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A three year study of the relationship of prematriculation variables on student success at a private, Southern university.

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A THREE YEAR STUDY OF THE RELATIONSHIP OF PREMATRICULATION VARIABLES ON STUDENT SUCCESS AT A PRIVATE, SOUTHERN UNIVERSITY

by

ROGER PHILIP KIMREY

A DISSERTATION

Submitted to the graduate faculties of The University of Alabama at Birmingham
and The University of Alabama, in partial fulfillment of the requirements
for the degree of Doctor of Education

BIRMINGHAM, ALABAMA

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ABSTRACT OF DISSERTATION
GRADUATE SCHOOL, UNIVERSITY OF ALABAMA AT BIRMINGHAM

Degree Ed.D. Program Educational Leadership

Name of Candidate Roger Philip Kimrey

Committee Chairs Eugene Golanda, Lynn Beck

Title A Three Year Study of the Relationship of Prematriculation Variables on Student Success at a Private, Southern University

This study investigated the prematriculation variables gathered from the application for admission at a private, Southern university and determined whether any significant and predictive relationship exists between the variables and freshman grade point average.

The research population was the 1995-1997 freshman classes (N = 2,045) of the university, with 43 independent variables studied. Multiple regression was the statistical procedure used to determine whether gender, race, religious affiliation, American College Test (ACT) composite score, Scholastic Assessment Test (SAT), type of high school attended, high school grade point average, core high school grade point average, rank in class, living accommodations in college, state of permanent residence, high school leadership, family income, employment, legacy or college major individually or in combination with another, were related to the freshman grade point average of the student.

The correlation produced 25 statistically significant variables, with 14 having the greatest individual relationship ($r > .10$) to be used in the prediction model. The forward and backward stepwise regression procedure in Statistical Package for the Social Sciences (SPSS) was used to select the model the best predictive model of freshman grade point

average. The model selected included the independent variables of ACT composite score, core grade point average, housing status, high school grade point average, rank in class and church leadership. The model was cross validated with the 1998 freshman class actual data to determine accuracy for prediction within the critical grade point averages for freshmen. Attention was also given to the predictive nature of variables for gender and race subpopulations.

DEDICATION

I dedicate the effort of this dissertation to my family . . .

. . . This dissertation is dedicated to my loving wife Penny, without whose love, support and unfailing devotion this project would never have been possible. To my precious daughters, Caroline and Grace, for the time I missed with them, when I was simply not at home. The weekends of research in the library, at the office and evenings in class, are all part of the sacrifice you have endured. The sacrifices we made as a family for my personal and professional benefit are countless. I thank you and love you very much.

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CHAPTER 1

INTRODUCTION

Among the list of critical concerns of administrators and researchers in the higher education community are the recruitment of academically successful students and the retention of students for degree completion. This interest is particularly evident during the current period when state and federal investment in the educational process is reduced, certain state student populations are declining and changing, and there is a lack of available, trained personnel able to meet the needs of the labor market (Levine, 1989). These issues are of particular importance to higher education, in seeking ways to improve the academic performance of student populations while reducing dropout rates (Boggs, 1996).

Of students attending private colleges and universities, 29% of freshmen will not return to the same college for the sophomore year of study (American College Testing, 1998). More than 40% of all college entrants drop out in the first 2 years of college, and an institution can expect that 56% of a typical entering class cohort will not graduate from that college (Tinto, 1987). More than 15% of private college freshmen will not return for the second year, yet 60% of those will return to college within 5 years, but most will change the college of attendance (ACT, 1998).

Institutions must plan and initiate effective recruitment and retention programs that will facilitate students' quests for a fulfilling collegiate experience as well as productive career and personal life. Today, the survival of many colleges and universities

is dependent not only on successful recruitment of available traditional-age college students, but also on the retention of students upon enrollment (Bers & Smith, 1991). The ability to understand the factors that lead to academic and personal success experienced by the student are paramount to the longevity, financial success and public reputation of the institution.

The prediction of college success based upon the ACT or Scholastic Assessment Test scores has been used for many years (Linn, 1993). Likewise, many institutions of higher education have utilized the cumulative high school grade point average in prediction of college success (Merante, 1983). Documentation is abundant which substantiates these individual variables are not necessarily the most reliable when used apart from other relevant criteria (Bunzel, 1996).

This study was an effort to determine whether significant predictability on student success exists from the prematriculation variables of gender, race, religious affiliation, ACT scores, SAT scores, type of high school attended, living accommodations in college, state of permanent residence, high school leadership or college major, gathered on students during the admission process. Institutions of higher education, particularly private, must have reliable information about the performance of student populations and subgroups for institutional planning, promotion, and resource allocation to insure fiscal viability. As the available traditional high school graduate profile drastically changes or decreases, as is predicted, the implication for college enrollment change in any one year could be substantial.

The Statement of the Problem

The decisions of admission offices throughout the country to offer admission to students are based on numerous factors, but most institutions do not have clear, decisive data about which factors affect student success during the freshman year. The average cost to recruit students continues to increase each year, and the cost to replace non-returning students compounds the energy and resources consumed (Williams & Crockett, 1994). As competition for students increases and the cost of higher education escalates at a higher rate than the cost of living each year, the financial consequences of selecting students that have a greater opportunity to succeed is vital for higher education institutions.

No definitive research has been conclusive to determine which of the numerous preenrollment variables gathered at the point of application for admission might have continuous significant impact on the predictability for academic success. Such a study was needed to provide the educational leaders and front line decision makers the necessary foundation and guidance for determining appropriate admission choices.

Purpose

The purpose of this study was to examine the relationship and influence of selected prematriculation variables--gender, race, religious affiliation, ACT composite score, SAT score, type of high school attended, high school grade point average, core high school grade point average, rank in class, living accommodations in college, state of permanent residence, high school leadership, family income, employment, legacy or college major--on the success of first-year, full-time students during the freshman year of college at a private, Southern university, in order to discover potentially significant

predictive enrollment factors. Data used in the study represented a period of 3 years, of which disaggregation by college major was also conducted.

Limitations of the Study

The variables analyzed in the proposed study were limited to those accessible for the population of a private, Southern university. It was recognized an unlimited number of factors contribute to determine whether a significant relationship existed with the dependent variable of freshman grade point average. The following limitations were imposed for this study:

1. This study was limited to the variables gathered for the entering freshman classes of the years 1995-1997.

2. It was recognized the university has attracted students based on years of recruitment, publicity, and market positioning that cannot be exclusively attributed to the variables studied.

3. Data were available only for those entering freshmen who enrolled and were the subjects for prediction. International applicants, incomplete applicants, admitted students not choosing to enroll, and students denied admission were not included.

4. The scope of this study was limited to students in a major that was considered a four year degree program or more, or as undecided/undeclared majors.

5. The data to be retrieved were considered relative to academic success. The study did not address or assess behaviors, attitudes, motivation, and other affective issues.

Assumptions of the Study

For the purposes of this study, it was assumed that several conditions were met.

1. The study assumed all students who enroll as first-time freshmen were planning to complete the chosen program of study or major in the designated time period of normal completion for graduation and did not plan to transfer to another institution.

2. It was assumed these students were interested in the institution for multiple reasons, including reputable academic programs and preparation for graduate school or the career field.

3. It was assumed the findings of this study will be generalized only to this private, southern institution.

4. It was assumed the freshman year success rates and retention rates were directly related to the ability to graduate within 4 years.

5. It was assumed the successful student could not be defined by only academic credentials, but factors of personality, leadership, aspiration, motivation, school involvement, character, family support, and financial ability that could contribute to success.

6. It was assumed that course instructors were equally knowledgeable of their subject matter; used materials appropriately; and were representative in ability, skill, and preparedness of other college faculty.

Definition of Terms

For the purpose of this study, the following key terms were operationally defined:

Academic achievement: The cumulative grade point average of completed college courses as of the end of the freshman year of study, or two semesters.

Attrition: The percentage of students not returning to the institution following their initial enrollment at the college.

Grade point average: The total of a student's quality points earned in all college courses divided by the total number of semester hours attempted.

Core grade point average: The cumulative grade point average from high school English, mathematics, history, science, and foreign language.

Legacy: The previous or current attendance of blood relatives at the same institution.

State of residency: The state of residence at the time of college enrollment.

Religious affiliation: The denomination or church membership of the student.

Employment: The level of paid employment by the student; full time or part time.

College residency: On- or off-campus student housing.

FAFSA: The free application for federal student aid. This is the national application for all types of federal financial assistance. The annual process is based upon the financial condition of the student's family for the year prior to actual college enrollment.

College major: The major selected by the student at the time of enrollment.

Leadership: The level of extracurricular activities of the student in high school, community, or church during the high school career.

Retention: The maintenance of a student's satisfactory progress toward her or his pedagogical objective until it is attained (Dolence, 1997).

Student success: The cumulative grade point average at the end of the freshman year of college or a minimum 24 semester hours.

Race: The ethnic category of the student reported on the admission application.

Gender: Male or female.

SAT: The SAT (or Scholastic Assessment Test) combines the verbal and mathematics reasoning ability scores as the Scholastic Assessment Test. Each reasoning ability score is on a scale of 200-800.

ACT composite: The ACT composite (or American College Testing Assessment) is composed of four tests, always administered in the same order: English, mathematics, reading and science reasoning. The composite score, used in this study, is representative of performance on all four tests combined (Bennett, 1997).

High School Type: Public or private, independent high school

Family Income: Adjusted gross income of the family, as determined by the FAFSA.

Recruitment: The active process an institution undertakes to favorably influence a student's decision to attend an institution (Dolence, 1997).

Research Question

To what extent do each of these variables-- gender, race, religious affiliation, ACT composite score, SAT score, type of high school attended, high school grade point average, core high school grade point average, rank in class, living accommodations in college, state of permanent residence, high school leadership, family income, employment, legacy or college major-- individually or in combination, relate to the freshman grade point average of the student? If a relationship is found, what is the best predictive model?

Summary

The potential of a student for academic success is crucial for the future of an institution of higher education. The measurement of admission officers generally is based upon the number and qualifications of the freshman class each year. It is the belief of some that admission officers should be evaluated by the number of students admitted who graduate. The concept is that admission criteria and process should do an adequate job of admitting students capable of attaining a bachelor's degree (Zink, 1997).

Research is not conclusive as to which predictors consistently and accurately provide valid indicators of academic success. The resources used in the admission offices throughout the country are enormous, and the consequences of not attracting the proper students into the institutions have grave consequences. In order to accomplish the enrollment goals for most institutions, the admission officers must have the ability to predict academic performance, to the best of their ability (Dolence, 1997). Research of the student data is the beginning of the ability to predict academic performance.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Introduction

The purpose of this chapter is to review the literature related to student success and predictive factors on academic achievement in a college or university setting. Attention was given to the variables in relationship to the freshman year grade point average.

Colleges and universities annually must determine which students have the greatest likelihood for success at their respective institutions. The competition for qualified students increases each year, and the pressure to make the entering freshman class is always present in the thoughts of an admission professional. The cost to recruit each student increases every year. Institutional budgets to support scholarship and work assistance programs increase for the purpose of attracting the student to the campus. The financial impact of attrition, from lost tuition dollars, of selecting a student that does not return after a semester or the first year grows with the rate of tuition. The majority of private colleges and universities are tuition driven and do not have a tax base for financial support. Thus, the impact on a campus from nonreturning students not only can end a career, but is likely to financially affect the entire campus. The average cost to recruit students continues to increase each year, and the cost to replace nonreturning students compounds the energy and resources consumed (Williams & Crockett, 1994). As competition for students increases and the cost of higher education escalates at a higher

rate than the cost of living each year, the financial impact of selecting students that have a greater opportunity to succeed is vital for the higher education institutions.

This chapter provides a selected review of literature on admission decisions, freshman year success in college, college entrance examinations, leadership components, college major, residential or commuter housing status, and retention issues affected by the decision to continue enrollment beyond the freshman year to degree completion. High school grades and the personal demographics of gender and race are also reviewed.

Freshman Year Success

Student growth in higher education through the 1970s provided the basis for two decades of unprecedented change in access and process for college admission. Ever rising costs associated with higher education requires that institutions understand which students are more likely to succeed at respective institutions. In 1966, Alexander Astin began monitoring and reporting the opinions and attitudes of college freshmen throughout the country. The Cooperative Institutional Research Program (CIRP) has provided information for countless studies and reports about similarities and changes in freshmen during the past 30 years. Much of these reports delves into the social and psychological aspects of freshman trends, as well as expectations students bring to the collegiate experience.

In conjunction with this program, Astin has researched critical issues that college students face and the adjustments made for success during the college experience. Through these studies, Astin has become a recognized leader in the measurement of college and student success. Countless studies by the Higher Education Research Institute (1997), housed at University of California, Los Angeles (UCLA), have assessed

student opinions, beliefs, and actions during the freshman year of college and published annual survey results.

For this study, the freshman year grade point average is the measurement point considered successful for students. According to Pascarella and Terenzini (1991) and as evidenced by numerous studies,

> A student's grades are probably the single most revealing indicator of his or her successful adjustment to the intellectual demands of a particular college's course of study. Without satisfactory grades, a student will not graduate from college, nor will he or she be admitted to graduate or professional school. (p. 388)

Educational attainment is directly affected by the continuity of the student's experience within the institution. If grades are not properly achieved, continued attendance will not take place, and the degree will not be completed. The degree received is directly related to the freshman year grade point average, as it is impossible to graduate without attaining satisfactory grades throughout the college years.

Pascarella and Terenzini (1991) continue by stating that it is not particularly surprising that undergraduate grades are perhaps the single best predictor of obtaining a bachelor's degree. This analysis has taken form in a number of studies from 1970 to 1986, all of which include the factorization of precollege characteristics, such as academic ability, aspirations, and secondary achievement. Studies have demonstrated when a student successfully completes the freshman year at a selected college or university, the likelihood for continued success and graduation is greatly increased.

Any number of studies indicate pre-enrollment variables are central to freshman success, but most institutions only consider the academic indicators, achievement examinations and high school grades, in the admission process. According to Upcraft, Gardner, and associates (1989), institutions that are serious about freshman success must

know the characteristics and backgrounds of current students, and use the data in planning for freshman success.

Institutions concerned only with the admission of students, and not with the individual and corporate probability of success of its students, has a serious divide in the ability to understand and plan for educational future of the college or university. Decisions, resources, and most importantly, individual potential are at stake for these institutions.

A student's college grades are probably the single most revealing indicator of his or her successful adjustment to the intellectual demands of a particular college's course of study. Without satisfactory grades, a student will not graduate from college, nor will he or she be admitted to graduate or professional school. Although heavily influenced by academic ability and intelligence, grades in college are not merely a function of those factors. As a measure of successful adaptation to an academic environment, grades tend to reflect not only requisite intellectual skills but also desirable personal work habits and attitudes.

Student's performance in first year courses is an important part of their overall success in college. Students who succeed in their first year courses usually progress to higher level courses (ACT, 1997). Given this, it is not particularly surprising that undergraduate grades are perhaps the single best predictor of obtaining a bachelor's degree and also of attending graduate or professional school and obtaining an advanced degree. This effect has been replicated across a number of national samples and holds even when the important student precollege characteristics of academic ability, aspirations and motivation, high school academic and personal achievements, and other collegiate experiences such as academic major or field of study, leadership, and social

organizational involvement are taken into account (Pascarella, Terenzini, & Wolfe, 1986). Moreover, even with such factors as gender, social class, race, and undergraduate major taken into account, grades remain an important determinant of the prestige or ranking of the graduate school attended (Pascarella & Terenzini, 1991). This is easily illustrated by the national recognition that colleges and universities seek, receive, and exploit by the media guides from magazines and proposed authorities.

Because an important function of admissions is to select the applicants most able to perform college-level work, grades constitute a logical measure of the outcome of the admissions decision: they reveal, to some extent, the level of academic success of the accepted students who enroll. The use of freshman grade point average as a measure of academic performance has many advantages: the freshman class is more representative of the applicant group than later classes, a full year of individual course grades tends to even out variations in grades from a variety of instructors and courses, and differences in the courses students take are smaller than in later years (Willingham, Lewis, Morgan, & Ramist,1990). Possible flaws could include a wide choice of courses in a variety of subject areas, the reliability of grades from course to course or term to term, and the comparability of freshman GPA from student to student, as was noted in the assumptions.

Students' performance in first-year courses is an important aspect of their overall success in college and will many times determine the academic future of the individual. The first year of transition to new surroundings, academic expectations, and possibly the first away-from-home experience can cause some students great anxiety. Students who succeed in their first-year courses usually progress to higher-level courses. In contrast, students who are not successful in their first-year courses may be required to take them again, may be placed on academic probation, or may even drop out (ACT, 1998).

In a study conducted by the American College Testing Program (1998), data from 29 colleges in a Midwestern state were analyzed. A sliding scale correlating ACT composite and high school grade average to predict freshman year academic success resulted. For most combinations of high school grade point average and ACT composite score, a student has greater than a 50% chance of achieving a 2.0 or higher gpa. The outcome of the study encourages the use of multiple means, ACT composite, and high school grades to identify likely success in college (ACT, 1998).

Freshman success has a much broader definition above credit accumulation to the point of graduation. Freshmen succeed when progress is achieved in the fulfillment of educational and personal goals. The definition of freshman success goes beyond diversity issues of freshmen, such as race, gender, age, and ethnicity, to describe a common framework of the group (Upcraft et al., 1989).

In order for freshmen to succeed, Upcraft and Gardner compiled constructs necessary to create a positive environment. Many of these beliefs are related to student involvement, interaction, and faculty support, not just academic performance in the classroom. More importantly, freshman success is many times determined by various characteristics of the institution, the students, and the "ethos" or climate experienced by the students (Tinto, 1987; Upcraft et al., 1989).

Admission Process

The decision of which college or university to attend is an important consideration for many students during the last 2 years of high school. Students and family members often go through cycles of emotional and rational decision making, only to find that time

has elapsed to the point necessitating a final decision. Students will visit many college campuses during the spring break and summer vacation, as well as many weekends in the fall before the senior year of high school. The campus visit and tour, meeting current college students and faculty members, greatly affects the choice of where the student will attend college. The total admission process for the student can be time consuming and emotionally draining.

How does the decision to enroll happen? For many students, the choice is financial; the college providing the most funding gets the student. For others, it is a matter of convenience; the college closest to home provides the easiest transition into higher education and away from home. For some students, the decision is independent of parental involvement, while for most, the decision is greatly influenced by the family. At times, the expectations of the family supersede the choice of the child. This can be based on what the child learns about higher education through personal relationships, the media, sports, or a chosen vocation.

The critical issue of the decision is for the student to determine which factors are most important for the college experience: Is it size of college, availability of major, location of the country, academic reputation, religious affiliation, availability of scholarship and financial assistance, or athletic and fine arts opportunities? For most students, a combination of factors require the students to make their first significant choice of their lives. This choice will many times mold the future of chosen vocation, life-long relationships, and a thirst for learning that does not stop at commencement.

Most colleges and universities have admission policies that denote minimum criteria for admission. The higher selective institutions generally do not publish established minimums, but admission decisions are based upon a comprehensive

evaluation of the student credentials. The open admission institutions, usually community colleges, also generally have numerous categories by which an individual could attend college, whether in academic or vocational programs.

The majority of institutions require entering freshmen to have completed high school as evidenced by receipt of a diploma and to provide college entrance examination scores to the college. These are the minimum educational criteria by which colleges admit students. Depending on the level of selectivity, the college may have established minimum grade point averages in specific courses from high school, as well as minimum SAT or ACT score requirements.

The prevalent method of high school evaluation is determined by the number of units of completed curriculum in English, mathematics, history, science, and foreign language, with some schools now including a computer literacy component. Should a student not have the required number of units, high school diplomas are not awarded, and college attendance is delayed. Which specific students will succeed in college is beyond the institution's control, but factors the institution believes are important indicators are used in the admission process (Astin, 1993b).

These college entrance differences have a common thread because public and private colleges are financially dependent upon student enrollment to a certain degree. The tuition, fees, and auxiliary payments of room, board, and incidentals provided to the institution by the student will support the variety of programs offered. What student factors are related to success at college? The scope of this study addressed this very issue for the university studied.

The admission process varies by type, control, and selectivity of the institution, as well as tradition, history, and purpose of existence. For public institutions of higher

education, the issues can be access and equity, whereas for private institutions, space and resources can limit availability. According to Duffy and Goldberg (1998), the quest for colleges and universities across the country is based on recruiting new students every year. These institutions live and die on their ability to recruit enough students, enough good students, and enough good students who can pay. Without question there are numerous varying factors including curricula, faculty, location, finances, reputation, and many other internal factors that affect the ability of colleges to meet their enrollment targets. There are also powerful events that can overwhelm an institution and cause quick destruction. These external forces are economic, demographic, social, and political in nature and change much faster than established institutional strengths and weaknesses, which can function as rough constants over the time institutions require to effect change.

The admission process at times must ignore the palpable facts that some objectives and some attributes are easier to measure than others and that we may be unable to tell which candidates have, or will develop, the qualities we desire. The admission decision at many colleges and universities is based upon the mandates of state government or local control (i.e., public land grant institution or community college). In many of these situations, the admission officer may not need as many guidelines for operation, because the primary admission issue is based upon the demand for equity and equality of access. In other situations, colleges desire a "match" of the student with the school, and great effort, energy, and resources are used to attract and retain an appropriate student population. It is anticipated that the students who enroll will ultimately achieve success by completing a degree based on the chosen field of study.

Bowen and Bok (1998) stated it sufficiently in describing the plight of how admission officers must decide which applicants, individually and collectively, will take

the fullest advantage of what the college has to offer, contribute the most to the educational process while in attendance, and experience success to benefit the community and society where they are involved. The task of educators is to accept the students who enroll and then mold and recreate them into positive contributors to their surrounding fellow man. Unless this is accomplished, some might say that educators have failed.

High School Grades

Of all the personal characteristics that predict freshman success, particularly academic success, the most powerful are intellectual ability and prior academic achievement, which account for 41% of the academic potential a student brings to the higher education experience (Adelman, 1999). This gives explanation to the primary use of high school grades and standardized examinations in the admission process. Students' academic preparation in high school is very important in determining whether they succeed later in college (Willingham et al., 1990; Educational Testing Service of the College Board, 1998; ACT, 1997). The more college preparatory courses students take in high school, and the higher the grades they earn, the more likely they are to acquire the academic skills and knowledge they need for college (ACT, 1997).

The size, type, and location of a high school can influence the academic performance of any given student. The high school grade point average, when compared to others in the school, determines the competitive nature of the high school. The rank in class of the student has been found to predict college success with a high level of statistical reliability (Merante, 1983; Educational Testing Service of the College Board, 1998). The rank in class has consistently predicted enrollment of certain ethnic groups, particularly African American, Asian, and Hispanic males (Hood, 1992).

The use of high school grades, rank in class, and core grade point averages predicts standardized test scores more accurately, which, in combination, provide a higher level of college grade prediction (ACT, 1997; Educational Testing Service of the College Board, 1998; Willingham et al., 1990; Bennett, 1997). The use of high school grade point average allows a current assessment of the students' ability to perform academically. With other variables held constant, a measure of "academic ability" that combined high school records and SAT test scores was about ten times as important as a measure of "student effort," in terms of how much was learned (Klitgaard, 1985).

College Entrance Examinations

The high school population is oversensitized as to the importance of college entrance examinations and the multiple roles the examinations hold. The SAT and ACT are the most well known acronyms among high school students and their families. The academic weight and impact these scores have on the future of many students is unusually high.

Not only is the college admission of a student at stake, the awarding of merit scholarships and course placement is at the forefront of most students' minds. These examinations have become the national admission exams, the standard by which graduating seniors are measured academically. These measures are recognized as the only methods by which students can be compared in acceptable fashion. High schools have variance in grading scales and instruction, most of which to do operate by a national standard but are under local jurisdiction of the school district. These examinations provide some rational means by which to compare students.

SAT

The SAT, or Reasoning Test, is one of the two primary components of the SAT program, which is designed to assess many of the skills that are important to students' success in college. The SAT is a multiple choice test, with only a few exceptions on mathematics. The test is in two sections, verbal and mathematics, with a score range of 200-800 for each section. The verbal section consists of 78 questions, and the math of 60.

In the booklet distributed to high school students throughout the nation, the College Board describes the SAT examination as one to assess many of the skills that are important to success in college, and these tests have been established as a common standard for student comparison (Educational Testing Service & The College Board, 1997). The SAT is intended to be supplement the high school record about how ready the student is for college work.

The subject matter of high school courses and grading standards vary widely; the tests have been developed to provide a common standard against which students can be compared. In April 1995, the score scales were recentered to establish the average score for 1990 seniors at 500, the midpoint of the 200 to 800 scale. This is to allow those interested to more easily interpret scores in relation to a similar group of college-bound seniors (Educational Testing Service & The College Board, 1997).

The SAT correlation for predicting college grades is only slightly lower than high school grades, at 0.52. When combined with high school grades, 0.54, the best predictor is 0.61 (Educational Testing Service & The College Board, 1998). Brian O'Reilly, Executive Director of the Guidance and Admission Programs for the College Board, states the impact is not that high school grades are only slightly better predictors, but that

a three hour test is almost as powerful a predictor as four years of high school grades (Educational Testing Service & The College Board, 1998).

The prediction of college success based upon SAT scores has been used for many years (Linn, 1993). SAT scores remain a useful indicator of academic performance in college, more useful, in some significant respects, than was previously recognized. It is in the more traditional academic courses with apparently rigorous grading for which SAT scores tend to show the strongest relationship with academic performance in college. In a study of Dartmouth College, Crouse and Trusheim (1991) determined that the SAT provided additional power for predicting college grades for that institution. The use of these scores assisted Dartmouth in selecting the correct students.

Willingham et al. (1990) determined that when the freshman grade point average is the criterion, and nonacademic courses are held constant, the SAT shows particularly strong incremental validity and is typically a better predictor than high school record. This was validated by the study of the Educational Testing Service & The College Board (1997) to give the slight predictive edge to the SAT.

In a 10 year study by Rick Morgan, the data suggested that a higher correlation exists between SAT scores and freshman grade point average for private colleges, colleges having fewer than 750 in the freshman class and colleges exercising more selective admission requirements. In the slight changes in predictive validity over the period, the same colleges had reduced measure of change (Willingham et al., 1990). It was determined that the college characteristic was the best predictor of change in the SAT correlation of the student and the freshman grade point average. The SAT mean was the method by which comparisons were analyzed (Willingham et al., 1990).

In a study of 685 colleges and universities, the best predictor of freshman grade point average (GPA) is a combination of the SAT scores and the high school record. The addition of these two increases the validity about 15% on average (Educational Testing Service & The College Board, 1997). The research results validate the use of the SAT as a predictor of the GPA, and show it is most effective when combined with the high school record of the student. This further solidifies the relationship of the high school courses and the SAT.

By using upon a national sample, Willingham et al. (1990) sought to determine the relationship of test scores and college grades. The data were based upon information reported by the students. Difficulties exist because the different colleges represented in the sample may not be comparable, and the grade point average may not be comparable from one educational unit to another. Across the 10-year span of the study, the trend of correlations is downward, though the differences are not large. The standard deviations within colleges were even smaller than across all colleges in the pooled data. The preponderance of large, public institutions showed larger declines in the predictive validity of the data, as well as the suggestion that there are shifts in some major sectors of higher education (Willingham et al.). The results of the study underscore the need, in considering further research on this topic, to look closely at college grades.

In a study of nine private colleges, Willingham and Breland (1982) showed that the median correlation between first-year college grades and a combination of SAT scores and prior grades was 0.51. Adding twenty-three different "background measures" raised the correlation by only 0.04. The academic ratings of applicants made by admission officers have less predictive power than the combination of SAT scores and previous grades (Klitgaard, 1985). This is significant when considering the vast amount

of data and information gathered by admission professionals to assist in the admission decision.

The findings of Willingham and coworkers seem reasonably clear to validate the high relationship of SAT scores with ability and potential for academic success. Available data are largely consistent in showing that the correlation of freshman grade point average with test scores has undergone two systematic changes in the past two decades: an increase in the late 1960s and early 1970s, followed by a gradual decrease. The changes in these correlations are not large, and they are not always statistically significant, but the overall trend seems generally comparable in magnitude from test to test. These results suggest that FGPA itself may have changed to some degree in recent years, because the decline in its predictability is not limited to the SAT but seems part of a more general phenomenon (Willingham et al., 1990).

A study of student athletes revealed the SAT was a predictor best for the first semester of the freshman year of college, during the critical transition time for most students (Sedlacek & Adams-Gaston, 1992). According to Klitgaard (1985), even prestigious, selective institutions demonstrate that substantial increases in test scores and previous grades usually correspond to substantial increases in later academic performance. Klitgaard is quick to mention that prediction for an individual student is imperfect, but in most situations involving selective universities, using both test scores and previous grades as admission criteria will lead to what seem to be important gains in the later academic performance of the student body as a whole.

ACT

The ACT is a required examination for many colleges and universities for admission consideration. The score range is from 0 to 36, with four major sections: English, reading, mathematics, and science reasoning. Some institutions believe the ACT is the best predictor of college success, while others use the ACT as one of a sacred few measures for predicting the grades of their students (Sedlacek, 1998). The student who consistently scores higher on the ACT is generally better prepared academically as a result of taking a core high school curriculum. These same students usually earn better grades in college (ACT, 1996).

The prediction of college success based upon the ACT scores has been used for many years (Linn, 1993). Controversy exists about using these examinations for college performance prediction. According to Williams (1997), the tests predict course achievement weakly and nothing else. The sole use of ACT scores to predict successful grades in college is not highly endorsed, but the accuracy of prediction increases when the scores are combined with the high school grade point average and rank in class (Merante, 1983). Willingham, Rock, and Pollack (1982) determined in a 10- year longitudinal study that the ACT and high school grades were slightly better predictors of college grades than SAT and high school grades. This validity has been replicated in several recent studies (Bennett, 1997; ACT & The College Board, 1997) that continue to substantiate the use of both ACT and high school grade point average as the two leading predictors for freshman academic success. Some emphasis has been placed on these scores as placement for college level courses. With the correlation to high school grades, minimum scores in one of the four subject areas for admission have also begun to be utilized.

Due to this, many colleges and universities minimum admission requirements are simply two factors: ACT scores and grade point averages. These institutions have developed a sliding scale to compensate for students having a low score on either component. When a deficiency occurs, the other factor must have a higher score than is usually required (ACT & The College Board, 1997). This can greatly assist the student that does not perform well on standardized examinations or has had other problems which lowered the grade point average. These could have been personal issues, special learning needs or other issues which result in the lower grade point average.

Families and high school guidance counselors place great emphasis on the ACT score, to the point of expensive test preparation classes and tutoring. This further explains why many colleges publish minimum standards for admission, rather than gather all the components of data before making an admission decision. The public expects a high score on the ACT or the high school grade point average to guarantee admission. This does not clarify how the most selective institutions in the United States determine which students to admit each year. Academic success in college can be determined by a number of factors, including the selectivity of the institution. The student attending the top tier of schools, the "Ivy's," generally are the best prepared academically and have the highest test scores in their high school.

Campus Residence

With a few exceptions (May, 1974; Moos & Lee, 1979), there is little recent evidence to suggest that when academic ability or previous achievement is held constant, different naturally occurring residence groups (those in dormitories, fraternities or sororities, or off-campus apartments) have a consistently differential influence of

academic achievement (Ballou, 1985). Nevertheless, residence groupings provide a readily available laboratory for enhancing the academic and interpersonal quality of student life. When the formal and informal group norms of a residence unit function to reinforce a serious and focused study environment, academic achievement is positively influenced. This influence is not particularly pervasive or dramatic in magnitude. There is also evidence that experimentally grouping students in residential units by academic aptitude or academic major may positively influence achievement (Pascarella & Terenzini, 1991).

Living on or near campus while attending college is consistently one of the most important determinants of a student's level of integration or involvement in the social system of an institution. Given the links between social integration during college and both persistence and educational attainment, it is not surprising that a considerable body of inquiry has focused on the influence of residence status on these same outcomes. Even when controls were made for important precollege characteristics, such as academic aptitude, socioeconomic status, educational aspirations, and secondary school achievement, across several independent samples, living on campus still exerted a statistically significant positive influence on persistence and on completion of the bachelor's degree (Anderson & Atelsek, 1982; Velez, 1985).

Regardless of the type of college attended, students who live on campus (versus those who commute) have precollege characteristics that make them more likely to obtain the bachelor's degree. Living on campus may provide an additional advantage for those who enter college with individual attributes that make them more likely to exploit and benefit from this advantage. Terenzini and Pascarella (1984) found that when they controlled for individual student characteristics such as academic aptitude, socioeconomic

status, and precollege educational aspirations and commitment to the institution, the average level of institutional commitment in one's residential facility had an additional positive effect on voluntary freshman-year experience. Astin found that without regard to the precollege characteristics, living in a sorority or fraternity house during the freshman year had a statistically significant positive influence on degree completion or continued persistence in college.

A national sample presented by Stewart, Merrill, and Saluri (1985) showed that the commuter student has become the statistical norm in American higher education. These investigators estimated that about 60% of all college students live at home or with parents and commute to higher education campuses for college level academic work. The same estimate is 41% at private four-year colleges and universities. According to the American Council on Education's 1980 study of student housing, more than one-third of the nation's 3,000 postsecondary institutions had no student housing at all (Andersen & Atelsek, 1982; Pascarella & Terenzini, 1991). Living on campus during the freshman year is of greater consequence in four-year colleges and universities than in two-year institutions.

The evidence is quite clear that living on campus rather than commuting to college has a strong positive net effect on persistence and completion of the bachelor's degree (Pascarella & Terenzini, 1991). The impact which supports the effect is the extent to which on-campus residence motivates and facilitates involvement with student peers and faculty. This interaction and activity continues to gain support from studies on the sociological aspect of student success. Limited evidence indicates residential living at a four year institution as opposed to a two year is of greater significance (Pascarella & Terenzini).

Research consistently demonstrates that social integration facilitated by on-campus living plays a significantly more important role in student persistence at residential institutions than at commuter institutions. According to several other studies, living on campus in college-operated facilities has minimal positive net influence on academic achievement (Blimling, 1989). A major difference exists between persistence and positive academic achievement. It should be noted that persistence has as a component academic achievement, which does not require positive increases for degree completion.

Leadership and Employment

Current studies regarding student extracurricular involvement and employment during the high school experience are rather limited in scope and purpose. The research conducted by Weidman (1984) analyzed a national sample of students and determined that extracurricular activities of the student were generally trivial and statistically insignificant. These included student government and organizations developed and operated by students. There were some exceptions for particular majors, but the effects were very small and held no specific patterns.

Smart (1986) conducted a study of factors that influenced one's job after graduation from college and determined that social integration or extracurricular involvement had no direct statistical effect on occupation. The social integration did had a positive statistical relationship with degree attainment. The research of Ryan (1989) presents statistical evidence that athletic participation and student involvement has a positive effect on the development of leadership and interpersonal skills during the

college experience. This activity and interaction provides an opportunity for social integration with students and faculty.

The aspect of student employment and evidence of a positive relationship with academic achievement in college has been minimally investigated. The larger portion of research has been conducted on college students employment and the impact on career choice, degree attainment, and level of professional responsibility attained (Pascarella & Staver, 1985).

Academic Major

As suggested by Weidman (1984) the individual student is more likely to identify with and interact with a number of salient subenvironments, each of which may have a unique influence on aspirations and attainment. One of these salient subenvironments is the student's academic major. Evidence on the net influence of academic major on educational attainment is mixed.

Academic major, like several other subenvironments is selective. That is, the student determines the selection based on any number of personal factors to be determined individually. According to Pascarella and Terenzini (1991), the impact of the major field of study is usually seen in high correlations with college courses in the related subject matter. Logically, when a student is interested in a particular subject, a higher level of motivation is present.

The other researched aspect of college major is not the predictive nature of the grade point average, but the link to career success. This dimension is not addressed in this study, but would hold some logical constructs regarding degree completion.

Demographic Variables

The personal demographic information of the student is not merely words on an application, but represents the cumulative background of the individual. Categories such as race, gender, state of residence, family income, and profession of the parents do not begin to describe the impact each area could hold on the academic achievement, motivation for success, and personal ambition of the student. This demographic information provides a glimpse of the generalities studied thus far.

According to Cole (1997), the most important aspect of studying performance is to not stereotype but to remember the individual student. Although generalities can be inferred, the specific student is to be considered. In general, Whites have a better chance of succeeding in college than other races, and males have a better chance than females (Hood, 1992). Family influence is especially important to freshman success. The maintenance of a compatible familial relationship suggests more likely persistence in college (London, 1996). According to Astin (1993b), freshmen from more affluent and educated families are more likely to succeed than freshmen from poorer and less educated families. This does not come as a surprise to the researcher, but what issues are at stake for the individual student when trying to predict success?

The question of gender bias for college entrance examinations has long been discussed, and the developmental differences of males and females certainly can affect the ability for academic performance. Research by the Educational Testing Service & The College Board (1997) of freshman performance related to SAT-I scores consistently found a higher correlation for females than males. Male students continue to outperform females on the standardized examinations, but females outperform males in all content areas as measured by high school grades. Females have closed the math and science

scores gap, and males continue to fall short in the areas of writing and language skills (Cole, 1997). The freshman grade point average of females is better predicted by test scores and high school grades than that of males (Willingham et al., 1990).

Numerous institutions, and leaders, have invested considerable resources in attracting a more diversified student populations, such as minorities, women, and students from lower socioeconomic backgrounds, in order to sustain programs and maintain enrollments (Creamer & Associates, 1990). With this investment of institutional resources, the predictive outcome is more valuable to the institution. Bowen and Bok (1998) contend that institutions must evaluate students based on societal needs, values, and objectives, and provide opportunity for diverse populations to develop leadership for the future.

Intensive recruitment has succeeded in maintaining enrollments, but traditional high school graduates are more likely to persist to the point of degree completion than are nontraditional students (Tinto, 1987). Consequently, there has been an abundance of research conducted over the past two decades concerning the recruitment and retention of a diverse student population (Noel, Levitz, & Saluri, 1987).

According to Pascarella and Terenzini (1991), the evidence is quite clear that the benefits from obtaining a college degree affect the educational expectation and attainment and are transferred from one generation to the next. The American Council on Education (Hammock, 1999) reports that earning a bachelor's degree increases average wages more than a high school diploma. The study of 1997 degree recipients determined that a college graduate earned 77% more than a high school graduate, as compared with 58% 20 years ago. The available impact of increased family resources provides multiple opportunities for the student to learn in a nontraditional educational manner. Having at

least the bachelor's degree appears to have a positive influence on the educational attainment of children, even when controlling for income, family size, and intelligence of the child (Hammock, 1999).

Students with parents holding college degrees are more likely to attempt and attain the college degree, based on expectation, motivation, and aspiration. The pressure from parents and older siblings can greatly affect college choice. This comprehensive analysis by Pascarella and Terenzini (1991) suggests that much of the long-term impact of legacy is indirect as a result of family resources and that legacy influences educational aspirations and type of institution family members attend.

Retention

The transition to college is often marked by complex personal challenges in emotional, social, and academic adjustment. During the 1970s, educators focused more on why students drop out of college, that is, reasons for attrition. Since the 1970s the focus has shifted to "retention," that is, keeping students enrolled and matriculating toward educational goals. This emphasis has been increasing as the number of new high school graduates has declined (Tinto, 1987). Indications are that students who leave college and later return usually have difficulty adjusting to college during their first year. According to the ACT Program (1998) the average national dropout rate of freshman in college to the sophomore year for students attending private colleges offering the bachelor's degree is 29.2%. This means that 80.8% of freshmen will return for the sophomore year of college at the institution where they attended the freshman year. Of private colleges offering the master's degree, the national average is 24.1%, or 75.9% of the students return for the sophomore year.

The national dropout rate also considers the aspect of admission selectivity. The level of selectivity of an institution can greatly affect the retention of students. The selectivity factor is based upon the middle 50% of the freshman class. For the institution of this study, the selective category most accurately describes the student population, with the middle 50% test score ranges: ACT composite of 22-27, and SAT-I of 1030-1220. These scores describe the majority of the entering freshman class scores.

For students attending selective colleges and universities, the average dropout rate is 18.7%, or 81.3% of the freshman return for the sophomore year. As the degree of admission selectivity increases, the degree of dropout decreases and the retention of students increases (ACT, 1998). The increased retention and reduced dropout rates can be partially attributed to the general nature that most selective institutions have private funding and the student costs are increased. The student will have a higher level of personal expense, and the competition for individual performance is increased.

Most freshmen who leave college are academically eligible to return for the sophomore year, but depart voluntarily (Tinto, 1987). Early studies, such as the National Longitudinal Survey of the High School Class of 1972, indicated that nearly 60 of every 100 first-time entrants to the four-year college sector will leave their first institution of registration without completing their degree program (Eckland & Henderson, 1981). The recent information by ACT (1998) suggests that only the selective and highly selective public institutions, and all levels of private institutions, will surpass those marks, with at least 43.5% of entering freshman completing a college degree (ACT, 1998; Astin, Tsui, & Avalos, 1996).

The more selective institutions as a group tend to graduate a larger portion of their students than the less selective institutions (Tinto, 1987). This could be perceived as a

result of the personal cost financially for attendance at a more selective institution; hence, the price for failure is increased. Equally present is the difference, whether perceived or real, of the institutional ethos existing at most selective institutions. It is the suggestion of Tinto that it is the ethos, and not necessarily the selectivity level, that underlies the low rates of institutional departure of the selective institution.

Nearly 85% of departures by students from their institutions is voluntary. Academic performance is satisfactory, scholarship is usually not an issue, but the departures are the result of personal intentions of the student and a change in commitments or expectations (Tinto, 1987). Only about one-half of all students complete a bachelor's degree within 5 years (ACT, 1998). The 6-year graduation rates of White students is 50%; the same standard for minority graduation is only 25%. The minority population in most institutional types continues to struggle with retention to degree completion (Astin, 1993a).

Summary

The study of success in college has numerous aspects which must be explored. It was the purpose of this study to explore previously researched factors that appear to contribute or not contribute to the success of students in college, and other factors that have no solid research base. Findings of research dealing with retention, persistence, and the academic achievement of students on the national level, along with recognition of obvious parallels with graduation rates, detail that initiatives to hold college freshmen on task throughout the initial year will increase the percentage of freshmen retained the second year, and a greater number of these students are more likely to persist on through to graduation (Astin et al., 1996).

The research continues to consistently validate the use of SAT-I or ACT combined with the high school grades as powerful and accurate of predictors for academic success in college. Even when combined with numerous other factors, the accuracy is only minimally enhanced. The statistical prediction of any individual student is difficult because numerous factors can influence the performance of the individual, causing over- or underachievement.

The research of high school grades combined with SAT-I or ACT, and the findings of certain specific studies on race or college population types creates a contrast of opinion regarding continuous validity for prediction. The individual student is affected by a variety of situations and decisions related to college success. It is the institutional responsibility to determine which factors consistently predict and contribute to the success of its students.

A selected review of literature revealed there is no single factor responsible for student attrition (Tinto, 1987). Numerous identified characteristics of students and their educational environment have a bearing on attrition, retention, and academic achievement. The results of Tinto (1987) have indicated that retention is a complex issue that seldom has a single cause but involves the interaction of different variables. Recognized variables have included factors related to student characteristics and student institutional interaction; academic aptitude and performance; level of aspiration and motivation; institutional type, image, and student services offered; and student involvement (Astin, 1993b).

CHAPTER 3

METHODOLOGY

Previous research has revealed that the academic preparation and achievement in high school can greatly assist in determining success at the collegiate level (Pascarella & Terenzini, 1991). It has also been determined that the freshman year grade point average has a significant relationship with the student completing the bachelor's degree and represents an important index of student accomplishment (Astin, 1993b).

The purpose of this study was to examine the relationship of academic achievement during high school and the influence of selected pre-enrollment variables of gender, race, religious affiliation, ACT composite score, SAT-I, type of high school attended, high school grade point average, core high school grade point average, rank in class, living accommodations in college, state of permanent residence, high school leadership, family income, employment, legacy or college major on the grade point average of students during the freshman year of college.

This chapter summarizes the research design of the study with a restatement of the research question, information regarding the population and the subjects selected for the study, description of the instrumentation and materials used to determine data relevance to the research question, and methods used to analyze the data.

Research Question

To what extent are gender, race, religious affiliation, ACT composite score, SAT-I score, type of high school attended, high school grade point average, core high school grade point average, rank in class, living accommodations in college, state of permanent residence, high school leadership, family income, employment, legacy or college major, individually or in combination with another, related to freshman grade point average of the student? If a relationship is found, what is the best predictive model?

Selection of the Population

The population for this study was all first-time, full-time freshmen entering college with the purposeful sample of a southern, private institution. The institution is comprehensive in composition and has a total enrollment of 4,500 students. The campus is located within 15 miles of a major metropolitan and attracts students from numerous states. The three year study ($N = 2,045$) of the entering fall semester freshmen (1995, $n = 656$; 1996, $n = 651$; 1997, $n = 738$) covered the period from 1995 to 1997. Out of the 2,045 freshmen included in the study, 1,266 (61.9%) were female and 779 (38.1%) were males. Of the 2,045 freshmen included in the study, 1,944 (94.6%) were Caucasian and 101 (5.4%) were minority. Of the 2,045 freshmen included in the study, 1,161 (56.8%) were Baptist and 884 (43.2%) were minority. The 2,045 freshmen of this study included 720 (35.2%) as Alabama residents and 1,325 (64.8%) as nonresidents of Alabama. The data on gender, race, religion, and residency are summarized in Table 1.

Table 1

Freshman Data 1995-1997

Variable	n
Gender	
Female	1,266
Male	779
Race	
Caucasian	1,944
Minority	101
Religion	
Baptist	1,161
Non-Baptist	884
Residency	
Alabama resident	720
Out of state residents	1,325

All data analyzed had a minimum of 20 subjects per level of each variable. The institution is larger than the average southern, private college, with a total enrollment of 4,400. Current enrollment stability provides an opportunity for study. The freshman retention rate of the 1997 cohort was 82.77%, an increase over the previous years, with more than 75% of those nonreturning after the freshman year academically eligible to return (Fact Book [name of institution], 1998).

Research Design

A descriptive correlational design was used to obtain data on the nature and strength of the relationships between the variables in the study. The method utilized was multiple comparisons between gender, race, religious affiliation, ACT composite score, SAT-I score, type of high school attended, high school grade point average, core high school grade point average, rank in class, living accommodations in college, state of

permanent residence, high school leadership, family income, employment, legacy or college major and the dependent variable, freshman grade point average.

This study was designed to investigate whether a student's personal and demographic data, high school type, and family resources are an acceptable predictor of his or her success in the freshman year of college as measured by the freshman grade point average. This study also determined whether certain variables, singly or in combination, were more predictive than others of the freshman grade point average. The criterion variable for the study was freshman grade point average, which was predicted with variables such as ACT composite score, core grade point average, high school grade point average, etc. This was done using multiple regression analysis. This model allowed the researcher to address and identify the strength and direction of the relationship between the criterion variable and the predictor variables.

Method of Data Collection

The source of the data for this study was archival in nature. Data were secured from the student records at the institution from the Office of Admission and Financial Aid. Data for the use of this study were gathered in the following manner:

1. The researcher requested formal written permission of the Institutional Review Board (IRB) to collect data relative to the study. An IRB expedited review was requested and approved for the study, which did not include persons under the age of 14 years, as mandated by the University of Alabama at Birmingham (Appendix);

2. The archival data, including all variables for the study, were secured from the database of the selected institution for the study. The Offices of Admission and Financial

Aid assisted in the data retrieval. All data were coded in such a manner as to provide confidentiality of the individual. The data were downloaded into a spreadsheet file and imported into the SPSS for Windows format for analysis;

3. The data files were retained at all times in a secure location at the researcher's office or residence.

Method of Data Analysis

The following methods were used to analyze the research question of this study. The scope and purpose of this study required the data to be analyzed using a quantitative methodology, and multiple regression was the statistical procedure employed. The statistics were computed using the Statistical Package for the Social Sciences (SPSS) Version 9.0 and SAS software, version 7.0. The selection of multiple regression was due to the number of type of dependent variables in the analysis as well as the number and type of independent variables (Huberty, 1989; Draper & Smith, 1981). According to Huberty (1989), when the dependent variable is continuous and the independent variables are a combination of continuous or dichotomous type data, multiple regression should be used.

For the research question, the .05 alpha level was used for the initial test of statistical significance. The specific techniques under multiple regression were used as related to the research question. The Pearson product moment technique was used to determine whether there was an independent statistically significant relationship between the criterion variable, freshman grade point average, and the set of 43 predictor variables. The number of subjects, means, and standard deviations for each of the independent

variables were reported. The use of all 43 variables, without regard to statistical significance, was employed to test the "full" level of practical significance on the model. Each statistically significant independent variable was regressed to determine the level of meaningful contribution of each independent variable to the dependent variable. The primary objective of this analysis was to obtain statistics for the full model for comparison with other models for predictive accuracy.

In this analysis, the dependent variable, freshman grade point average, was a continuous variable. The independent variables of ACT composite score, core grade point average, high school grade point average, and rank in class were also continuous variables. Rank in class is expressed as a percentage. However, the remaining independent variables were categorical and were recoded as dichotomous variables with a value of one or zero (Table 2) to facilitate the analyses.

Table 2

Variables and Levels Used in Study

Variable	Levels
Continuous	
ACT composite score	Composite score of 00-36
Core high school grade point average	Core High School GPA of 0.00-5.22
High school grade point average	High school grade point average of 0.00-5.55
Rank in class	Class rank as described by a percentage
Freshman grade point average	College grade point average after two college semesters on a 0.00 - 4.00 scale
Dichotomous	
Band	1= Band involvement, 0= No involvement
Boys or girls state	1= Boys/girls state involvement; 0= No involvement
Choir	1= Choir involvement; 0= No involvement
Church	1= Church involvement; 0= No involvement

Table 2. (Continued)

Variable	Levels
Class officer	1= Class officer; 0= No involvement
Art majors	1= College majors of art, art education, graphic design, interior art, interior design 0= All others
Business majors	1= College majors in the School of Business 0= All others
Communication majors	1= College majors of journalism, mass communication, speech communication and theatre 0= All others
Education majors	1= College majors in the School of Education 0= All others
Humanities majors	1= College majors of Congregational studies, English, French, German, language arts, language and world trade, philosophy and religion, Spanish, religion, history 0= All others
Music majors	1= College majors in the School of Music 0= All Others
Natural science or mathematics	1= College majors of biology, chemistry, computer science, environmental geographical information systems, environmental physics, forestry, mars, mathematics, pre-dentistry, physics, pre-medicine, pre-engineering, pre-optometry 0= All others
Nursing majors	1= College majors in the School of Nursing 0= All others
Pharmacy majors	1= College majors in the School of Pharmacy 0= All others
Social science majors	1= College majors of social science, sociology, social studies, pre-law, political science, psychology, religion 0= All others
Undecided majors	1= College majors of undecided 0= All others
Debate	1= Debate involvement; 0= No involvement

Table 2. (Continued)

Variable	Levels
Drama	1= Drama involvement; 0= No involvement
Gender	1= Female; 0=male
Governor's school	1= Governor's School involvement 0= No involvement
Housing	1= Housing in college residence hall 0= Housed off campus
High school type	1= Public high school; 0= All others
Legacy	1= Legacy status; 0= No legacy status
Newspaper staff	1= Newspaper involvement 0= No involvement
National honor society	1= National honor society involvement 0= No involvement
Political club	1= Political organization involvement 0= No involvement
Club president	1= President of club or organization 0= Not president of club or organization
Race	1= Caucasian; 0= All others
Religion	1= Baptist; 0= All others
Scouts	1= Scout involvement; 0= No involvement
Student Government	1= Student Government involvement 0= No involvement
Sports	1= Athletic involvement 0= No involvement
Senior class officer	1= Senior class officer; 0= Not an officer
Alabama resident	1= Resident of Alabama; 0= Non-Resident
Other state resident	1= Resident of Florida, Georgia, Mississippi, Tennessee 0= Non-Resident
Volunteer service	1= Demonstrated volunteer service 0= No service
Student employment	1= Work during the high school years 0= No work during the high school years
Yearbook staff	1= Involvement in the yearbook 0= No involvement

The regression sampling was the entire data set for the three year study. The assumptions of normality, homoscedasticity, and collinearity have been reviewed in the analysis and are appropriate for the use of the procedure.

The results of this analysis provided correlation coefficients, Pearson product-moment correlation technique, for each of the 43 variables in the analysis regressed on freshman grade point average. The correlation coefficients of the variables having statistical significance were used to construct the predictive model. The multiple regression was the statistical procedure employed to determine whether any of the 43 variables were more predictive than others of freshman grade point average, singly or in combination. The SAS RSQUARE procedure was used to initially determine possible prediction models. Variables were selected based on error variance and the level of variance explained by each set of variables.

The process of model building to determine the most effective variables for predicting freshman grade point average was to group significant variables and determine which model was most effective in predicting freshman grade point average. The following information was used to help select the variables for the model: Pearson product moment correlation coefficient, multiple correlation squared (R^2), standard error of the estimate, Durbin-Watson statistic, degrees of freedom, analysis of variance (ANOVA) table, multicollinearity diagnostics, outlier influence, and the significance level for each coefficient based on t tests values.

In determining the best model, the following criteria were used: reduction of the degrees of freedom, reduction of the mean square error and increased R square.

Instrumentation

Instruments per se were not used. Data obtained were archival in nature, and validity measures at the university review data for accuracy and integrity. The procedures in the Offices of Admission and Institutional Research mandate review and data correction prior to archival. The personnel of those offices are responsible for validity for university reporting purposes.

The data were analyzed using quantitative analysis to determine whether there was a significant positive relationship between the any of the 43 prematriculation variables and the students' freshman grade point average. The analysis determined whether any of the 43 personal or demographic variables, singly or in some combination, significantly influenced prediction of the freshman grade point average in the years 1995-1997. The freshman grade point average was a standard 4.0 scale of continuous data carried to the thousandth decimal point, which is normally acceptable in higher education. The data for the analysis were collected from the institutional database by the Office of Admission for freshmen enrolled for the fall semester in the years 1995-1997. The names of the individuals and personal information were not used, to prevent identification of any individual in the study.

Validity and Reliability of the Data

The predictive model of criterion-related validity was used to determine the correlations between the freshman grade point average and the 43 prematriculation variables. This method employs correlations, known as validity coefficients or regression

coefficients, to describe the strength and direction of relationship between a predictor and a dependent variable, or criterion. The predictor variables were derived from the materials submitted by freshmen on the application for admission to the institution, and the dependent variable, or criterion, is the cumulative grade point average at the end of the freshman year in college.

The institution being studied is in good standing with the regional accrediting body, the Southern Association of Colleges and Schools (SACS), as well as numerous other accrediting organizations specific to college, school, or program. Annual student and financial data reports are submitted to state and federal authorities, as well as private auditors, for verification. All data are verified upon the enrollment of the student for accuracy. The test score of record, ACT composite, is directly received and maintained from the respective testing agency. This examination has long been the subject of studies regarding admission decisions for colleges and universities, and although the agencies do not advise the exclusive use of these examinations as admission tests, or as the single criterion for admission to postsecondary education, institutions use these examinations because there is no national admission test for undergraduate study.

Limitations

This study examined 43 independent variables and by calculation had the possible production of over 38 million models for predicting freshman grade point average. The RSQUARE statistical procedure in SAS was considered, but given the extensive number of possible models, another model building strategy was applied. A four-point approach was used to determine which model was most efficient and effective in predicting

freshman grade point average. First, a minimum statistically significant relationship ($p < .01$) must be found. Then a forward stepwise regression was used to determine the upper boundary of predictive value to the model, and the backward stepwise regression was used to determine the lower boundary of predictive value to the model. The forward and backward stepwise regression in SPSS was used to bracket the variables with the greatest predictive contribution of freshman grade point average. Finally, the appropriate model was selected from those variables identified in the first three steps.

Another limitation for the study was the intercorrelation of certain variables. Independent variables with significant correlation to one another did not require removal from model building. The purpose of the study was to predict freshman grade point average. The correlation of two or more variables to predict freshman grade point average was allowed when R square was increased.

The subject size for all 43 variables were above the stated minimum of 20 for observation. When considered as a percentage of the sample ($N = 2,045$), certain variables were statistically significant but lacked practical significance in application to the population. This was due to a low percentage of the sample size.

Summary

This analysis used a descriptive correlational design to determine whether prematriculation variables, personal and demographic, have a significant relationship with freshman grade point average. The population was the freshman classes for three years, 1995-1997. Categorical data were recoded as dichotomous data, allowing regression with the dependent variable freshman grade point average. The multiple

regression procedure was used to analyze the data and to compute statistics to build a predictive model. Finally, this study utilized the computed statistics for predicting actual freshman grade point averages to determine the adequacy of the model.

CHAPTER 4

RESULTS

This study was a descriptive correlational investigation, the primary purpose of which was to investigate the relationships between the dependent variable, freshman grade point average, and the 43 independent variables of prematriculation information. The independent variables were personal and demographic information. The results of this analysis are presented in the following order: descriptive statistics and analyses for tests of relationships conducted as initial screening of freshman demographic data for the 43 variables with freshman grade point average; predictive model building of statistically significant variables and testing the model with actual data; and a summary of results.

Description of Data

The data collected for the study included 43 independent variables and the dependent variable of freshman grade point average. A description of each variable was previously summarized in Table 2.

Freshman Variable Descriptives

Before conducting the main analysis, initial screening procedures were conducted on the freshman demographic data furnished by the institution of the study. The three years of freshmen 1995-1997 ($\underline{N} = 2,045$), provided an mean ACT score of 24.74, core grade point average of 3.4673, high school grade point average of 3.5192, rank in class of

78.63, family adjusted gross income of 76,774.12, and a freshman grade point average of 2.8404. Variable descriptions and data are summarized in Table 3.

Table 3

Freshman Variable Data 1995-1997

Quantitative variables	n	%	M	SD
ACT	2,035	99.51	24.74	3.57
Core grade point average	1,913	93.35	3.4673	.5082
Freshman grade point average	2,045	100.00	2.8404	.7559
High school grade point average	2,019	98.73	3.5192	.4666
Parents adjusted gross income	1,315	64.30	76,774.12	57,884.56
Rank in class	1,602	78.34	78.63	18.47
Gender				
Female	1,266	61.9		
Male	779	38.1		
Race				
Caucasian	1,944	95.1		
Minority	101	4.9		
Religion				
Baptist	1,161	56.8		
Non-Baptist	884	43.2		
Residency				
Alabama resident	720	35.2		
Out of state residents	1,325	64.8		
Band	165	8.1		
Boys or girls state	112	5.5		
Choir	126	6.2		
Church	618	30.2		
Class officer	116	5.7		
Art majors	31	1.5		
Business majors	210	10.3		
Communication majors	113	5.5		
Education majors	273	13.3		
Humanities majors	100	4.9		
Music majors	87	4.3		
Natural science and math majors	270	13.2		
Nursing majors	112	5.5		
Pharmacy majors	88	4.3		
Social science majors	191	9.3		
Undecided majors	563	27.5		

Table 3 (Continued)

Quantitative Variables	n	%	M	SD
Debate	20	1.0		
Drama	118	5.8		
Governors school	89	4.4		
Housing	1,884	92.1		
High school type	1,409	68.9		
Legacy	386	18.9		
Newspaper	89	4.4		
National honor society	945	46.2		
Political club	55	2.7		
President of club	20	1.0		
Scouts	43	2.1		
Student government	486	23.8		
Sports	975	47.7		
Sr. class officer	174	8.5		
Volunteer service	366	17.9		
Student employment	467	22.8		
Yearbook staff	199	9.7		

Relationship of Independent Variables to Dependent Variable

The purpose of this study was to determine the relationship between the 43 independent variables and the dependent variable, freshman grade point average. The analysis examined this relationship to determine whether significant statistical differences exist among the independent variables. Categorical data were recoded to dichotomous variables before analysis. The initial correlation of the 43 prematriculation variables produced 25 variables with statistically significant levels of correlation ($p < .01$, two-tailed) with the dependent variable freshman grade point average. These variables are shown in Table 4.

The 25 statistically significant variables were reviewed to determine which variables provided the greatest individual significance. The variables with greatest

individual relationship ($r > .10$) were selected ($n = 14$) for use in the prediction model building and are found in Table 5.

Table 4

Variables Significantly Related to Freshman Grade Point Average

Variable	r	p
Act	.483	.000
Band	.073	.001
Boys or girls state	.120	.000
Core grade point average	.607	.000
Choir	.058	.004
Church	.168	.000
Class officer	.069	.001
Business	-.056	.005
Communication major	.053	.008
Drama	.051	.011
Gender	.141	.000
Governor's school	.125	.000
Housing	.167	.000
High school grade point average	.603	.000
Newspaper staff	.055	.007
National honor society	.384	.000
Club president	.065	.002
Race	.133	.000
Religion	.059	.004
Rank in class	.548	.000
Student government	.123	.000
Senior class officer	.105	.000
Volunteer service	.138	.000
Student employment	.070	.001
Yearbook staff	.098	.000

Table 5

Statistically Significant Independent Variables with Correlations Exceeding .10

Variable	r	p
ACT	.483	.000

Table 5 (Continued)

Variable	r	p
Core grade point average	.607	.000
Church	.168	.000
Gender	.141	.000
Governor's school	.125	.000
Housing	.167	.000
High school grade point average	.603	.000
National honor society	.384	.000
Race	.133	.000
Rank in class	.548	.000
Student government	.123	.000
Sr. class officer	.105	.000
Volunteer service	.138	.000

Research Question

To what extent do gender, race, religious affiliation, ACT composite score, type of high school attended, high school grade point average, core high school grade point average, rank in class, living accommodations in college, state of permanent residence, high school leadership, family income, employment, legacy or college major, individually or in combination with another, are related to freshman grade point average of the student? If a relationship is found, what is the best predictive model?

Findings

The multiple regression procedure was used to determine the predictability of the statistically significant independent variables on freshman grade point average.

The process of predictive model building to determine the most effective variable for predicting freshman grade point average was initially to determine the highest eta square using all variables. The multiple regression procedure of modeling reviewed

levels of the R square, standard error of the estimate, Durbin-Watson statistic, degrees of freedom, ANOVA table, and the statistical significance for each model by analyzing the *t* values and the Beta values. The full model regression with all 43 independent variables yielded an $\underline{R}^2 = 46.10\%$.

Selection of the Model

In determining the model selected, the objective of the categories scrutinized were reduction of the degrees of freedom, reduction of the standard error, reduction of the mean square error, reduction of the predicted error and increased level of the multiple correlation squared. By using the procedures previously described, three possible models were identified: models with 3, 6, and 14 independent predictor variables. The full model included all 43 independent variables. The 3 variable model included the varibles of ACT composite score, core grade point average and rank in class. The 6 variable model included ACT composite score, core grade point average, housing status, high school grade point average, rank in class and church leadership. The 14 variable model included core grade point average, high school grade point average, rank in class, ACT composite score, National honor society leadership, church leadership, housing status, gender, volunteer service, race, Governor's school, student government association, boys or girls state, and senior class officer. The four models and the contribution for prediction are listed in Table 6.

Table 6

Models for Prediction of Freshman Grade Point Average

Model	df	F	MS_{Error}	R^2
Full	44	19.153	.281	.461
Fourteen variable	14	83.40	.288	.435
Six variable	6	192.737	.289	.432
Three variable	3	360.919	.296	.415

The model with the 6 independent variables of ACT composite score, core grade point average, housing status, high school grade point average, rank in class, and church leadership provided the most significant level of reviewed factors, and the prediction of the freshman grade point average at a 95% confidence level of the range produced an R^2 of 43.20 %, a standard error of .5373, a mean square error of .289, a F value of 192.737, 6 degrees of freedom, and all six predictor variables had significant beta values.

A prediction equation was generated to predict freshman grade point average: Freshman Grade Point Average=

0.877 + .003606 (ACT composite score) + .423 (core grade point average)

+ .263 (housing status as resident) + .210 (high school grade point average)

+ .0004799 (rank in class) + .008262 (church leadership)

The purpose of the study was to correctly predict the freshman grade point average for individual cases. In order to validate the prediction model, it was applied to a new set of data. The selected model was used to predict freshman grade point averages of the 1998 freshman class, which were compared with the actual grade point averages. A summary of grade point average comparisons is shown in Tables 7 and 8.

Table 7

1998 Actual and Predicted Freshman Grade Point Averages (N = 464)

GPA	Actual	%	Predicted	%	Accuracy %
< 3.50	343	73.92	413	89.01	120.41
< 3.00	228	49.14	239	51.51	104.82
< 2.50	112	24.14	94	20.26	83.93
< 2.00	51	10.99	20	4.31	39.22

The prediction model greatly underpredicted grade point averages the lower the grade point average (<2.00, 39.22%) and slightly overpredicted grade point averages at the higher level (<3.50, 120.41%). The predicted grade point average in the combined middle levels (<3.00 + <2.50, 97.94%) yielded a highly accurate prediction of grade point average.

Table 8

1998 Actual and Predicted Ranges of Freshman Grade Point Averages (N = 464)

Grade Point Average	Actual	%	Predicted	%
3.51 - 4.00	121	26.08	51	10.99
3.01 - 3.50	115	24.78	174	37.50
2.51 - 3.00	116	25.00	145	31.25
2.01 - 2.50	61	13.15	74	15.95
< 2.00	51	10.99	20	4.31

The prediction model underpredicted grades of the 1998 freshman class (N = 454) for the higher and lower grade point averages (3.51-4.00, 42.15%; <2.00, 39.22%) and

greatly overpredicted in the prediction for the combined middle portion (2.01-3.50, 134.46%) of the grade point averages. When the top four levels were combined to predict a grade point average above 2.00, the prediction model only slightly overpredicted the grade point average (2.01-4.00, 107.51%) with 444 grade point averages predicted and 413 actual grade point averages.

The freshman grade point averages most important for this study were the minimum grade point average needed to remain in academic good standing and not be placed on academic probation (1.7), the minimum grade point average needed to maintain eligibility for financial aid assistance (2.0), and the minimum grade point average needed to renew university-based academic scholarships (3.0). A summary of the critical grade point averages for freshman is listed in Table 9.

Table 9

Critical Freshman Grade Point Averages of the 1998 Freshman (N = 464)

Grade point average		Actual	Predicted	% Correct
Academic Probation	≥1.70	452	456	100.88
	<1.70	12	8	66.67
Financial Aid	≥2.00	413	444	107.51
	<2.00	51	20	39.22
Scholarship	≥3.00	236	225	95.34
	<3.00	228	239	104.82

The model predicted with high accuracy the number of students to remain eligible for continuing academic study not on probation (456/452, 100.88%) but underpredicted

those students placed on academic probation (8/12, 66.67%). The number of students eligible to continue financial aid was slightly overpredicted by the model (444/413, 107.51%), and the model greatly underpredicted those students not eligible for financial aid as sophomores (20/51, 39.22%). The model slightly underpredicted students eligible to renew academic scholarships (225/236, 95.34%) and slightly overpredicted students not eligible to renew academic scholarships (239/228, 104.82%). In general, the model predicted with high accuracy for the three critical freshman grade point average categories.

Race

The institution studied had particular interest in the prediction of freshman grade point averages based on the race of the student. The percentage of minorities represented in the 1995-1997 freshman classes was relatively low as shown in Table 3.

Relationship of Independent Variables to Dependent Variable

Further analysis and predictive modeling was utilized to determine whether statistical differences exist among the independent variables and the dependent variable when race was of primary consideration. The initial correlation of the 43 prematriculation variables produced five variables with statistically significant levels of correlation ($p < .01$, two-tailed) with the dependent variable freshman grade point average when race was considered. These variables are located in Table 10.

Table 10

Variables Significantly Related to Freshman Grade Point Average (Race)

Variable	r	p
ACT	.493	.000
Core grade point average	.637	.000
High school grade point average	.615	.000
High school type	-.304	.002
Volunteer service	.316	.001

The five statistically significant variables were reviewed to determine which variables provided the greatest individual significance. All of the variables were selected for use in the prediction model building. The forward and backward stepwise regression in SPSS was used to determine the best predictive model.

Findings

The multiple regression procedure was used to determine the predictability of the statistically significant independent variables on freshman grade point average.

The process of predictive model building to determine the most effective variable for predicting freshman grade point average was initially to determine the highest eta square using all variables. The multiple regression procedure of modeling reviewed levels of the R square, standard error of the estimate, Durbin-Watson statistic, degrees of freedom, ANOVA table, and the statistical significance for each model by analyzing the *t* values and the beta values. The full model regression with all five independent variables yielded an $R^2 = 44.70\%$.

Selection of the Model

In determining the model selected, the objective of the categories scrutinized were reduction of the degrees of freedom, reduction of the standard error, reduction of the mean square error, reduction of the predicted error and increased level of R square. Using the procedures previously described, four possible models were identified: models with 2, 3, 4, and all five independent predictor variables. The full model and models consisting of 2, 3, and 4 independent variables and the contribution for prediction are listed in Table 11.

The model with the three independent variables of core grade point average, ACT composite score, and high school type provided the most significant level of reviewed factors, and the prediction of the freshman grade point average at a 95% confidence level of the range produced an R^2 of 43.90 %, a standard error of .6273, a mean square error of .393, a F value of 21.378, 3 degrees of freedom, and all three predictor variables had significant beta values.

A prediction equation was generated to predict minority student freshman grade point average:

Freshman grade point average=

-0.568 + .004688 (ACT composite score) + .697 (core grade point average)

- .207 (high school type)

Table 11

Models for Prediction of Freshman Grade Point Average (Race)

Model	df	F	MS_{Error}	R^2
Full	5	12.466	.393	.447
Four	4	15.493	.391	.443
Three	3	21.378	.393	.439
Two	2	31.427	.394	.431

The purpose of the study was to correctly predict the freshman grade point average for individual cases. In order to validate the prediction model, it was applied to a new set of data. The selected model was used to predict freshman grade point averages of the 1998 freshman class, which were compared with the actual grade point averages. A summary of grade point average comparisons is found in Tables 12 and 13.

The prediction model accurately predicted grade point averages with the exception of the lowest category grade point average (<2.00, 50.00%).

Table 12

1998 Actual and Predicted Freshman Grade Point Averages (n = 29) Race

G.P.A.	Actual	%	Predicted	%	Accuracy %
< 3.50	27	93.10	27	89.01	100.00
< 3.00	24	82.76	22	75.86	91.67
< 2.50	16	55.17	14	48.28	87.50
< 2.00	10	34.48	5	17.24	50.00

Table 13

Accuracy Rates of Race Prediction Model

Grade point average	Predicted, present	Predicted, not present	Not predicted, present	Not predicted, not present
3.51 - 4.00	1.00	0.00	0.00	1.00
3.01 - 3.50	.75	.33	.04	1.04
2.51 - 3.00	.56	.38	.19	1.05
2.01 - 2.50	.44	.33	.22	1.15
< 2.00	.60	.70	.11	.79

The prediction model greatly underpredicted grades of the 1998 freshman class (n = 29) for the lowest grade point averages (<2.00) and slightly overpredicted in the prediction for the combined middle portion (2.01-3.50) of the grade point averages.

The freshman grade point averages most important for this study were the minimum grade point average needed to remain in academic good standing and not be placed on academic probation (1.7), the minimum grade point average needed to maintain eligibility for financial aid assistance (2.0), and the minimum grade point average needed to renew university-based academic scholarships (3.0). A summary of the critical grade point averages for freshman are listed in Table 14.

Table 14

Critical Freshman Grade Point Averages of the 1998 Freshman (n = 29) Race

Grade point average		Actual	Predicted	% Correct
Academic probation	≥1.70	20	25	125.00
	<1.70	9	4	44.44
Financial aid	≥2.00	19	24	126.32
	<2.00	10	5	50.00

Table 14 (Continued)

Grade point average		Actual	Predicted	% Correct
Scholarship	≥3.00	5	7	140.00
	<3.00	24	22	91.67

The model overpredicted the number of students to remain eligible for continuing academic study not on probation (20/25, 125.00%) but greatly underpredicted those students placed on academic probation (4/9, 44.44%). The students eligible to continue financial aid was slightly overpredicted by the model (19/24, 126.32%), and the model greatly underpredicted those students not eligible for financial aid as sophomores (10/5, 50.00%). The model greatly underpredicted students eligible to renew academic scholarships (5/7, 140.00%) and slightly underpredicted students not eligible to renew academic scholarships (24/22, 91.67%).

Given the small size of the minority population studied in the 1998 freshman class, the impact of one student per grade point average category greatly affected the percentage of accuracy.

Gender

The institution studied had particular interest in the prediction of freshman grade point averages based on the gender of the student. The percentage of male students represented in the 1995-1997 freshman classes was relatively low as shown in Table 3.

Relationship of Independent Variables to Dependent Variable

Further analysis and predictive modeling was utilized to determine whether statistical differences existed among the independent variables and the dependent variable when gender was of primary consideration. The initial correlation of the 43 prematriculation variables produced 15 variables with statistically significant levels of correlation ($p < .01$, two-tailed) with the dependent variable freshman grade point average when gender was considered. These variables are located in Table 15.

Table 15

Variables Significantly Related to Freshman Grade Point Average (n = 779) Gender

Variable	r	p
ACT	.496	.000
Band	.100	.005
Boy or girls state	.212	.000
Core grade point average	.664	.000
Choir	.125	.000
Church leadership	.159	.000
Governor's school	.132	.000
High school grade point average	.615	.000
Housing	.109	.002
National honor society	.429	.000
Race	.138	.000
Rank in class	.602	.000
Student government	.139	.000
Senior class officer	.121	.001
Volunteer service	.131	.000

The 15 statistically significant variables were reviewed to determine which variables provided the greatest individual significance. All of the variables were selected for use in the prediction model building. The forward and backward stepwise regression in SPSS was used to determine the best predictive model.

Findings

The multiple regression procedure was used to determine the predictability of the statistically significant independent variables on freshman grade point average.

The process of predictive model building to determine the most effective variable for predicting freshman grade point average was initially to determine the highest R square using all variables. The multiple regression procedure of modeling reviewed levels of the R square, standard error of the estimate, Durbin-Watson statistic, degrees of freedom, ANOVA table, and the statistical significance for each model by analyzing the *t* values and the beta values. The full model regression with all 15 independent variables yielded an $R^2 = 50.5\%$.

Selection of the Model

In determining the model selected, the objective of the categories scrutinized were reduction of the degrees of freedom, reduction of the standard error, reduction of the mean square error, reduction of the predicted error and increased level of the R square. Using the procedures previously described, five possible models were identified: models with 3, 4, 5, 9, and all 15 independent predictor variables. The full model and models consisting of 3, 4, 5, 9, and 15 independent variables and the contribution for prediction are listed in Table 16.

Table 16

Models for Prediction of Freshman Grade Point Average (Gender)

Model	df	F	MS_{Error}	R^2
Full	15	36.365	.278	.505
Nine Variable	9	56.778	.314	.471
Five Variable	5	108.716	.276	.499
Four Variable	4	134.067	.277	.496
Three(a) Variable	3	177.879	.281	.493
Three(b) Variable	3	204.515	.293	.467

The model with the three independent variables of core grade point average, high school grade point average, and rank in class provided the most significant level of reviewed factors, and the prediction of the freshman grade point average at a 95% confidence level of the range produced an R^2 of 49.30 %, a standard error of .5302, a mean square error of .281, a F value of 177.879, 3 degrees of freedom, and all three predictor variables had significant beta values.

A prediction equation was generated to predict minority student freshman grade point average:

Freshman grade point average=

-0.429 + .5697 (core grade pointaAverage) + .005107 (rank in class)

+ .266 (high school grade point average)

The purpose of the study was to correctly predict the freshman grade point average for individual cases. In order to validate the prediction model, it was applied to a new set of data. The selected model was used to predict freshman grade point averages of the 1998 freshman class, which were compared with the actual grade point averages. A summary of grade point average comparisons is found in Tables 17 and 18.

Table 17

1998 Actual and Predicted Freshman Grade Point Averages (n = 166) Gender

G.P.A.	Actual	%	Predicted	%	Accuracy %
< 3.50	145	87.35	163	98.19	112.41
< 3.00	106	63.86	121	72.89	114.15
< 2.50	62	37.35	74	44.58	119.35
< 2.00	30	18.07	24	14.46	80.00

The prediction model greatly over predicted grade point averages with the exception of the lowest category grade point average (<2.00, 80.00%), which was under-predicted.

Table 18

Accuracy Rates of Gender Prediction Model

Grade point average	Predicted, present	Predicted, not Present	Not predicted, present	Not predicted, not present
3.51 - 4.00	.67	.90	.01	.89
3.01 - 3.50	.47	.26	.26	1.22
2.51 - 3.00	.40	.57	.23	1.03
2.01 - 2.50	.30	.72	.16	.99
< 2.00	.29	.76	.13	.96

The prediction model greatly underpredicted grades of the 1998 freshman class (n = 166) for the highest grade point averages (3.51-4.00), but when combined with the second highest grade point average (3.01-3.50) there was only a slight overprediction. The lowest grade point average was also underpredicted (<2.00).

The freshman grade point averages most important for this study were the minimum grade point average needed to remain in academic good standing and not be placed on academic probation (1.7), the minimum grade point average needed to maintain eligibility for financial aid assistance (2.0), and the minimum grade point average needed to renew university-based academic scholarships (3.0). A summary of the critical grade point averages for freshman is listed in Table 19.

Table 19

Critical Freshman Grade Point Averages of the 1998 Freshman (n = 166) Gender

Grade point average		Actual	Predicted	% Correct
Academic probation	≥1.70	152	159	104.61
	<1.70	14	7	50.00
Financial aid	≥2.00	136	142	104.41
	<2.00	30	24	80.00
Scholarship	≥3.00	60	65	108.33
	<3.00	106	101	95.28

The model slightly overpredicted the number of students to remain eligible for continuing academic study not on probation (152/159, 104.61%) but greatly under-predicted those students placed on academic probation (14/7, 50.00%). The students eligible to continue financial aid was slightly overpredicted by the model (136/142, 104.41%), and the model slightly underpredicted those student not eligible for financial aid as sophomores (30/24, 80.00%). The model slightly overpredicted students eligible to renew academic scholarships (60/65, 108.33%) and slightly underpredicted students not eligible to renew academic scholarships (106/101, 95.28%).

Summary

The results of initial screening of the 43 freshmen variables yielded 28 variables having a statistically significant correlation to the dependent variable freshman grade point average. The 28 variables were reduced to those having great statistical significance ($r > .10$). The variables were tested in multiple regression techniques for predictive modeling levels of R square, standard error of the estimate, Durbin-Watson statistics, degrees of freedom, and ANOVA table. The significance for each coefficient model was compared to other models by analyzing t values and the beta values. Four models resulted from the regression analysis and provided comparison with actual freshman grade point averages from the freshman class of 1998. The full model ($n = 43$) produced an R^2 of 46.10 %, a standard error of .5303, a mean square error of .281, a F value of 19.153, and 44 degrees of freedom. The model composed of six variables (ACT composite score, core grade point average, housing status, high school grade point average, rank in class, and church leadership) produced a R^2 of 43.20 %, a standard error of .5370, a mean square error of .289, a F value of 192.737, six degrees of freedom, and all predictor variables had significant beta values.

The selected predictive model data were cross validated with actual 1998 freshman grade point average data for accuracy of prediction. The model greatly under-predicted the grade point average below 2.00 (39.22%) but only slightly overpredicted the grade point averages above 2.00 (107.51%). The model predicted 444 grade point averages above 2.00, and 413 actual grade point averages were above 2.00. The critical grade point averages for the 1998 freshmen were 1.70 for academic probation, 2.00 for financial aid assistance, and 3.00 for academic scholarship renewal. The model predicted

with high accuracy every category of grade point average except those students not eligible to return for the sophomore year (66.67%) and students not eligible for financial aid renewal (39.22%).

Models were also analyzed with identical guidelines for predictive accuracy for race and gender preferences. The model selected for race preference was the model with the three independent variables of core grade point average, ACT composite score, and high school type provided the most significant level of reviewed factors, and the prediction of the freshman grade point average at a 95% confidence level of the range produced an R^2 of 43.90%, a standard error of .6273, a mean square error of .393, a F value of 21.378, three degrees of freedom, and all three predictor variables had significant beta values.

The model overpredicted the number of students to remain eligible for continuing academic study not on probation (20/25, 125.00%) but greatly underpredicted those students placed on academic probation (4/9, 44.44%). The students eligible to continue financial aid was slightly overpredicted by the model (19/24, 126.32%), and the model greatly underpredicted those student not eligible for financial aid as sophomores (10/5, 50.00%). The model greatly underpredicted students eligible to renew academic scholarships (5/7, 140.00%) and slightly underpredicted students not eligible to renew academic scholarships (24/22, 91.67%).

The model selected for gender preference was with the three independent variables of core grade point average, high school grade point average, and rank in class provided the most significant level of reviewed factors, and the prediction of the freshman grade point average at a 95% confidence level of the range produced an R^2 of

49.30%, a standard error of .5302, a mean square error of .281, a F value of 177.879, three degrees of freedom, and all three predictor variables had significant beta values.

The model slightly overpredicted the number of students to remain eligible for continuing academic study not on probation (152/159, 104.61%) but greatly under-predicted those students placed on academic probation (14/7, 50.00%). The students eligible to continue financial aid was slightly overpredicted by the model (136/142, 104.41%), and the model slightly underpredicted those student not eligible for financial aid as sophomores (30/24, 80.00%). The model slightly overpredicted students eligible to renew academic scholarships (60/65, 108.33%) and slightly underpredicted students not eligible to renew academic scholarships (106/101, 95.28%).

CHAPTER 5

CONCLUSIONS

The findings of this dissertation research will be presented in the following order: a summary of results and findings, conclusions based on these results, implications of the results for education decision makers, and recommendations for further study.

Summary

The purpose of this study was to examine the relationship of academic achievement during high school and the influence of selected pre-enrollment variables--gender, race, religious affiliation, ACT composite score, SAT score, type of high school attended, high school grade point average, core high school grade point average, rank in class, living accommodations in college, state of permanent residence, high school leadership, family income, employment, legacy or college major--on the grade point average of students during the freshman year of college. The initial analysis of all 43 variables produced 25 variables with statistically significant relationships to the freshman grade point average. The 25 statistically significant variables were reviewed to determine which variables provided the greatest individual significance. The variables with greatest individual relationship ($r > .10$) were selected ($n = 14$) for use in the prediction model building. Three models were compared, and the model composed of six independent variables produced a R^2 of 43.20%, a standard error of .5373, a mean square error of .289,

an F value of 192.737, six degrees of freedom, and all six predictor variables had significant beta values.

The level of correlation between the freshman grade point average and the high school academic variables of ACT composite score, core grade point average, high school grade point average, and rank in class have traditionally provided strength for prediction (Astin, A., 1993b; Willingham et al., 1990). This study determined that those predictors with two additional variables of church leadership and housing on campus increased the level by which a student's freshman grade point average could be predicted. The practical significance of the study was indicated by the large values for R square for the predictive model of freshman grade point average.

The results of this study have implications for the admission officers and admission process of the private, southern university from which the data were obtained. These implications will be discussed after the conclusions. Recommendations related to study design, research population, and further study will be presented after the section on implications of these results.

Conclusions

Several logical conclusions may be drawn from the results of this study:

1. The results of the study lead one to conclude that a number of independent variables may have statistical significance to the freshman grade point average. This result was an indication that nonacademic factors did affect students' academic success. The difficulty with statistical significance was that many of the variables did not contribute significantly to the prediction of the freshman grade point average.

This study was to predict freshman grade point average, not determine variable relationship.

2. The significant relationship of the academic variables of ACT composite score, core grade point average, high school grade point average, and rank in class contributes to the prediction of freshman grade point average for all students studied. This is certainly no surprise, given the research of ACT and Willingham and Astin, but the high correlation of these variables substantiates the previous research. The students with higher grade point averages, ACT scores, and rank in class were more likely to earn higher freshman grade point averages.

3. The statistical relationship of housing on-campus and having church leadership as a part of the high school experience is of critical importance in predicting freshman grade point average. These two nonacademic predictors are in strong support of the mission and purpose of the institution studied.

4. State of residence or distance from the institution did not have a positive or negative impact on academic performance or prediction. An assumption was that students whose homes and parents were closer to the location of the university would have performed at a higher academic level. That was not substantiated by this study.

5. The insignificant relationship of parent's adjusted gross income with freshman grade point average supported the research of Astin (1977) regarding the impact of family resources on academic achievement. Students from families with high incomes may assume to have access to academic progress, cultural exposure, and technology. These perceived advantages did not correlate with increased academic performance in this study.

6. The small sample size of minority students created difficulty generalizing the results about predicting academic success based on the factors of ACT composite score, core high school grade point average, and type of high school attended. The type of high school attended was statistically significant and held predictive value for minority students.

7. The statistical and predictive value of variables for male students was limited to high school information of core grade point average, high school grade point average, and rank in class. The ACT composite score was statistically significant, but the ACT composite score and additional statistically significant variables did not contribute when predicting freshman grade point average.

Implications for Educators

Among the variables of this study, the traditional academic variables support previous research for college success prediction (Astin, A., 1993b; Willingham et al., 1990). The particular predictors of ACT composite score, core grade point average, high school grade point average, and rank in class would not surprise many in higher education. Of particular importance to this study were the numerous additional variables having statistical significance (Table 5) and their usefulness in guiding students toward academic success. Although many of these variables were statistically significant, the more important question for the scope of this study was whether predictive significance was derived from these variables. Most did not provide practical application.

Admission officers frequently interview students with less desirable ACT composite scores and above average high school grade point averages. The situation is

problematic without institutional research to substantiate a favorable admission decision or denial. For most colleges and universities, the use of a prediction formula to guide admission policies would necessitate reconsideration of basic assumptions about freshman success. If freshman grades are the most practical means of measuring success, admission officers would be clearly advised. This study demonstrates the large number of students having a freshman grade point average of 2.50-3.50, which allows continued college enrollment, but is not necessarily stellar achievement. The success for many students is measured by more than just a grade point average, particularly at the private institution. It must be argued that without an appropriate grade point average, college attendance cannot continue.

The implications of this study provide insight into a single institution of higher education and should not be generalized to any other. The composition of the freshmen studied was predominately Caucasians who lived on the university campus. For these students, the predictive model was generous in forecasting future academic achievement. The cross validation with the 1998 freshmen provided the accuracy of the model.

The application of this research to the institution's admission policies and practice are enumerated below:

1. Academic predictors are central to the academic success of freshmen students as determined by the freshman grade point average. These predictors are statistically and logically the best measures of deciding potential for academic success in college. These factors, when available, should have the highest priority in admission decisions. Students do not always realize their academic potential during the high school years. When

standardized scores are unusually high compared with high school performance, caution should be used.

The use of the predictive model for freshman grade point average can be particularly helpful when students may not perform as expected on one of the academic variables. For numerous reasons, students may have deficient scores on ACT composite or high school grade point average. Given the high correlation of these components, a compensating factor could be allowed for the objective prediction of the student's freshman grade point average. Many institutions, particularly those that are public supported, have this sliding scale approach to admission. The institution studied can determine to what extent any compensation would be permitted, given levels of the other components of the predictive model.

2. As demonstrated by this study, living in university residence facilities increases the potential for academic success. Although the likelihood of residence facilities contributing to socialization, long-term university bonding, and satisfaction with the college experience is logical, the on-campus living experience makes a determined difference in college performance. Caution should be demonstrated when an applicant has marginal academic credentials and does not expect to live on the university campus.

3. All involvement and leadership in church and church-related activities increases the potential for academic success of students at this university. The mission and purpose of the institution studied emphasizes the spiritual dimension and development during the college experience. In review of admission applicants, particular attention must be given to the demonstrated church involvement and leadership

component. When an applicant has marginal academic credentials and has no particular church involvement, caution for admission should be demonstrated.

As summarized in Table 4, numerous variables were statistically significant with freshman grade point average but held no additional predictive significance. Leadership roles demonstrated by the student could span into several dimensions within the high school experience. Students can be leaders in more than one activity or organization. For this reason, caution should be used in reducing significant leadership as measured by certain levels of involvement. The mission and purpose of the institution studied could encourage certain levels of involvement or activity in particular organizations or clubs. It is possible that the relationship of leadership demonstrated by the student is supported, expected, and possibly rewarded by the institution.

4. The results of this study demonstrate the statistical and predictive value of the high school variables for male students at the institution. These common elements for recruiting male students for academic success could simplify the process for admission officers. Should the institution seek to increase the number of male students, these high school factors predicting success allow an opportunity for growth.

5. The study provides the institution with a glimpse of academic success for the minority student. Due to the small sample size of the 1998 freshman class, the generalization for application should be cautious. One interesting conclusion is that high school type was statistically and practically significant for the minority student. This description of the high school provides guidance for where minority students should be recruited. The significance of the ACT composite also provides an avenue for searching minority students by scores and location for recruitment.

Implicit in these observations is the constant need to evaluate the individual and not overlook particular contributions possible to the institution. Admission options for probationary periods, or with specified provisions for admission, are acceptable means of recognizing individual significance and undocumented potential for academic success. Some schools will limit semester hours of enrollment for the initial semester.

Recommendations for Future Research

The findings of this study will require additional research to verify the reliability and validity, as well as their usefulness in guiding the development and administration of admission offices concerning the academic and personal preparation of college freshmen. To be able to generalize these results more widely, additional student populations would need to be studied, both on a longitudinal basis at the selected private, southern university and from other universities in the same class years.

Studies of additional populations could consider such questions as those listed below:

1. The present study should be replicated in other colleges and universities of various sizes and affiliations, using the same design and variables to determine the extent to which size of the freshman class, location, and affiliation affected the results of the analysis. The replicated study of identical design would enable more powerful generalization to the higher education population.

2. A further study should be conducted on the identical populations to determine what relationship, if any, exists between these statistically significant variables in predicting college retention and degree attainment. The longitudinal study of the same

group could provide valuable insight into degree prediction at the time of freshman enrollment.

3. A further study should be conducted to determine whether specific high school courses significantly increase the ability to predict freshman grade point average.

4. A further study should be conducted by another private, southern university with a higher percentage of commuter students, minority students, and male students to determine whether these variables are more significant for the private university community.

5. A further study should include geodemographic data on the student to determine whether this categorization has any statistical relationship to grade point average prediction.

6. A further study should be conducted on admitted students that did not enroll during the same period to determine their predictability for academic success.

7. A further study should be conducted on nonreturning freshmen who were eligible to return. What reasons contributed to their change of college attendance, given their academic eligibility?

8. A further study should be conducted to determine the predictive nature of rank in class, as numerous academically competitive high schools do not rank at the time of graduation.

Although this research will provide the admission officers of the university studied findings of particular relevance to procedural and predictive aspects of the entering students, the broad generalization or interpretation of the results of this study to a larger population should be approached with considerable caution. Particular caution

should be demonstrated if the generalization of this study were applied to a public university given the diverse mission and purpose of the institutions.

In summary, it would appear that the results of the present research have provided an adequate and action-oriented response to the original statement of the problem of this dissertation research. The purpose of the study was to provide decision makers with data that would aid the evaluation of students for college admission personnel and assist in the prediction of the freshman grade point average for the institution studied. These results can provide appropriate implementation and action for the admission officers of the university.

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APPENDIX

INSTITUTIONAL REVIEW BOARD APPROVAL

UAB THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Office of the Institutional Review Board for Human Use

Form 4: IRB Approval Form
Identification and Certification of Research
Projects Involving Human Subjects

The Institutional Review Board for Human Use (IRB) has an approved Multiple Project Assurance with the Department of Health and Human Services. The Assurance became effective on February 1, 1994 and the approval period is for five years. The Assurance number is M-1149.

Principal Investigator: Roger Philip Kinsey
Protocol Number: [illegible]
Protocol Title: Predictors of Post-Secondary Success of Freshmen

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The IRB reviewed and approved the above named project on 9/16/99. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services. This Project will be subject to Annual continuing review as provided in that Assurance.

This project received EXPEDITED review.

Date: 9/16/99

Marilyn Dean, M.A.
Vice Chair of the Institutional Review
Board for Human Use (IRB)

Investigators please note:

The IRB approved consent form used in the study must contain the IRB approval date and expiration date.

IRB approval is given for one year unless otherwise noted. For projects subject to annual review research activities may not continue past the one year anniversary of the IRB approval date.

Any modifications in the study methodology, protocol and/or consent form must be submitted for review and approval to the IRB prior to implementation.

Adverse Events and/or unanticipated risks to subjects or others at UAB or other participating institutions must be reported promptly to the IRB.

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GRADUATE SCHOOL
UNIVERSITY OF ALABAMA AT BIRMINGHAM
DISSERTATION APPROVAL FORM
DOCTOR OF EDUCATION

Name of Candidate Roger Philip Kimrey

Major Subject Educational Leadership

Title of Dissertation A Three Year Study of the Relationship of Prematriculation Variables on Student Success at a Private, Southern University

I certify that I have read this document and examined the student regarding its content. In my opinion, this dissertation conforms to acceptable standards of scholarly presentation and is adequate in scope and quality, and the attainments of this student are such that he may be recommended for the degree of Doctor of Education.

Dissertation Committee:

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