the Community College, Educational Administration Quarterly, Journal of College Student Development, Journal of College Student Retention, Journal of College Student Personnel, Journal of Higher Education, Mentoring & Tutoring: Partnership in Learning, Research in Higher Education, Review of Educational Research,* and *Sociology of Education.*

This chapter presents an overview of existing literature on student persistence developed over the past four decades. The chapter begins with how the theory is retrieved, and that is followed by the theory written by Durkheim (1951), which laid the foundation for later theories by Tinto (1987), Astin (1984, 1999), and Spady (1971). The second part of the chapter discusses all the variables that may possibly affect student persistence and that are indicated in the empirical literature.

Conceptual Models of College Student Persistence

There has been substantial research into student persistence at colleges and universities, and many theoretical models have been developed to explain these processes (Astin, 1984; Bean, 1980, 1985; Bean & Metzner, 1985; Durkheim, 1951; Pascarella, 1980; Pascarella & Terenzini, 1991, 2005; Spady, 1970, 1971; Tinto, 1975, 1993). The earliest theory – based on which some later models developed – is Durkheim's Theory of Suicide. Although this theory is not directly related to student persistence, it laid the

foundation from which other theories developed. Spady's Model of Student Attrition is built on this theory. Astin's Theory of Student Involvement also places special emphasis on students' academic and social engagement, and their interaction with faculty and friends. A recent framework for student success, developed by Kuh et al. (2006) provides a synthesis of the literature and findings related to student success.

Durkheim's Theory of Suicide

Although Durkheim's Theory of Suicide (Durkheim, 1951) is not directly related to college student persistence, it sets the foundation for the development of persistence theories. In fact, Tinto's (1993) Theory of Student Departure and Spady 's (1971) Theory of Student Attrition are developed based on this Theory of Suicide. In the 1950's and 1960's, when student persistence was not yet thoroughly studied, Durkheim believed that integration into the fabric of the society can help individuals establish membership in the communities (Tinto, 1987). Based on this belief, Durkheim argued that the social integration into the society and the membership that integration brings about are two important factors of social existence (Tinto, 1987). As a result, suicide is more likely to occur when individuals are not sufficiently integrated into the society (Tinto, 1975). On the contrary, when individuals are effectively integrated into the social and intellectual life of a society, the suicide rate in that society can be reduced (Tinto, 1987). Durkheim's Theory of Suicide – with emphasis on low rates of suicide in societies with a high level of integration, and referred to as a classic in sociological study – is valued for it helps account for variations in suicide rates by looking at the social environment and the level of integration (Durkheim, 1951).

Astin's Theory of Student Involvement

Astin (1984, 1999) noticed the connection between learning and students'
involvement. He proposed that there is a direct connection between college students'
amount of involvement and their persistence. In the Theory of Student Involvement,
Astin (1999) states that the more students are involved in various institutional activities
the better they learn. By involvement, Astin referred to the amount of energy that the
student devotes to their academic experience. In his point of view, students' learning and
development are directly proportional to student involvement in an academic program,
from both quantitative and qualitative perspectives.

Student involvement may take several forms ranging from devoting considerable
energy to studying, to spending much time on campus, participating in student
organizations, and interacting with faculty members and other students. Astin (1999) laid
special emphasis not on what students think or how they feel, but on what they do and
how they behave. In particular, if they interact frequently with faculty members, they
obtain satisfaction with all aspects of institutional experience. In short, students are
highly involved when they not only spend their time studying regularly, they also live on
campus, participate in student clubs and organizations, and engage in activities with their
faculty and other students.

Related to the Theory of Student Involvement, Astin (1993) also developed his
Inputs-Environment-Outcomes (I-E-O) model, which states that students' inputs have a
direct impact on the outcomes and an indirect impact due to different environmental
factors. Whereas the inputs refer to the family background and personal qualities students

initially bring to college, the environment refers to the experiences that students have

during college, and the outcomes refer to the knowledge and skills students possess after

graduation (Astin, 1993; Pascarella & Terenzini, 2005). Students' knowledge and skills

are the results of a combination of their efforts and the resources provided by the college.

Astin's study of student involvement can be summarized in these assumptions: (1)

Involvement requires the investment of psychological and physical energy; (2) The

amount of energy students invested varies from student to student; (3) Involvement has

both qualitative and quantitative features; (4) What students learns is proportional to the

extent of their involvement; and (5) How effective a policy is depends on the extent to

which it stimulates student involvement.

Spady's Model of Student Attrition

Research related to college student persistence began in the 1970's when Spady

applied Durkheim's Theory of Suicide to explain students' departure from college. To

adapt Durkheim's theory of suicide in societies in the higher education area, Spady

theorized that if college is viewed as a social system, departure from this social system

can be compared to suicide in society (Spady, 1970). It can be inferred from this that

college students' persistence is negatively affected when they are not adequately

integrated into the academic and social environment of the college.

With this in mind, Spady conducted a study in which he collected data from 683

first-year students at the University of Chicago. The findings from Spady's multiple

regression analysis of the data revealed that college students' dropout is strongly

influenced by their academic performance. In addition, the other variables predicting

student persistence include (a) students' background characteristics; (b) academic factors; (c) environmental aspects; (d) degree of social integration; and (e) psychological outcome factors (Spady, 1971).

Spady (1971) also believed that students drop out of college because of the lack of shared academic values and the lack of financial and emotional support from their family or friends. The factors of friendship support and normative congruence greatly contribute to students' grade performance, which in turn affects students' integration into the college environment. It is this integration that controls students' decision to stay with the college.

Spady's Model of Student Attrition contributes to the literature by providing a theory accounting for college student persistence. The model connects theory developed in the past to his research, and lays emphasis on the roles of the social and academic aspects of the college environment in student persistence. However, as Tinto (1975) pointed out, Spady's model is rather a descriptive than a predictive one.

Kuh et al.'s Framework for Student Success

Kuh et al. (2006), in an attempt to synthesize the relevant literature and findings related to student success, suggested that students navigate through a wide path to success rather than through a direct route to educational attainment. The path includes twists, turns, detours, roundabouts, and occasional dead ends that many students may encounter, and is divided into the sections of background characteristics and pre-college experiences, student engagement, and outcomes and indicators of student success.

According to this path, students' background characteristics and pre-college experiences interact to influence enrollment patterns and subsequently student success. Specifically, students' gender, race and ethnicity, educational aspirations and family support, and pre-college encouragement programs all appear to play a role in student persistence and retention. Enrollment patterns (full-time or part-time, 2-year or 4-year, direct or delayed persistence) influence their long-term attainment. In particular, the quality of high school academic preparation is a strong predictor of postsecondary success, as measured by grades and persistence. Social economic status also influences admission, enrollment, and persistence. In addition, the availability and type of financial aid significantly affects students' college attendance and persistence.

Student engagement in educational practices has been shown to benefit all types of students. First, participating in college activities, peer interactions, and on-campus clubs is related to the positive outcomes of satisfaction, grades, and persistence. Student-faculty interaction activities, whether formal or informal, are positively correlated with student learning and development because they encourage students to develop greater effort to other educationally purposeful activities. In particular, emerging research suggests that student engagement has compensatory effects for low-income students, first generation students, and students of color. According to Kuh et al. (2006), it is thus important for institutions to invest in academic support services and improve the learning climate to have the greatest impact on student success.

In the last section of the Kuh et al. framework, college grades are identified as the best predictor of student persistence, degree completion and graduate school enrollment; and first-year academic performance is particularly important to subsequent academic

success and degree completion. Several factors are specified to affect college success: Pre-college characteristics, academic preparation, and socio-economic status affect outcome attainment. Interacting with faculty is positively associated with persistence and other measures of success. Additionally, the number of hours that students spend on, and the effort and engagement they devote to, their studies and research have a strong, significant effect on their academic development.

Empirical Research on College Student Persistence

As noted in the theoretical literature, college student persistence has much to do with students' integration, whether it is social integration (Durkheim, 1951; Spady, 1971; Tinto, 1993) or integration into the academic environment of the college (Spady, 1971; Tinto, 1993). Astin (1999) went one step further in concretizing the social and academic integration by placing special emphasis on student involvement in various activities on campus. Since persistence is the focus of this proposed study, the review of the empirical literature that follows will examine the factors that are associated with persistence and that either are significantly correlated with or significantly predict college student persistence.

Gender

Like men, many women go to work to share the rising costs with their partners. More and more women are now working in the areas that used to be dominated by men. To meet the need of the working place, many of them are returning to college for the knowledge and skills required (Peltier, Laden, & Matranga, 1999). This may contribute to the increasing dominance by women in college attendance nationwide. With regards to

student demographics, more women than men enroll in college (Mortenson, 2003). The tendency is similar ten years later. In fall 2013, female students made up 56 percent of total undergraduate enrollment and male students made up 44 percent (National Center for Education Statistics, 2015). A report by the Pew Research Center (Lopez & Barrera, 2014) indicated that women outpace men in college enrollment.

According to the National Center for Education Statistics (2011), females earned 57 percent of all bachelor's degrees in 2009–2010. In 2012, among young graduates, 72 percent of young White women and 62 percent of young White men went to college right after high school. This growing gender gap in college enrollment also happened in Hispanic and Black youth (Lopez & Barrera, 2014).

As far as gender differences in college persistence are concerned, prior research resulted in mixed results. Some studies indicated no relationship between gender and persistence. A large research study using stepwise regression to analyze data from ACT, Inc., (Reason, 2001) found no significant association. Similarly, St. John, Hu, Simmons, and Musoba (2001) found that gender was significant in some models but not significant in other models. Actually, research indicated that women are more likely to drop out of college (Hagedorn, Maxwell, & Hampton, 2002). According to Bradburn and Carroll (2002), women are predicted to leave college more than men because of both personal and family reasons.

Other research in college student persistence and gender indicated that women have a higher persistence rate than men (Ross et al., 2012). In the college environment, women are found to have an advantage over men: they are more easily integrated into the

social aspects of college (Boyer, 2002). Also, women report higher grades than men (Kuh et al., 2006; the National Survey of Student Engagement, 2005).

Age

More than half of the students enrolled in higher education are non-traditional students. According to Tinto (1993), there are many reasons why they want to go back to college. Some of them want to get a better job with another employer because they are not satisfied with the job they are having, and college provides the knowledge and skills they need to change the job. Other people go to college to get additional training for a more decent job (Delsilver, 2014) because the nature of the job they want requires them to possess certain skills, and they can only get these skills at college. The range of other reasons varies from pursuing personal interests to proceeding professionally, enhancing self-esteem, learning to serve others better, creating social networks, and escaping boredom. While some non-traditional students go back to college after some interruption, others just go to college for the first time. The results of some studies suggested that non-traditional students have higher college GPA than traditional age students (Cofer & Somers, 2000; Hagedorn, 2005). Older students are more mature; for this reason, they are more focused and show stronger commitment to learning (DesJardins et al., 2002a).

Age is a factor found to have a positive relationship with college GPA: The older the students are, the more likely they get a higher cumulative college GPA and the more likely they are to persist (Martinez, 2011). In fact, age is a statistically significant predictor of student's accumulative college GPA, and so of their college persistence (Martinez, 2011). However, when controlling for high school GPA and first semester

college GPA, age is no longer a significant predictor (Martinez, 2011). A similar study of 1,028 online students from a college in Maryland (Muse, 2003) used factor analysis to identify factors related to student success and concluded that age was an important predictor of college student GPA.

Race/Ethnicity

Statistics from the National Center for Education Statistics (2011) show that between 1999–2000 and 2009–2010, the number of White students earning bachelor's degrees increased by 26 percent, compared with the larger increases of 53 percent for Black students, 87 percent for Hispanic students, 51 percent for Asian/Pacific Islander students, and 42 percent for American Indian/Alaska Native students. These figures demonstrate both the expansion in ethnic students' college enrollment and the completion rates of these groups.

More ethnic students are getting college degrees overtime with the exception of the Native American and Alaska Native groups. In 2009–2010, White students earned 71 percent of all bachelor's degrees awarded (compared with 75 percent in 1999–2000). These respective figures were 10 percent for Black students (compared with 9 percent in 1999–2000), 9 percent for Hispanic students (compared with 6 percent in 1999–2000), and 7 percent for Asian/Pacific Islander students (compared with 6 percent in 1999–2000). American Indian/Alaska Native students earned about 1 percent of the degrees in both years (National Center for Education Statistics, 2011).

Ethnic diversity has been an area of interest in higher education. Despite the growing body of students from ethnic groups as a result of concerted efforts to promote

diversity, the predominance of the Caucasian still exists at most colleges and universities. The fact is that more access to higher education by ethnic groups results in higher dropout rates among students of these groups (Cofer & Somers, 2000). More ethnic students drop out of college because of their low level of integration into predominantly White institutions, which is in turn caused by the six ethnic dynamics of (1) the role of family life; (2) being placed socially by race/ethnicity; (3) racial/ethnic accountability; (4) the pervasiveness of the white culture; (5) the pursuit of a color-blind society; and (6) the overrepresentation of minority students among weaker students (Morley, 2004). In addition, an important reason for the high dropout rate is the language barriers the ethnic student might have to face (Suzuki, 2002).

Race has been found to be consistently associated with the persistence of undergraduate students (Bailey, Jeong, & Cho, 2010; Fike & Fike, 2007; Peltier, Laden, & Matranga, 1999; Sullivan, 2010; Wolfle & Williams, 2014). Current literature shows that White students have better academic performance and more possibility to persist than other races. White students Asian American and White students are found to be the most likely to persist while other racial groups less likely to persist (Murtaugh, Burns, & Schuster, 1999; Peltier, Laden, & Matranga, 1999). Non-White students (Fike & Fike, 2007) and Black students (Bailey et al., 2010; Roksa, Jenkins, Jaggars, Zeidenberg, & Cho, 2009; Sullivan, 2010; Wolfle & Williams, 2014) are less likely to succeed at college. For Native American students, lack of academic preparation, difficulty in the transition to and survival in the university, and insufficient financial support are the three main barriers to persistence at college (Guillory & Wolverton, 2008).

Enrollment status

Most college students maintain a full-time status at college. However, for a variety of reasons, other student can only attend college part-time. A study in 2005 showed that 37 percent of White students attend postsecondary institutions part-time as compared to 52 percent of Latino students (Swail, Cabrera, Lee, & Williams, 2005).

Full-time student status helps students perform better and have a higher possibility to persist. Adelman (2006) found that students who studied part-time reduced the predictive probability of completing a degree by 30 percent when compared to students who maintained a full-time status. Similarly, part-time students are more likely to leave, especially in the initial semesters (Johnson, 2006). In short, one of the risk factors that threaten persistence is attending college part-time (Community College Survey of Student Engagement, 2005).

High School GPA

High school GPA is found to be the best predictor of college retention (Astin & Oseguera, 2005; Atkinson & Geiser, 2009; Camara & Kimmel, 2005; Geiser & Santelices, 2007; Hoffman & Lowitzki, 2005; Martinez, 2011, Pike & Saupe, 2002; Stewart, 2010). Stewart (2010) found from her research that there is a statistically significant relationship between high school GPA and persistence. Similarly, Martinez's (2011) later study revealed that high school GPA is the next best predictor of persistence when he observed the positive relationship between high school GPA and cumulative college GPA. In their latest study of 3,213 first-time degree-seeking students from a

university by Stewart, Lim and Kim (2015), high school GPA is found to be one of the two significant predictors of student persistence.

Researchers have also found a very strong association between high school GPA and college completion. Astin and Oseguera (2005)'s study showed that students having a high school GPA of A are four times more likely to graduate from college than those with a high school GPA of C. Similarly, Reason (2009) found that students with an A-average in high school are seven times more likely to finish college in four years. On the contrary, students with a C average or below are less likely to persist at college than students who maintain above a C average (Hu & St. John, 2001; Kahn & Nauta, 2001; Titus, 2004). This is how high school GPA ensures college persistence, and also why this score is widely used in college admissions.

Standardized Test Scores

The most common standardized tests used in college admissions are the American College Testing (ACT) and the Scholastic Assessment Test (SAT) (Camara & Kimmel, 2005). The components of the ACT are English, mathematics, reading, science reasoning, and an optional writing test. The SAT includes mathematics, critical reading, and writing. Most universities require their applicants to submit ACT and/or SAT scores, in addition to their class rank, high school GPA, and extracurricular activities. The ACT is found to have a statistically significant relationship with students' college persistence (Stewart, 2010). Those students with a higher ACT score will be more likely to persist at college. In addition, standardized tests are a highly efficient and cost-effective way to distinguish applicants from others (Linn, 1990).

Research also identified several other reasons for the use of standardized tests. Students' SAT and ACT scores predict cumulative college GPA, and by extension, their college persistence (Burton & Ramist, 2001; Stewart, 2010). Candidates with a higher ACT or SAT score are more likely to stay with the college until graduation. Moreover, standardized tests provide students the opportunity to demonstrate their academic ability even when their high school GPA does not show evidence of academic success (Geiser, 2009). As the tests are designed in such a way that the questions, conditions for administering, scoring procedures, and interpretations are administered and scored in a standard manner, the scores are considered to be a reliable measure of the students' ability. Similarly, Schmitt et al. (2009) collected SAT/ACT scores from 2,771 incoming freshman college students at 10 U.S. colleges and universities in a study to determine the validity of these predictors of student performance. The results indicated that SAT and ACT scores were among the primary predictors of cumulative college GPA.

Financial Aid

Since going to college has never been so expensive nowadays, it is essential that students be financially supported from various sources in order to maintain their status at college. According to a study by Johnstone (2005), within a 10-year period from 1990 to 2000, tuition costs in the U.S. increased by 70 percent at private universities and 84 percent at public universities. In Oklahoma, higher education tuition continued to rise every year. In 2013, an average full-time Oklahoma student had to pay $200.13 more per year than in 2012, and $430.13 more per year than in 2011 (State Regents of Higher Education, 2013).

As a way to avoid dropouts from students whose families cannot afford their pursuing education at college, Federal agencies, State Regents, and institutions have implemented the financial aid policy. For example, despite large reductions in state revenues, the total state funding for financial aid programs increased from 93.7 million in 2011 to 100 million in 2013 and the same amount in 2015, including 63.4 million in Oklahoma's Promise (OHLAP) scholarships (Oklahoma State Regents for Higher Education, 2015). As a result, these efforts from the state allowed 19,600 students in 2013 and 18,894 students in 2015 to benefit from the Oklahoma's Promise program alone. In addition, financial aid provided to college students is also an important way to ensure equal opportunity of access to and success at higher education. Of the many kinds of financial aid, this study focuses on Oklahoma's Promise and other scholarships, grants, loans, and tuition waivers.

There are conflicting results in the current literature on the impacts of financial aid on students' academic performance and persistence (Hossler, Ziskin, Gross, Kim, & Cekic, 2008). Financial aid is not found to be a significant predictor of college student persistence (Martinez, 2011) when her study resulted in a weak relationship between financial aid and cumulative college GPA. This finding is similar to the results of Contento's (1999) study, which concluded that financial aid does not significantly affect persistence for both lower income and more affluent students. Similarly, Singell and Stater (2006) found that financial aid had no independent effect on persistence but that merit aid attracted students with characteristics associated with a higher likelihood of persistence.

Cofer and Somers (2000), however, found that grants had a strong positive effect on persistence. Similarly, other research studies have found positive relationships between either form of aid and persistence (Battaglini, 2004; DesJardins et al., 2002a; Mendoza, Mendez, & Malcolm, 2009; St. John, Paulsen, & Carter, 2005; Singell, 2004). In their review of the literature, Hossler and colleagues (2008) found total aid and grants had a small positive impact on persistence. In addition, Ganem and Manasse (2011) found that institutional scholarships and other forms of need-based aid seem to be variables of high impact on predicting persistence. In particular, Mendoza and Mendez (2012) concluded from their study that OHLAP is a significant predictor of persistence to the second year. Mendez, Mendoza and Archer (2009) added that athletic scholarships are not enough, but must combine with Pell grants and Stafford loans to significantly predict White and high-income athlete students.

Other studies showed that receipt of financial aid negatively affected student success (GPA), but had positive significant impacts on persistence (Bynum, 2011). Similarly, current literature also revealed that non-scholarship student-athletes had higher GPAs than scholarship student-athletes (Rubin & Rosser, 2014).

First and Second Semester College GPA

First semester college GPA is an important factor because it is connected to the transition from high school to college. A study by Stewart (2010) revealed that there is a statistically significant relationship between first year college GPA and their college persistence ($\alpha = 0.01$). Actually, first semester college GPA is found to have a high impact on cumulative college GPA ($\beta = 0.776$) (Martinez, 2011). Similarly, the results of

DesJardins et al.'s (2002b) study indicated that college GPA is a very powerful predictor of bachelor's degree attainment. Another study mentioned earlier found that first-semester college GPA is one of the two significant predictors of student persistence (Stewart et al., 2015). These findings supports Pascarella and Terenzini's (2005) conclusion that college grade may be the single best predictor of students' persistence, degree completion, and graduate school enrollment. It also confirmed Martinez's (2011) finding that first semester college GPA is the best predictor of students' cumulative college GPA, and by extension, their persistence in college.

Similarly, poor college performance, including first semester GPA and second semester cumulative GPA leads students to dropping out. Departure is found to be strongly associated with poor college grade performance (Johnson, 2006). Reason (2009) concluded from his review of retention-predicting variables that students with a GPA of 0.0 to 2.0 had only a 57 percent probability of being retained.

Student Involvement

Based on a study of 339 undergraduates assigned to mentors paired with nonmentored students, Campbell and Campbell (1997) discovered that there were significant correlations in the number and duration of students' contacts with faculty members and greater achievements. In short, faculty mentoring programs help students have better performance than usual during their first year of college when the transition may have negative influence on their performance (Thile & Matt, 1995).

In addition, student persistence improves considerably as a result of participating in faculty mentoring (Thile & Matt, 1995). Based on their study of 32 freshmen invited to

participate in faculty mentoring, one year later Thile and Matt observed that 82 percent of the participants returned for the next academic year, compared with the university-wide retention rate of 73 percent. They concluded that mentoring program participants are more likely to return for their second year. Other studies also showed the same result. For example, in Campbell and Campbell's (1997) study mentioned earlier, for comparison purposes they matched each of the 339 protégés with a control student who had not participated in the program, and discovered that the dropout rate (students who failed to reenroll in any semester) among protégés was about half of that for students in the control group. McClenney, Marti, and Adkins (2012) found from their 20-year project of student outcomes that the more actively engaged students are with faculty and staff, with other students, and with the subjects, the better they are to learn and to obtain academic goals.

Research also showed that students actively participating in various campus activities learn better (Astin, 1999; Fiorini et al., 2014; Kuh et al., 2006). A study including 16,630 students at a public university who completed the National Survey of Student Engagement survey in a spring semester from 2006-2012 showed that student engagements in a variety of academic and extracurricular activities were predictive of better college performance. (Fiorini et al, 2014). Similarly, Kuh et al. (2006)'s framework for student success indicated that postsecondary education is a wide path in which student engagement connects precollege experience and college grades.

Summary

This chapter provided a review of the early theoretical literature on student persistence. The chapter also examined experimental literature on persistence, especially the role of the variables that have been proposed in the literature to possibly affect students' persistence, and that are relevant to the scope of the current study. Chapter Three sketches the methodology of the study, which describes the sample chosen, the process of collecting the pre-existing data, and the research design employed to analyze the data.

CHAPTER III

METHODOLOGY

This study will use a quantitative research design to examine students' persistence to the second year at public research universities in Oklahoma. Specifically, the research design will lead to the following objectives of the study: (1) to examine whether students' background characteristics, pre-college preparation, and financial factors contribute to their first year academic performance, (2) to determine which demographic and family characteristics, pre-college, financial, and college performance factors predict their college persistence.

This chapter explains the methods used in carrying out the study, and is organized around the following sections: (1) General perspective, (2) Research context, (3) Theoretical framework, (4) Research subjects, (5) Data collection instruments, (6) Data collection procedures, (7) Data analysis, and (8) Summary.

Statement of Purpose

Previous research studies showed that students' high dropout rates happen at the transition to the first semester of their second year at college (Nora, Barlow, & Crisp, 2005; Oklahoma State Regents for Higher Education, 2002). As higher education institutions are still looking for factors that can potentially increase students' academic success, identifying factors that can predict their academic performance and persistence at this transition has become more important than ever. This research study, which is based on data from 16,991 full-time and part-time degree-seeking students entering OU

and OSU from fall 2013 to fall 2014, reflects one more attempt to serve this purpose. By using multiple linear and logistic regression, this study examines whether there are significant associations between students' college performance and their background characteristics, high school performance, financial factors, using pre-existing data from the student database at Oklahoma Regents for Higher Education. Equally important, the study also explores how these factors are related to their persistence beyond the second semester of college.

The General Perspective

This study aims to examine whether there are any connections between college students' background characteristics, pre-college factors, financial factors, college performance and their academic performance beyond the first year of college. Hopefully the analysis of the collected data also serves to predict students' persistence beyond their first year in Oklahoma higher education based on these factors.

A quantitative research design is utilized for the analysis of the data obtained in this study. Prior studies pointed out the factors that affect student persistence such as high school GPA, standardized test scores, financial aid, and college GPA (Astin & Oseguera, 2005; Atkinson & Geiser, 2009; Cofer & Somers, 2000; Ganem & Manasse, 2011; Hagedorn, Maxwell, & Hampton, 2002; Mendoza & Mendez, 2012; Stewart, 2010). The question is which of these factors significantly predict student persistence at colleges and universities in Oklahoma. When the purpose of the research is prediction, quantitative research is used (Creswell, 2008). Once the result of the study indicates which factors predict student persistence, it will contribute to the body of knowledge on college

persistence. The research is also for faculty members and other researchers who may evaluate its contribution to the literature in the field.

The Research Context

Due to the nature of this study, which examines student persistence at public research universities in Oklahoma, the sites of the study will not be restricted to one university. The data for the study will be obtained from the Unified Data System (UDS) on storage at Oklahoma State Regents for Higher Education. The data come from students of the two research universities of Oklahoma State University (OSU) and University of Oklahoma (OU).

Oklahoma State University is a land-grant, public research university. Besides the main campus of OSU-Stillwater, there is a campus located in Oklahoma City (OSU-OKC), one located in Tulsa (OSU-Tulsa), and another located in Okmulgee (OSU-Okmulgee). OSU is the largest university system in Oklahoma with a total enrollment of 35,073 in the fall 2012 semester, including 22,369 at OSU-Stillwater (Oklahoma State University, 2012a). OSU is rated one of the 120 best western colleges by the Princeton Review with students coming from 128 countries in the world. OSU is committed to the mission of integrated, high-quality teaching, research, and outreach (Oklahoma State University, 2012b).

The University of Oklahoma is a public research university located in Norman, Oklahoma and has three campuses: OU main campus located in Norman, Oklahoma, the Health Sciences Center campus located in Oklahoma City, and the Tulsa campus. In the fall semester of 2012, OU had a total enrollment of 31,097, including 27,518 at the

Norman campus (University of Oklahoma, 2012). The university is known for its

academic excellence and attracts students from over 100 countries in the world. OU is

committed to the mission of teaching, research and creative activity, and service to the

society (University of Oklahoma Public Affairs, 2012).

Conceptual Framework

A number of theoretical frameworks have been used to guide previous research

studies and explain the findings of these studies. The most widely used model was Tinto

(1993)'s Theory of Student Departure, which emphasizes the importance of students'

social and academic integration into the institution. According to this theory, students

who are socially and academically integrated into their institutions are more likely to

persist. Other theories have focused on students' academic performance, background

characteristics, and engagement in institutional activities. While Bean (1980)'s Academic

Preparation stressed the importance of students' capacity to perform at college, Astin

(1999)'s Model of Student Involvement stressed the physical and psychological energy

that the student devotes to the academic experience. While Bean stressed the importance

of background characteristics such as academic achievement at high school, Astin

stressed the importance of student engagement in activities socially and academically. In

addition, although Bean's model focused on academic preparation, the model also

indicated that students' socio-economic status played an important role in their

persistence. Similarly, Astin indicated that students' learning and development are

directly proportional to their involvement in an academic program, from both quantitative

and qualitative perspectives.

There have been theories that are based on psychological or cultural perspectives. Bean and Eaton (2000)'s Attitude-Behavior Theory links students' personality traits with their success at college. This theory posits that students with personality traits such as self-efficacy are more likely to succeed when they are faced with challenges. In contrast, students with less confidence in their ability to succeed will be more likely to give up. The cultural perspective states that underrepresented students face challenges related to their ethnic minority status when they go to college. In Torres (2003)'s study, first-generation Latino college students are faced with the conflict between home life and college life. Similarly, Turner (1994) described minority students' college experience as a guest in other people's home, a feeling of being lonely and unwelcomed. Both of these negatively affect their success and persistence at college.

Kuh et al. (2006) used a framework in their synthesis of literature and findings related to student success. In this framework (Figure 3.1, page 38), college students' educational career is portrayed as a "wide path" which starts with precollege experiences. The college experience includes mediating conditions, which are followed by student behaviors, institutional conditions, and student engagement, and ends with grades and graduation.

Figure 3.1. Kuh et al. (2006)'s Framework for Student Success
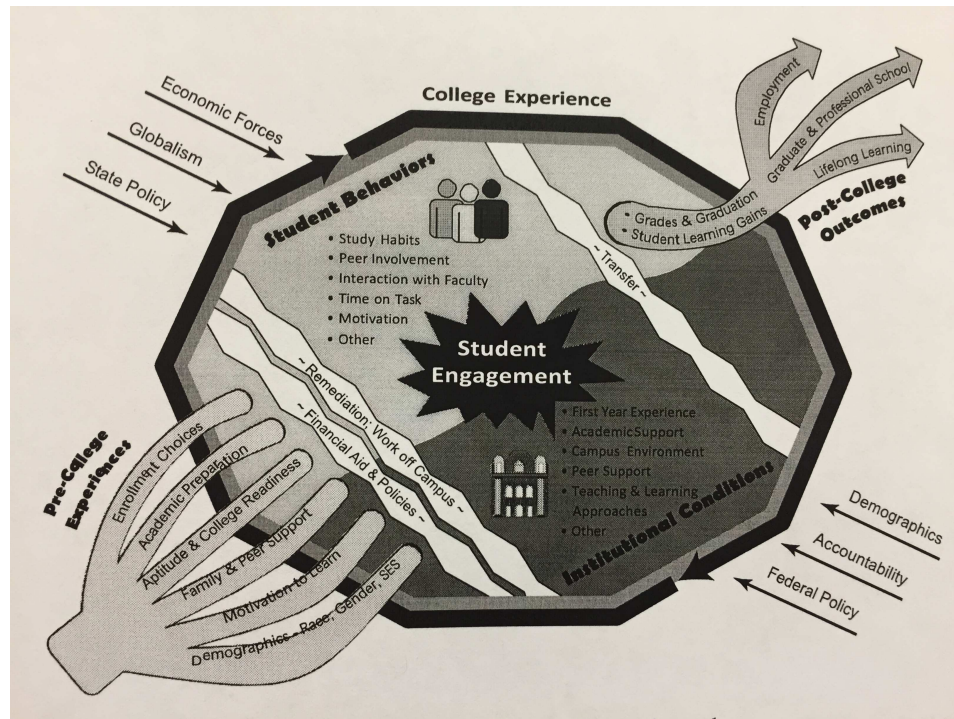
This study used Kuh et al. (2006)'s framework for student success to understand and predict student persistence. To prepare for and succeed in college, students navigate through a wide path comprised of stages and mediating conditions. The first section of the path – precollege preparation – includes demographics (gender, race), enrollment choices, and academic preparation. In the next part of the path, college experience, students devote time and effort in their studies with the support of financial aid, and institutions develop programs to facilitate their continued enrollment. The aspects of both student behaviors and institutional conditions are represented by student engagement, which includes a wide range of practices and conditions. The experiences end with grades and graduation, which lead to students' post college outcome of employment.

Research Design

The Research Subjects

The participants in this study include full-time and part-time first-year students enrolled at Oklahoma State University and University of Oklahoma from Fall 2013 to Fall 2014. The exclusion of sophomores, juniors and seniors is accounted for by the conclusion that the most critical period for college students – during which most dropouts occurred – is the first college year, especially the transition from high school to college in the first semester (Nora et al., 2005; Oklahoma State Regents for Higher Education, 2002).

The research sample includes 16,991 full-time and part-time degree-seeking first-year students enrolled at OSU and OU from fall 2012 to fall 2013. The subjects have an age range from 16 to 53, and include a variety of races and financial aid statuses. The sample does not include high school students concurrently enrolled at these higher education institutions, but it does include students with transfer credit hours earned before their enrollment. Students from both institutions are chosen for the study to ensure the criterion that the sample will be representative of all the students at public research universities in Oklahoma.

Independent Variables

The variables used in this study are based on an extensive search for the current literature on factors affecting student persistence in combination with the variables available in the student data record obtained from Oklahoma State Regents for Higher Education. The literature indicated that the most two common factors predicting student

persistence were high school GPA and SAT scores (Zwick & Slar, 2005). Because SAT scores were not included in the pre-existing data, high school GPA and ACT composite scores were chosen as the first two independent variables. Since the current literature also consider the impact of gender, age and ethnicity on both high school GPA and ACT, this study also includes gender, age, and ethnicity as predictor variables. In addition, the study also considers the participants' enrollment status, financial aid status, first semester GPA and second semester cumulative GPA as other independent variables.

Dependent Variables

This study uses both linear and logistic regression for data analysis. For linear regression, Spring GPA or second semester cumulative GPA is the dependent variable. This continuous variable is used to determine how the participants performed in the second semester of the first year of college. Student persistence is the second dependent variable, used in logistic regression. This is a binary variable, with the values of Did persist and Did not persist. For the purpose of this study, persistence refers to a student who remains in the same institution beyond the first year of college. It should be noted that in this logistic analysis, the continuous independent variable Spring GPA will be transformed into a binary variable for the purpose of locating a cutoff point in this independent variable.

Data Collection Instruments

Because the pre-existing data requested from the Oklahoma State Regents for Higher Education will be a de-identified data set, the research is not qualified as a human subject study. According to regulations from Oklahoma State University Institutional

Reviews Board (OSU IRB), the researcher does not need to complete a full IRB because he does not have access to the code to decode the data. All the researcher needs to do is to file to OSU IRB a Request for Determination of Non-Research or Non-Human subject (see Appendix A, page 159). If upon examination, OSU IRB decides that the researcher does need an IRB, many of the questions will be similar and can be transferred to a full IRB easily.

Another instrument the researcher needs for the study is the Oklahoma State Regents for Higher Education Data Request Form, which is filled out and filed to the Regents' Office for his access to the pre-existing data (see Appendix B, page 163). The next instrument is the application WinSCP. The researcher has contacted the staff in charge of the data at the Regents' Office and was required to install the WinSCP in his laptop for the reception of the data requested.

The student data used in this study include participants' background characteristics (gender, age, ethnicity/race, and enrollment status), pre-college preparation (non-weighted high school GPA and standardized test scores), financial factors (Pell, OHLAP, OTAG, Perkins, Stafford, tuition waivers, and athletic scholarship), and college performance (first-semester college GPA, second-semester cumulative GPA, third-semester cumulative GPA, and student persistence) (see Table 3.1, page 42).

Table 3.1

Description of Variables

Variable	Variable type	Description
Gender	Dichotomous	0 = female
		1 = male
Age	Continuous	17-23
Ethnicity/Race	Categorical	White
		Black
		American Indian
		Hispanic
		Asian
		Multiple
		Alien
		Other
Enrollment Status	Binary	0 = Full-time
		1 = Part-time
High school GPA (non-weighted)	Continuous	0.00-4.00
ACT composite score	Continuous	1-36
Financial aid	Categorical	Pell
		OHLAP
		OTAG
		Perkins
		Stafford
		Waivers
		Athletic
First-semester GPA	Continuous	0.00-4.00
Return to Spring	Binary	0 = Did not persist
		1 = Did persist
Second-semester cumulative GPA	Continuous	0.00-4.00
Persistence	Binary	0 = Did not persist
		1 = Did persist
Third-semester cumulative GPA	Continuous	0.00-4.00

Data Collection Procedures

The process of data collection will be conducted in steps. First, the researcher will

fill out the Request for Determination of Non-Research or Non-Human subject and send

it to OSU IRB via an email. When the approval is sent back, the researcher will meet two

people in charge at the Regents' Office, present the proposal to them, and let them know what data he is looking for in his study. He will then be asked to fill out the Data Request Form, stating what variables he requests from them. He has been promised the latest available data for three semesters starting fall 2013. When the request form is approved, he will be informed to install WinSCP in his laptop. Meanwhile, the staff will prepare from the dataset an Excel file containing most of the variables he requests. When the Excel file is ready, they will instruct the researcher to open the installed application, enter required information, and then the researcher will be given access to the file posted in their desktop. Compared with the data the researcher requests, the Excel file he receives will not have information on the participants' employment or SAT scores. In addition, the staff said they might have information on the participants' parental education. The Excel file contains information from 16,991 participants. This file will later be converted to a .sav file in the Statistical Pack for the Social Sciences (SPSS) software version 19 for data analysis with a significance level of 0.001.

The following research questions will guide this study:

1. Do students' background characteristics (gender, age, ethnicity/race, enrollment status) predict their persistence beyond the first year at public research universities in Oklahoma?

2. Does students' high school academic performance (high school GPA and ACT test scores) predict their persistence beyond the first year at public research universities in Oklahoma?

3. Does students' financial status (financial aid) predict their persistence beyond the first year at public research universities in Oklahoma?

4. Does students' college performance (first-semester GPA, second-semester cumulative GPA) predict their persistence beyond the first year at public research universities in Oklahoma?

The following null hypotheses will be tested:

1. Students' background characteristics (gender, age, ethnicity/race, enrollment status) do not predict their persistence beyond the first year at public research universities in Oklahoma.

2. Students' high school academic performance (high school GPA and ACT test scores) does not predict their persistence beyond the first year at public research universities in Oklahoma.

3. Students' financial status (financial aid) does not predict their persistence beyond the first year at public research universities in Oklahoma.

4. Students' college performance (first-semester GPA, second-semester cumulative GPA) does not predict their persistence beyond the first year at public research universities in Oklahoma.

Data Analysis

This study will employ several strategies to analyze the collected data, including descriptive statistics, correlation coefficients, multiple linear regression, and multiple logistic regression.

Descriptive statistics, i.e., frequencies will be analyzed for each of the independent and dependent variables. Central tendency is summarized by the means (for continuous variables) and modes (for categorical variables), and dispersion is represented by the standard deviations (for continuous variables) and ranges (for categorical variables). In this study, the continuous variables include age, high school GPA, ACT composite scores, first-semester GPA, cumulative second-semester GPA, and cumulative third-semester GPA. The categorical variables include Gender, Ethnicity/Race, Enrollment status, financial aids, and Persistence. The dependent variable "persistence" is a binary variable with the values of "did persist" and "did not persist."

Pearson r correlations will be used to measure the direction and size of the relationship between every two variables, and will serve two purposes. First, they will be either positive or negative. A positive relationship means that a high score in one variable is accompanied by a high score in the other variable, and a low core in one variable is accompanied by a low score in the other variable. The trend is in the same direction. On the other hand, a negative relationship means an increase in one variable entails a decrease in the other variable. The trend is in opposite directions. Second, the size of the coefficients indicates whether there is a very strong ($r = 0.91$ to 1.00), strong ($r = 0.71$ to 0.90), moderate ($r = 0.51$ to 0.70), or low ($r = 0.31$ to 0.50) bivariate relationship or there

is little if any correlation (r = 0.00 to 0.30). This classification of the strength of the correlation is based on the interpretation by Hinkle, Wiersma and Jurs (2002). In addition, when both variables are predictors, the size also serves to test the collinearity of the two variables.

Multiple linear regression will be used to examine the relationship between two or more explanatory variables (independent variables) and the response variable (dependent variable). The explanatory variables can be either continuous or categorical but the response variable has to be continuous (GPA scores). After determining that the dependent variables are approximately normally distributed, we can perform multiple analyses to determine the relationship between students' college GPA and their gender, age, race/ethnicity, high school GPA, ACT composite score, and financial aids. The benefit of multiple regression models is the attempt to control the variables that can measure the impact of any given variables above and beyond the effect of other variables. In addition, we need to test for collinearity before multiple regression is performed (Pedhazur, 1997). A correlation coefficient between any two explanatory variables needs to be established for the detection of collinearity. If any two variables are highly correlated, it becomes difficult or impossible to distinguish their individual effect on the response variable.

Logistic regression is a special case of multiple regression with two possible values of the response variable (Moore & McCabe, 1999). When the response variable is a binary variable, which takes value 1 and value 0, logistic seems to be the common method design (Geiser & Santelices, 2007; Noble & Sawyer, 2002). In this study, the response variable "persistence" takes "did persist" as value 1 and "did not persist" as

value 2. The logistic regression method transforms nonlinear relationships into linear relationships by changing the odds to the natural logarithm (Pampel, 2000). As usual, the explanatory variables will be checked for collinearity before logistic regression is run.

Multiple Linear Regression Performance

Dependent and Independent Variables

The variables were entered into regression analysis. The dependent variable or outcome variable was Spring GPA, which was a continuous variable. The explanatory or independent variables included background variables (D_Male, Age, D_Black, D_AmIn, D_Hisp, D_Asian, D_Part_time), High school Performance (HSGPA and ACT), and financial aid (D_Pell2, D_OHLAP2, D_OTAG2, D_Perkins2, D_Stafford2, D_Waivers2, D_Athletic2). Of these independent variables, Age, HSGPA and ACT were continuous variables and the rest were dichotomous. The stepwise method was employed and the explanatory variables were entered to the regression analysis one at a time based on the order of their significance. The results reported were from the final model of the analysis.

Assumptions

The first thing to do before any data analysis using regression is checking assumptions because the results are only trustworthy when all the assumptions are satisfied. Linearity, normality, independence, and homoscedasticity are the four important assumptions that need to be met in multiple linear regression (Osborne & Walters, 2002; Pedhazur, 1997).

For linearity, the relationship between the dependent variable and each of the independent variables needs to be linear. This linear relationship can be detected by

creating scatterplots (Figure 3.2), or partial regression plots (Pedhazur, 1997). If the relationship displayed in the plots created from the data appears like a curve, no or little linearity is present.

Figure 3.2. Scatterplot of the Model
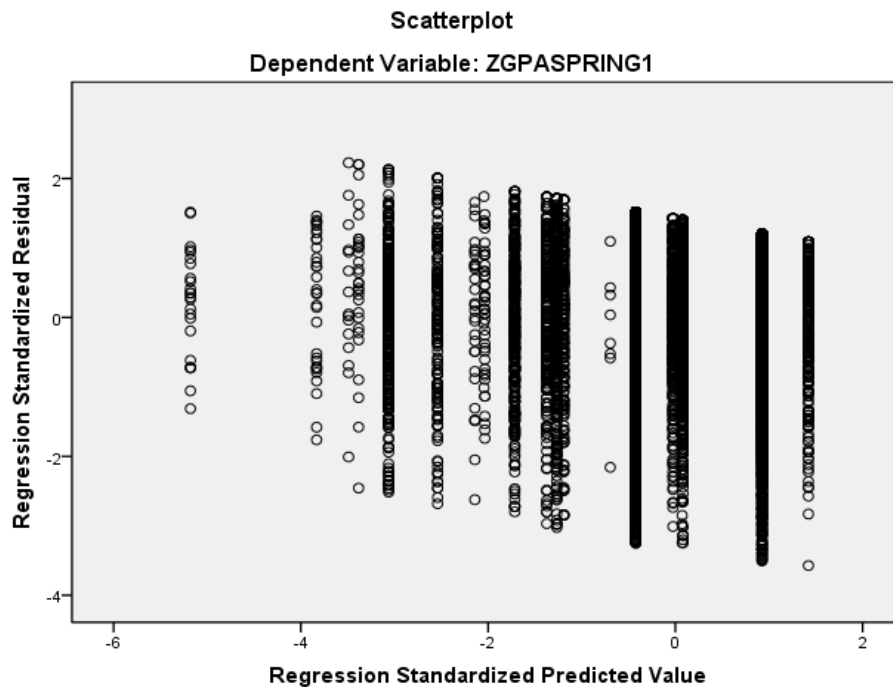
The next assumption is normality, which refers to the normal distribution of the scores around the mean. The scores on the outcome variable are normally distributed at each value of the predicted variable, and the normal distribution is shaped like a bell in the data histogram. This assumption is normally tested by normal P-P plots (Figure 3.3, page 49) or histograms (Figure 3.4, page 49) (Osborne & Waters, 2002). If scores are not symmetric around the mean, the data are skewed and outliers appear. If these extreme cases occur, the data scores can be converted to z-scores, by which outliers are identified and removed. There are a number of other solutions; however, removing outliers reduces the probability of Type I and Type II errors (Osborne, 2001).

Figure 3.3. Normal P-P Plot of the Model
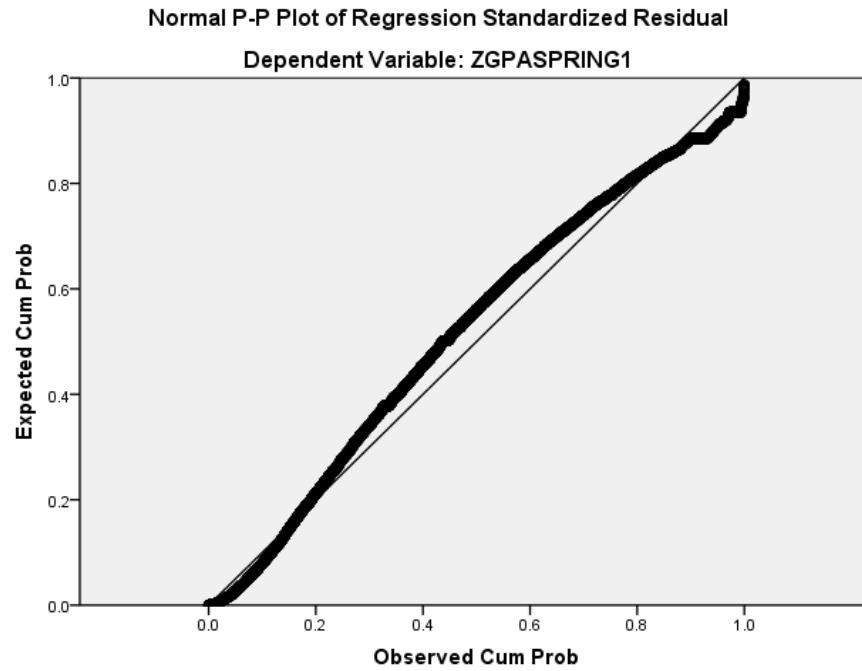
Figure 3.4. Histogram of the Model
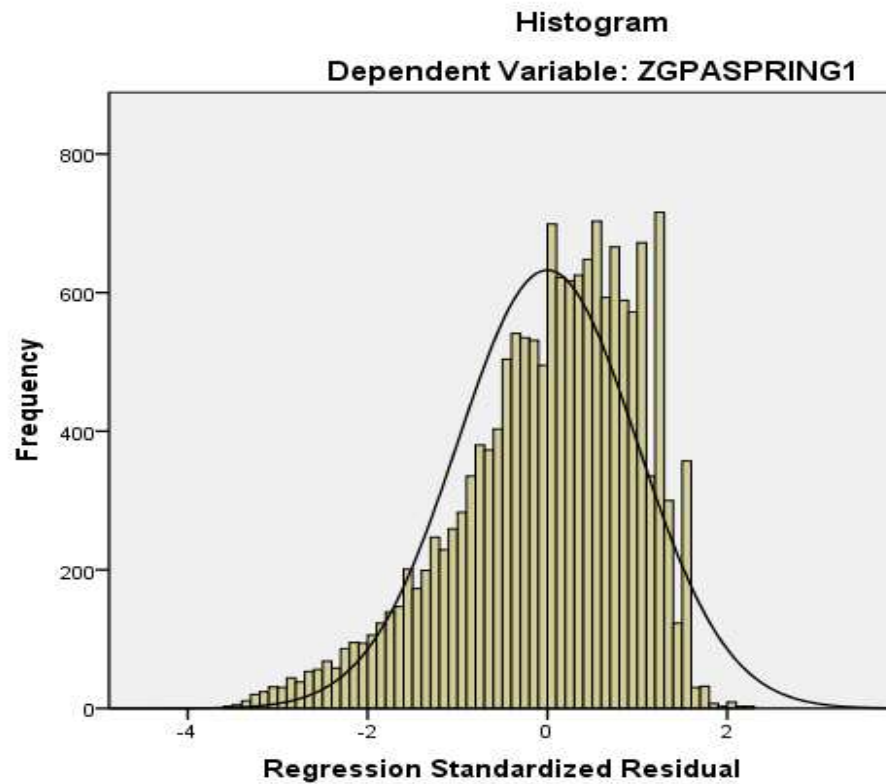
What is assumed for the independence assumption is the scores of any particular subject are independent of the scores of all other subjects. These scores should be unrelated. When the independent variables are not independent from each other, multi-collinearity occurs. Multi-collinearity can be tested by the size of the bivariate correlation r. If r is equal to or bigger than 0.90, that is collinearity (Hinkle, Wiersma, & Jurs, 2009). Multicollinearity is also detected when the tolerance T is smaller than 0.1 or when the variance inflation factor VIF is larger than 10 (Freund, Mohr & Wilson, 2010; Pedhazur, 1997).

Linear regression also assumes that residuals have equal variances across the values of the predictors. For homoscedasticity, the spread of the scores is about the same and should be constant. In other words, the variance of errors should be the same for all values of the independent variables. This assumption can be checked by looking at plots of standardized residuals or partial plots (Osborne & Walters, 2002). When residuals are not evenly scattered around the line, the data is not homoscedastic.

Test of Significance

The next step is to test the significance of the overall model to see the proportion of variance in the dependent variable Y (Spring GPA) accounted for by the set of independent variables (X's). This proportion is reflected by the R^2. Following are the hypothesis and null hypothesis for this test:

H_0: R^2 equals zero, or there is no relationship between the dependent variable Y (Spring GPA) and the set of independent variables (X's).

H_1: R^2 is significanty different from zero, or there is a significant relationship between the dependent variable Y (Spring GPA) and the set of independent variables (X's).

This null hypothesis is tested by the F test (Pedhazur, 1997). If the F test is not significant, the null hypothesis is accepted, which means there is no relationship between the dependent variable Y (Spring GPA) and the set of independent variables (X's). The study is terminated. If the F test is significant, the null hypothesis is rejected, and the hypothesis is accepted. The conclusion is that there is a significant relationship between the dependent variable Y (Spring GPA) and the set of independent variables (X's).

Tests of Regression Coefficients

In this model, each regression coefficient reflects the change in the dependent variable as a result of a unit change in the independent variable under consideration while holding other variables constant. The regression equation for this model will read like this:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots + \beta_m X_m$$

in which   Y is the dependent or outcome variable

X_i (i = 1, 2, …, m) are independent variables

β_0 is the intercept

β_i (i = 1, 2, …, m) are parameters or regression coefficients

Following are the null hypothesis and alternative hypothesis for testing the regression coefficients:

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H_0: $\beta_i = 0$, which means the independent variable under consideration (X_i) does not significantly predict the dependent variable (Y).

H_1: $\beta_i \neq 0$, which means the independent variable under consideration (X_i) significantly predicts the dependent variable (Y).

This null hypothesis is tested with the t-test (Pedhazur, 1997). If the t-test is not significant, the null hypothesis is accepted and the conclusion is that there is no relationship between the independent variable in consideration and the outcome variable. If the t-test is significant, the null hypothesis is rejected, which means the independent variable under consideration (X_i) significantly predicts the dependent variable (Y) while controlling for the effects of the other independent variables.

Building Models

Models in multiple linear regression are built by using either standard multiple regression or stepwise selection (Freund, Mohr & Wilson, 2010; Pedhazur, 1997). For standard multiple regression, all the independent variables are entered for analysis, and the significant variables are checked. For variables which are non-significant, they are entered into the model manually, and decisions are made on whether to keep or drop them based on their significance in the new models. Then, different models are compared for the final choice of the best model. For stepwise regression, independent variables are entered to the regresion one at a time based on the order of significance, the size of the F value, and their correlation with the dependent variable. Stepwise regression is designed to find the best set of predictors that are most effective in predicting the independent variable.

Multiple Logistic Regression Performance

Dependent and Independent Variables

The variables were entered into logistic regression analysis. The dependent variable or outcome variable was Persistence (return to Fall of the second year), which was a binary variable. The explanatory or independent variables included background variables (D_Male, Age, D_Black, D_AmIn, D_Hisp, D_Asian, D_Part_time), High school Performance (HSGPA and ACT), financial aid (D_Pell2, D_OHLAP2, D_OTAG2, D_Perkins2, D_Stafford2, D_Waivers2, D_Athletic2), and College GPA. Of these independent variables, Age, HSGPA, ACT and College GPA were continuous variables and the rest were dichotomous. The stepwise method was employed and the explanatory variables were entered to the regression analysis one at a time based on the order of their significance. The results reported were from the final model of the analysis.

Assumptions

Logistic regression is different from linear regression in that the outcome variable is discrete. The assumptions for logistic analysis include mainly linearity, followed by absence of outliers, absence of multicollinearity, and sample size. The first assumption of logistic regression is that the relationship between the logit(pi) or log(odds) is a linear funtion of covariates. In other words, the logistic regression equation should have a linear relationship with the logit form of the independent variables. The assumptions of outliers and multicollenearity are similar to those in linear analysis. While multiple linear regression uses ordinary least square estimate of β, binary regression uses maximum likelihood estimate to estimate the parameters that best fit the data. For this reason, the

assumption of large sample size is required. For some researchers, maximim likehood needs at least 15 cases per independent variable, while other researchers sugest 50 cases per predictor.

Test of Significance

Block-0 model (or constant-only model) only includes the constant beause the predictors have not been entered into the model. This model indicates what percentage of the probabiliy in the dependent variable Y is predicted when the predictors have not been accounted for.

For block 1, the independent variables are added to the model step by step in the order of significance. To test the model significance, the Log-likelihood (LL) Chi-square test is used to compare constant-only model (or intercept-only model) and the predictor-plus intercept model. If Likelihood Chi-square test is significant, the model with the added predictors is best.

H_0: There is no relationship between the dependent variable Y (persistence) and the set of independent variables (X's).

H_1: There is a significant relationship between the dependent variable Y (persistence) and the set of independent variables (X's).

If the Chi-square test is not significant, the nulll hypothesis is accepted, which means there is no relationship between the dependent variable (persistence) and the set of independent variables (X's). The analysis is terminated. On the contrary, if the Chi-square test is significant, the null hypothesis is rejected, which means the set of

independent variables improves the prediction of the dependent variable (persistence) better than chance.

Pseudo R square or Nagelkerke R^2 is the proportion of variance in the dependent variable (persistence) accounted for by the set of independent variables (X's).

The Hosmer and Lemeshow goodness-of-fit test is used to test for the model fit, or how well the model fits the data.

H_0: The model fits the data.

H_1: The model does not fit the data.

If the Hosmer and Lemeshow test is not significant, the model fits the data. In contrast, if the Hosmer and Lemeshow test is significant, there is a lack of fit.

Tests of Regression Coefficients

The logistic regression equation for this model will read like this:

Logit(pi) = log (odds) = $\beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \ldots + \beta_mx_m$

In which:

Logit(pi):   logit transformaiton of the propability of the event

X_i: (i = 1, 2, …, m)   independent variables

β_0 intercept of the regression line

β_i (i = 1, 2, …, m)   parameters or regression coefficients

Following are the null hypothesis and alternative hypothesis for testing the regression coefficients:

H_0: Beta = 0 (Exp = 1), which means the independent variable under consideration (X_i) does not significantly predict the dependent variable (Y).

H_1: Beta $\neq$ 0 (Exp $\neq$ 1), which means the independent variable under consideration (X_i) significantly predicts the dependent variable (Y).

This null hypothesis is tested with the Wald test (Hosmer & Lemeshow, 2000). If the Wald test is not significant, the null hypothesis is accepted and the conclusion is that there is no relationship between the independent variable in consideration and the outcome variable. If the Wald test is significant, the null hypothesis is rejected, which means the independent variable under consideration (X_i) significantly predicts the dependent variable (Y) while controlling for the effects of the other independent variables.

Building Models

Models in multiple logistic regression are built by using either standard multiple regression or stepwise selection (Hosmer & Lemeshow, 2000). For standard multiple logistic regression, all the independent variables are entered for analysis. According to Hosmer and Lemeshow (2000), the variables are checked, first of all for a significance level of 0.25. The variables that are significant at this level will then be manually entered into the next model. The model-building process continues with consideration for the significance level and pseudo R square until the desired model is reached. For stepwise regression, independent variables are entered to the regresion one at a time based on the

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order of significance, the size of Chi-square value, and their correlation with the dependent variable. Stepwise regression is designed to find the best set of predictors that are most effective in predicting the independent variable.

Limitations of the Study

For the specific purpose of this study, the sample will be limited to degree-seeking first-year students at the two research universities in Oklahoma. For this reason, the results of this study may not be generalized to a larger population of university students, and they may or may not apply to part-time students or students in their junior and senior years. Similarly, the data reflect the period of fall 2013 to fall 2014. As a result, the findings of the study may not be generalized to a larger population of students during this specific time, and they may or may not be indicative of future applicants.

Another boundary of this study is the fact that data are collected for student characteristics, pre-college preparation, financial factors and college academic performance. It is recognized that numerous other factors may affect student persistence. These include, but are not limited to, students' communication and behavior skills, and contact with professors (Pascarella & Terenzini, 1980; Tinto, 1975, 1987), attendance, institutional environment (Astin, 1984, 1999; Spady, 1971), and adequate support from and satisfaction with institutions. However, these factors are beyond the scope of this study.

Regarding the correlational design, it only shows that one variable can be predicted from another variable. One problem is there is the possibility that some third variable may impact the two variables without there being a causal relationship between

the three. For that reason, a high correlation between two variables does not necessarily lead to the cause-and-effect relationship between these variables (Gay et al., 2009). In addition, the limitation in the generalizability of the findings is another problem with correlational research. The findings apply for the targeted group, but these correlational findings may or may not apply for other groups or situations.

Summary

This chapter discussed the methods employed in carrying out the study, with emphasis on the correlational design to analyze the data. Bivariate correlations and multiple regression will be used for this purpose. The chapter also examined the validity and reliability of the data collection instruments of the personal data form and survey, and listed the sample chosen and the process of data collection. Lastly, this chapter presented the variables of the study, the research questions used to examine the possible prediction of student persistence, the null hypotheses, and how to interpret the results. Chapter 4 will present the results of the data analysis, which describe the findings associated with each research question and the determination whether to retain or reject the hypotheses.

CHAPTER IV

RESULTS

As stated in Chapter 1, this study examined whether college students' background characteristics, high school performance, financial aid, and first semester GPA predict their college performance, in particular their second semester college GPA. Of equal importance, the study also sought to determine if significant relationships exist between students' background characteristics, high school performance, financial aid, first semester GPA, second semester GPA and their persistence beyond the first year at college. The Statistical Pack for the Social Sciences (SPSS) software version 19 was used for the analysis of the data resulting from following four research questions:

1. Do students' background characteristics (gender, age, ethnicity/race, enrollment status) predict their persistence beyond the first year at public research universities in Oklahoma?

2. Does students' high school academic performance (high school GPA and ACT test scores) predict their persistence beyond the first year at public research universities in Oklahoma?

3. Does students' financial status (financial aid) predict their persistence beyond the first year at public research universities in Oklahoma?

4. Does students' college performance (first-semester GPA, second-semester cumulative GPA) predict their persistence beyond the first year at public research universities in Oklahoma?

The results of the study are presented in this chapter in three parts. The first part highlights descriptive statistics of the 16,181 full-time degree-seeking first-year students enrolled at Oklahoma State University and the University of Oklahoma from fall 2013 to fall 2014. The other 810, or 4.8 percent of the total number of subjects, are not included in the data analysis because they dropped out after the first semester and therefore their data are incomplete. The descriptive data include mean, mode, median, standard deviation, minimum and maximum values for continuous variables, and the percentage and frequency distribution for categorical variables. This part also reports the direction and strength of bivariate correlations in the model. The second part presents the results of the linear analysis in the order of the research questions. In the third part, the results of the logistic analysis are presented, also in the order of the research questions.

Descriptive Statistics for Model Specifications

Sample Characteristics

The sample entered for analysis included 16,181 full-time degree-seeking students who returned to the spring semester of their first year at college. Table 4.1 (page 61) summarizes the frequency and percentage of students' background characteristics. Of the 16,181 participants in the sample, over half were female (52.1 percent) while male participation was 47.9 percent, as illustrated in Figure 4.1 (page 62).

Table 4.1

Background Characteristics

Variable	Frequency (N)	Valid Percent (%)
Gender		
Female	8,432	52.1
Male	7,749	47.9
Race/Ethnicity		
White	11,046	68.3
Black	811	5.0
American Indian	654	4.0
Hispanic	1,221	7.5
Asian	593	3.7
Multiple	1,360	8.4
Alien	348	2.2
Other	148	0.9
Enrollment Status		
Full-time	15,559	96.2
Part-time	622	3.8

Figure 4.1. Gender Breakdown
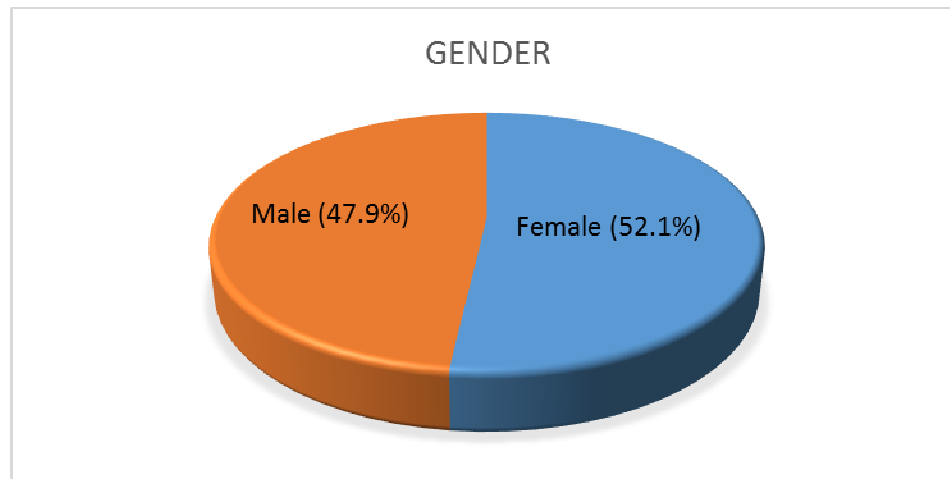
The age of the students in the sample ranged from 16 to 53, with the vast majority in traditional college age (18-23 years of age). Only 0.4 percent of the 16,181 participants were in the age range 24-53. The minimum, maximum, mean and standard deviation are detailed in Table 4.2, and the percentages are displayed in Figure 4.2 (page 63).

Table 4.2

Descriptive Statistics for Original Continuous Variables

Variable	Mininum Value	Maximum Value	Mean	Standard Deviation
AGE	16	53	18.59	1.02
HIGH SCHOOL GPA	1.51	4.00	3.57	0.36
ACT	12	36	25.27	4.06
FALL GPA	0.03	4.00	3.08	0.75
SPRING GPA	0.02	4.00	3.03	0.72

Figure 4.2. Age Breakdown
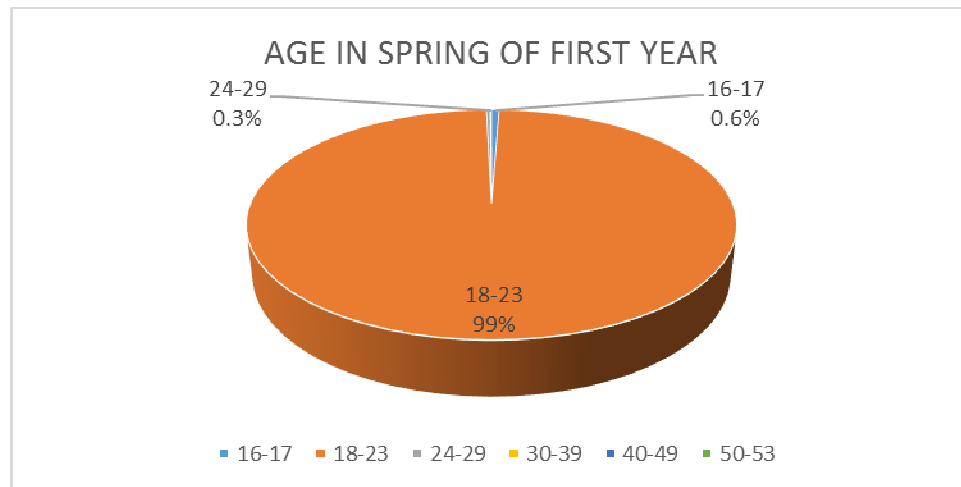
Figure 4.3. Ethnicity Breakdown
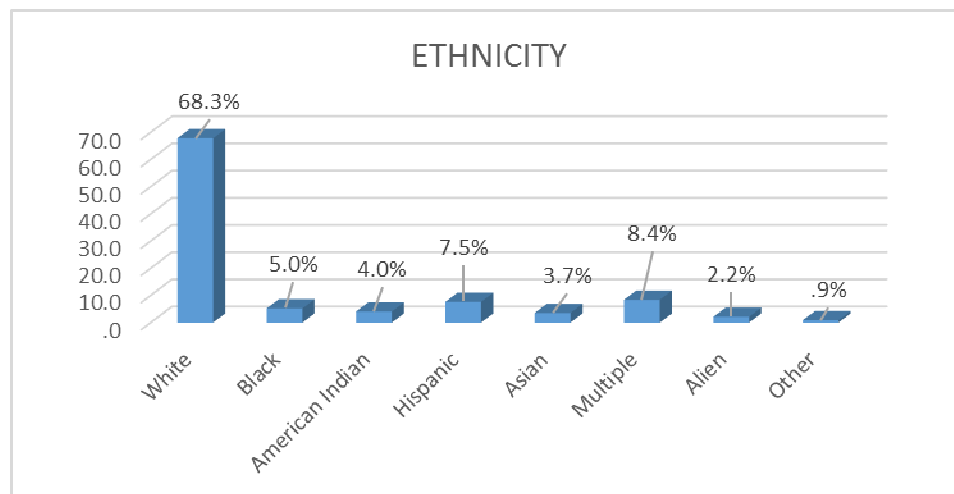
The ethnicity proportion of the students who persisted beyond the first semester is

illustrated in Figure 4.3. The largest proportion of the study participants (68.3 percent)

indicated they were White. Among the participants, 5.0 percent were Black, 4 percent

were American Indian, 7.5 percent were Hispanic, 3.7 percent were Asian American, 8.4 percent were students of mixed ethnicity, and 0.9 percent were students of other ethnicity.

The high school GPA of the students in the sample ranged from 1.51 to 4.00, with the majority having a high school GPA from 3.50 to 4.00 (59.5 percent). There were also 28.9 percent with a high school GPA of 3.00 to 3.49, 5.4 percent from 2.50 to 2.99, 0.6 percent from 2.00 to 2.49, and 5.6 percent from 1.51 to 1.99. The minimum value, maximum value, mean and standard deviation are detailed in Table 4.2 (page 59), and the percentages are displayed in Figure 4.4.

Figure 4.4. High School GPA Breakdown
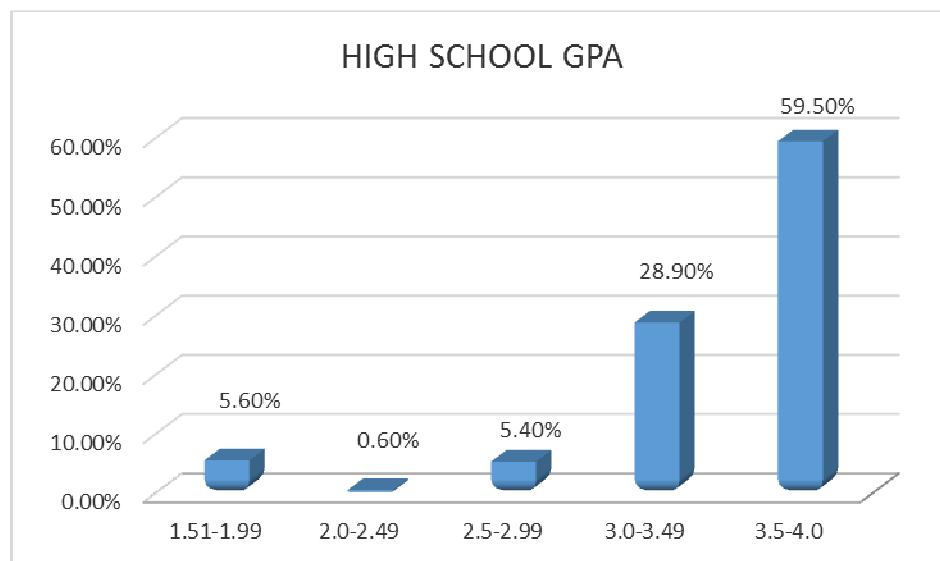
The ACT composite score of the students in the sample ranged from 12 to 36. The minimum values, maximum values, mean and standard deviation are detailed in Table 4.2 (page 62), and the percentages are displayed in Figure 4.5 (page 65).

Figure 4.5. ACT Breakdown
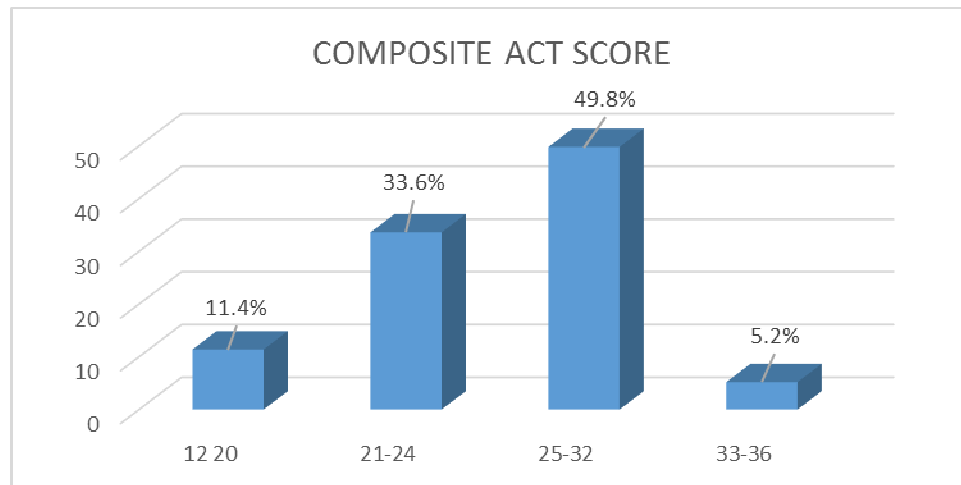
With regard to financial aid, the number of students awarded a Pell grant in the first semester (fall semester) of college accounted for 23.6 percent of the population; 76.4 percent were not awarded a Pell grant. In the second semester (spring semester), 23.2 percent were awarded a Pell grant and 76.8 percent were not awarded the grant. As shown in Figure 4.6, 22.7 percent of the participants were awarded a Pell grant in both the first and second semesters, 1.4 percent received a Pell grant in either the first or the second semester, and 75.9 percent did not receive the grant.

Figure 4.6. Receiving a Pell Grant
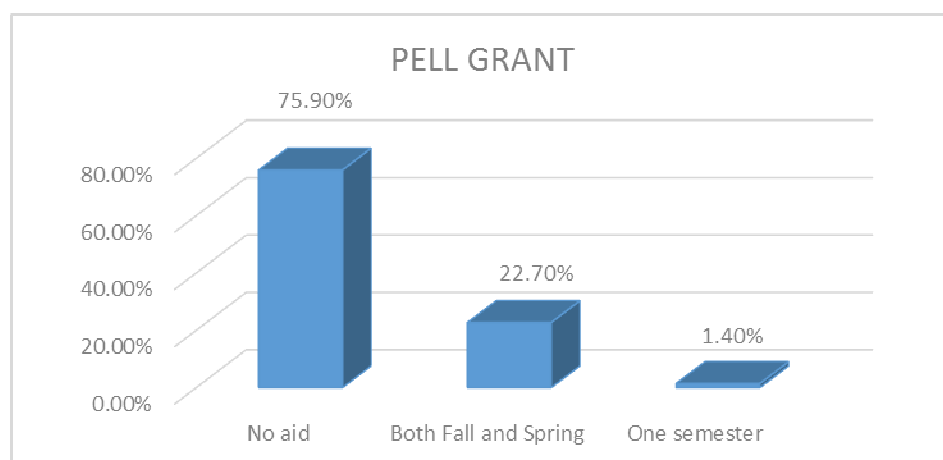
The number of students awarded an Oklahoma Higher Learning Access Program (OHLAP) scholarship in the first semester (fall semester) of college accounted for 15.2 percent of the population; 84.8 percent were not awarded an OHLAP scholarship. In the second semester (spring semester), 14.7 percent were awarded an OHLAP scholarship and 85.3 percent were not awarded the scholarship. As shown in Figure 4.7, 14.6 percent of the participants were awarded an OHLAP scholarship in both the first and second semesters, 0.8 percent received an OHLAP scholarship in either the first or the second semester, and 84.7 percent received the scholarship in neither the first nor the second semester.

Figure 4.7. Receiving an OHLAP Scholarship
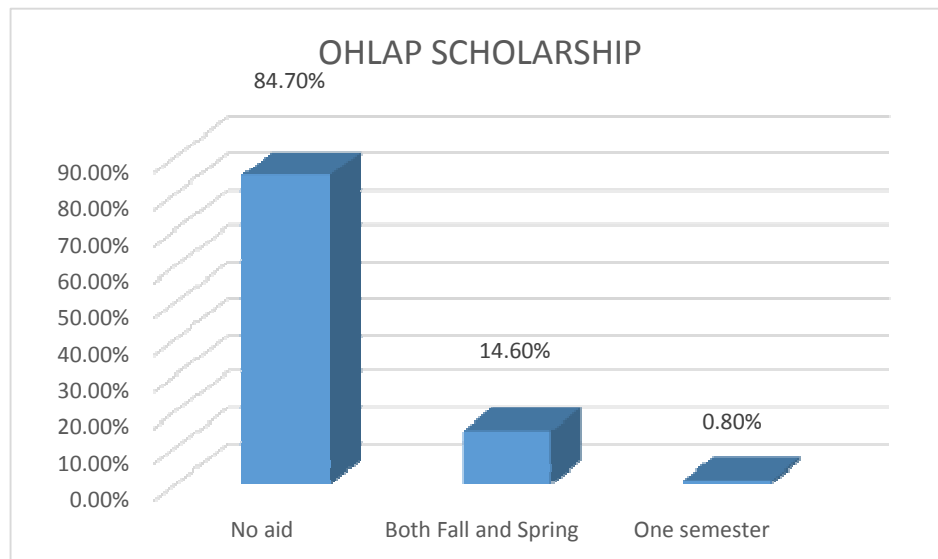
The number of students awarded an Oklahoma Tuition Aid Grant (OTAG) in the first semester (fall semester) of college accounted for 6.1 percent of the population; 93.9 percent were not awarded an OTAG grant. In the second semester (spring semester), 5.8 percent were awarded an OTAG grant and 94.2 percent were not awarded the grant. As

shown in Figure 4.8, 5.5 percent of the participants were awarded an OTAG grant in both

the first and second semesters, 1.0 percent received an OTAG grant in either the first or

the second semester, and 93.6 percent received the grant in neither the first nor the

second semester.

Figure 4.8. Receiving an OTAG Grant
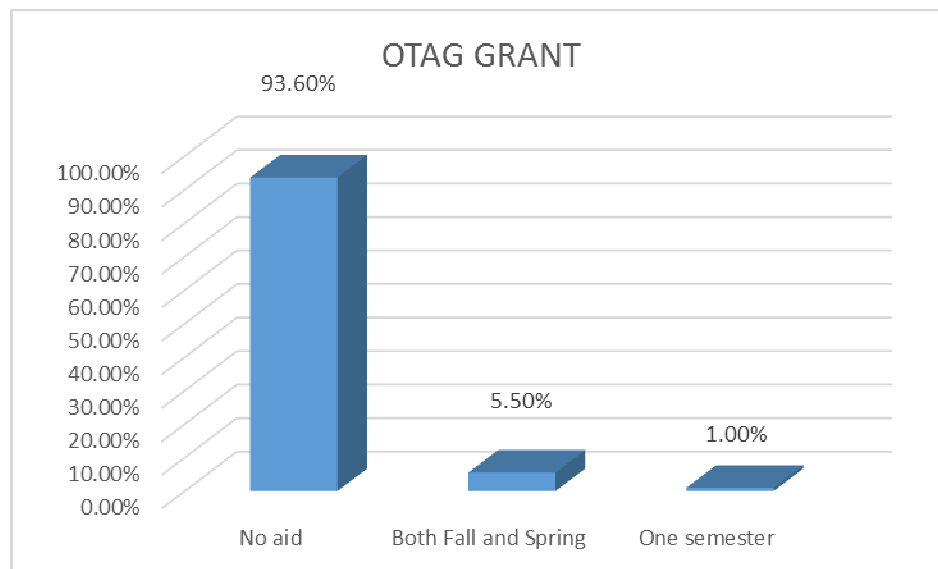
The number of students receiving a Perkins loan in the first semester (fall

semester) of college accounted for 2.7 percent of the population; 97.3 percent did not

receive a Perkins loan. In the second semester (spring semester), 2.8 percent received a

Perkins loan and 97.2 percent did not. As shown in Figure 4.9 (page 68), 2.5 percent of

the participants received a Perkins loan in both the first and second semesters, 0.5 percent

received a Perkins loan in either the first or the second semester, and 97.0 percent

received the loan in neither the first nor the second semester.

Figure 4.9. Receiving a Perkins Loan
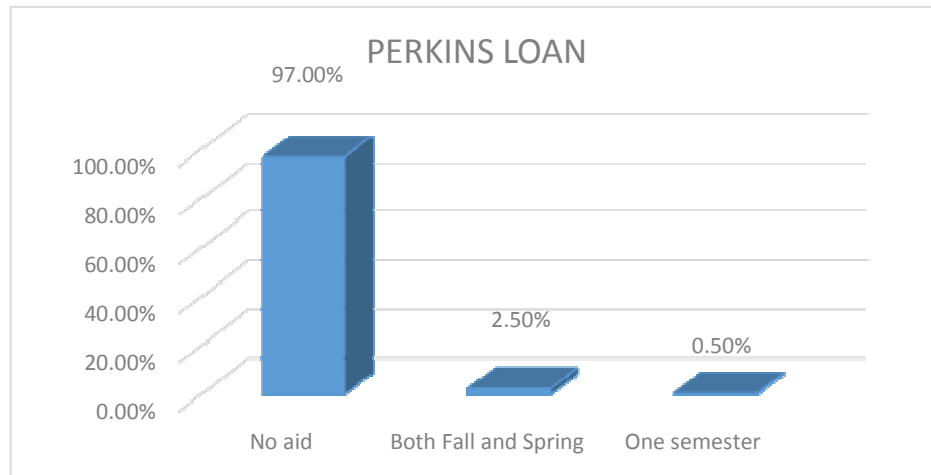
The number of students receiving a Stafford loan in the first semester (fall semester) of college accounted for 43.6 percent of the population; 56.4 percent did not receive a Stafford loan. In the second semester (spring semester), 36.9 percent received a Stafford loan and 63.1 percent did not. As shown in Figure 4.10, 35.8 percent of the participants received a Stafford loan in both the first and second semesters, 9.0 percent received a Stafford loan in either the first or the second semester, and 55.3 percent received the loan in neither the first nor the second semester.

Figure 4.10. Receiving a Stafford Loan
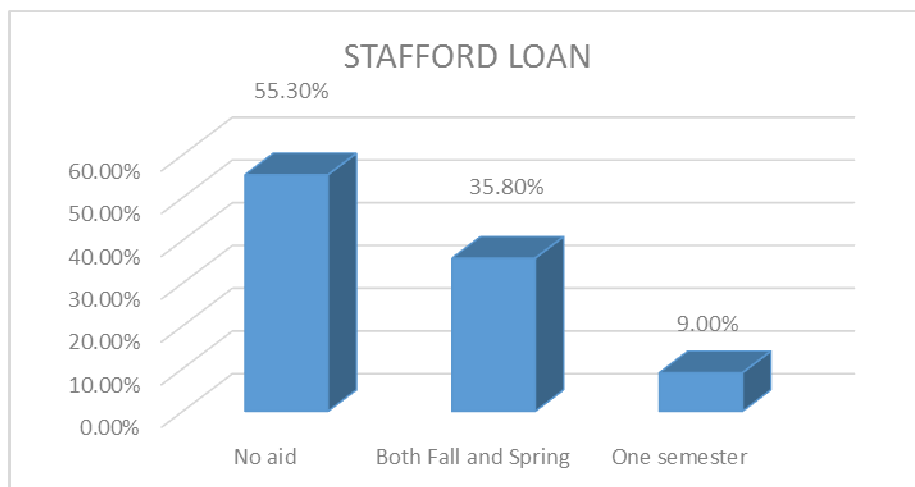
The number of students who received tuition waivers in the first semester (fall semester) of college accounted for 24.9 percent of the population; 75.1 percent did not receive tuition waivers. In the second semester (spring semester), 24.2 percent received waivers and 75.8 percent did not. As shown in Figure 4.11, 23.9 percent of the participants received tuition waivers in both the first and second semesters, 1.2 percent received tuition waivers in either the first or the second semester, and 74.8 percent received waivers in neither the first nor the second semester.

Figure 4.11. Receiving Tuition Waivers
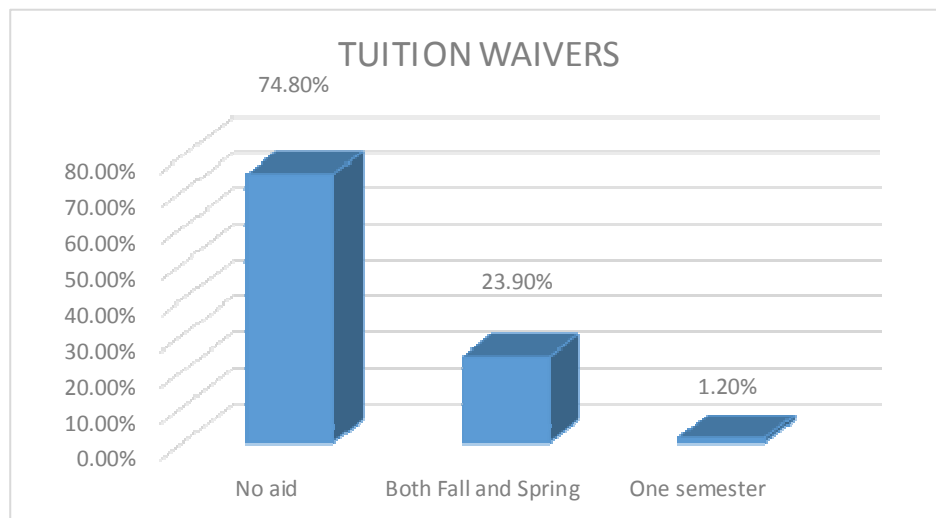
The number of students awarded an athletic scholarship in the first semester (fall semester) of college accounted for 1.9 percent of the population; 98.1 percent were not awarded an athletic scholarship. In the second semester (spring semester), the same percentage held, although the number of participants receiving an athletic scholarship decreased by four participants. As shown in Figure 4.12 (page 70), 1.8 percent of the participants were awarded an athletic scholarship in both the first and second semesters,

0.2 percent received an athletic scholarship in either the first or the second semester, and

98.0 percent received an athletic scholarship in neither the first nor the second semester.

Figure 4.12. Receiving an Athletic Scholarship
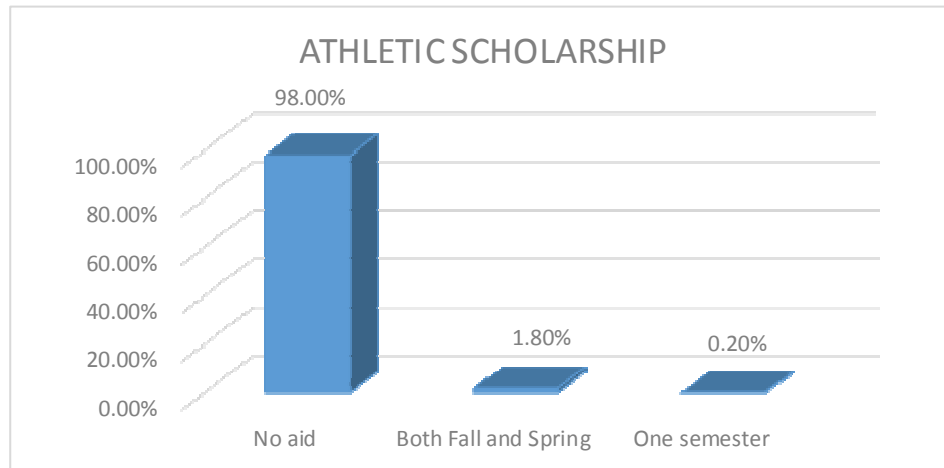
Frequency analyses of the participants' enrollment status indicate that 96.2

percent of the students enrolled full-time (at least 12 credit hours). The other 3.8 percent

enrolled part-time (Figure 4.13).

Figure 4.13. Enrollment Status Breakdown
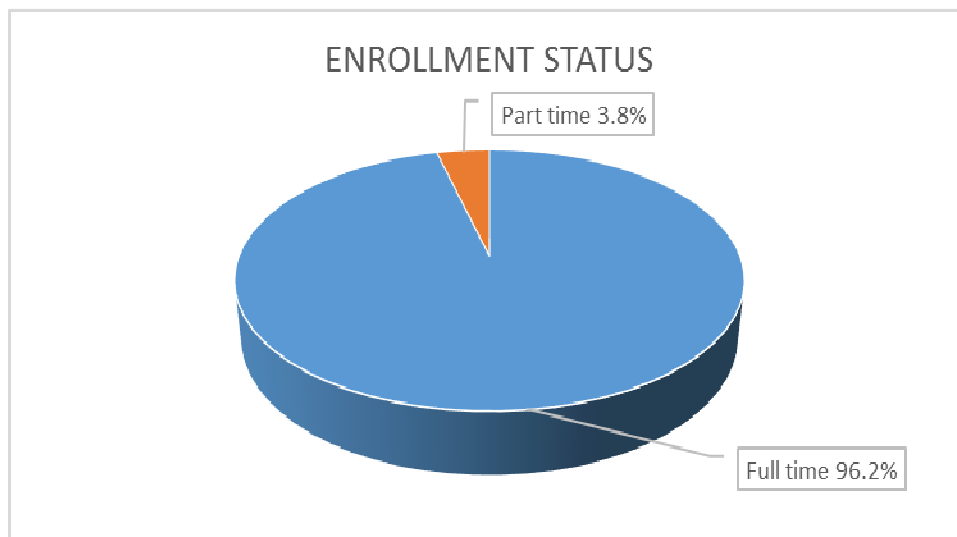
First semester college GPA of the students in the sample ranged from 0.03 to

4.00, with the majority having a Fall GPA from 3.50 to 4.00 (34.8 percent). There were

28.2 percent with a Fall GPA of 3.00 to 3.49, 17.3 percent from 2.50 to 2.99, 10.1 percent

from 2.00 to 2.49, and 9.5 percent under 2.0. The mean and standard deviation are

detailed in Table 4.2 (page 62), and the percentages are displayed in Figure 4.14.

Figure 4.14. First Semester GPA
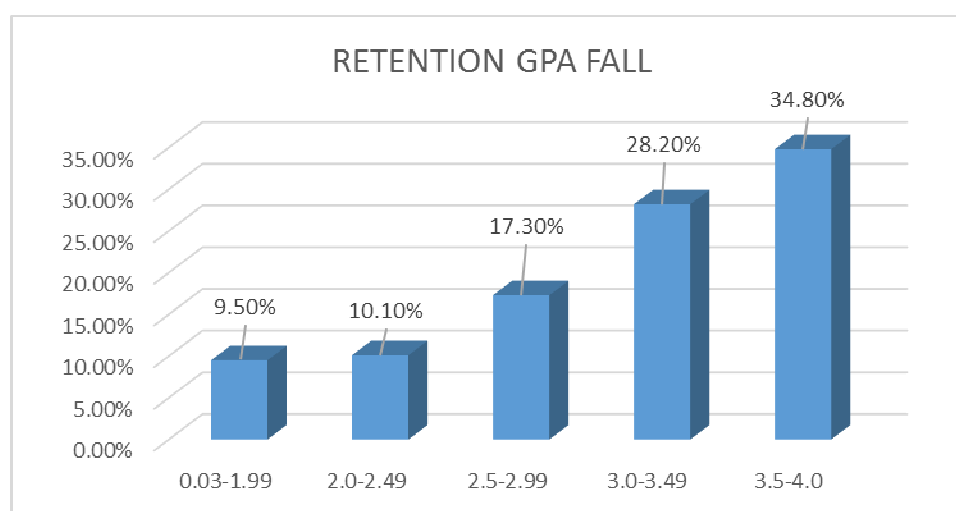
Frequency analyses of the participants' status of Spring persistence indicate that

95.2 percent of the students returned to the Spring semester. The other 4.8 percent did not

persist beyond the first semester (Figure 4.15, page 72).

Figure 4.15. Persistence to Second Semester

RETURNED TO SPRING OF FIRST YEA

4.80%

95.20%
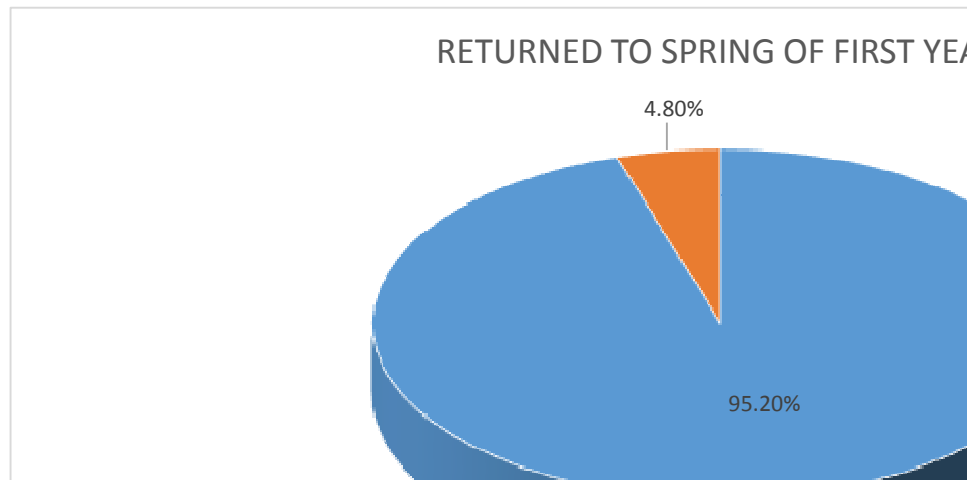
Second semester college GPA of the students in the sample ranged from 0.02 to 4.00, with the majority having a Spring GPA from 3.50 to 4.00 (29.9 percent). There were 29.1 percent with a Spring GPA of 3.00 to 3.49, 20.0 percent from 2.50 to 2.99, 11.2 percent from 2.00 to 2.49, and 9.7 percent under 2.0. The mean and standard deviation are detailed in Table 4.2 (page 62), and the minimum values, maximum values, median and quartiles are displayed in Figure 4.16 (page 73).

Figure 4.16. Second Semester GPA Breakdown
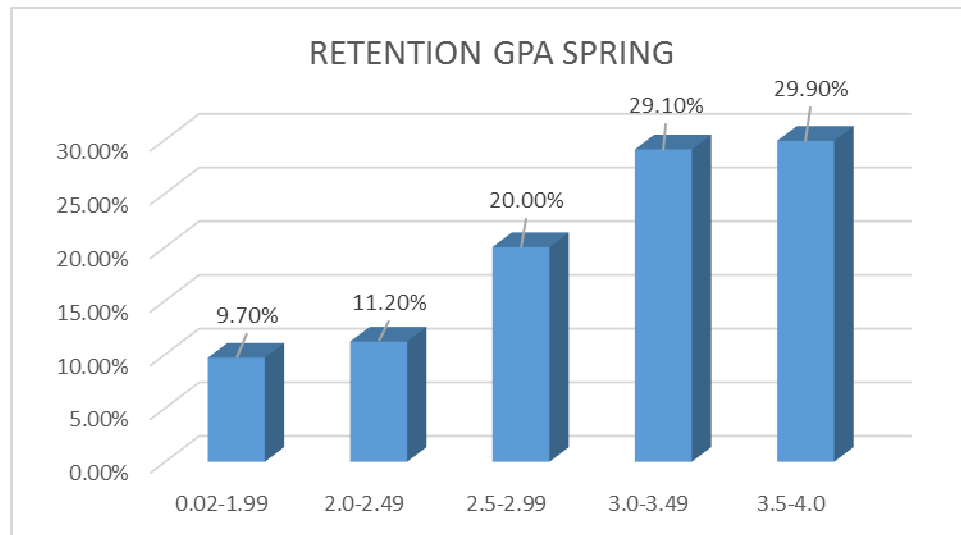
Frequency analyses of the participants' persistence status from the second semester (Spring) to the third semester (Fall) indicate that 87.4 percent of the students returned to the Fall semester. The other 12.6 percent did not persist beyond the second semester (Figure 4.17).

Figure 4.17. Third Semester Persistence
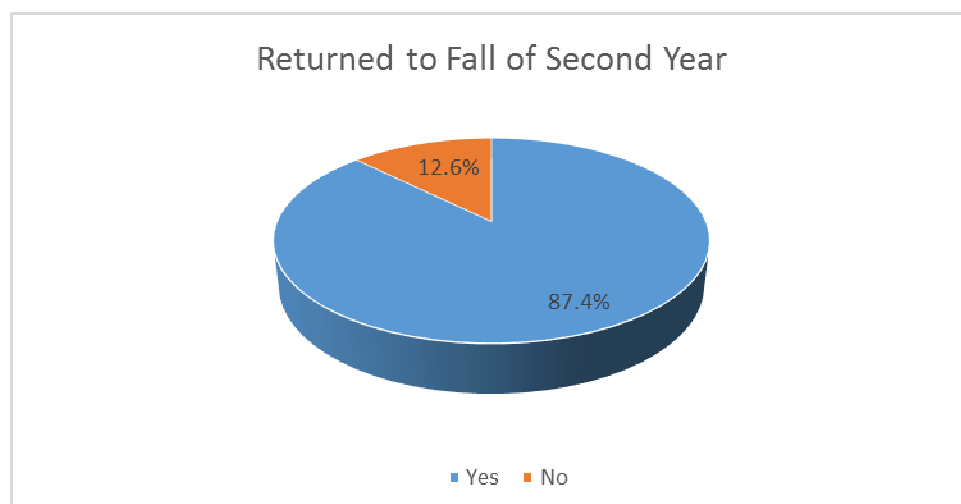
Correlations

  Prior studies show a positive relationship between high school GPA and college GPA, and between ACT and college GPA. High school GPA has a strong association with college GPA and there is a strong positive relationship between performance on the ACT and college GPA (Belfield & Crosta, 2012; Culpepper & Davenport, 2009; Noble & Sawyer, 2002; Radunzel & Noble, 2012, Stumpf & Stanley, 2002). In this study, however, High school GPA has a moderate positive correlation with Spring GPA ($r = 0.51$). As high school performance increases, second semester college GPA also increases. Students' ACT scores are also positively associated with Spring GPA, but this association is rather low ($r = 0.34$) as shown in Table 4.3 (page 75). Fall GPA and Spring GPA have a strong positive relationship ($r = 0.89$).

Table 4.3

Correlations of Continuous Variables

Variable	AGE	HS GPA	ACT	FALL GPA	SPRING GPA
AGE		-0.087**	-0.059**	-0.004	-0.009
HS GPA			0.377**	0.497**	0.510**
ACT				0.334**	0.341**
FALL GPA					0.887**
SPRING GPA					

** p< 0.001

College Performance

Variable Coding

Multiple linear regression was used for the prediction of Spring cumulative GPA. This outcome variable is a continuous variable and was directly entered into the regression with no coding needed. Categorical variables, however, were dummy-coded to enter regression analysis.

Because Gender is a dichotomous variable, the use of dummy coding applied: Female was assigned the reference group and coded 0, and male was coded 1. Because Ethnicity is a categorical variable having eight categories (White, Black, American

Indian, Hispanic, Asian, Multiple, Alien, and Other), it was converted to seven

dichotomous variables of Black, American Indian, Hispanic, Asian, Multiple, Alien and

Other, with White as the reference variable. The reference group was coded 0. The

coding for the variables in the first research question is displayed in Table 4.4.

Table 4.4

Coding for Background Characteristics

Variable	Variable type	Coding
D_Male	Dichotomous	Female = 0
		Male = 1
Age	Continuous	
D_Black	Dichotomous	Black = 1, Non-Black = 0
D_American Indian	Dichotomous	Am_In = 1, Non-Am_In = 0
D_Hispanic	Dichotomous	Hispanic = 1, Non-Hispanic = 0
D_Asian	Dichotomous	Asian = 1, Non-Asian = 0
D_Part_Time	Dichotomous	Full_Time = 0
		Part_Time = 1

For financial aid, most students with scholarship, grants, or loans had them in both semesters, so another variable was created with the dummy code 0 for no financial aid and 1 for financial aid in both semesters. Table 4.5 (page 78) displays the codes for variables in the second research question.

Table 4.5

Coding for Ethnicity

Variable	Type	Coding
D_PELL2	Dichotomous	0 = No Pell Grant
		1 = Pell Grant in both Fall and Spring
D_OHLAP 2	Dichotomous	0 = No OHLAP scholarship
		1 = OHLAP in both Fall and Spring
D_OTAG2	Dichotomous	0 = No OTAG scholarship
		1 = OTAG in both Fall and Spring
D_PERKINS2	Dichotomous	0 = No Perkins loan
		1 = Perkins in both Fall and Spring
D_STAFFORD2	Dichotomous	0 = No Stafford loan
		1 = Stafford in both Fall and Spring
D_WAIVERS2	Dichotomous	0 = No waivers
		1 = Waivers in both Fall and Spring
D_ATHLETIC2	Dichotomous	0 = No athletic scholarship
		1 = Scholarships in both Fall and Spring

Dependent Variable and Independent Variables

The variables were entered into regression analysis. The dependent variable or outcome variable was Spring GPA, which was a continuous variable. The explanatory or independent variables included background variables (D_Male, Age, D_Black, D_AmIn, D_Hisp, D_Asian, D_Part_time), High school Performance (HSGPA and ACT), and financial aid (D_Pell2, D_OHLAP2, D_OTAG2, D_Perkins2, D_Stafford2, D_Waivers2, D_Athletic2). Age, HSGPA and ACT were continuous variables and the rest were dichotomous. The stepwise method was employed and the explanatory variables were entered to the regression analysis one at a time based on the order of their significance. The results reported in this chapter were from the final model of the analysis.

Assumptions

Before any analysis on linear regression was done on the data, it was important to check the assumptions behind them because violation of the assumptions could have led to serious biases (Pedhazur, 1997). The results were only meaningful when all the assumptions were satisfied. In this study, the four assumptions of linearity, normality, collinearity, and homogeneity were observed.

Linearity.

Figure 4.18. Scatterplot Showing Linearity
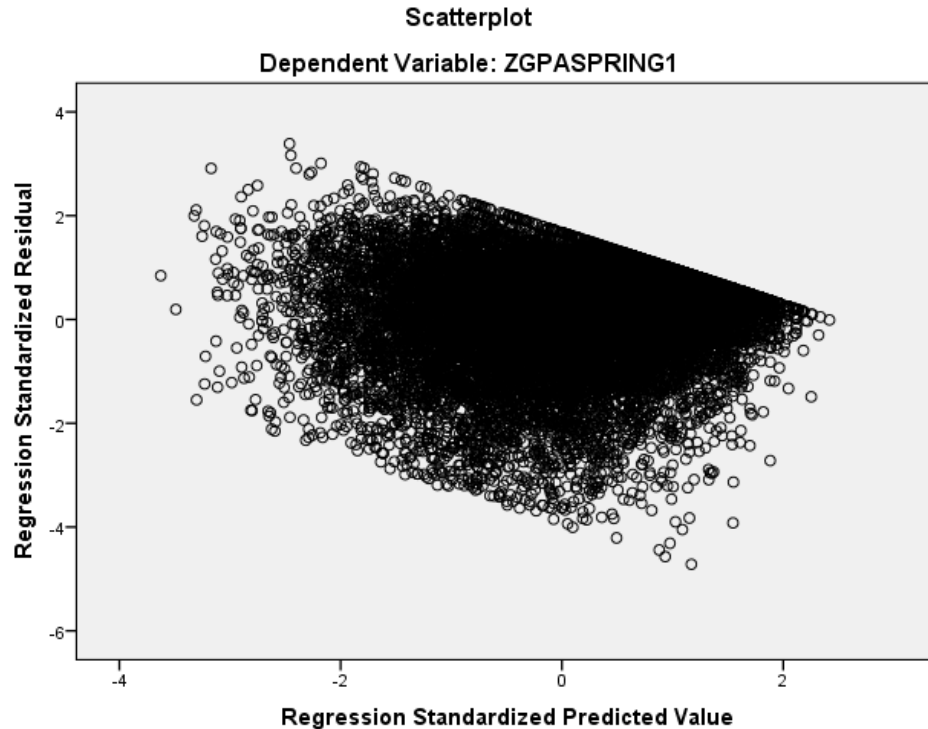
Figure 4.18 shows the data points contained within two imaginary lines, one at the top and the other at the bottom. The points concentrate on the center with only a few trailing off. As the predicted values increase, the variance of the residuals stays constant. The assumption of linearity was satisfied.

Normality and outliers.

As mentioned in Chapter Three, the data set should be normally distributed to avoid skewness and outliers. In other words, the scores on the outcome variable are normally distributed at each value of continuous variables. The descriptive statistics show that the minimum value of spring GPA is 0.02, compared with the mean of 3.03. There seems to be more probability than expected in the tails of the distribution due to such an

extreme case away from the mean, and this shows that the data set was skewed. As a

solution, the spring GPA variable scores were converted to z-scores. The new spring

GPA variable – named ZSpringGPA – with converted scores was formed, and only data

with z-scores ranging from -3 to +3 were entered for analysis. As a result, ZSpringGPA

had a minimum value of 0.85, maximum value of 4.00, mean of 3.06, and standard

deviation of 0.68. Similarly, all the other continuous variables in the data set were

converted to z-variables in this way. Anything outside this range was considered outliers

and was removed from analysis. Table 4.6 summarizes the descriptive statistics of these

new variables, which from this point on will be used for data analysis in place of the

statistics displayed in Table 4.2 (page 62).

Table 4.6

Descriptive Statistics of Converted Continuous Variables

Variable	Mininum Value	Maximum Value	Mean	Standard Deviation
ZAGE	16	21	18.53	0.64
ZHIGH SCHOOL GPA	2.47	4.00	3.58	0.34
ZACT	14	16	25.27	4.05
ZFALL GPA	0.73	4.00	3.11	0.70
ZSPRING GPA	0.85	4.00	3.06	0.68

Figure 4.19 displays the visual graph for the distribution of the converted data, where the histogram looks roughly like a normal curve.

Figure 4.19. Histogram Showing Normal Distribution
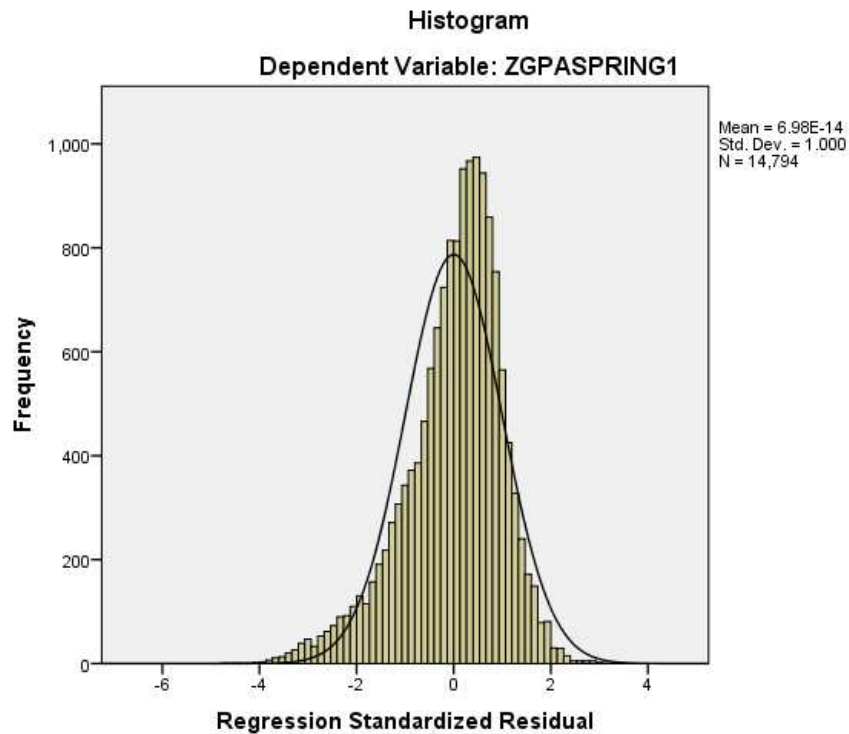
In Figure 4.20 (page 83), all the values line up along a diagonal that goes from lower left to upper right. The data points almost fall on a straight line, which is desired in a normal P-P plot. Figures 4.19 and 4.20 indicate that the assumption of normality was met.

Figure 4.20. Normal P-P Plot Showing Normal Distribution
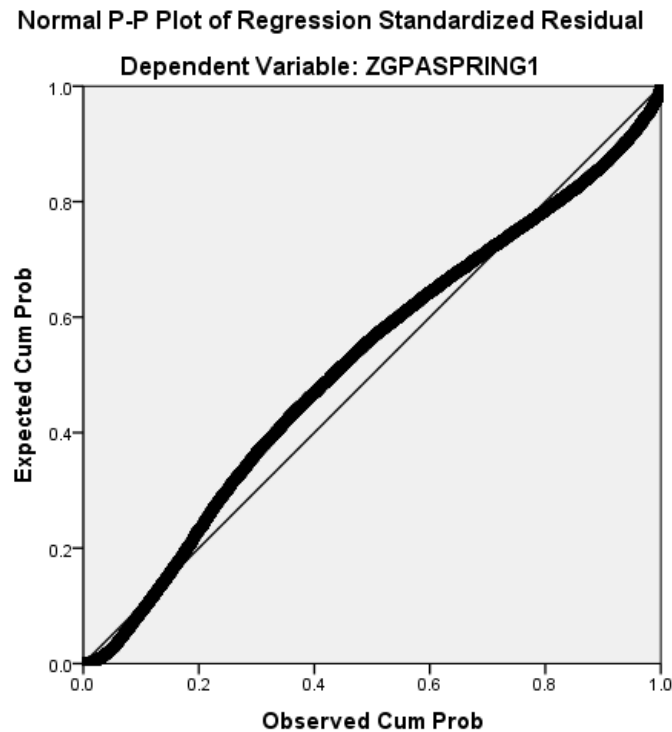
Collinearity.

Table 4.3 (page 75) indicates that the correlations between Age, ACT and High

school GPA with Fall GPA or Spring GPA were all smaller than 0.6. The collinearity

assumption for these variables was met. As discussed in Table 4.3, Fall GPA had a strong

correlation with Spring GPA (r = 0.887). The two independent variables were highly

correlated, and this violates the assumption of collinearity. As a solution, the mean-

centering method was used to create two other variables (Centered_FallGPA and

Center_SprGPA), which were thought to eliminate multicollinearity. However, the

correlation between these two newly created variables was still high (r = 0.877). Because

Spring GPA also included Fall GPA in itself, the variable Fall GPA was removed from

the data set to satisfy the collinearity assumption. For this reason, from this point on,

"college GPA" will be used interchangeably for "spring GPA".

Homogeneity.

The check for homogeneity, the variance of the dependent variable at every value
of predictor, should be the same.

Figure 4.21 shows the partial plots of the three continuous independent variables
in the model. All the plots indicate that the spread of the scores is about the same and
constant. The variance of the residuals is the same for all values of the predictors, and this
satisfies the assumption of homogeneity.

Figure 4.21. Partial Plots Showing Homogeneity
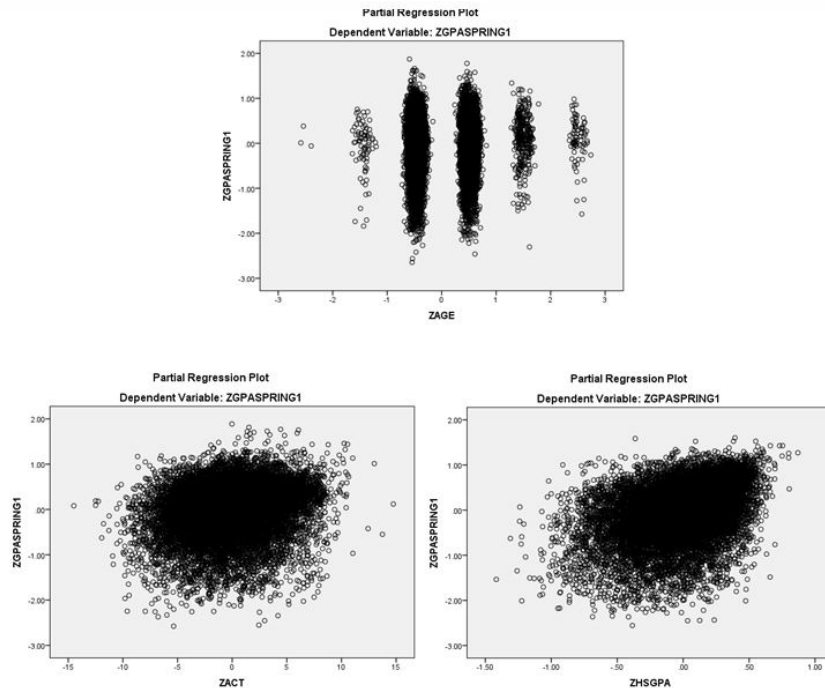
In addition to the four key assumptions, two other assumptions of sample size and missing data were also considered.

Sample size.

Numerous researchers address the minimum required sample size for results to be reliable in multiple regression. Disagreement exists regarding the number of subjects per variable. Whereas Miller and Kunce (1973) suggest 10 subjects for every predictor variable, Pedhazur and Schmelkin (1991) recommend 30 subjects per predictor variable. As a rule of thumb, however, Pedhazur (1997) recommends a minimum of 15 subjects for each predictor variable. Consequently, the large sample size of this study satisfies the minimal sample size.

Missing data.

Missing data can be a problem because missing data on certain variables can shrink the sample size and weaken the statistical power. For this reason, standard statistical methods require missing data to be handled in a way to produce complete information for all the variables included in the analysis. In this research, the missing data were handled by using the traditional approach of excluding from analysis the cases with missing data (Lisch, 2014; Soley-Bori, 2013). However, this approach did not mean that a large fraction of the original sample was excluded. When missing cases were specified in SPSS, the software handled the problem automatically case by case. Those parts of the cases that were not missing were considered normal in other analyses. This approach was especially useful because the sample was relatively large (N= 16,181).

Testing for Model Significance

The F test assesses the significance of the final model (model 11).

H_0: There is no relationship between college performance and the set of independent variables.

H_1: There is a significant relationship between college performance and the set of independent variables.

Table 4.7

ANOVA for Multiple Linear Regression Final Model

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
11	Regression	2229.863	11	202.715	651.167	.000[a]
	Residual	4601.785	14782	0.311		
	Total	6831.648	14793			

The final model was significant with $F = 651.167$, $df = 11$, $p < 0.001$ (Table 4.7). Consequently, there was a significant relationship between Spring GPA and the set of independent variables of Gender, Age, High school GPA, ACT, American Indian, Pell, OHLAP, OTAG, Stafford, and Athletic scholarship. As described in Table 4.8 (page 87), 33% of the variance in Spring GPA was accounted for by the set of predictors.

Table 4.8

R Square

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.571[a]	0.326	.326	0.55795

Testing for Regression Coefficient Significance

Table 4.9

Coefficients and t-test Results from Linear Analysis

Measure	Coefficients		T test	p-value	95% confidence interval
	B	Beta			
Age	0.027	0.023	3.431*	0.001	(0.012, 0.043)
Gender	-0.163	-0.119	-16.97*	0.000	(-0.181, -0.144)
D_Am Indian	-0.08	-0.023	-3.385*	0.001	(-0.126, -0.034)
High Sch GPA	0.835	0.415	55.061*	0.000	(0.805, 0.865)
ACT	0.032	0.189	24.752*	0.000	(.029, .035)
D_Pell2	-0.077	-0.048	5.403*	0.000	(-0.106, -0.049)
D_OHLAP2	-0.127	-0.066	-8.294*	0.000	(-0.157, -0.097)
D_OTAG2	-0.076	-0.026	-3.347*	0.001	(-0.12, -0.031)
D_Stafford2	-0.116	-0.082	-11.605*	0.000	(-0.135, -0.096)
D_Athletic2	0.208	0.038	5.561*	0.000	(0.135, 0.281)
D_Asian	0.052	0.015	2.157	0.031	(0.005, 0.099)
Constant	-1.092		-6.969	0.000	(-1.399, -0.785)

* $p \leq 0.001$

Table 4.9 (page 88) summarizes the coefficients, t-tests, and confidence interval of the final model. The following equation for the prediction of students' Spring GPA (regression equation 1) was formed based on the coefficients from the final model:

Spring GPA = -1.09 + 0.03(ZAGE) - 0.16(D_MALE) - 0.08(D_AMERICAN_INDIAN) + 0.84(ZHS_GPA) + 0.03(ZACT) - 0.08(D_PELL2) - 0.13(D_OHLAP2) - 0.08(D_OTAG2) - 0.12(D_STAFFORD2) + 0.21(D_ATHLETIC) + 0.05(D_ASIAN)

Research question 1a.

Research question 1a observed the independent variables of Gender, Age, Ethnicity, and Enrollment status, and the dependent variable of Spring GPA. The research question tested the hypothesis that students' background characteristics had a significant relationship with their academic performance in the second semester of college. The statistics used to test the following null hypothesis were presented in Table 4.9:

H_0: College students' Gender, Age, Ethnicity, and Enrollment statuses do not predict their Spring GPA.

H_1: College students' Gender, Age, Ethnicity, and Enrollment statuses predict their Spring GPA.

Based on the result from Table 4.9 and the equation for the prediction of Spring GPA, the null hypotheses for Gender ($t = -16.91$, $p = 0.000$), Age ($t = 3.431$, $p = 0.001$), and Ethnicity ($t = -3.385$, $p = 0.001$) for American Indian were rejected. The null

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hypotheses for "Enrollment status" or for other races were not rejected because these variables did not satisfy the significance level p = 0.001.

In summary, the variable "Age" was positively associated with "Spring GPA". One unit increase in Age (16-21) was associated with an increase of 0.03 in Spring GPA when other predictors were held constant. Male students had a Spring GPA of 0.16 lower than female students' GPA, when controlling for other predictors. With regard to "Ethnicity", American Indian students' Spring GPA was 0.08 point lower than the GPA of non-American Indian students, mainly White students, when the other predictors were controlled.

Research question 2a.

Research question 2a observed the independent variables of High school GPA and ACT for the prediction of Spring GPA. The research question tested the hypothesis that students' high school performance had a significant relationship with their academic performance in the second semester of college. The statistics used to test the following null hypothesis were presented in Table 4.9 (page 88):

H_0: College students' High school GPA and ACT score did not predict Spring GPA.

H_1: College Students' High school GPA and ACT score did predict Spring GPA.

Table 4.9 indicated that High school GPA (t = 55.061, p = 0.000) and ACT (t = 24.752, p = 0.000) were significant predictors of Spring GPA. Based on these results, the null hypothesis for both High school GPA and ACT was rejected.

In summary, when all other predictors in the model were held constant, one unit increase in High school GPA was associated with an increase of 0.84 in Spring GPA. One unit increase in ACT was associated with an increase of 0.03 in Spring GPA.

Research question 3a.

Research question 3a observed the independent variables of Pell, OHLAP, OTAG, Perkins, Stafford, Waivers, and Athletic scholarship for the prediction of Spring GPA. The research question tested the hypothesis that students' financial aid status has a significant relationship with their academic performance in the second semester of college. The statistics used to test the following null hypothesis were highlighted in Table 4.9 (page 88):

H_0: College students' Pell, OHLAP, OTAG, Perkins, Stafford, Waivers, and Athletic scholarship do not predict their Spring GPA.

H_1: College students' Pell, OHLAP, OTAG, Perkins, Stafford, Waivers, and Athletic scholarship predict their Spring GPA.

Table 4.9 indicated that Pell ($t = -5.403$, $p = 0.000$), OHLAP ($t = -8.294$, $p = 0.000$), OTAG ($t = -3.347$, $p = 0.001$), Stafford ($t = -11.605$, $p = 0.000$), and Athletic scholarship ($t = 5.561$, $p = 0.000$) were significant predictors of Spring GPA. The null hypothesis for Pell, OHLAP, OTAG, Stafford, and Athletic scholarship was rejected based on these results. The null hypothesis for Perkins and Waivers was not rejected because they were not included in the final model, which means Perkins and Waivers were not significant predictors.

In summary, when other predictors were held constant, students who were eligible for the Pell grant had a Spring GPA of 0.08 lower than those who were not. Those students who were eligible for the OHLAP scholarship had a Spring GPA of 0.13 lower than those who did not receive this scholarship. Students who were eligible for the OTAG grant had a Spring GPA of 0.08 lower than those who were not awarded this grant. Students who were eligible for the Stafford loan were 0.12 lower in Spring GPA than those who were not. Students who were eligible for an athletic scholarship had a Spring GPA of 0.21 higher than those who did not receive such a scholarship.

Research question 4a.

Research question 4a observed the independent variable of Fall GPA for the prediction of Spring GPA. The research question tested the hypothesis that students' first semester academic performance in college has a significant relationship with their academic performance in the second semester. However, as discussed in Table 4.3 (page 75), Fall GPA had a strong correlation with Spring GPA. For this reason, this variable was not included in the model. The hypothesis was not tested.

Summary of Linear Regression Analysis

The focus of the multiple linear regression analysis was to explore if students' background characteristics, high school performance, and financial status were significantly associated with their cumulative Spring GPA. The results of the stepwise analysis indicated that 33 percent of the variance in Spring cumulative GPA was accounted for by gender, age, high school GPA, ACT composite score, ethnicity

(American Indian), and financial aid (Pell, OHLAP, OTAG, Stafford, and athletic

scholarship) ($R^2 = 0.326$, F = 651.167, p = 0.001).

For the first research question, the results showed that age, gender and American

Indian significantly predicted cumulative Spring GPA. The second research question

tested whether there are any relationships between high school performance and Spring

GPA. The results indicated that both high school GPA and ACT composite score were

significant predictors of Spring GPA. The third research question assessed if students'

financial aid was significantly related to Spring GPA. The results indicated that Pell,

OHLAP, OTAG, Stafford and athletic scholarship were significant predictors of Spring

GPA.

<div align="center">

Student Persistence

</div>

Variable Coding

Logistic regression was used for the prediction of student persistence. This

outcome variable was discrete with the values "did not persist," which was coded 0, and

"did persist," which was coded 1. The independent variables mainly used the same

coding as in linear analysis above for Gender, Enrollment status, and ethnicity. The only

difference was in the independent variable College GPA.

College GPA, or Spring cumulative GPA, was the dependent variable in linear

analysis. In this logistic regression analysis, it was used as an independent variable.

During the process of model building, it was observed that the model did not fit with

College GPA as a continuous variable. A temporary output showed that an increasing

college GPA score was likely to be associated with an increasing probability of college

persistence. However, the Hosmer and Lemeshow test showed that the model with this positive trend did not fit with college GPA as a continuous variable. Therefore, it was hypothesized that the positive trend did not hold true at any point in the college GPA spectrum. In other words, there might exist a cutoff point above which the positive trend applied and under which persistence did not increase as college GPA increased. An effort was devoted to looking for this cutoff point, and the model building process indicated this cutoff point was at the college GPA value of 2.04. A dummy variable was created from College GPA with the range from the lowest college GPA through 2.03 coded 0, and the range from 2.04 through the highest college GPA coded 1. Thus, college GPA in this logistic analysis was transformed to a binary variable.

Dependent Variable and Independent Variables

The variables were entered into logistic regression analysis. The dependent variable was college persistence (Return to Fall of Second Year), which was a binary variable. The explanatory variables included background variables (D_Male, Age, D_Black, D_AmIn, D_Hisp, D_Asian, D_Part_time), high school performance (High school GPA and ACT), financial aid (D_Pell2, D_OHLAP2, D_OTAG2, D_Perkins2, D_Stafford2, D_Waivers2, D_Athletic2), and College GPA (D_SprGPA2.04). Age, High school GPA and ACT were continuous variables and the rest were dichotomous. The stepwise method was employed, which means that the explanatory variables were entered to the regression analysis one at a time based on the order of their significance. The results reported in the chapter were from the final model of the analysis.

Assumptions

Although multiple linear regression requires more assumptions to be met for the results to be meaningful, logistic regression just requires the assumptions of absence of outliers, absence of multicollinearity, the relationship between log odds and the independent variables must be linear, and the sample size. These assumptions were already addressed in the assumption section for the linear regression above, with the exception of the assumption sample size due to the characteristics of multiple logistic regression.

Sample size.

For maximum likelihood estimate, logistic regression requires a larger sample size than linear regression. Whereas some researchers suggest a rule of thumb of fifteen participants per predictor (Hosmer & Lemeshow, 2000), other researchers emphasize that the number has to be 50 in order to avoid the systematic overestimation of the effect sizes (Nemes, Jonasson, Genell & Steineck, 2009). The very large sample size of this study satisfies both of the above minimal sample size recommendations.

Testing for Model Significance

All variables were entered into linear regression for backward stepwise analysis. The results are exhibited in two blocks in Tables 4.10 and 4.11 (page 96).

Table 4.10

Constant-Only Model

Classification Table[a,b]

Observed			Predicted		
			ReturnedFallsecondyear		Percentage Correct
			0	1	
Step 0	ReturnedFallsecondyear	0	0	1318	.0
		1	0	13782	100.0
	Overall Percentage				91.3

Block 0 model (Table 4.10) represents the constant–only model, which contains

only the constant because none of the variables were added to the model. The statistics

displayed in Table 4.10 indicate that without any of the predictors, the constant-only

model predicts a 91.3 percent probability of student persistence (of Y occurring).

Table 4.11

Omnibus Test of Model Coefficients

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 10	Step	4.753	1	.029
	Block	1394.055	10	.000
	Model	1394.055	10	.000

In block 1 (Table 4.11, page 96), the variables are added step-by-step in the order of their significance. The Omnibus test was used to assess the significance of the final model (step 10).

H_0: There was no relationship between student persistence and the set of independent variables.

H_1: There was a significant relationship between student persistence and the set of independent variables.

As indicated in Table 4.12, Chi-square = 1394.055, p = 0.000. The null hypothesis was thus rejected. The conclusion was that there was a significant relationship between student persistence and the set of independent variables. This set of independent variables improved prediction of dependent variables better than chance. As can be seen from Table 4.12, Nagelkerke R^2 = 0.197, which means the model accounted for almost 20 percent of the variance in student persistence.

Table 4.12

Nagelkerke R Square

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
10	7551.498[a]	0.088	0.197

Next, the Hosmer and Lemeshow goodness-of-fit test was used to assess the model fit.

H_0: Predictions made by the model do not fit with observed group memberships.

H_1: Predictions made by the model fit with observed group memberships.

Table 4.13

Goodness-of-Fit Test

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
10	12.437	8	.133

Table 4.13, which presents the results of the Hosmer and Lemeshow test, indicated that Chi-square = 12.437, df = 8, p-value = 0.133. The Homesmer and Lemeshow test was not statistically significant, indicating that predicted group memberships corresponded closely to the actual group memberships, indicating good model fit.

Testing for Regression Coefficient Significance

Table 4.14 (page 99) summarizes the coefficients, Wald test, and confidence interval of the final model.

The following equation for the prediction of student persistence (regression equation 2) was formed based on the coefficients from the final model:

Ln(Persistence) = -1.4 - 0.22(D_MALE) + 0.65(ZHS_GPA) - 0.41(D_PELL) + 0.75(D_OHLAP) + 0.34(D_OTAG) – 0.35(D_PERKINS) - 0.30(D_STAFFORD) + 0.26(D_WAIVERS) + 2.11(D_COLLEGE_GPA_2.04)

Table 4.14

Coefficients and Wald Test Results from Logistic Analysis

Variable	Coef	Standard error	Wald	*p*-value	Exp(B)	95% confidence interval
D_MALE	-0.222*	0.064	12.214	0.000	0.801	(0.707, 0.907)
ZHS GPA	0.648*	0.095	46.795	0.000	1.911	(1.588, 2.301)
D_BLACK	0.309	0.132	5.473	0.019	1.362	(1.051, 1.763)
D_PELL	-0.406*	0.091	19.953	0.000	0.666	(0.558, 0.796)
D_OHLAP	0.747*	0.108	47.668	0.000	2.111	(1.708, 2.610)
D_OTAG	0.341	0.151	5.131	0.023	1.406	(1.047, 1.889)
D_PERKINS	-0.353	0.159	4,950	0.026	0.702	(0.514, 0.959)
D_STAFFORD	-.296*	0.067	19.541	0.000	0.743	(0.652, 0.848)
D_WAIVERS	0.260	0.086	9.125	0.003	1.297	(1.096, 1.535)
D_SprGPA2.04	2.110*	0.070	901.08	0.000	8.247	(7.186, 9.465)
Constant	-1.395*	0.324	18.496	0.000	0.248	

* p≤ 0.001

Research question 1b.

Research question 1b observed the independent variables of Gender, Age, Ethnicity, and Enrollment status with Student persistence (return to Fall of the second year) as the dependent variable. The research question tested the hypothesis that students' background characteristics had a significant relationship with their persistence beyond the second semester of college. The statistics used to test the following null hypothesis were presented in Table 4.14 (page 99):

H_0: $\beta = 0$ (College students' Gender, Age, Ethnicity, and Enrollment statuses did not predict student persistence).

H_1: $\beta \neq 0$ (College students' Gender, Age, Ethnicity, and Enrollment statuses predicted student persistence).

Statistics from Table 4.14 showed that the probability of the Wald statistics of the independent "D_Male" [$\chi2$ (1, N= 15,100) = 12.214, p = 0.000] was less than the level of significance of 0.001. The null hypothesis that the β coefficient for "D_Male" was equal to zero, or there was no relationship between the odds of persistence for males and females, was rejected. On average, male students were 20 percent [$100(e^{-0.22} - 1) = 100(-0.20) = -20$] less likely to persist than female students, holding all other independent variables in the equation constant. The null hypotheses for Age, Ethnicity, and Enrollment status could not be rejected because these variables did not satisfy the significance level p = 0.001. In summary, male students were 20 percent less likely to persist (odds ratio = 0.80) than female students when other predictors were controlled.

Research question 2b.

Research question 2b observed the independent variables of High school GPA and ACT for the prediction of student persistence. The research question tested the hypothesis that students' high school performance had a significant relationship with their persistence beyond the second semester of college. The statistics used to test the following null hypothesis were presented in Table 4.14 (page 99):

H_0: $\beta = 0$ (College students' High school GPA and ACT score do not predict Student persistence).

H_1: $\beta \neq 0$ (College Students' High school GPA and ACT score do predict Student persistence).

The probability of the Wald statistics of the independent "HS_GPA" [$\chi2$ (1, N= 15,100) = 46.795, p = 0.000] was less than the level of significance of 0.001. The null hypothesis that the coefficient for "HS_GPA" is equal to zero was rejected. On average, one unit increase in high school GPA was associated with a 1.91 ($e^{0.65} = 1.91$) times more likelihood for persistence, holding all other independent variables in the equation constant. The null hypothesis for ACT could not be rejected because this variable did not satisfy the significance level p = 0.001. In summary, controlling for other variables in the equation, a 1-unit increase in high school GPA increased the odds of persistence by 91 percent.

Research question 3b.

Research question 3b observed the independent variables of Pell, OHLAP, OTAG, Perkins, Stafford, Waivers, and Athletic scholarship for the prediction of College persistence. The research question tested the hypothesis that students' financial aid status had a significant relationship with their persistence beyond the second semester of college. The statistics used to test the following null hypothesis were presented in Table 4.14 (page 99):

H_0: $\beta = 0$ (College students' Pell, OHLAP, OTAG, Perkins, Stafford, Waivers, and Athletic scholarship do not predict their College persistence).

H_1: $\beta \neq 0$ (College students' Pell, OHLAP, OTAG, Perkins, Stafford, Waivers, and Athletic scholarship predict their College persistence).

Statistics from Table 4.14 showed that the probability of the Wald statistics of the independent variables "D_Pell" [$\chi2$ (1,N= 15,100) = 19.95, p = 0.000], "D_OHLAP" [$\chi2$ (1, N= 15,100) = 47.67, p = 0.000], and "D_Stafford" [$\chi2$ (1,N= 15,100) = 19.54, p = 0.000] was less than the level of significance of 0.001. The null hypotheses that the coefficients for "D_Pell", "D_OHLAP", and "D_Stafford" were equal to zero were rejected. The null hypotheses for "D_OTAG", "D_Perkins", "D_Waivers" and "D_Athletic" could not be rejected because these variables did not satisfy the significance level p = 0.001.

On average, students who were eligible for a Pell grant were 33 percent [$100(e^{-0.41}$ $- 1) = 100(-0.33) = -33$] less likely to persist than students who did not receive a Pell grant, holding all other independent variables in the model constant. Students who were

eligible for an OHLAP scholarship were 2.11 times ($e^{0.75} = 2.11$) more likely to persist than students who did not receive an OHLAP scholarship, holding all other independent variables in the equation constant. Students who were eligible for a Stafford loan were 26 percent [$100(e^{-0.30} – 1) = 100(-0.26) = -26$] less likely to persist than students who did not receive a Stafford loan, holding the effects of all the other independent variables in the equation constant.

In summary, students who received a Pell grant were 33 percent less likely to persist than students who did not receive a Pell grant. Students who were granted an OHLAP scholarship were 2.11 times more likely to persist than students who were not granted an OHLAP scholarship. Students who were eligible for a Stafford loan were 26 percent less likely to persist than students who were not eligible for a Stafford loan.

Research question 4b.

Research question 4b observed the independent variable Spring GPA for the prediction of college persistence. The research question tested the hypothesis that students' second semester academic performance at college had a significant relationship with their persistence beyond the second semester.

H_0: $\beta = 0$ (College performance did not predict persistence).

H_1: $\beta \neq 0$ (College performance predicted persistence).

Statistics from Table 4.14 (page 96) showed that the probability of the Wald statistics of the independent variable "Spring GPA" [χ^2 (1, N= 15,100) = 901.085, p = 0.000] was less than the level of significance of 0.001. The null hypothesis that the

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coefficient for "spring GPA" was equal to zero was rejected. College GPA was a significant predictor of college persistence. Students who had a cumulative Spring GPA of 2.04 or more were 8.25 ($= e^{2.11}$) times more likely to persist than students with a Spring GPA of 2.03 or less.

Summary of Logistic Regression Analysis

The focus of the multiple logistic regression analysis was to explore whether students' background characteristics, high school performance, financial status and college GPA were significantly associated with their persistence. The results of the stepwise analysis indicated that roughly 20 percent of the variance in student persistence was accounted for by gender, high school GPA, financial aid (Pell, OHLAP, and Stafford), and Spring GPA ($R^2 = 0.197$, $\chi^2 = 1394.055$, $p = 0.000$).

For the first research question, the results showed that gender was significantly associated with student persistence. The second research question tested whether there were any relationships between high school performance and persistence. The results indicated that high school GPA was significantly related to student persistence. The third research question assessed if students' financial aid was significantly related to persistence. The results indicated that Pell, OHLAP, and Stafford were significant predictors of student persistence. For the fourth research question, the results showed that Spring GPA significantly predicted persistence.

Chapter Summary

The purpose of this chapter was to summarize the results of data analysis that employed multiple linear regression and multiple logistic regression and to present the

findings of the study. This study examined whether there were significant relationships between students' college performance and their background characteristics, high school performance, financial factors, and college performance; the study also explored how these factors were related to their persistence beyond the second semester at college.

The results indicated that the strongest predictors for the second semester GPA were high school GPA (B = 0.84, β = 0.42, p = 0.000), ACT composite score (B = 0.032, β = 0.19, p = 0.000), and Gender (B = -0.16, β = 0.12, p = 0.000). Accordingly, when all other predictors were held constant, one unit increase in high school GPA was associated with an increase of 0.84 in Spring GPA, one unit increase in ACT was associated with an increase of 0.03 in Spring GPA, and male students had a Spring GPA of 0.16 lower than female students. This model accounted for 33 percent of the variability in Spring GPA.

Similarly, the strongest predictors for student persistence were Spring GPA (B = 2.11, Exp(B) = 8.25, p = 0.000), OHLAP (B = 0.75, Exp(B) = 2.11, p = 0.000), and high school GPA (B = 0.65, Exp(B) = 1.91, p = 0.000). Accordingly, when all other predictors were held constant, students who had a cumulative Spring GPA of 2.04 or more were 8.25 times more likely to persist than students with a Spring GPA of 2.03 or less, students who were awarded an OHLAP scholarship were 2.1 times more likely to persist than students who were not, and for each unit increase in high school GPA, the odds of persistence increased by 1.91 times. Chapter Five will discuss these findings and make recommendations for research, theory and practice.

CHAPTER V

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

This final chapter of the dissertation restates the statement of the problem and the purpose of the study, and reviews the methodology used to collect and analyze the data (Glatthorn & Joyner, 2005). The major sections of this chapter summarize the results and discuss their implications for theory, research and practice. This chapter also includes recommendations for policymakers and further research.

Statement of the Problem

As presented in Chapter One, low student persistence is not only a problem for students and institutions, it also affects the country as a whole. Because student persistence is shown to be a significant predictor of college graduation, low persistence is equated with a decreased likelihood for graduation. Economically, individuals with only a high school diploma earn much less than a college graduate. At the institutional level, an institution's low retention and graduation rates, according to the federal government, are indicators of the low effectiveness of that institution, and for this reason not only potentially deprive the institution's eligibility for federal funding but also harm its college ranking and prestige. Consequently, low student persistence may harm both institutional reputation and financial status. At the national level, low student persistence will worsen the current shortage of professional labor.

Research demonstrated that of the full time students nationwide enrolled in the fall of 2003 for a bachelor's degree, only 4 percent attained a degree or certificate at their first institution and 20 percent transferred without a degree by June 2006 (Wine, Janson, & Wheeless, 2011). Seven percent of these students left their first institution without a degree or certificate and did not enroll anywhere else within the next three years (Wine et al., 2011). The dropout rate in this case was 27 percent and the equivalent rate for 2-year public institutions was 45 percent (Wine et al., 2011). In another study, 36 percent of all 2003-2004 post-secondary students did not persist by June 2009 (Ross et al., 2012). These students did not earn a degree or were no longer enrolled in a postsecondary institution.

In Oklahoma, within a 10-year period from 1997-1998 to 2006-2007, the dropout rate for first-year students decreased from 9.7 percent to 9.4 percent at research universities, but increased from 21.3 percent to 24.1 percent at regional universities, and increased from 32.8 percent to 34.5 percent at community colleges (Oklahoma State Regents for Higher Education, 2009). Prior research found potential barriers to student persistence, such as the lack of financial resources and academic preparation, personal problems and inadequate faculty development (Oklahoma State Regents for Higher Education, 2002). However, research on student persistence and retention patterns at colleges and universities in Oklahoma is limited. For these reasons, research into the relationships between college students' background characteristics, pre-college preparation, financial factors, college performance, and student persistence will hopefully contribute to the existing literature on student retention in Oklahoma.

Statement of Purpose

Previous research studies show that students' high dropout rates occur at the transition to the first semester of their second year of college (Nora, Barlow, & Crisp, 2005; Oklahoma State Regents for Higher Education, 2002). Because higher education institutions are still looking for factors that can potentially increase students' academic success, identifying factors that can predict their academic performance and persistence at this transition is more important than ever. This research study, which is based on data from 16,991 students entering the University of Oklahoma and Oklahoma State University from fall 2013 to fall 2014, reflects an attempt to serve this purpose. Employing multiple linear and logistic regression, this study examines whether there are significant associations between students' college performance and their background characteristics, high school performance, and financial factors, using pre-existing data from the student database at Oklahoma Regents for Higher Education. Equally important, the study also explores how these factors are related to persistence beyond the second semester of college.

Review of Methodology

This study employed quantitative methodology to analyze data and interpret the results. The intent of the research was to examine the relationships between students' persistence and factors such as high school GPA, standardized test scores, and first-semester college GPA at public research universities in Oklahoma. In other words, the study attempted to discover if significant connections exit between these factors and student persistence. To serve this purpose, the study aimed to create prediction equations

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by determining which, if any, factors predict student persistence. The research questions employed multiple linear regression for second semester academic performance and multiple logistic regression for student persistence.

Correlation coefficients between pairs of independent variables were used to check multicollinearity. Next, the correlation coefficients between cumulative second semester GPA and the set of predictors determined the association of each predictor and student performance in the second semester. Similarly, the correlation coefficients between student persistence and the set of predictors determined the association of each predictor and student persistence beyond the second semester. In addition, regression coefficients shaped prediction equations for students' college performance and persistence.

Summary of the Findings

The present study provided support that financial aid, high school GPA and standardized test scores predict first year college student academic performance and persistence, and that Spring semester GPA provides additional prediction of student persistence beyond the first year of college. To a lesser extent, gender, race/ethnicity and age also contribute to these effects.

Descriptive statistics from this study showed that 12.6 percent of the participants dropped out following the second semester, including the 4.8 percent who did not return to the second semester. Because 95.2 percent of these students returned to the second semester and 87.4% returned to the third semester, the data for those who dropped out were not recorded. For this reason, incomplete data for these dropouts were excluded

from the analysis of this study. As a result, the data were based on students who returned to the second semester. Although students' spring cumulative GPA did not account for all persistence beyond the spring semester, the study found that spring GPA was a strong predictor of persistence. Other factors, together with spring GPA, significantly contributed to students' spring GPA and the decision to return to the fall semester of the second year, as demonstrated in the following regression equations.

Regression equation 1:

Spring GPA = -1.09 + 0.03(ZAGE) - 0.16(D_MALE) - 0.08(D_AMERICAN_INDIAN) + 0.84(ZHS_GPA) + 0.03(ZACT) - 0.08(D_PELL2) - 0.13(D_OHLAP2) - 0.08(D_OTAG2) - 0.12(D_STAFFORD2) + 0.21(D_ATHLETIC) + 0.05(D_ASIAN)

Regression equation 2:

Ln(Persistence) = -1.4 - 0.22(D_MALE) + 0.65(ZHS_GPA) - 0.41(D_PELL) + 0.75(D_OHLAP) + 0.34(D_OTAG) – 0.35(D_PERKINS) - 0.30(D_STAFFORD) + 0.26(D_WAIVERS) + 2.11(D_COLLEGE_GPA_2.04)

The two equations indicated that compared to other variables in the linear model, high school GPA, ACT composite score, and Gender emerged as the top predictors, in that order, for the second semester academic performance. In the logistic analysis, Spring GPA, OHLAP and again high school GPA were strongest, in that order, for predicting student persistence. Table 5.1 (page 111) displayed the strength of these predictors.

Table 5.1

Coefficients of the Strongest Predictors

Predictor	Spring GPA	Persistence
	(Beta)	Exp(B)
HIGH SCHOOL GPA	0.415	1.911
ACT	0.189	
GENDER	-0.119	
DUMMY SPRING GPA 2.04		8.247
DUMMY OHLAP		2.111

The findings of the study are subsequently summarized for each of the four research questions.

Research Question 1

The results of multiple linear regression (Table 5.2, page 112) indicated that there was not a significant predicting relationship between participants' enrollment status and second semester college GPA, nor was there a significant association between ethnicity groups (except the American Indian group) and second semester GPA. In contrast, Gender was the third strongest predictor for second semester GPA ($B = -0.16$, $\beta = -0.12$). Although the predicting power for "Age" ($B = 0.03$, $\beta = 0.02$) and "American Indian" (B

= -0.08, β = -0.02) were relatively low, both "Age" (the older the higher Spring GPA) and ethnicity (other races – mainly White – were higher in Spring GPA than American Indian) were significant predictors of college academic performance. In the logistic analysis (Table 5.2), "Gender" (B = -0.22, exp(B) = 0.80) was significantly related to student persistence (males were less likely to persist than females). No other variables in the student background block had any significant association with student persistence.

Table 5.2

Coefficients of Predictors in the Background Block

Predictor	Spring GPA		College Persistence	
	B	Beta	B	Exp(B)
DUMMY MALE	-0.163	-0.119	-0.22	0.801
AGE	0.027	0.023		
DUMMY AM INDIAN	-0.080	-0.023		

Research Question 2

Both high school GPA and ACT composite score were found to be positively associated with spring semester GPA. In fact, the results (Table 5.3, page 113) indicated that high school GPA (B = 0.84, β = 0.42) was the strongest predictor of spring GPA, followed by ACT (B = 0.03, β = 0.19). In logistic regression analysis, only high school GPA (B = 0.65, exp(B) = 1.91) was significantly associated with student persistence.

After spring GPA and OHLAP, high school GPA was the third strongest predictor of student persistence. An increased high school GPA was associated with increases in both college performance and the possibility of student persistence. ACT was not found to be significantly associated with student persistence. In other words, a higher ACT score was associated with increased college performance but not significantly increased student persistence.

Table 5.3

Coefficients of Predictors the High School Performance Block

Predictor	Spring GPA		College Persistence	
	B	Beta	B	Exp(B)
HIGH SCHOOL GPA	0.835	0.415	0.648	1.911
ACT	0.032	0.189		

Research Question 3

Linear regression analysis of the data indicated that financial aid factors were significant in predicting college performance. Specifically, Pell (B = -0.08, β = -0.05), OHLAP (B = -0.13, β = -0.07), OTAG (B = -0.08, β = -0.03), and Stafford (B = -0.12, β = -0.08) were all negatively associated with spring semester GPA (Table 5.4, page 114). In contrast, athletic scholarship (B = 0.21, β = 0.04) was positively associated with spring GPA. Tuition waivers and Perkins were not found to be significant predictors of spring

GPA. Financial aid factors also significantly predicted student persistence beyond the second semester (Table 5.4,). Specifically, OHLAP (B = 0.75, exp(B) = 2.11) was found to be positively associated with student persistence while Pell (B = -0.41, exp(B) = 1.91) and Stafford (B = -0.30, exp(B) = 0.74) were negatively associated with student persistence. Waivers, Perkins, OTAG, and athletic scholarship were not significant predictors of student persistence. Of the three types of financial aid that were found to be significantly associated with both spring GPA and student persistence (Pell, OHLAP and Stafford), OHLAP had the largest effect size (exp(B) = 2.11).

Table 5.4

Coefficients of Predictors in the Financial Aid Block

Predictor	Spring GPA		College Persistence	
	B	Beta	B	Exp(B)
DUMMY PELL	-0.077	-0.048	-0.406	0.666
DUMMY OHLAP	-0.127	-0.066	0.747	2.111
DUMMY OTAG	-0.076	-0.026		
DUMMY STAFFORD	-0.116	-0.082	-0.296	0.743
DUMMY ATHLETIC	0.208	0.038		

Research Question 4

As discussed in Chapter Four, Spring GPA was transformed to a binary variable for a good-of-fit model. The results of logistic regression analysis, reflected in Table 5.5, indicated that Spring GPA significantly predicted student persistence. In fact, it was the strongest predictor of student persistence (B = 2.11, exp(B) = 8.25), followed by OHLAP and high school GPA.

Table 5.5

Coefficients of the College Performance Block

Predictor	Spring GPA		College Persistence	
	B	Beta	B	Exp(B)
DUMMY SPRING GPA 2.04	NA	NA	2.110	8.247

Discussion

The results of this study suggested that of the eleven variables that significantly predicted college performance and student persistence, spring semester GPA, OHLAP, and high school GPA were the most prominent predictors. Although some variables had a small effect size, they all contributed to the overall picture of student persistence at research universities in Oklahoma. Each variable is subsequently discussed.

Spring GPA

This study supported prior literature in finding that students with a high college GPA are more likely to persist to the second year of college (Adelman, 2006; DesJardins et al., 2002b; Johnson, 2006; Kuh et al., 2006; Pascarella and Terenzini, 2005; Reason, 2009; Stewart, 2010; Stewart et al., 2015; Wood, 2012). DesJardins et al.'s study (2002b) revealed that college GPA is a powerful predictor of student persistence. Similarly, Pascarella and Terenzini (2005) indicated that college grade is the best predictor of students' persistence. Kuh et al. (2006)'s and Stewart (2010)'s studies supported these conclusions and showed significant association between the two variables. The results of this study were also in line with Wood (2012)'s confirmation of the significance of college GPA in predicting student persistence and Johnson (2006)'s finding that student departure was strongly associated with poor college grade performance. More specifically, Reason (2009) concluded from his review of retention-predicting variables that students with a GPA of 0.0 to 2.0 had only a 57 percent probability of being retained.

The findings of this study, based on logistic regression analysis, indicated that spring semester GPA was strongly associated with student persistence. Interestingly, the improvement of students' spring GPA did not hold meaning when the GPA was increased to under the cutoff point of 2.04. In other words, spring GPA should be increased to this cutoff point or higher to achieve the effect of increasing the likelihood of persistence. Holding the other predictors constant, students who had a spring cumulative GPA of 2.04 or higher are 8.25 times more likely to persist than students with a spring cumulative GPA of 2.03 or less. This finding bears an important implication for policy and practice, as will be examined in the implication section.

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The finding that second semester GPA was strongly associated with student persistence beyond the first year of college completely agrees with current literature. Part of the reason is that academically, second semester GPA is an important factor to help students decide whether to return to the third semester. Under such a condition, the use of the same methodology, which was multiple linear regression and multiple logistic regression, led to similar results.

Although this finding is basically similar to what was found in the literature, the study was different from prior studies in that Spring GPA was transformed into a binary variable. Due to this difference, the study further indicated that students with a Spring cumulative GPA of 2.04 were more likely to persist to the second year.

OHLAP

The literature on the relationship between financial aid and persistence revealed conflicting results (Hossler, Ziskin, Gross, Kim, & Cekic, 2008). Some prior studies found no relationship between financial aid and persistence (Braunstein, McGrath, & Pescatrice, 2000; Singell & Stater, 2006). In the study by Martinez (2011), financial aid was not found to be a significant predictor of college student persistence because there was a weak relationship between financial aid and college cumulative GPA. Other studies revealed that financial aid factors might contribute to student success at college (Astin & Oseguera, 2005; Atkinson & Geiser, 2009; Cofer & Somers, 2000; Hagedorn, Maxwell, & Hampton, 2002; Stewart, 2010). In contrast, other research indicated that financial aid status statistically predicted persistence (Fike & Fike, 2008; Mendoza & Mendez, 2012; Mendoza et al., 2009; Stewart, 2010). According to Stewart, students who received

financial aid were more likely to persist than students who were not awarded financial aid.

The present study found that OHLAP was positively associated with student persistence. Students who were awarded an OHLAP scholarship were 2.1 times more likely to persist than students who were not awarded an OHLAP scholarship. This finding agreed with current literature on the positive impact of an OHLAP scholarship on student persistence (Cofer & Somers, 2000; Martinez, 2011; Mendoza et al., 2009; Mendoza & Mendez, 2012; Oklahoma State Regents for Higher Education, 2013). More specifically, current literature revealed that grants had a strong positive effect on persistence (Cofer & Somers, 2000). In their research, Mendoza et al. (2009) found a positive effect of an OHLAP program on student persistence. Similarly, Mendoza and Mendez (2012) found that when controlling for other factors, OHLAP scholarships were a positively significant predictor of student persistence to the second year. In particular, Oklahoma's Promise program participants graduated at a higher rate than non-participants (Oklahoma State Regents for Higher Education, 2015).

The results of this research did not confirm the positive association between OHLAP scholarships and Spring GPA. Martinez (2010) seemed to prove that OHLAP might contribute to students' college performance. Although the effect size of the association between OHLAP and Spring GPA in the current study was relatively small, OHLAP scholarships seemed to decrease Spring GPA. Students with an OHLAP scholarship had a slightly lower Spring GPA than students who did not receive an OHLAP scholarship.

Like other types of scholarships, an OHLAP scholarship helped students pay tuition and other costs of going to college. In addition, students with an OHLAP scholarship might have spent more time on their studies because they did not have to earn money to support attending college. In addition, a possible explanation for the negative association between OHLAP scholarships and Spring semester GPA was that these students had a low GPA before the financial aid was offered. The requirements for this type of financial aid were not very high.

In this study, although students who were awarded an OHLAP scholarship had a lower GPA compared to students who did not receive an OHLAP scholarship, the scholarship receipt more than doubled their chances of persistence. This effect could not be found in other scholarships: OHLAP increased students' persistence despite their low performance. One possible reason for the significance between scholarship and persistence, accompanied by the lack of significance between scholarship and academic performance, was the low conditions for application, which only required a minimum high school GPA of 2.5 in addition to an adequate curriculum (Oklahoma State Regents for Higher Education, n.d.). This was important because although OHLAP scholarships did not help increase students' second semester GPA, the receipt of this scholarship improved the likelihood of student persistence to the second year. Another possible explanation was, as Singell and Stater (2006) found, the scholarship attracted students with a higher likelihood of persistence although the scholarship itself had no impact on persistence. Another explanation was due to the conflicting results in the literature; this study was not consistent with some studies, but was consistent with the finding that receipt of financial aid negatively affected student success (GPA) but positively

influenced persistence (Bynum, 2011). That was exactly the effect of OHLAP scholarships found in this study on spring GPA and persistence respectively.

High School GPA

The results of this study showed that high school GPA was the strongest predictor of spring GPA and the third strongest predictor of student persistence. One unit increase in high school GPA was associated with an increase of 0.84 in spring GPA and 91 percent more likely to persist. This finding concurred with prior research that indicated that high school GPA had a very strong influence on student persistence (Astin & Oseguera, 2005; Atkinson & Geiser, 2009; Camara & Kimmel, 2005; Geiser & Santelices, 2007; Hoffman & Lowitzki, 2005; Martinez, 2011, Stewart, 2010; Stewart et al., 2015). Martinez (2011) revealed that high school GPA was the next best predictor of persistence when she observed a positive relationship between high school GPA and college cumulative GPA. Other research also supported this finding. Prior studies showed that students with a high pre-college academic performance persisted through to the end of their first year in college (Barefoot, 2000; Ishitani, 2006), and review of the literature indicated that high school GPA was consistently a strong predictor of first year college grades, accounting for 25-33 percent of the variance (Pike & Saupe, 2002).

A possible explanation for the consistently strong association between high school GPA and college student persistence in prior studies and the current study is that high school GPA reflected students' efforts in a variety of courses over a period of four years before college. Research on this pre-college academic performance consistently used GPA as a continuous variable. Another explanation is in both prior research and the

current research, high school GPA was an important criterion to consider for students' admission to college.

ACT Composite Score

The ACT was shown in the literature to have a consistently positive correlation with Spring semester GPA. Results from some research studies revealed that ACT is strongly correlated with college persistence (Astin, 1993; Burton & Ramist, 2001; Stewart, 2010; Stillman, 2007). Similarly, other studies indicated that students' ACT scores predicted college cumulative GPA (Fiorini et al., 2014), and by extension, their college persistence (Burton & Ramist, 2001; Stewart, 2010) and students with high ACT composite scores were more likely to persist. Results of the present study were consistent with prior literature because it showed that ACT composite score was the second strongest predictor of Spring semester GPA, with a one unit increase in ACT associated with a 0.03 unit increase in Spring GPA.

This finding does not concur with results from other research, which confirmed the association between ACT composite scores and student persistence. Although ACT was a significant predictor of GPA in this study, there was no significant association between ACT scores and student persistence.

One possible reason for the disagreement between current literature and the present study is that other research did not directly find an association between the ACT and student persistence. What other studies found was actually a significant predicting power between the ACT and college cumulative GPA. Another explanation is although the ACT was the second largest predictor of Spring GPA in this study, the increase in

Spring GPA was only 0.03 for every unit increase in ACT. It is likely that this increase was not large enough for the prediction of student persistence.

Gender

Research showed mixed results about the effects of gender on student persistence. Earlier studies reported that female students were more likely to persist than male students. Later research indicated no relationship between gender and persistence. A large research study using stepwise regression to analyze data from ACT, Inc., (Reason, 2001) found no significant association. Similarly, St. John et al. (2001) found that gender was significant in some models but not significant in other models. The results of other studies showed that women were more likely to drop out of college (Hagedorn, Maxwell, & Hampton, 2002). According to Bradburn and Carroll (2002), women were predicted to leave college more than men because of both personal and family reasons.

However, recent research studies in college student persistence and gender indicated that gender is significantly related to student persistence. Specifically, women report higher grades than men (Kuh et al., 2006; the National Survey of Student Engagement, 2005) and they have a higher persistence rate than men (Fiorini et al., 2014; Kuh et al., 2006; Ross et al., 2012; Wolfle & Williams, 2014). These findings agree with the current study, which indicated that male students had a Spring GPA of 0.16 lower than female students' Spring GPA, and male students were 20 percent less likely than female students to persist beyond the second semester of college. This may mean that women enjoy certain persistence-related advantages over men. However, because current literature reveals mixed results on the association between gender and persistence,

questions remain unanswered regarding why women are more likely to persist. Further research is needed to better understand the impact of gender on persistence.

Federal Stafford Loan and Federal Pell Grant

The results of this research did not confirm the findings of prior literature, which indicated positive associations between loans or grants and college GPA or college persistence. Current literature revealed that grants had a strong positive effect on persistence (Cofer & Somers, 2000). Similarly, research studies found positive relationships between loans, grants and persistence (Battaglini, 2004; DesJardins et al., 2002b; Mendoza et al., 2009; Mendoza & Mendez, 2012; St. John, Paulsen, & Carter, 2005; Singell, 2004). In this study, students with a Stafford loan or a Pell grant had a lower Spring GPA and were less likely to persist compared to students without a Stafford loan or a Pell grant.

A possible explanation is these students had a low GPA before the Stafford loan or Pell grant was offered. Another reason is there are no academic requirements to receive financial aid because the Pell Grant Program provides these need-based grants to low-income students without consideration of GPA. Similarly, Stafford loans are available for students who demonstrate financial need, but GPA is not considered.

Athletic Scholarship

The results of this study did not confirm prior research, which indicated a negative association between athletic scholarship and academic performance. Current literature revealed that students who did not receive an athletic scholarship had a higher GPA than scholarship student-athletes (Rubin & Rosser, 2014). In contrast, the present

study showed that there was a positive association between athletic scholarship and Spring semester GPA. A possible explanation is that Rubin and Rosser's student-athletes' sports activities affected their academic performance.

State Grant OTAG

Oklahoma Tuition Aid Grant Program is a state grant awarded to college students with a high school GPA of at least 2.0 who demonstrate a certain level of financial need. There was no information on the association between the grant and students' college performance in the current literature. The results of this study showed that OTAG was negatively associated with Spring semester GPA. More specifically, students with an OTAG grant had a Spring cumulative GPA of 0.08 lower than students who did not receive the grant. A possible explanation is that, like Federal Pell grants, students receiving this grant had a low GPA before the grant was awarded.

Age

As reported in Table 4.6, the data for age, which were converted to z-scores as a way to remove outliers before analysis, included the 16-21 age range. For this reason, non-traditional age was not analyzed and thus not included in the discussion. In this study, age was not found to be a significant predictor of student persistence, but it was positively related to college performance. Within the 16-21 age range, the older college students were, the higher their spring cumulative GPA was. More specifically, holding other predictors constant, one unit increase in age (16-21) was associated with an increase of 0.03 in spring cumulative GPA.

This finding was consistent with the literature in which age was shown to be a significant predictor of college GPA (DesJardins et al., 2002b; Cofer & Somers, 2000; Hagedorn, 2005; Martinez, 2011). Muse's study (2003) indicated that age is one of the important predictors of success (college GPA), and some other studies suggested that older students have higher college GPA than younger age students (Cofer & Somers, 2000; Hagedorn, 2005).

Two possible reasons are that older students are more focused and they have a clearer goal when they go to college (DesJardins et al., 2002b). This positive association might also be accounted for by the skills older students had in their life experiences (Byrd & Macdonald, 2005).

Race/Ethnicity

This research study found that American Indian students had a lower GPA than non-American Indian students. American Indian students' GPA was 0.08 lower than the GPA of other students. There have been no previous studies comparing the college GPA of American Indian students and students of other races. The result might be accounted for by the fact that Oklahoma is a state with a high rate of American Indian population compared with other states. According to Cofer and Somers (2000), more access to higher education by ethnic groups results in higher dropout rates among students of these groups.

<center>**Implications**</center>

The use of state data in this research and the results of the statistical analyses, contribute to the theory, practice and research of higher education, particularly to public

research universities. The sections below will first discuss the implications for theory, followed by implications for policymakers and for research.

Implications for Theory

This study contributes to theory in two ways. First, the results of the study support Kuh et al. (2006)'s framework for student success. This research study identified the effects represented in Kuh et al.'s framework, which posits that students navigate through a wide path of factors and mediating conditions. These factors and mediating conditions intermingle with each other from high school to college graduation. According to Kuh et al., the sections of the path include precollege experiences, student behaviors and institutional conditions, student engagement, and college grades and graduation. These sections are mingled with financial aid, remediation, and transfer.

The findings of this study suggest that in the first section, precollege experiences, students navigated through the factors of age, gender, race/ethnicity, and pre-college preparation. Because this study included only the first two semesters of college, the mediating condition of financial aid took them to spring semester performance and persistence to the second year. The results of the study concur with Kuh et al.'s framework in several ways. First, the framework indicates that women report higher college grades than men; this study indicated that male students had a lower spring GPA and were less likely to persist than female students. Second, the framework specifies that college grades are the best predictor of persistence and degree completion; this study concluded that spring GPA was the strongest predictor of student persistence. Third, Kuh et al. show that the availability of different types of financial aid significantly affects

students' college attendance and persistence; this study confirmed that different types of financial aid, particularly OHLAP, were significant predictors of both spring GPA and student persistence. And fourth, the framework posits that high school academic performance is a strong predictor of college grades and persistence; the results of this study showed that high school GPA was the strongest predictor of spring GPA and strongly associated with student persistence.

In the second section, Kuh et al.'s framework would have connected to students' engagement at college. However, variables related to student engagement were not included in the dataset of this study. In summary, the findings of this study that students' background characteristics, high school performance, financial aid, and college performance are significant predictors of student persistence concur with Kuh et al.'s framework which indicates that to prepare for and succeed in college, students navigate through a wide path to success, starting with precollege experiences, via financial aid, and ending up with college grades.

Another contribution of this study is the modification to the last section of Kuh et al.'s framework, grades and graduation. This is done by transforming spring semester cumulative GPA into a binary variable and discovering a cutoff point below which the positive association between spring semester cumulative GPA and student persistence beyond the second semester does not work.

Implications for Practice

Predictions of college performance and persistence have several practical implications for policymakers and professionals. Because students' decisions to reenroll

are very important for higher education institutions, stakeholders are doing all they can to encourage re-enrollment. The review of the literature and the subsequent results of this study suggest that students' college performance has a large direct impact on their persistence. They also imply that providing various types of financial aid has an impact on students' decision to persist. In addition, analyses also show that the better students perform at high school the more likely they are to persist in college. Based on this knowledge, this study conveys that there is a role for each stakeholder (institutions, high schools, faculty, students) to play to help students persist. The federal government, Oklahoma State Regents for Higher Education, and institutions should also be aware of the need for financial aid to facilitate student persistence. Specific recommendations will follow later in the chapter.

Implications for Research

This research study contributes to research in several ways. The first contribution is an examination of an overlooked sector of higher education, namely, public research universities. The second is expanding existing college student performance research. As reported by the National Science Board (2012), public research universities enroll a large percentage of students; enrollment in these institutions rose by 43 percent over a 15-year period in 2009 and is projected to increase an additional 16 percent by 2019. The limited extant research on this sector is not commensurate with its developing scale. This research study responds to this deficit by adding to the existing body of knowledge concerning the relationships between college students' background characteristics, pre-college preparation, financial factors, and college performance at public research universities in Oklahoma.

Of equal importance, this research study adds to student persistence scholarship. Although there have been studies on student persistence at colleges and universities in Oklahoma, most are either reports from individual institutions or reports from the Oklahoma State Regents for Higher Education, which relied primarily on surveys of administrators and teachers. Although a few other research studies have also been published, they focus primarily on the impacts of financial aid on student persistence in Oklahoma. Minimal research examined the specific situations in which students in Oklahoma decide to return to the third semester of college. This study reflects an attempt to fill that gap.

Another important contribution is the finding concerning the positive effects of spring semester GPA, OHLAP scholarship, and high school GPA on student persistence. Interestingly, these three predictors are significant in both linear and logistic regression analyses. While linear regression aimed to predict students' success (spring GPA), logistic regression was used to detect the effects of factors on students' persistence. The finding that they are all significant in both linear and logistic regression reaffirms the validity of these statistical analyses. More interestingly, while OHLAP is negatively related to college success, this scholarship positively affects student persistence. In other words, students who received OHLAP had a slightly lower spring GPA than other students, but this scholarship was very powerful in helping students persist.

In addition, this research study makes a unique contribution to research by turning spring cumulative GPA into a categorical variable in logistic regression analysis to make the model fit. During the analysis, the results were very positive with model 10 of the stepwise analysis significant, no multicollinearity, significant coefficients, and high

Nagelkerke pseudo R square. However, when the Hosmer and Lemeshow test was conducted, most of the time it was significant, indicating lack of fit. A cutoff point of 2.04 in the spring GPA was discovered, and a dummy variable was created from this predictor. With this dummy variable instead of the previous continuous spring GPA variable, the Hosmer and Lemeshow test did not show significance, indicating good model fit. This shows that the model was only fit with spring GPA as a binary variable, and the prediction was only significant at certain spring GPA values.

This study also offers a new way to look at student persistence: to include both spring cumulative GPA and persistence to the first semester of the second year, the former being the dependent variable in multiple linear regression and the latter being the dependent variable in multiple logistic regression analyses. There are two reasons for the decision to study the variance of both spring semester GPA and persistence. First, although spring GPA is a very strong predictor of persistence to the second year, it should not be equated with persistence. Second, for this reason, conducting separate analyses for these two dependent variables provides a chance for the comparison of the results.

Finally, given the limited knowledge of student persistence in the state of Oklahoma, researchers can use the findings of this study as a starting point for further investigations into the factors contributing to students' success and persistence. These investigations will hopefully confirm the findings of this study while expanding the literature.

Limitations

This study has several limitations. First, with regard to the conceptual framework, data related to the two features of student behaviors and institutional conditions in Kuh et al.'s framework are missing in the analysis, and because student engagement is at the intersection of these two features (Kuh et al., 2006) data related to student engagement are also missing. The use of pre-existing data provided by the state in this study accounts for the absence of these variables. More strenuous efforts to work closely with state authorities to obtain a comprehensive dataset, which includes such variables as amount of time spent studying, interaction with faculty, and campus environment, would likely result in the inclusion of student engagement.

In addition, the dataset of the study did not record marital status, employment status, or information related to other factors that may determine student persistence, such as parents' education, socioeconomic status and motivation. Unfortunately, the dataset received from the state lacked several factors that potentially contribute to student persistence.

Another limitation is as stated at the beginning of the findings section, namely, the data for those who dropped out were not recorded because 95.2 percent of these students returned to the second semester and 87.4 percent returned to the third semester. For this reason, the incomplete data for these dropouts were excluded from the analysis of this study. As a result, the data used for analysis in this study were based on students who returned to the second semester. Therefore, the sampling was biased in favor of those who had better academic performance.

Recommendations

Factors such as gender and ethnicity are static and cannot be changed. Therefore, the study results concerning these predictors seem to only have the effect of informing policymakers and professionals. However, the results provide suggestions on how to reduce the effects of these factors to increase students' academic performance and persistence. Following are the recommendations for policymakers and professionals to target policy and interventions to increase student persistence based on the predictors that can be changed for improvement, followed by suggestions for further research.

Recommendations for Policymakers and Practitioners

The strongest predictor found in this study to affect significantly college persistence is spring GPA. To increase student persistence to the second year, therefore, there should be concerted efforts from the Federal Government, State Regents, institutions, the faculty, and individual students to raise students' spring GPA. The Federal Government and State Regents should implement policies that potentially help students to raise their spring GPA, especially policies on financial aid. As seen in Kuh et al. (2006)'s framework and from the literature, student engagement is an important measure for student success. Therefore, institutions should design first-year experiences to better prepare students in their transition to college, design campus activities for students' involvement, and provide the academic support necessary for students to perform better, including their access to a wide variety of books, articles, and online resources. In addition, free tutoring sessions should be offered when necessary so students can have prompt support from professionals on their coursework. As for faculty,

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effective teaching is required. Faculty should also consider creating their own websites with specific course-related content for students' reference, regular interaction with students (Kuh et al., 2006), extra opportunities for bonus points, and offering additional review sessions if necessary. Individual students are recommended to establish study habits, involve themselves in campus activities, and interact with faculty (Kuh et al., 2006). Additionally, they are encouraged to work in groups for the benefits of peer correction.

The next recommendation is for practitioners and faculty to help students achieve a spring GPA of 2.04 or higher. Current literature strongly confirms that Spring GPA increases persistence (Adelman, 2006; DesJardins et al., 2002b; Kuh et al., 2006; Pascarella and Terenzini, 2005; Stewart, 2010; Wood, 2012), but this cutoff point should be differentiated. Increasing spring GPA can increase students' probability for persistence by more than eight times. However, only spring GPA increases above the cutoff point of 2.04 will produce this effect. For that reason, efforts to help students achieve a higher second semester GPA should target this goal. This cutoff point is also useful for policymakers and professionals who could structure financial aid, especially financial aid for students who reach this GPA.

Another recommendation is that because OHLAP scholarship is mainly for low-income families, it is important to make sure that low-income students and parents know about it. Although the potential of spring GPA to enhance the likelihood of persistence is large, results from this study (regression equation 2, page 99) show that just focusing on increasing spring GPA is not enough. Therefore, state agencies, institutions and schools need to think more thoughtfully not only about how to sustain the funding of this

scholarship but also about how to make it known to high school students who meet the requirements. The possibility that homeschool students and students from low-income families do not know about this scholarship or know about it too late should be examined. Application for the scholarship is made when students are in the 10th grade at the latest. The role of information is very important; Long (2008) found that what students and their parents know about financial aid may affect college affordability and consequently persistence. Similarly, the awareness of how to access financial assistance may affect a student's decision to persist in college (Swail, 2003). To increase the possibility that students and families get information about the real costs and aid availability, it is important to diversify the communication channels. In addition to information posted on Oklahoma State Regents for Higher Education website and leaflets sent to high school students' home, it is recommended that high school counsellors and other staff mention this opportunity whenever they can, such as at one-on-one meetings, to make sure students and parents have information about OHLAP and it is their own choice whether or not to apply. Another possible way to bolster the information is to invite students who received the scholarship to talk to students or parents about how the scholarship enabled them to persist.

The OHLAP program was created by the Oklahoma Legislature in 1992 and has helped tens of thousands of students in Oklahoma to complete their college degrees. In the 2015-2016 academic year, 18,500 students received over 61 million dollars in scholarships from the program (Oklahoma State Regents for Higher Education, 2015). The result is that participants have a higher high school GPA, perform better in college, and graduate at a higher rate than non-participants. This is a huge success. However, due

to the lack of knowledge about the availability of this financial resource, the next recommendation is to allow OHLAP application later than the 10th grade. When the state legislature specified that students must enroll in the eighth, ninth or 10th grade, the intent was to promote early college awareness. However, allowing students to enroll one year before college would raise the number of eligible students that could receive this scholarship. This would produce not only more college graduates in Oklahoma but also a significant economic benefit for the state.

The last recommendation is for policymakers and institutions to help Native American students to persist in college. First, institutions should consider support programs that help these students socially and academically to succeed in the dominantly White society and campus environment. In addition to organizations for Native American students, an association gathering the participation of Native American staff, faculty members and administrators may be a useful way to serve this purpose and also to celebrate achievements, present concerns, and deal with the potential lack of academic preparation in K-12, especially in math and English, with the support of tutorial assistance. Second, the current financial support with priorities for Native American students – including federal financial aid, scholarships, loans, work-study and tribal support – should be maintained to help pay for college and childcare, offset low income as the result of going to college, and pay rent.

Recommendations for Further Research

In quantitative studies, accounting for 16 percent in the variability of the independent variable is typically considered good. In this study, 33 percent of the

variability in second semester GPA and nearly 20 percent of the variability in student persistence to the second year were accounted for by the set of variables in the established equations. However, this means that 67 percent in the variability in second semester GPA and 80 percent of the variability in student persistence were explained by other variables. The role of future research will be to explore these unexplained variables. In this section of the chapter, four recommendations for further research are offered.

First, additional research is needed on the factors that influence student persistence in Oklahoma. Although there have been studies on this issue, they resulted in mixed findings. As noted above, few research studies focused on student persistence at research universities in Oklahoma.

Second, when a logistic model is not proved to be fit, the researcher should try to find a cutoff point in the data. When the Hosmer and Lemeshow test is significant, indicating the model does not fit, some researchers may suggest that it is due to an extremely large dataset (over 10,000 observations). However, before this conclusion is reached, researchers should review the data because for certain continuous independent variables, it is possible that what is significant does not apply for every point of the predictor. There may be a certain point under which the trend does not apply. This is exactly what makes the model unfit. In such a case, the researcher should try to find the point, convert the continuous predictor variable into a dichotomous variable, and test the model again.

Third, given the limited knowledge of American Indian students' persistence at research universities in Oklahoma, researchers can use these findings as a starting point

for further investigations into factors that potentially affect success and persistence. The results of this study indicate that American Indian students had a slightly lower spring GPA than non-American Indian students. However, the persistence patterns of American Indian students, representing important racial groups in Oklahoma, have not yet been widely studied.

Fourth, the datasets examined in this study account for roughly 33 percent of the variability in college cumulative GPA and about 20 percent of the variability in student persistence. This indicates that other variables not included in this study might be common to the variability in student persistence. As mentioned earlier, these variables might include variables such as marital status, employment status, parental education, socioeconomic status, student involvement and engagement, and motivation. These variables deserve further in-depth study in the future.

Related to student persistence, statistics from the study indicated that 810 students, or 4.8 percent of the total number of subjects, did not return to the second semester of college. Further research is needed to investigate the factors that led to their decision not to return to the spring semester and what higher education institutions can do to assist.

Summary

The regression equations produced in this study have a predictive power in determining the academic performance and persistence of incoming college freshmen, and, in particular, provided statistical evidence for the importance of spring semester GPA, OHLAP scholarship, and high school GPA in predicting student persistence. The

study data were tested for, and met, the assumptions underlying the use of multiple linear and logistic regression. Chapter Five restated the statement of the problem and statement of purpose, reviewed the methodology used in the study, and summarized the findings found from the data analyses. The chapter also importantly discussed the results and compared them to existing literature. Finally, the chapter examined the implications and limitations of the study and offered recommendations for future research.

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APPENDICES

Appendix A

IRB Approval

Oklahoma State University Institutional Review Board

Request for Determination of Non-Research or Non-Human Subject

Federal regulations and OSU policy require IRB review of all research involving human subjects. Some categories of research are difficult to discern as to whether they qualify as human subject research. Therefore, the IRB has established policies and procedures to assist in this determination.

1. **Principal Investigator Information**

First Name: Ky	Middle Initial: P	Last Name: Le
Department/Division: Educational Studies		College: Education
Campus Address: 219 Willard Hall, Stillwater, OK		Zip+4: 74078-4045
Campus Phone: (405) 744-7429	Fax:	Email: ky.le@okstate.edu
Complete if PI does not have campus address:		
Address:		City:
State:	Zip:	Phone:

2. **Faculty Advisor (complete if PI is a student, resident, or fellow)** ☐ **NA**

Faculty Advisor's name: Stephen P. Wanger	Title: Associate professor
Department/Division: Educational Studies	College: Education
Campus Address: 309 Willard Hall, Stillwater, OK	Zip+4: 74078-4045
Campus Phone: (405) 744-3982 Fax: (405) 744-7758	Email: steve.wanger@okstate.edu

3. **Study Information:**

A. Title
   Factors affecting student persistence at research universities in Oklahoma
B. Give a brief summary of the project. (See instructions for guidance)
   The following research questions will guide this study:

1. Do students' background characteristics (gender, age, ethnicity/race, parents' education) predict their persistence beyond the first year at public research universities in Oklahoma?

2. Does students' high school academic performance (high school GPA and ACT test scores) predict their persistence beyond the first year at public research universities in Oklahoma?

3. Does students' financial status (financial aid) predict their persistence beyond the first year at public research universities in Oklahoma?

4. Does students' college performance (first-semester GPA, second-semester cumulative GPA, third-semester cumulative GPA) predict their persistence beyond the first year at public research universities in Oklahoma?

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Oklahoma State University Institutional Review Board
Request for Determination of Non-Research or Non-Human Subject

This research study uses pre-existing data from the Regents' Office. The researcher will use a de-identified data set with none of the above 18 identifiers for data analysis.
C. Describe the subject population/type of data/specimens to be studied. (See instructions for guidance)
D. The research sample includes 16,991 full-time degree-seeking first-year students enrolled at OSU

and OU from fall 2012 to fall 2013. The subjects have an age range from 17 to 23, and include a

variety of races and financial aid statuses. The sample does not include high school students

concurrently enrolled at these higher education institutions. Students from both institutions are

chosen for the study to ensure the criterion that the sample will be representative of all the students

at public research universities in Oklahoma.

4. **Determination of "Research".**
45 CFR 46.102(d): *Research* means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge. Activities which meet this definition constitute research for purposes of this policy whether or not they are conducted or supported under a program which is considered research for other purposes.

One of the following must be "no" to qualify as "non-research":

A. Will the data/specimen(s) be obtained in a systematic manner?
    ☒ No   ☐ Yes

B. Will the intent of the data/specimen collection be for the purpose of contributing to generalizable knowledge (the results (or conclusions) of the activity are intended to be extended beyond a single individual or an internal program, e.g., publications or presentations)?
    ☐ No   ☒ Yes

5. **Determination of "Human Subject".**
45 CFR 46.102(f): *Human subject* means a living individual about whom an investigator (whether professional or student) conducting research obtains: (1) data through intervention or interaction with the individual or (2) identifiable private information. Intervention includes both physical procedures by which data are gathered (for example venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes. Interaction includes communication or interpersonal contact between investigator and subject. Private information includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public (for example, a medical record). Private information must be individually identifiable (i.e., the identity of the subject is or may be ascertained by the investigator or associated with the information) in order for obtaining the information to constitute research involving human subjects.

A. Does the research involve obtaining information about living individuals?
    ☐ No   ☒ Yes
    If no, then research does not involve human subjects, no other information is required.
    If yes, proceed to the following questions.

All of the following must be "no" to qualify as "non-human subject":

Request for Determination of Non-Research or Non-Human Subject

B. Does the study involve intervention or interaction with a "human subject"?
☒ No   ☐ Yes

C. Does the study involve access to identifiable private information?
☒ No   ☐ Yes

D. Are data/specimens received by the Investigator with identifiable private information?
☒ No   ☐ Yes

E. Are the data/specimen(s) coded such that a link exists that could allow the data/specimen(s) to be re-identified?
☐ No   ☒ Yes
   If "Yes," is there a written agreement that prohibits the PI and his/her staff access to the link?
   ☐ No   ☒ Yes

6. **Signatures**

Signature of PI _____   Date   11/17/2015

Signature of Faculty Advisor _____   Date   11/17/15
(If PI is a student)

☒ Based on the information provided, the OSU-Stillwater IRB has determined that this project **does not** qualify as human subject research as defined in 45 CFR 46.102(d) and (f) and **is not subject to oversight by the OSU IRB.**

☐ Based on the information provided, the OSU-Stillwater IRB has determined that this research **does** qualify as human subject research and **submission of an application for review by the IRB is required.**

_____   11·19·15
Dr. Shelia Kennison, IRB Chair   Date
Hugh Crethar

Appendix B

Data Request Form

Oklahoma State Regents for Higher Education

Data Request Form

Release of data is subject to approval. For consideration please provide the following information.

Contact information

Name: _Ky Le_
Title: _Ph.D. Student_
Organization _Oklahoma State University_
Department: _School of Educational Studies_
Phone number: _405-762-3454_
E-mail address: _ky.le@okstate.edu_

How will the data be used? What is the purpose of the request?

The data will be used for the statistical analyses for my dissertation entitled, "Factors affecting student persistence at public research universities in Oklahoma."

What data are needed?

The following variables by students at the research universities of OU and OSU:

Gender	Enrollment status	Financial status
Age	High school GPA	First and second semester college GPA
Race/Ethnicity	ACT composite scores	First-to-second year persistence

Date needed _____

Identify preferred mode of output (ASCII, Excel, hardcopy)

Excel

Statement of Understanding

The information obtained through the unitary data system is, by Federal law and State Regents policy, confidential, and may not be used except as officially authorized. The Family Educational Rights and Privacy Act of 1974 (FERPA) protects the privacy of the student records. The requester agrees to maintain the confidentiality of the data provided, use the data exclusively for the intended purpose, store the data in a secure area, and dispose of the data in an approved manner (i.e., shredding). Requesters may be held liable for the information divulged to unauthorized parties as a result of negligent maintenance or use of reports by requesters or their agents.

By my signature, I verify the information requested and confirm I have read, understand, and will comply with the above statement of understanding.

_____Ky Le_____   11/17/2015
　　　　　　Signature　　　　　　　　　　　　　　　　　　　　　　　　　　　Date

Approval Level   _____

Authorizing Signature   _____

VITA

Ky Phuoc Le

Candidate for the Degree of

Doctor of Philosophy

Thesis: FACTORS AFFECTING STUDENT PERSISTENCE AT PUBLIC RESEARCH UNIVERSITIES IN OKLAHOMA

Major Field: Higher Education Administration

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Higher Education Administration at Oklahoma State University, Stillwater, Oklahoma in July, 2016.

Completed the requirements for the Master of Arts in Teaching English to Speakers of Other Languages at the University of Canberra, Ho Chi Minh City, Vietnam in 2001.

Completed the requirements for the Bachelor of Arts in Teaching English at the University of Education, Ho Chi Minh City, Vietnam in 1986.

Experience: Teaching, Administration

Professional Memberships:
American Educational Research Association
Association for the Study of Higher Education
Comparative and International Education Society
Graduate and Professional Student Government Association
Graduate Professionals in Student Affairs
Phi Beta Delta
World Education Research Association