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An analysis of the enrollment pattern of Black students in four-year public colleges and universities in the United States: The influence of academic, institutional, and environmental variables

Johnson, Allan Eugene, Ph.D.
The Ohio State University, 1989

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AN ANALYSIS OF THE ENROLLMENT PATTERN OF BLACK STUDENTS IN FOUR-YEAR PUBLIC COLLEGES AND UNIVERSITIES IN THE UNITED STATES: THE INFLUENCE OF ACADEMIC, INSTITUTIONAL, AND ENVIRONMENTAL VARIABLES

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in the Graduate School of The Ohio State University

By

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****

The Ohio State University

1989

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To my grandfather, John H. Battle, Sr., in memorium
I express sincere appreciation to Dr. William Moore, Jr. for his unwavering support, guidance, and encouragement throughout the research and during my tenure within the department. His excellence is a model for all who are associated with him. Dr. Mac A. Stewart always made me feel special; I thank him for availability on many short notice occasions. Dr. Philip Young's insights and suggestions helped clarify many thoughts about statistical concepts; his many kind words are also greatly appreciated. I would like to also express a special note of thanks to Dr. David Hothersall in the Department of Psychology--more than my minor advisor--who was a joy to work with when I was a Graduate Teaching Associate.

Special thanks to Dr. Jill A. Strawbridge, for being there, for helping me keep my sanity during it all, and for being a truly outstanding person.

Finally, I wish to thank all of my friends from California State University, Long Beach, who were with me in spirit every step of the way.
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"During the same period when the pool of minority high school graduates was becoming bigger and better than ever, minority college attendance rates initially fell, and have remained disproportionately low."

One Third of A Nation (p. 11)

The myth of racial parity in higher education

Examination of the data on progress toward racial parity in higher education in the 1970's revealed that although progress was encouraging in the early 1970's, the later years of the decade showed either little progress or an actual decline (Morris, 1981). There was almost no progress towards parity at the undergraduate level in terms of degrees conferred as a percentage of the total from 1975-1976 academic year to 1978-1979 academic year. Trent (1983) reviewed Higher Education General Information Survey (HEGIS) data on degrees awarded by race and sex for both predominantly white and predominantly Black colleges for the years 1975-76 and 1980-1981 and found that the minority share of bachelor's degrees awarded increased by only 1%.

American Council on Education data indicated there are fewer Black students on campuses today, based on percentage of the student population and in terms of absolute numbers, than there were just a few years ago ("ACE Board," 1987). In 1979, there existed a 9- to 21-point gap between the proportion of Black and white individuals who graduated from high school, had some college, and
graduated from college. Full-time enrollment of Black students (in absolute numbers) in graduate school declined by almost 5% between 1976 and 1978, and first professional enrollment remained unchanged. In the 1979-1980 academic year, Black student enrollment in medical schools and law schools declined from 6.3% to 5.7%, and 4.7% to 4.3%, respectively. In fact, educational equality for Black student may be declining, partly in response to the current emphasis being placed on "educational quality" at the expense of educational opportunity (Bailey, 1985; Blackwell, 1983). Hodgkinson (1985) noted that 29% more Black students graduated from high school in 1982 than in 1975, but Black student enrollment in college dropped 11% during that period (p. 16). In 1986, 20.1% of whites over the age of 25 years had completed at least four years of college; for Black Americans, however, the completion rate was 10.9% ("Neglect of Minorities," 1988). All of these figures are substantially lower than the corresponding figures for white students.

The report from the American Council on Education and the Education Commission of the States, One Third of a Nation, suggests that by 1985 high-school graduation rates for minority students have improved for Blacks between the ages of 18 and 24 years from 60% in 1970 to 76%. United States Bureau of the Census data reported in Higher Education & National Affairs ("Facts in Brief," 1988) reported that the percentage of Black students with a high school diploma increased significantly between 1977 and 1987, from 46% to 63%. College attendance and completion rates, however, declined for Black students between 1975 and 1981 despite a dramatic improvement in their high school graduation rates (College Entrance Examination Board, 1985). In 1965, only 600,000 Blacks were in college; by 1980, one million were enrolled. Of the 600,000 Blacks who were enrolled in 1965, 85% were enrolled in historically Black
colleges. By 1980, however, 80% who were enrolled were enrolled in predominantly white institutions (Vital Speeches of the Day, 1988, p. 474). In 1980, more that 40% of Black college students were in two-year colleges, where persistence rates are low, especially for Black students. In 1982, although 72% of Black students who entered high school graduated from high school, only 29% who graduated from high school entered college. Twelve percent who entered completed college, 8% who completed college entered graduate or professional school, and 3% who entered completed graduate or professional school.

The enrollment of Black college students decreased by 11% between 1979 and 1986, and the decline is at every level: Undergraduate, graduate, and professional schools. Additionally, the number of Black faculty is declining as well. Fewer Blacks earned doctorate degrees in 1985 than in 1980 or 1975. The Summary Report 1985: Doctorate Recipients From United States Universities (cited in "Facts In Brief," 1988) indicated that the number of Black doctorate recipients rose from 999 in 1975 to 1032 in 1980; however, the number fell to 909 in 1985. In addition, the number of Blacks who earned doctorates decreased from 1975 to 1985, from 999 in 1975 to 909 in 1985 ("College Examines," 1987).

Statement of the problem

This study addressed the pattern of enrollment of Black students in historically white institutions. Blacks and other minorities still are not represented fully in higher education, and minorities who are enrolled experience a high level of frustration and alienation (Hayes, 1985). According to Harold Wilson in a speech to the Columbus (Ohio) Metropolitan Club (2/12/88), minority enrollment at its peak in higher education never reached parity with their proportion of the population. Blacks at 13% of the population
accounted for only 9.4% of higher education enrollments at their peak and are now below 8.8%. And of those enrolled, 43% are in community colleges from which only 20% transfer to four-year colleges. Of those who transfer, only 5% earn bachelors degrees (Vital Speeches of the Day, 1988, p. 474). Black enrollment rates actually increased between 1976 and 1980, decreased 2.8% between 1980 and 1984, and slightly increased between 1984 and 1986, even though Black enrollment in 1986 was 26,000 students less than the highest Black enrollment level recorded (1.11 million in 1980) (Center for Education Statistics, 1988). Even though Blacks are graduating from high school in greater numbers, their dropout rate still exceeds that of whites (Bailey, 1985).

The main focus of this investigation is the enrollment profile of Black students at historically white colleges and universities. What are the characteristics of institutions which have differential Black student enrollment? Conversely, what are the characteristics of institutions that have high enrollment? Is it possible to predict which institutions will have the most difficulty enrolling, and subsequently retaining Black students on the basis of academic, environmental, and institutional factors?

**Purpose of the study**

This study had several purposes. First, the study attempted to identify factors that impact Black student enrollment at historically white universities and colleges. The main foci of the investigation are the academic, institutional, and factors which may impact enrollment. Factors from the literature which bear on these issues will be utilized in the present investigation so that a comprehensive model of Black student enrollment can be described.

Second, the study attempts to suggest strategies and policies concerning the enrollment pattern of Black students. It is assumed
that many aspects of a college influence not only a student's initial enrollment but also subsequent retention. Granted, there may be factors beyond the control of the institution that may influence enrollment and retention. It should be recognized, however, that strategies and institutional policies could be developed to maximize those factors which, based on the data analysis, positively impact Black student enrollment.

**Background and value of the study**

Although many structural barriers to matriculation in colleges and universities persist in the form of economic disabilities and at times improper preparation, Black students are admitted. As Blackwell (1983) noted, "gaining entrance now appears to be less troublesome than progressing through to graduation". He supports the contention that attrition among Black students results from a number of highly complex factors. Among those factors are the quality of teaching and academic support in colleges, insufficient finances, interpersonal complications, difficulties with faculty or family life, a hostile institutional environment, and others.

The study of the pattern of enrollment of Black students at historically white colleges and universities is important given the recent increase in the selection of these types of institutions by the best Black students. Concerns for minority access and retention have increased as Black enrollment patterns have shifted from largely segregated Black campuses to predominantly white campuses (Carey, Singh, & Pillenger, 1981). Black freshmen with B+ or better high school grade point averages increasingly enrolled in white (particularly white four-year colleges) rather than Black institutions (Stockard, Webster, & Henson, 1981). For Black students in the top quartile of their high school class, enrollment changes showed gains of 3% and 7% respectively for white universities and white four-year
institutions, and a loss of 10% for Black institutions. Shifts in enrollment to historically white institutions also were found for Black freshmen with affluent, well-educated parents, and for fathers with high-status jobs. These shifts tended to benefit the white four-year colleges.

The lack of enrollment and subsequent retention of the Black high-school elite in historically white institutions can be viewed as a waste of valuable Black talent that arguably might be better served if these students had been educated at an historically Black college. Historically Black colleges and universities may be successful in graduating Black students because of the use of intrusive advising strategies and the system of faculty involvement in student life, the nurturing and general demonstration that someone cares for the student. Historically Black colleges and universities enroll only one-fifth of the total number of Black students enrolled in colleges and universities, yet annually graduate about half of all Black baccalaureate degree recipients (Blackwell, 1987).

The results of the current investigation may be prescriptive given the future make-up of the population of the United States. Frank Newman, President of the Education Commission of the States, reporting on the commission's report *One Third of a Nation*, said demographic trends show the urgency of increasing minority participation in higher education. By the year 2000, almost 42 percent of all American public school students will be minority children or other children living in poverty. *Higher Education & National Affairs* ("Report Signals," 1988) The report predicts that if disparities in education and other basic measures of well-being between minorities and the majority population continue, then the United States will suffer both socially
and economically. This idea has support from others, as E. D. Hirsch, author of *Cultural Literacy*, stated "...Blacks will be condemned in perpetuity to oversimplified, low-level tasks and will never gain their rightful place in controlling the levers of power unless they also acquire literacy..." (p. 11).

Harold L. Hodgkinson, a demographer with the Institute for Educational Leadership, indicated both federal and state governments could do a better job of designing educational policies if they had more information about who attends America's schools and colleges ("Demographic Study," 1988). Hodgkinson believes that this information could aid government leaders in building political support for programs, as well as provide policymakers with a better understanding of the implications of shifting trends in population and the changing racial make-up and socioeconomic class of students. He reports in *All One System: Demographics of Education, Kindergarten through Graduate School* that 29% more Blacks graduated from high school in 1982 than in 1975, but Black enrollment in college dropped 11% during the period.

**Assumptions and justification for the study**

The major hypothesis of this investigation was that educational and non-educational factors negatively impact the enrollment and subsequent retention of Black students at historically white institutions. A major assumption of this study is predominantly white institutions have a vested interest in recruiting and retaining qualified Black students. It is assumed that historically white institutions would not admit obviously unqualified students, or students that have little or no probability of success in college. Thomas Thielen, the vice-president for student affairs as the Iowa State University, said in an article appearing in *The Chronicle of Higher Education* that "...the university takes fewer risks in
admitting minority students... We don't think that it is a fair thing to do, with the high expenses, to encourage someone to come here who might not be quite ready" ("Notebook," 1988). The consequences of admitting unqualified students and having them fail is the possibility of causing non-minority students to perceive that all Black students are not qualified to be enrolled in the university, not just the ones who failed. In addition, Black students who fail at historically white institutions may become negative role models and sources of information for the increasing number of minority high school graduates.

Lastly, it is assumed that the decision of Black students to attend historically white institutions is influenced by factors different from those which would influence the decision to attend an historically Black institution. Some of these assumptions will be explored further in Chapter II.

Limitations of the study

There are several limitations which must be considered when interpreting the findings from this research. First, the scope of this study was restricted to the investigation of factors which impact the enrollment and subsequent retention of Black students at historically white public 4-year institutions, even though a sizable number of Black students attend historically Black colleges and universities. Consequently, the results of this study do not bear on those institutions.

No attempt was made to review all of the enrollment and retention literature, which Astin (1975; cited in Lea, Sedlacek, & Stewart, 1979) described as ..."large in volume, poor in design, and limited in scope". Rather, this effort is geared toward elucidating some of the implicated factors current in the literature at this time. It is hoped, however, that the material presented will provide insight
into the complex issue of enrollment and retention of Black students, particularly at historically white institutions. In essence, when assessing Black enrollment and retention, the question becomes: Is there a future for Black students at white campuses?

Allen (1988, p.) reported that "One must ask whether the nation's colleges and universities ever intended to define the grand experiments of the late 60's and 70's so broadly as to entirely open up the system. If one looks carefully at the responses of schools in these times of economic stringency, then the answer seems self-evident. There is a retrenchment of frightening proportions underway, a headlong rush to cut programs and to scuttle new initiatives. The end result will be to return to the time when blacks on white campuses were a rarity."

Definition of terms

The following definitions are presented to clarify the terms that will be used throughout the study.

**Black Student.** Those non-Hispanic students who identify themselves as Black or Afro-American.

**Historically Black College or University (HBCU).** Institutions which have traditionally accepted Black students, (e.g., Bethune-Cookman, Hampton Institute, Howard University, and Tuskegee Institute) as opposed to historically white institutions, which have not.

**Historically White Institutions (HWI):** Institutions which until the late 1960's have been historically white (i.e., did not admit Black students) or who admitted very few Black students (e.g., Stanford, Michigan, Alabama, Auburn, Vanderbilt, Ole Miss, Arkansas, and Tennessee).

The following definitions were adopted from Lee (1987), who investigated factors affecting the migration of college students to
institutions outside of their home state. These definitions are assumed suitable for the present investigation, since Black students who attend predominantly white institutions may migrate to those institutions.

Factor(s). Underlying force(s) which explains an endogenous variable

Four year institution. Institutions which grant baccalaureate or higher degrees.

Model. A framework in which exogenous variables, based on some assumptions, explain endogenous variables.

Public College, University, or Institution. A college or university under state control.

The following definition of terms are adopted from Long (1985).

Endogenous variable. Variable that is hypothesized to be causally dependent on other endogenous variables and/or exogenous variables.

Exogenous variable. Variables that are hypothesize as being determined outside of the model, and as such are not explained by the model.

Structural equation. An equation which describes the assumed causal structure of the process being modeled.

Identification. Restricting a structural equation model such that only a finite number of sets of parameters could generate the observed data.

Estimation. Procedure used to provide estimates of the population parameters once a model has been identified. Maximum likelihood (ML) estimates will be used to minimize the fitting function which measures how close a population covariance matrix is to the sample covariance matrix. A maximum likelihood estimator is approximately unbiased, has a small sampling
variance, and is approximately normally distributed.
CHAPTER II
REVIEW OF THE LITERATURE

Introduction

Thomas and McPartland (1982) gathered Office of Civil Rights data for virtually all federally funded colleges and universities in the United States, or approximately 3000 institutions. Information was gathered by race (Blacks and whites) for 1976, 1978, and 1980 nationwide and by region (West, Midwest, Northeast, and South) for full-time and part-time student enrollment in two-year and four-year colleges, student persistence to the junior year in four-year colleges, graduate and professional school access, and desegregation. The results revealed general trends towards higher full-time and part-time enrollment of Blacks than whites in two-year colleges and higher part-time and lower full-time enrollment of Blacks than whites in four-year colleges. Except in the West (which had the lowest rate of Black access to four-year colleges) Black undergraduates were less likely to persist to the junior year than were white undergraduates. Black students were most severely underrepresented at the graduate and professional school level, where white enrollment exceeded Black enrollment by at least 16:1 in all regions except the South. The West, which paradoxically was the least progressive of the four regions, showed increased student racial isolation and decreased enrollment of Black graduate and professional students. These results indicate minimal progress by
Black students relative to access, retention, and desegregation. As recently as 1985, Spraights, Dixon, and Nickolai (1985) noted that "...Black students...retention rate is low".

Deborah Haynes, director of admissions at the University of South Carolina (USC), reported that "the major problem in recruiting Black students is that the competition for minority students has intensified, but the pool of Black students who apply for college admission has remained fairly static". The chairman of USC's retention committee, Paul Fidler, suggested that this fact has caused a change in emphasis from recruitment to retention to aid students in college survival. The school has the highest percentage of Black students of any predominantly white flagship university in the country; the enrollment of Black students at the institution peaked at approximately 19% for the freshman class of 1984.

Consistent with national trends, USC's enrollment of Black students has dropped since 1984, but still remains high (15.3% of the 1986 freshman class and 13.9% of all undergraduate students in 1986). The graduation rate for Black students was higher than that for white students for three of fours years surveyed (1976-1979); the graduation rate for Black students was higher than for white students until the freshman class of 1979 ("College Examines," 1987).

Indeed, since there exists a limited number of students and a shortage of resources, retention may be more cost effective than recruitment (Astin, 1975). This becomes increasingly important, as recent data suggests that Black enrollments in 4-year institutions have stabilized since 1982, when 612,000 students were enrolled, to 615,000 students in 1986 (Center for Education Statistics, 1988).

Increasingly, retention is being viewed in relation to admissions, with the two functions seen as twin aspects of enrollment management (Increasing Student Retention, p. x).
In the sixties, we began with an academic literature on issues of student persistence and attainment. During the seventies, the vocabulary shifted from "persistence" to "retention", that is, to the needs of the institution; the focus moved to techniques and program adaptations believed to retain students. Now we are in a new phase, in which the focus is less on techniques and brushing up services than it is on the overall character of the experience offered to students...Over time, it is qualities of the institution itself that attract and retain students...Retention...has everything to do with providing experiences that engage student minds and energies. The effective institution commits itself to student advancement...".

The "educational pipeline" and Black students

"The educational pipeline for minority students is one of inordinately diminishing percentages."

California State University (1986, p. 21)

According to Berryman, (1985, Winter), the term pipeline indicates the sequence of educational levels and degrees, beginning with grade 1 and ending with a professional or doctoral degree. The educational pipeline has a number of points at which minorities drop out. For Black students, the losses are dispersed across the pipeline and typically concentrate at degree completion points (p. 18). Christoffel (1986) reported that almost 40,000 fewer Black students were enrolled in college in 1984 than in 1976. Astin (1982) showed that 72% of Blacks graduate from high school but only 29% actually enter college; 12% graduate from college; 8% enter a graduate or professional school and only 4% complete graduate or professional school education. Even though minorities, in toto, experienced a 3% decrease in enrollment during this period, the most devastating attrition was among Black graduate students whose representation fell by 22.4% (a loss of 15,000 graduate school students) between 1976 and 1984 (Blackwell, 1984). If minorities cannot gain access (i.e., no bachelor's degree) to graduate education and if they do not obtain the doctoral degree, then the consequences are an increasingly limited
pool of minority group members eligible for faculty and administrative positions at the time when the demographic trends indicate that minorities will constitute a larger portion of the population than they currently occupy (One Third of a Nation).

Minorities lose ground in comparison with their white counterparts at each successive stage of educational attainment--high school graduation, college entrance, college graduation, entrance into graduate school, and completion of graduate school. In the College Entrance Examination Board report Equality and Excellence: The Educational Status of Black Americans (College Entrance Examination Board, 1985), it is reported that education in the United States remains separate and unequal. It is noted that "Blacks have lost ground...at each stage of the educational pipeline. In 1972, for example, blacks represented 12.7 percent of all 18-year-olds, 10.5 percent of all high school graduates, 8.7 percent of all college freshmen, and four years later, 6.5 percent of all bachelor's degree recipients. By 1979, blacks represented only about 4 percent of all professional and doctoral recipients" (p. 1). Even though predominantly Black colleges enrolled only 27% of Black college students in 1980, compared to more than 50% prior to 1970 and accounted for only 34 percent of all blacks' undergraduate degrees in 1980-1981 academic year, they granted more than 40% of all degrees for Blacks in agriculture, computer sciences, biology, mathematics, physical sciences, and social sciences (p. 2). "While 28 percent of black high school graduates between 18 and 24 years of age were enrolled in college in 1980 (as compared to 32 percent for white high school graduates), only 19 percent of the total 18- to 24-year-old black population were enrolled in college, as compared to 27 percent of their white counterparts" (p. 11). Relative to non-blacks, Blacks have greater loss rates at each point in the educational pipeline.
except from the bachelor's to the master's degree. Fewer Blacks earned doctorate degrees in 1985 than in 1980 or 1975 (Summary Report 1985: Doctorate Recipients From United States Universities; cited in "College Examines," 1987). Although Blacks have made gains over the last two decades, there is still a long way to go.

It is important to remember that decreases in the number of minority students who have achieved the baccalaureate negatively impacts the "pipeline" of not only future graduate and professional students but also places major limitations on the potential number of minorities eligible for faculty and administrative positions in colleges and universities. Blacks represent approximately 4% of the total number of faculty members (Blackwell, 1984; Harvey, 1985); however, when the number of faculty members employed at historically Black colleges and universities is disaggregated from the data, Blackwell (1987) estimated that Blacks account for only about 1% of the faculty in predominantly white colleges and universities. In addition, Blackwell cites information obtained from the American Council on Education and The U.S. Equal Employment Opportunity Commission that Blacks were the only minority to experience both a decline in absolute numbers and a percent loss of the total number of faculty positions in the United States; more than half of the Black administrators are employed at historically Black colleges and universities (HBCU's).

Catalano (1985) believes that the best way to view the problem of minority student retention is through the eyes of "motivation-retention theory", which states that things that are considered motivators are, in reality, morally neutral. Any factor can be a negative or positive motivator; it is the perception of these entities that makes them motivators. Basic student needs for survival and safety, such as money, food, dorms and classrooms,
health services, and counselor availability are interrelated with needs for social companionship and ego needs such as peer association and academic advancement. Needs that are met act as positive motivators to keep students in college; unmet needs become forces that draw students away from staying in college. Interestingly enough, Baker and Siryk (1984) found that almost 40% of the students who scored low on a 52-item Likert-type scale on adjustment to college did not enroll for the first term of the sophomore year. It is within this theoretical framework, I believe, that many of the academic, environmental, and institutional variables operate to negatively impact the enrollment and subsequent retention of Black students.

**Impetus for Black enrollment in historically white institutions**

Over thirty years has passed since the United States Supreme Court decreed in *Brown v. Board of Education* of Topeka, Kansas that racial segregation is unconstitutional. This decision changed the course of American history by outlawing segregation in public schools. The *Civil Rights Act of 1964* made it illegal to give Federal funds to segregated institutions. This, and other decisions and actions indicated that the United States Congress would support equal opportunity in college education, which radically changed the experience of Black Americans in higher education. The 1972 *Adams v. Richardson* decision mandated that segregated collegiate institutions develop expeditious plans to increase the numbers of Black students, Black faculty, and Black administrators; the department of Health, Education, and Welfare was ordered to discontinue providing funds to institutions that were in violation of the *Civil Rights Act of 1964* (Allen, 1987; Blackwell, 1975; Vital Speeches of the Day, 1988, p. 474).
In *Adams v. Richardson*, and the *Civil Rights Act of 1964*, the nation indicated a resolve to expand equality of educational opportunity for all Americans. Yet, as James Blackwell, Professor of Sociology at University of Massachusetts at Boston noted, there have been significant signs of retrogression and assaults against the modest achievements gained toward equality of educational opportunity, in spite of the recent pronouncements that the United States must become more competitive and that the nation must develop all of its human resources. Consequently, the problem of increasing the number of baccalaureate degrees among minority group members is especially salient.

Walter R. Allen reported that in an effort to solve the problem of racial inequality, American society in the decade of the 1960's and in response to the Civil Rights Movement made efforts to increase Black access to higher education. He noted that public support for higher education was high, in general, and that colleges and universities were experiencing continual expansion. Consequently, the decade saw dramatic increases in the enrollment of Black students in predominantly white colleges and universities. Currently, however, there has been less of a commitment by higher education to Blacks and other minorities; Black enrollment in four-year predominantly white institutions has fallen short of goals and expectations and is declining. Allen (1987) further stated that "Despite a generation of experience with a significant presence of Black students in white institutions of higher education, we have only a limited and imprecise understanding of the factors that affect the increases and decreases in an institutions enrollment of minority students, and once enrolled, of the factors that provide these students an institutional and educational experience that is personally gratifying and academically successful. Thus, even when an institution is
ready to commit more resources to the minority endeavor, the institution's leadership lack clear directions on how best to expend these resources".

**Summary of historical trends**

There was improvement in the trend of higher education participation of Blacks during the first part of the 1970's when federal policies and statutes aimed at reducing barriers for minorities and low-income students were enacted or expanded (College Entrance Examination Board, 1985, p. 13). When federal aid leveled off during the recession, however, the gains eroded during the last half of the decade to the point that even though the number of Black youth eligible for college increased after 1975, the number of Blacks that actually enrolled in college each year remained about the same. By 1976, there were proportionately fewer Blacks in both graduate and first professional schools than there had been in the early 1970's (National Center for Education Statistics, 1983b).

Profound changes have occurred in the pattern of Black student college attendance over the past 30 years (Allen, 1987). Previously, the overwhelming majority of Black college students were enrolled in historically Black institutions; by 1973, however, roughly only one-quarter attended historically Black institutions (Anderson, 1984). Fleming (1984) reported that historically Black colleges awarded a smaller share of degrees to Black graduates in 1980-81 than in 1973-76, 59% vs 68% in the South, 34% vs 40% nationwide. In 1965, only 600,000 Blacks were in college; by 1980, one million were enrolled. Of the 600,000 Blacks who were enrolled in 1965, 85% were enrolled in historically Black colleges. By 1980, however, 80% who were enrolled were enrolled in predominantly white institutions (Vital Speeches of the Day, 1988, p. 474). Nearly three-fourths of all Black students in college currently attend predominantly white institutions of higher
learning (National Center for Education Statistics, 1982).

Information provided by the Robert Wood Johnson Foundation detailing the foundation's minority medical training programing noted that the shift in enrollment from historically Black colleges and universities to historically white colleges and universities is not restricted to shifts in undergraduate enrollment. Admissions rates have declined, even for minority students with the highest Medical College Admission Test (MCAT) scores. The acceptance rate for Black applicants with an MCAT score of 8 or higher fell 1.5% between 1979 and 1983, whereas the acceptance rate for majority applicants with comparable scores rose 2.9%. The report found that advances in Black admissions rates and enrollment were almost entirely the result of increased minority enrollment in majority schools: Historically Black medical colleges graduated 66% of Black medical students in 1970-1971; however, a decade later, they graduated only 22% of the total ("The Foundation's Minority Medical," 1987).

Historically Black colleges are losing students to historically white institutions because Black institutions tend to reproduce the curricula found in white institutions, instead of seeking to orient their programs to the special needs of Black students (Erickson, 1982). Historically white institutions generally have better resources and facilities than Black institutions; however, historically white institutions often provide less support for Black students in terms of cognitive, personal, and social development (Fleming, 1984).

Factors affecting choice of college by Black students

Ewell (1985) suggested that the decision to apply to a college or university is the result of many factors, including institutional visibility within a particular market, the perceived academic quality of the institution, proximity, the perceived program array, and the kinds of competition provided by other institutions. If institutions
conducted analyses to determine how the greatest gains in enrollment for a particular student population could be realized by increasing the proportion of potential applicants who apply, it might be possible for research questions to center on discovering the extent to which these factors are present in the institution and influence student decisions, and second, determine the proportion of potential applicants who might change their behavior if changes in institutional policy or practice was made.

Once a Black student decides to attend college, what factors affect the type of college attended? Numerous factors influence whether minority students attend college and which college they will attend once the decision to attend has been made. One important factor must be the uncertainty of how they will be treated. It is important to recognize that campuses that have a negative reputation with respect to how minority students are treated while on the campus can severely impact the level of minority student enrollment. An article appearing in *Black Issues in Higher Education* indicated that when Black parents are in the process of deciding where their sons and daughters will attend college, criteria in addition to the traditional ones (e.g., student interests/abilities, faculty-student ratio, urban versus rural, public versus private, etc.) are important, such as whether to send their children to historically Black versus historically white universities ("Researchers Paint", 1988). The author, Frank Matthews, stated that for Black parents, the issue of racial hostility is a reality. As Crosson (1988) noted, the perceived climate (i.e., the cognitive image that people have of the institution) can affect an institution's ability to attract minority students. If minority students do not feel welcome on certain campuses, they will not attend them; once enrolled at such campuses, they will not remain. It is important for the campus community to acknowledge
not only the impact of the established policies and practices of the institution but also the impact of the social, cultural, academic, and environmental factors which influence attendance rates.

Burrell (1980) polled a sample of Black students at five predominantly white institutions and found that academic reputation in the student's field of interest and the availability of scholarships and other financial aid were the most important factors in attracting the students to attend an institution. Thomas and Braddock (1981) used data from the National Longitudinal Study of the High School Class of 1972 for Black students who enrolled in postsecondary education between 1972 and 1979, and conducted a series of multiple regression analyses to assess the effects of eight independent variables (IV's) on four dependent measures (DV's) of college choice. The IV's were: Family socioeconomic status (SES); standardized test performance; high school characteristics (racial composition and location); high school class rank, curriculum, and mathematics and science courses; educational expectations, study habits, and self-confidence; the influence of significant others and academic, financial, and proximity inducements to attend college; college-bound program participation (i.e., Upward Bound); and college options. The dependent variables included attendance at a two-year versus a four-year college, a public versus private college, a predominantly Black versus predominantly white college, and a selective versus a nonselective college. For all student groups, high school racial composition was a significant predictor of attendance at a predominantly white or Black institution; high school preparation, rank, and standardized test scores were predictive of choice of a selective vs. nonselective institution. The availability of financial aid affected the choice of a selective vs. nonselective institution.
Oliver and Etcheverry (1987) focused on factors that facilitate or inhibit academically talented Black students' decisions to attend or not to attend college. It was found that three variables influenced college choice: Career objective, job availability, and contact with professionals in the field. Additionally, the availability of financial aid was found to be a powerful predictor of college attendance.

**Enrollment qualifications of Black students**

Dr. Samuel D. Cargile, the director of the Office of Minority Education of the American College Testing program (ACT), reported that scores earned by minority students increased for the third consecutive year. In addition to this increase, the proportion of ACT-tested students from minority groups taking a core high school curriculum has increased noticeably. He believes that the increased enrollment in core curriculum, in addition to other factors such as increased motivation and recent emphasis on academic development by the schools, are associated with the increase in average ACT composite scores for minority students ("Scores Earned," 1987). An article appearing in *The Chronicle of Higher Education* reported that almost 52,000 high school students from minority groups took College Entrance Examination Board (CEEB) advanced placement examinations in order to qualify for college credit or for advanced placement. Of those who tested, approximately 49,000 minority students had examination scores high enough to qualify for college credit or advanced placement, an increase of 34% from the previous year and an increase of more than 150% over the previous five years ("Participation of Minority Students," 1988).

Allen and Nweke (1983; cited in Ohio Board of Regents, 1988) found that Black students attending predominantly white colleges tended to come from middle-class, well educated families. They estimated that over one-fourth of these students came from families
whose parents were college graduates. Middle-class Black students perform in ways similar to their white counterparts, achieving academic records in high school that qualify them to attend the most selective universities (Richardson & Bender, 1987).

**Admission requirements for minority students**

Since retention is predicated upon enrollment, it is important to consider the admission criteria used by historically white institutions for minority admission. Williams (1982) investigated admissions criteria and the minority student using a nationwide sample of 536 colleges and 18 admission criteria. Four-year predominantly white colleges treated grade-point average (GPA), high school curriculum, academic curriculum, high school rank, and test scores as the most important admission criteria for minorities. Qualitative measures were ranked low in importance. As various research studies conducted by the Educational Testing Service (ETS) have shown, even though a large number of Black students have superior academic achievements and perform exceptionally well on objective measures such as the Scholastic Aptitude Test (SAT) and the ACT (Blackwell, 1983), high school grades and standardized tests best predict the future academic performance for whites only, and display less accuracy in predicting the college grades of Hispanics and Blacks (Anrig, 1985).

**Predicting college graduation of Black students**

What, then, are the best predictors of graduation for Black students, if such predictors exist? Bond and Lebold (1977) investigated factors associated with attracting and retaining Black Americans in engineering at Purdue University from 1966-1976. The best predictor of retention of Black students in engineering was college grades. Conversely, college board scores were the poorest predictors of grades and retention. Council (1974) investigated
graduation and attrition of Black students at North Carolina State University and found that SAT scores and high school rank, when used alone, were not good predictors of performance for Black students. While investigating the causes and consequences of dropping out, stopping out, and transferring, Cope and Hannah (1975) concluded that precollege admissions tests were of little value in detecting probable dropouts.

Thomas (1981) gathered data on nine background items and on four-year college graduation (bachelor's degree obtained) on Black students who participated in the National Longitudinal Survey of the High School class of 1972, with follow-ups in 1973, 1974, and 1976. College grade point average was the single most important predictor of prompt graduation. Of the college institutional variables, the financial aid status of the college had the strongest positive effect on prompt graduation. A 1985 research report by the College Entrance Examination Board also notes that of the Black students who attended four-year colleges, those receiving financial aid were nearly twice as likely to persist as were those who were not receiving aid.

There are, however, several other structural, interpersonal, and psychological correlates of success. Allen (1985), for example, solicited questionnaire data from a sample of randomly selected Black undergraduate students at six large, geographically diverse, predominantly white state universities. Of the 327 questionnaires returned, he found that academic achievement was best predicted by favorable faculty relations, better high school grades, more years attending college, and attending college outside of the South. Smith and Allen (1984) used The National Study of Black College Students (NSBCS) to develop a model to distinguish between high- and low-performing Black undergraduates attending public, four-year institutions. They found that high academic performers tended to be
relatively well-adjusted upperclassmen who attended comparatively larger schools.

Donovan (1984) developed a path model of persistence in higher education among 403 low-income Black youth who entered one of 69 colleges and universities throughout the United States in Fall 1979. The analysis revealed that academic performance was the best predictor of persistence; interestingly, college experiences were more important than were various background variables in determining persistence. These results are consistent with those of Nettles, Thoeny, and Gossman (1985), who surveyed 4094 students (white and Black) at thirty institutions in the South and East and found that the Black students experienced more "interfering problems" (college experiences!) and less satisfaction with college than white students.

An interesting attempt to determine how well non-cognitive variables predict academic success by race was conducted by Tracey and Sedlacek (1984). They noted that traditional predictors (SAT, GPA) and criteria are culturally or racially biased; the researchers attempted to determine if non-cognitive variables which had previously been studied individually could be studied collectively and yield predictive information above and beyond that obtained by using only SAT scores. Two samples of students were given the Non-Cognitive Questionnaire (NCQ), consisting of 2 nominal items on educational expectations, 18 Likert-type items on expectations about college, and 3 open-ended questions on present goals, past accomplishments, group memberships, and offices held. The results of a principle components factor analysis yielded 7 factors that could be used to identify those minority students who may not persist in school until graduation: Positive self-concept, realistic self-appraisal, and academic familiarity were related to persistence across all periods of enrollment for Black students. Having support
for college plans and a preference for long-range goals were predictors after three semesters, and demonstrated community service experience and an understanding of racism were predictive for the later semesters.

The basic value of pursuing the predictive power of noncognitive variables for Black students was established. In two follow-up studies, White and Sedlacek (1985) and Tracey and Sedlacek (1986) investigated noncognitive predictors of grades and retention of specially admitted students and the power of noncognitive variables to predict college graduation using statistical procedures other than path analysis. In the first study, 58 freshmen completed the 8-item Noncognitive Questionnaire (NCQ) prior to matriculation under the Individual Admissions Program, which evaluates applicants for admission on the basis of special aptitudes other than traditional criteria, leadership potential, extenuating family or personal circumstances, and level of maturity and breadth of experience. Multiple regression analysis revealed that grade-point average after two semesters was best predicted by the NCQ variables of successful leadership and positive self-concept; after three semesters, by understanding and dealing with racism and successful leadership; and, after four semesters, by positive self-concept, availability of a strong support person, and understanding and dealing with racism. A discriminant analysis revealed that retention after the second and fourth semesters was best predicted by successful leadership and positive self-concept and after the third semester by successful leadership and availability of a strong support person.

The Tracey and Sedlacek (1986) study was more ambitious. At a large, predominantly white eastern state university, all 1979 entering freshmen and a 25% random sample of the 1980 entering freshmen who attended summer orientation completed the NCQ. Data on
enrollment and graduation status as of July 1985 were obtained for 1262 of the 1979 entrants, including 415 white and 89 Black students. The researchers found that based on the $z$ test, Black students had a lower rate of graduation than did the white students. Stepwise discriminant analyses revealed that the noncognitive variables were better predictors of graduation for Black students than for white students. Of the eight NCQ subscales, academic motivation, perseverance, having strong support for college plans, and demonstrated community service were related to graduation for the Black students in both years; expectations of difficulty due to racism and academic self-confidence were related for one of the groups of Black students.

Factors affecting Black student enrollment and retention

The problems of enrollment and retention of Black students in predominantly white institutions can be generally categorized as difficulties arising due to academic, financial, environmental, and institutional variables. These variables range from feelings of alienation (of not belonging), to worries concerning lack of funding, to worries about college achievement as assessed by the grade point average, and to fears of racial discrimination. Representative research is presented in this section detailing the extent to which variables such as these impact Black student enrollment and retention.

Cross (1984) used questionnaires sent to a 1% random sample of fall 1981 enrollees in New York State postsecondary institutions to examine costs and aid for full-time undergraduates according to financial dependence status by institutional sector, and for financially dependent aid recipients by family income. The results showed that low-income students, who are disproportionately women and minorities, are not receiving adequate aid to cover costs.
Because parental help is not available to these students, they may default on formidable debt burdens or withdraw from school.

Mallinckrodt and Sdlacek (1985) investigated student retention and the use of campus facilities at a large eastern university using a stratified random sample of Black and white second-semester freshmen who completed a 24-item questionnaire on their use of campus facilities. Of the 207 respondents, 80% returned to the campus the next fall and 75% returned the following spring. Using the technique of discriminant analysis, Black student persisters were correctly predicted 90% of the time in both semesters. For Black students, the only use of an academic facility that was related to retention was studying in a campus library!

Suen (1983) investigated the alienation and attrition of Black college students at a predominantly white four-year public university in the rural Midwest. Attrition was defined as not being on the third-semester roster during the monitoring period, and not having graduated. The results of a chi-square analysis revealed that the Black students had a higher attrition rate and higher levels of alienation than the white student comparison group. Also, attrition was directly related to all alienation scores and inversely related to grade point average.

Allen, Daughtry, and Wilson (1982) used a questionnaire to elicit background and college experiences and outcomes from a stratified random sample of Black undergraduate students at six predominantly white state universities nationwide. Almost two-thirds of the respondents reported little or no integration into student activities on campus. More than three-fourths of the students reported little or no contact with Black faculty and staff members. A large majority of the students reported that white students and faculty members avoided interacting with them outside
of class. More than half of the students had experienced an incident of racial discrimination, and perceived relations between Black students and white faculty and staff members to be generally negative. Interestingly, most of the students had excelled in high school, and came from two-parent middle-income families where the fathers and/or mothers had attended college.

The Allen et al. (1982) data was consistent with that later obtained by Allen, Bobo, and Fleuanges (1984) and Allen, Haddad, and Kirkland (1984), who found that Black undergraduate students had ambivalent feelings about their relationships with white faculty, staff, and students. Almost two-thirds of the students also reported experiencing some form of discrimination and felt that they were not part of general campus life. The overwhelming majority of the students felt that the number of Black faculty, staff, and students at their university was insufficient.

Additionally, Lunneborg and Lunneborg (1985) surveyed a large number of minority freshmen and noted that most did not feel as if they belonged to the university community; they lacked social life and felt that the university was cold, and perceived prejudice, racism, and patronizing attitudes. The Asian-American, Black, Chicano, and Native-American minority students interviewed at the University of Washington during the study recommended improvements be made in three areas: more financial aid, more ethnic studies classes, and more minority faculty members.

Carter and Sedlacek (1984) investigated interracial contact, background, and attitudes of a representative sample of entering freshmen (white and Black) at the University of Maryland, and found that the Black students who came from backgrounds with a great amount of interracial contact thought that the university treated minorities and whites differently. They also believed that the
university did not foster respect for cultural differences. Jacobs (1981) reported that minority students felt out of place in class because of professors' attitudes and hostile attitudes in general of non-minority students towards minority students, while Cones, Noonan, and Janha (1983) detail racial prejudice among white faculty members towards minority students at predominantly white institutions. All too frequently, professors stereotyped minority students, and relations between white and minority students are lacking (Spaights, Dixon, & Nickolai, 1985). This finding, however, seems to be inconsistent with the results of Anderson (1985), who found that Black students benefited from living on campus and having contact with faculty members. It seems that in this case, the college characteristics, and the degree of integration of the Black students into the college, had a greater effect on the graduation rate of Black students than of the graduation rate for white students.

Allen, Hall, and Tabler (1982) surveyed Black graduate and professional students attending primarily white universities in Michigan, North Carolina, California, Tennessee, New York, and Arizona. One fourth or more of the students reported that professors never assisted Black students in job opportunities or offered them teaching assistantships, and the majority indicated that their professors sometimes had difficulty relating to Black students. More than half of the students reported little or no exposure to Black professors. Fewer than one in ten students reported fellowships as a major source of funding. Most blamed the system rather than themselves for the failure of Blacks to get ahead.

A Model for Black student enrollment

The theoretical approach for the study emphasizes connections between institutional, academic, and environmental characteristics in the explanation of Black student enrollment patterns. Data for the
study are from predominantly white state-supported colleges and universities in the United States. The study posits that academic, institutional, and environmental variables are antecedent to and explanatory of observed differences in the enrollment pattern of Black students in predominantly white institutions. Additionally, it is assumed institutions with the highest institutional graduation rates will have substantial minority enrollment, since these institutions may exhibit academic, institutional and environmental characteristics which are conducive to high graduation rates for students in general, which may positively impact the level of Black student enrollment. Specifically, what is the relative importance of the independent variables in the predication of the pattern of Black student enrollment at public, four-year historically white colleges, and can casual relationships be depicted based on the observed data?

Rationale for the structure of the model

A model diagram is a pictoral representation of the predicted relationships among variables (Voorhees, 1985). The absence of a path or link predicts that the relationship between two variables is not significant. Conversely, the presence of a path indicates that the researcher predicts that the relationship between two variables is significant. The structure of the initial model, shown in Figure 1, displays the conceptual relationships among the variables under investigation predicated on existing conceptual orientations to the study of Black student enrollment and the findings of previous empirical studies linking academic, institutional, and environmental factors to the enrollment of Black students in historically white colleges and universities. The following assumption underlies the specification of the initial model: academic, institutional, and environmental variables have an effect
Figure 1. Hypothesized model
on the enrollment pattern of Black students at predominately white colleges and institutions.

The initial model depicts the relationships of each of the measured variables and of the latent variables in the model. Specifically, the model posits that each of the measured variables indirectly effects Black student enrollment (BSE) through the mediating effect of the corresponding latent variable. Several measured variables are assumed correlated by the nature of what each measures: fees assessed out-of-state students (OUTFEE) and fees for room and board (RB) are assumed to be correlated since institutions that are expensive on one measure typically are expensive on the other; and the ratio of the population with 16 or more years of education to the total population aged 25 or over (COLED) is assumed correlated with the size of the service industry of the locale (SVC), as earnings are based on wage and salary disbursements, other labor income, and proprietor's income.

Research Hypotheses

Based on the interrelationships posited among the variables, the following are the hypotheses of this study.

**Hypothesis 1:** The model shown in Figure 1 is a plausible explanation of the relationship among these variables in the population.

**Hypothesis 2:** A significant portion of the variance in Black student enrollment will be accounted for by the entire set of variables in the model than which can be accounted for by ACT score (Variable 1) alone.

**Hypothesis 3:** Each of the intervening variables in the model will account for a significant portion of the variances in BSE beyond that which can be accounted for by ACT score (Variable 1) alone.
Summary

The poor record of enrollment and retention of Black students enrolled in predominantly white institutions is indeed a skeleton that should no longer be hidden in the closet. Several studies suggested that factors independent of ability to perform college- and graduate-level work negatively impact minority students in general and Black students in particular. Gosman, Dandridge, Nettles, & Thoeny (1983) noted that racial differences in retention and progression disappear when the effects of other student and institutional characteristics are controlled statistically. Indeed, as Heyward (1985) found, Black students are more likely than are other minority and nonminority students to view themselves as victims of racism and discrimination. Black students often mistrust the white establishment. Most Black students who attend a predominantly white institution must make psychological, social, and cultural adjustments to an often hostile environment if they are to have any chance of succeeding academically. If minorities are to be represented in higher education, given these conditions, then institutions of higher learning must seek ways to positively impact minority enrollment, academic progress, retention, and graduation.
CHAPTER III

METHOD

Introduction

The purpose of this study is to identify factors or variables associated with the enrollment pattern of Black students in predominantly white 4-year undergraduate universities and colleges. A substantive model will be suggested which describes the causal relationships of the predictor variables to Black student enrollment so that appropriate efforts by policy-makers can be initiated to positively impact Black student enrollment and subsequent retention. This chapter presents the methodology used to accomplish the study objectives.

Overview of Methodology

Because past research has not adequately considered potential interrelationships and the possible underlying structure among various measures with the potential to impact the pattern of Black student enrollment at historically white colleges and universities, a statistical modeling technique known as "covariance structure modeling" (CSM), or the analysis of covariance structures, or structural equation modeling, will be employed in this study. Nora (1987) states that causal modeling is the most appropriate form of data analysis for educational research because of the (1) intercorrelations between the independent (predictor) variables, (2) nonrandom groups that comprise the samples to be used,
(3) nonmanipulation of the variables, and (4) the inability to
determine the relative importance of predictor variables.

The use of structural equation models can accommodate a
variety of research conditions when certain assumptions cannot be
met by the researcher (e.g., uncorrelated residuals or error terms,
single indicators or indices for observed variables in the model).
Structural equation models take into account the correlations found
between and among the residuals (Joreskog & Sorbom, 1984). The use
of CSM allows the specification of a priori relationships among
variables selected for investigation and provides for simultaneous
analyses of the effects of variables hypothesized to effect other
variables (Voorhees, 1985).

Models for the analysis of covariance structure models attempt
to explain the relationships among a set of observed variables in
terms of a generally smaller number of unobserved variables. The
relationships among the observed variables are represented by the
covariances among the variables contained in the covariance matrix.
The covariance matrix can be decomposed by a model that assumes
that unobserved variables generate the pattern or structure among
the observed variables (Long, 1985). Estimating the covariance
structure model requires the use of sophisticated software. Linear
Structural Relations (LISREL), written by Joreskog and Sorbom, is
the most commonly used computer program for estimating the
covariance structure model (Long, 1985).

The covariance structure model consists of two components.
The first component, from psychometrics, is the confirmatory factor
or measurement model; the second component is the structural
equation model from econometrics. The factor analytic model
presupposes that the observed variables are generated by a smaller
number of unobserved or latent variables called factors (Long, 1985).
The factor model uses observed variables to estimate latent variables without regard for the structural relations among the latent variables. Observed variables are assumed to be measured with error. In the covariance structure model, latent variables are linked to observed variables in the same way as in the factor model.

The structural equation model presents these structural relations by causally relating the latent variables which have been factored from the observed variables through a measurement model, but does so with an initial assumption that all of the variables are measured without error. The latent variables that are causally specified by the structural equation model are endogenous variables and exogenous variables. Variables that are explained by the model are endogenous variables, which are explained by specifying that they are causally dependent on other endogenous variables or dependent on exogenous variables. Exogenous variables are not explained by the model, but determined by variables outside of the model (Long, 1985). An analysis of the covariance matrix is made to describe its structure through the use of the measurement model linking the observed variables to the unobserved variables, and the structural model relating the structural relations among the latent (unobserved) variables.

In LISREL, a chi-square ($\chi^2$) statistic is utilized to determine how well an a priori model fits the observed data (Voorhees, 1985). The $\chi^2$ statistic provides a referent to determine how well a hypothesized model accounts for the intercorrelations (covariances) among the variables that make up the model. A significant $\chi^2$ value at a predetermined level of probability leads to the rejection of the null hypothesis that there is no significant difference between the covariance matrix implied by a specified model and the observed
covariance matrix; consequently it is concluded that the model does not fit the data. The lower the value and the larger the probability associated with the $\chi^2$ statistic, the better the fit of the model to the data, which causes the researcher to fail to reject the null hypothesis (i.e., that the model is plausible statistically).

**Exogenous and Endogenous variables**

Exogenous variables are variables whose causes are determined outside of a structural model. Models do not explain levels of exogenous variables; they are predetermined. Exogenous variables in the proposed investigation are all of the independent variables described in the section labeled "Operationalization of the independent variables."

The levels of endogenous variables are determined by the model. The endogenous variable proposed for this investigation is the dependent variable, Black student enrollment (BSE).

**Statistical Analyses**

**Hypothesis 1.** The primary hypothesis of this investigation is that the interrelationships depicted in Figure 1 are plausible given the variables in the population of interest. This hypothesis was tested using a statistical technique commonly called the "analysis of covariance structures" or "covariance structure modeling" (Bentler, 1980; Joreskog & Sorbom, 1984; Long, 1983). The use of this procedure allows the researcher to explain the covariances among a set of observed variables in terms of the relationships among a set of unobserved (latent) variables. Each specified model consists of both a factor analytic model, which describes the posited relationships of the measured variables (MVs) as indicators of particular latent variables (LVs), and a structural equation model which describes the hypothesized causal relationships among the latent variables.
The LISREL statistical software package developed by Joreskog and Sorbom was used to analyze the data in this study. The LISREL program estimates values for all of the non-zero parameters specified in the model using the method of maximum likelihood to yield parameter estimates that provide the "best fit" of the hypothesized model to the covariances observed among the measured variables.

When the best-fitting solution for the parameters specified in the model is a poor fit with the observed data, the hypothesized model is rejected as an inaccurate description of the "true" relationships in the population from which the data arose. A statistical decision regarding the general goodness of fit of the model can be made based on a $\chi^2$ statistic which the LISREL program yields. The $\chi^2$ statistic provides a direct test of the hypothesis that the model fits perfectly in the population. This is not a test of a competing null hypothesis. The significance test is thus paradoxical: if the $\chi^2$ is large relative to its degrees of freedom (i.e., significant), then the model is rejected. If the $\chi^2$ is small (i.e., nonsignificant), then the model may be a plausible description of the covariances in the population.

In addition to the use of the analysis of covariance structures in a confirmatory fashion as a means of theory testing, this technique can also be used in an exploratory manner by creating a modified model which better fits the data observed. Various statistics are yielded by the LISREL program which allows the researcher to identify areas of the model which could be improved: MVs that are weak indicators of its corresponding latent variable, parameters whose estimates are nonsignificant, and parameters not originally specified in the model which need to be added to make the model plausible. The process of modifying a model based on these findings is known as a "specification search" (Bentler, 1980; Long, 1983). The
specification search is an important part of the statistical analysis in
this study, as it was the process used in model development.

As Voorhees (1985) noted, there is always a danger inherent in
all techniques that can be employed to analyze structural models.
Pedhazur (1982, p. 660) indicated that the route to knowledge leads
from theory to model development, and not the other way around.
The process to develop a model in this investigation is not
synonymous with the testing of a formal theory of Black student
enrollment. The absence of such a theory necessitates a more
heuristic approach.

**Overview of Hypothesis 2 and Hypothesis 3.** Both Hypothesis 2
and Hypothesis 3 posit that various variables included in the
covariance structure model will predict a portion of the variance in
Black student enrollment beyond that which can be accounted for by
aptitude (Variable 1) alone. Multiple linear regression analysis was
used to test these hypotheses, with ACT score as the initial
independent variable and Black Student Enrollment as the dependent
variable. The statistic of interest in testing both Hypothesis 2 and
Hypothesis 3 is the increment in $R^2$ ($\Delta R^2$) as each of the variables of
interest are added to the model. A significant value of the statistic for
the increment allows the researcher to reject the null hypothesis that
the added variable accounts for none of the variance in BSE beyond
that which is accounted for by ACT alone.

**Hypothesis 2:** A significant portion of the variance in Black
student enrollment will be accounted for by the entire set of variables
in the model than which can be accounted for by ACT score (Variable
1) alone.

**Hypothesis 3:** Each of the intervening variables in the model will
account for a significant portion of the variances in BSE beyond that
which can be accounted for by ACT score (Variable 1) alone.
Using the percentage of Black students enrolled as of the 1988 academic year as the dependent variable, Hypothesis 2 and Hypothesis 3 will be tested using the following regression model:

\[ Y_i = a_{1i} + a_{2i}x_{1i} + a_{3i}x_{2i} + \ldots + a_{ki}x_{ki} + u_i \]  

(3.1)

where \( Y_i \) is the ith institution's percentage of Black student enrollment; \( x_{ki} \) is the kth variable on the ith college; \( a_{1i} \) is the constant term; \( a_{ki} \) is the kth coefficient of the ith college; and \( u_i \) is the disturbance term assumed to be normally distributed with a mean of zero and constant variance.

Variables

**Operationalization of the dependent variable.** Black Student Enrollment (BSE) was operationalized as the percentage of Black, non-Hispanic students enrolled at each public four-year college or university in the population. An analysis of the enrollment pattern based on this dependent variable is important, as Elizabeth De Roma and Terry Lewis (1984) found that one of the major factors in student withdrawal is poor motivation linked to the quality of enrollment decisions.

**Operationalization of the independent variables.** The variables selected for this study were chosen based upon variables present in the literature which have impacted Black student retention and enrollment, and from Lee (1987), who investigated the factors affecting migration of college students. Tinto (cited in *Increasing Student Retention, 1985*) reported that "...Nearly 85% of student institutional departures are voluntary...such departures are primarily the result of the individual's intentions and commitments and the nature of personal experiences in the academic and social communities of the college" (p. 32). The independent or predictor variables and the dependent measures for this proposed study can be
classified into three groups. They can be categorized as academic, institutional and environmental factors.

It has been well established that the dependent variable can be predicted more accurately if more than one predictor (i.e., independent variable) is used. Lewis-Beck (1980, p. 47) noted that the incorporation of more than one independent variable into the equation is useful in two ways: it offers a fuller explanation of the dependent variable, since few phenomena are products of a single cause; and second, the effect of a particular independent variable is made more certain, since distorting influences from the other independent variables is removed.

**Academic/Institutional Variables**

1. **Average Aptitude Test Score of Freshman (ACT).** The American College Testing (ACT) score was used to assess the quality of the institution. The higher the ACT score of students admitted, the higher the assumed quality of the institution. Preliminary findings from a project at the University of Chicago (The Metropolitan Opportunity Project) suggest that minority students tend to enroll in institutions with less competitive or open admission standards (Black Issues in Higher Education, July 1, 1988, p. 1). For the 96 institutions where only the Scholastic Aptitude Test (SAT) verbal and mathematics scores were provided, the SAT total score (verbal plus math) was converted to an ACT equivalent score based on Langston (1987), who used the equipercentile method to derive ACT equivalents for SAT scores using a sample of 18,950 student scores submitted to the University of Illinois between January 1983 and August 1985. The correlation between ACT composite score and SAT total score is .877. The ACT equivalent scores used for the 96 universities and colleges in the present study were used in order that all institutions in the study would provide a data point for this measure since this
variable will be used as the initial variable for subsequent regression analyses.

2). **Library Volumes** (LIB). This variable represents the total number of books available at campus libraries. The amount of microfilm and microfiche is not included. This variable is used to assess academic resources.

3). **Student-Faculty Ratio** (SFR). This is the ratio of total faculty to total full-time (FTE) students. The smaller the student-faculty ratio, the more likelihood that a student may receive individual attention.

4). **Faculty with doctorate degree** (PHD). This variable is the ratio of the number of faculty with a doctorate degree to the total number of faculty members. This variable may indicate the quality of the faculty.

5). **Dormitory Facility** (DORM). This is the ratio of the capacity of the dormitory to the number of full-time students. This may be an important variable if many Black students are away from home, living on campus.

6). **Student Employment** (STEMP). This variable is operationalized as the ratio of students who are employed at the college and in the college community to the total number of students. This may be an important factor, given that many Black students may need employment in order to afford to enroll and continue to enroll in the institution.

7). **Students Continuing to Graduate Studies from Graduating Class** (CONT). This variable is the ratio of students going directly to graduate schools after graduation from undergraduate school to the total number of graduates. This could be an indication of the quality of the academic environment.
8). **Acceptance Rate of Freshman (ACCEP)**: This variable is the ratio of admitted students to total applicants.

9). **Institutional Graduation Rate (IGR)**: 1984-1986 average. Because it is based on a multi-year average, this variable may indicate the relative stability in the overall graduation rate of the institution. It is assumed that "better" institutions will have a higher graduation rate.

10). **Retention Rate (RETEN)**: Defined as the percentage of freshmen returning for the sophomore year. This variable is hypothesized as an indicator of the academic difficulty of the institution. Note, however, that retention is a multifaceted concept that may also indicate difficulty of adjustment to the college environment.

11). **Out-of-state tuition (OUTFEE)**: This represents the actual amount charged for students who are not residents of the state where the institution is located. It is possible that the prospect of paying out-of-state tuition may dissuade many Black students, some of which are low income, from attending institutions outside of their home states, which effectively limits their opportunities for admission to colleges that might grant admission to them.

12). **Room and Board for an Academic Year (RB)**: This variable represents an estimation on the living expenses that a student will incur for an academic year (nine months), if the institution has dormitory facilities.

13). **Total Undergraduate Enrollment (UGE)**: This represents the number of full-time undergraduate students enrolled at the institution.
Environmental Variables. The following environmental variables were adopted from Lee (1987).

14). College Graduates in the Locale (COLED): the ratio of population with 16 or more years of education to the total population aged 25 or over. Higher ratios may indicate a better environment for academic activity.

15). Size of Service Industry of the Locale (SVC): The ratio of earnings from service industries to total earnings. Earnings are based on wage and salary disbursements, other labor income, and proprietor's income (Bureau of the Census, 1986a, p. 640). The service industry includes: Hotels and other lodging places; personal services and miscellaneous business services; auto repair, services, and garages; miscellaneous repair services; motion picture; amusement and recreation services; legal services; educational services; membership organizations and social services; miscellaneous professional services; and, private households (Statistical Abstract of the United States, 1986a, p. 772). This variable may be a measure of potential part-time job opportunities.

16). Per Capita Income of the Locale (PCI): The total money income is the sum of all regularly received income (United States Bureau of the Census, 1986a, p. 640). This variable could indicate the general economic condition of the locale.

17). Crime Rate of the Locale (CRIME): This is the crime rate per 100,000 population. It includes burglary, larceny-theft, motor vehicle theft, murder and nonnegligent manslaughter, forcible rape, robbery and aggravated assault. It is believed that students choose a college located in a low crime rate area.

18). Climate of the Locale (CLIMA): This variable represents the uncomfortableness of the temperature. It is the absolute value of the difference between the average temperature of the month of
January and the most comfortable temperature (68 degrees Fahrenheit). It is assumed that students will enroll in colleges located in temperate rather than intemperate climates.

**Sources of the data for the Study**

**Population.** The population of the study consists of 412 four-year public colleges and universities located in the 50 states of the United States and in the District of Columbia. The population was selected by identifying 454 names and addresses of four-year colleges and universities from the *College Admissions Data (CAD) Handbook: 1983-84* (Pendleton & Blair, 1983). Thirty-four traditionally Black four-year institutions were deleted from the population based on definitions presented in Hill (1985); five institutions were deleted due to hybrid control; and three institutions, although not historically Black institutions, were deleted because they enroll over 60% Black enrollment.

**Dependent variable.** The sources of the data for the dependent variable—the Black student enrollment of each of the 412 institutions in the 50 states and the District of Columbia—are *The Chronicle of Higher Education* ("1986 Minority Enrollment at 3,200", 1988) and *Peterson’s Guide to Four-year Colleges 1988* (Peterson’s Guides, 1989). All institutions in the study are public institutions that offer at least the baccalaureate degree and have been accredited by recognized accrediting agencies. The dependent variable will be represented as BSE.

**Independent variables.** Several sources will be used to obtain information for the independent, or predictor variables. The following represents the sources of the information for the independent variables and the abbreviations used to represent them in the analysis.


17. CRIME: *State and Metropolitan Area Data Book: 1986* (The Bureau of the Census, 1986)--Column B32: Original source is United States Federal Bureau of Investigation, unpublished data. [County and City Data (The Bureau of the Census, 1988)].

CHAPTER IV
RESULTS

The Covariance Structure Model–Hypothesis 1

Hypothesized Model. Figure 2 depicts the full hypothesized model using the conventional notation of covariance structure modeling (Long, 1983; Joreskog & Sorbom, 1984). The measured (independent) variables are depicted as rectangles, while the latent variables are represented as circles. The hypothesized structural equation model contains three LVs--academic, institutional, and environmental--that have more than one measured variable (MV) as indicators. BSE is measured directly with one MV having no assumed error.

The relationships among the variables are represented by unidirectional arrows, which indicate a directional (or "causal") effect, or with bidirectional arrows, which indicate simply a correlation between two variables. Three of the specified relationships in the present model are bidirectional: The posited relationship between LVs "academic" and "institutional"; between "institutional" and "environmental"; and between "academic" and "environmental". Each of the latent variables is hypothesized to directly effect BSE; thus, three directional effects are specified in the model.

Variables in a structural equation model can be categorized as independent variables (i.e., variables that are determined entirely
PLEASE NOTE:

Page(s) not included with original material and unavailable from author or university. Filmed as received.
outside of the model) and dependent variables (i.e., variables that are the recipient of at least one directional effect in the model). In this model, the 18 variables described in Chapter III (e.g., ACT, PHD, STEMp, etc.) served as IVs, and Black student enrollment (BSE) was the DV. Each parameter was specified in the model, such as the effects of independent variables on the dependent variables. Each is labeled $\gamma_{ij}$, the effect of independent variable j on dependent variable i.

The parameter $\zeta_1$ (zeta) is also part of the structural model, and represents the error in prediction of the dependent variable.

Table 1 shows the correlation matrix for the 19 variables (one dependent and 18 independent variables) in the model (see Appendices A and B for raw data and descriptive statistics). Results of the LISREL analysis using this matrix as data are shown in Figure 3. The $\chi^2$ statistic, which gives an overall test of the goodness of fit of the model, is the most important statistic at this stage of the analysis. As previously indicated in Chapter III, the use of the $\chi^2$ statistic in hypothesis testing is contrary to the usual logic of hypothesis testing such that a significant value of the $\chi^2$ leads to the rejection of the hypothesized model. The $\chi^2$ value for the hypothesized model, 2140.88 (df = 144, N = 377), is clearly significant ($p = .000$); the model was consequently rejected as a plausible description of the relationship among the selected variables in the population. Hypothesis 1 (i.e., the model shown in Figure 1 is a plausible explanation of the relationship among the variables in the population) is consequently rejected.

Figure 3 also contains the rho ($\rho$) statistic suggested by Bentler and Bonett (1980) as another indicator of overall fit as an alternative
### Intercorrelations among the Measured Variables

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* *< .05
** *< .01
Table 1 (cond)

Intercorrelations among the Measured Variables

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*p < .05
**p < .01
to the $\chi^2$ statistic. According to Bentler and Bonett, the $\chi^2$ can be overly stringent in large samples; consequently, even the most accurate of models may be rejected when sample size is extremely large. Although the $\rho$ statistic does not allow an inferential statistical test, it can be useful as a criterion with which to compare the fit of competing models. The formula for $\rho$ for a given model $A$ is

$$
\rho_A = \frac{(Q_0 - Q_a)}{(Q_0 - 1.0)}
$$

where $Q_a$ is the ratio $\chi^2/df$ for the hypothesized model, and $Q_0$ is the corresponding ratio for a "worst-fitting" model where the observed variables are specified as having no pattern of relatedness. The term 1.0 in the denominator is the value of the $\chi^2/df$ for the hypothetical "perfect" model. The $\rho$ statistic is the ratio which compares the improvement in fit obtained by changing from the worst-fitting model to the specified model, against the improvement that would be obtained if a perfect model (theoretically) could be specified. Values of $\rho$ can range from 0 to 1.0.

The value of $\rho$ for the hypothesized model is .379. It is difficult to interpret the absolute value, but an obtained value of .379 is consistent with the rejection of the model based on the chi-square probability level. According to Bentler and Bonett, models that have an associated $\rho$ value below .90 can be improved significantly.

An estimate and standard error for each specified parameter is also computed by the LISREL program. Figure 3 contains the estimates for the parameters of the structural equation model. The raw values of each parameter are not meaningful because they depend on the scales of measure for each of the variables; however,
Figure 3. Hypothesized model with initial parameter estimates
the significance of each parameter can be tested using the $t$-value from LISREL obtained by dividing each parameter estimate by its standard error. These $t$-values approximate a $z$ distribution; thus, estimates with a $t$-value less than 2.0 are considered nonsignificant (i.e., not significantly different from zero) and are candidates for removal from the model (Bentler, 1980; Joreskog & Sorbom, 1984). These results served a useful role in the stepwise specification search described in the following section of this chapter.

**Specification Search.** The LISREL program provides a variety of statistics which were used to modify the model in a series of 13 steps. The changes made to the initial model during the specification search are shown in Table 2. Once an initial model has been tested for its overall compatibility with the observed correlation matrix, the chi-square statistic is used to test successive improvements in the model. In the present investigation, these successive improvements included the elimination of six measured variables as indicators of the three latent variables, the inclusion of 11 new effects in the model (i.e., adding paths between variables that were previously unconnected), and the deletion of one nonsignificant parameter. The statistical significance of each of these improvements was assessed relative to the magnitude of change in the model's chi-square value for the corresponding degrees of freedom. The theoretical justification for each modification in the model will be presented in Chapter V.

Because each of the measures had a low squared multiple correlation, the first modified model (Model B) deleted six MVs from the model: DORM, CONT, RETEN, RB, STEMPE, and CLIMA. The squared multiple correlation indicates the proportion of variance in each of the MVs accounted for by the hypothetical LV; in factor analysis, this statistic is equivalent to a "communality" (Long, 1983).
Table 2: Summary of Steps in Specification Search

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<td>303.96</td>
<td>57</td>
<td>.000</td>
<td>.843</td>
</tr>
<tr>
<td>G</td>
<td>added $\lambda_{12,1}$</td>
<td>MI = 18.15</td>
<td>286.03</td>
<td>56</td>
<td>.000</td>
<td>.851</td>
</tr>
<tr>
<td>H</td>
<td>added $\lambda_{42}$</td>
<td>MI = 11.27</td>
<td>272.30</td>
<td>55</td>
<td>.000</td>
<td>.857</td>
</tr>
<tr>
<td>I</td>
<td>added $\theta_{612,4}$</td>
<td>MI = 8.41</td>
<td>263.21</td>
<td>54</td>
<td>.000</td>
<td>.860</td>
</tr>
<tr>
<td>J</td>
<td>added $\theta_{512,8}$</td>
<td>MI = 20.52</td>
<td>241.61</td>
<td>53</td>
<td>.000</td>
<td>.871</td>
</tr>
<tr>
<td>L</td>
<td>added $\lambda_{33}$</td>
<td>MI = 19.41</td>
<td>221.87</td>
<td>52</td>
<td>.000</td>
<td>.882</td>
</tr>
<tr>
<td>M</td>
<td>added $\lambda_{10,1}$</td>
<td>MI = 14.17</td>
<td>202.70</td>
<td>51</td>
<td>.000</td>
<td>.893</td>
</tr>
<tr>
<td>N</td>
<td>added $\theta_{511,9}$</td>
<td>MI = 8.31</td>
<td>193.60</td>
<td>50</td>
<td>.000</td>
<td>.896</td>
</tr>
<tr>
<td>P</td>
<td>added $\theta_{512,10}$</td>
<td>MI = 39.03</td>
<td>156.96</td>
<td>49</td>
<td>.000</td>
<td>.920</td>
</tr>
</tbody>
</table>
The squared multiple correlations for the remaining measured variables are shown in Table 3.

The $\chi^2$ for Model B was 488.06 ($df = 59, N = 377$), which is still highly significant ($p = .000$). Even if the $\chi^2$ had a much higher probability level associated with it, it is arguable whether a re-specified model should be assessed in terms of a significance test (Bentler & Bonnet, 1980). Since the new model is being fitted to same data that generated the modification, there is a high risk of capitalizing on chance. The $p$ statistic, consequently, is more appropriate for use as a criterion when comparing a modified model to the original model. The value of $p$ for this model was .737, which indicates that a significant improvement in the model took place as a result of the deletion of the six measured variables, which resulted in an improvement in the measurement model. Although this model is still not a plausible explanation of the data (i.e., a value of $p$ less than .90), improvements in the measurement model allow a better-fitting model to be specified at later stages of analysis.

The next step in the specification search involved adding another path to the model, $\theta_{61}$, a path not originally included in the original model. This change was based not only on substantive theoretical considerations but also on the "modification index" (MI) provided by the LISREL program. A modification index is an estimate of the decrease in $\chi^2$ which will be obtained by adding the missing parameter to the model. The $\chi^2$ for the resulting model (Model C) was reduced to 436.38 ($df = 58, N = 377$) but is still highly significant ($p = .000$). The $p$ value for Model C was .764, which
Table 3: Squared Multiple Correlations for the Variables Remaining in the Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT</td>
<td>.627</td>
</tr>
<tr>
<td>LIB</td>
<td>.307</td>
</tr>
<tr>
<td>SFR</td>
<td>.293</td>
</tr>
<tr>
<td>PHD</td>
<td>.586</td>
</tr>
<tr>
<td>ACCEP</td>
<td>.358</td>
</tr>
<tr>
<td>IGR</td>
<td>.164</td>
</tr>
<tr>
<td>OUTFEE</td>
<td>.525</td>
</tr>
<tr>
<td>UGE</td>
<td>.165</td>
</tr>
<tr>
<td>COLED</td>
<td>.840</td>
</tr>
<tr>
<td>PCI</td>
<td>.403</td>
</tr>
<tr>
<td>SVC</td>
<td>.724</td>
</tr>
<tr>
<td>CRIME</td>
<td>.260</td>
</tr>
</tbody>
</table>

Table 4: Squared Multiple Correlation for the Dependent Variable

<table>
<thead>
<tr>
<th>Variable</th>
<th>Effects of:</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSE</td>
<td>ACT, LIB, SFR, PHD, ACCEP, IGR, OUTFEE, UGE, COLED, PCI, SVC, CRIME</td>
<td>.793</td>
</tr>
</tbody>
</table>
represents a slight improvement over the .737 value obtained for Model B.

The $t$-value associated with the path $\gamma_{13}$, the directional effect of the latent variable "environmental" ($\xi_{13}$) on the dependent variable BSE, was not significantly different from zero ($t = -1.75$); consequently, this path was eliminated from the model. The resulting model, Model D, had a $\chi^2$ value of 439.09 ($df = 59, N = 377$), which is still highly significant ($p = .000$). The $\rho$ value for the model was .767, a slight improvement over Model C.

All of the remaining models resulting from each additional step in the specification search (Models E through P) involved the addition of one parameter due to both substantive theoretical reasons and large MIs. The values of $\chi^2$, $df$, probability of $\chi^2$, and $\rho$ are listed in rows E through P of Table 2. Values for the final model are shown in row P.

**Final Model.** The final model developed in this study, the result of all of the previous improvements is represented as Model P. Figure 4 presents Model P along with parameter estimates and measures of overall goodness of fit. The $\chi^2$ value for this model is 156.96 ($df = 49, N = 377, p = .000$). The value of $\rho$ is .92. Although the $\chi^2$ has a significant probability level, which would ordinarily mean that the model does not fit the data, the $\chi^2$ value is inflated due to the large sample size; the $\rho$ value greater than .90 indicates that Model P is a plausible explanation for the pattern of correlations and intercorrelations in the data.
\[ \chi^2 = 156.96 \ (df = 49, N = 377, p = .000) \]
\[ \rho = .920 \]

Figure 4. Final model (Model P)
The LISREL analysis also provides a squared multiple correlation \( R^2 \) for each measured variable and dependent variable in the structural equation model. The values of \( R^2 \), or the proportion of variance in the dependent variable BSE that is accounted for by the various measured variables, are shown in Table 3. The proportion of variance in the dependent variable that is accounted for by the latent variables which affect it is .793 (see Table 4).

**Multiple Regression Analyses**

_Initial regression analysis when all variables are regressed on BSE._ Table 5 lists the variable designations (e.g., Var2, Var7, etc.) and results of the initial regression analysis when all of the 18 measured variables are regressed on BSE; Table 6 presents the results of the regression analyses for the specific research hypotheses, Hypothesis 2 and Hypothesis 3. The variable designations are different than those presented in Chapter III when the definitions of the variables were presented, because during the regression analyses BSE was designated as Variable 1 for methodological purposes. For example, ACT was Variable 1 for the purpose of definition, but it is Variable 2 in the regression analysis. Table 5 designations are used to describe the results of the regression analyses for Hypothesis 2 and Hypothesis 3 presented in (see Table 6).

The initial regression analysis when all 18 measured variables were regressed on the dependent variable was performed in order to verify the results of the covariance structure model in the sense that, overall, a significant proportion of variance in BSE could be obtained and that several of the variables would exhibit parameter estimates in the predicted direction. The results of the analysis will not be described in detail since Hypothesis 2 and Hypothesis 3 predict specific hypotheses that the research was designed to assess.
Table 5: Results when all variables are regressed on Black Student Enrollment

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>$F$</th>
<th>prob &gt; $F$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>18</td>
<td>1789.608</td>
<td>99.423</td>
<td>5.24</td>
<td>.0001**</td>
<td>.3941</td>
</tr>
<tr>
<td>Error</td>
<td>145</td>
<td>2751.321</td>
<td>18.975</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>163</td>
<td>4540.929</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta value</th>
<th>Standard Error</th>
<th>$T$</th>
<th>prob &gt; $T$</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERCEPT</td>
<td>32.72</td>
<td>6.2084</td>
<td>5.270</td>
<td>.0001**</td>
</tr>
<tr>
<td>ACT (Var2)</td>
<td>-0.5107</td>
<td>0.1893</td>
<td>-2.698</td>
<td>.0078*</td>
</tr>
<tr>
<td>LIB (Var3)</td>
<td>2.628(-07)</td>
<td>6.117(-07)</td>
<td>0.430</td>
<td>.6682</td>
</tr>
<tr>
<td>SFR (Var4)</td>
<td>-0.1842</td>
<td>0.1181</td>
<td>-1.560</td>
<td>.1209</td>
</tr>
<tr>
<td>PHD (Var5)</td>
<td>0.0884</td>
<td>0.0364</td>
<td>2.428</td>
<td>.0164*</td>
</tr>
<tr>
<td>DORM (Var6)</td>
<td>0.0040</td>
<td>0.0251</td>
<td>0.158</td>
<td>.8750</td>
</tr>
<tr>
<td>STEMP (Var7)</td>
<td>-0.0182</td>
<td>0.0170</td>
<td>-1.071</td>
<td>.2859</td>
</tr>
<tr>
<td>CONT (Var8)</td>
<td>0.0054</td>
<td>0.0244</td>
<td>0.222</td>
<td>.8244</td>
</tr>
<tr>
<td>ACCEP (Var9)</td>
<td>-0.0374</td>
<td>0.0295</td>
<td>-1.268</td>
<td>.2068</td>
</tr>
<tr>
<td>IGR (Var10)</td>
<td>-0.0001</td>
<td>0.0353</td>
<td>-0.004</td>
<td>.9967</td>
</tr>
<tr>
<td>RETEN (Var11)</td>
<td>0.0090</td>
<td>0.0119</td>
<td>0.757</td>
<td>.4502</td>
</tr>
<tr>
<td>OUTFEE (Var12)</td>
<td>-0.0006</td>
<td>0.0003</td>
<td>-1.693</td>
<td>.0926</td>
</tr>
<tr>
<td>RB (Var13)</td>
<td>-0.0022</td>
<td>0.0008</td>
<td>-2.847</td>
<td>.0051**</td>
</tr>
<tr>
<td>UGE (Var14)</td>
<td>-0.0001</td>
<td>0.0001</td>
<td>-0.566</td>
<td>.5725</td>
</tr>
<tr>
<td>COLED (Var15)</td>
<td>0.0018</td>
<td>0.0030</td>
<td>0.614</td>
<td>.5400</td>
</tr>
<tr>
<td>SVC (Var16)</td>
<td>-0.0004</td>
<td>0.0003</td>
<td>-1.309</td>
<td>.1925</td>
</tr>
<tr>
<td>PCI (Var17)</td>
<td>-0.0092</td>
<td>0.0052</td>
<td>-1.791</td>
<td>.0754</td>
</tr>
<tr>
<td>CRIME (Var18)</td>
<td>0.0003</td>
<td>0.0003</td>
<td>1.352</td>
<td>.1785</td>
</tr>
<tr>
<td>CLIMA (Var19)</td>
<td>-0.1847</td>
<td>0.0371</td>
<td>-4.986</td>
<td>.0001**</td>
</tr>
</tbody>
</table>

* $p < .05$  
** $p < .01$
Table 6: Summary of Forward Selection Procedure and Multiple Regression Analyses with ACT score as initial variable, BSE as Dependent Variable, and 15% Significance Level as Selection Criterion

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R^2$</th>
<th>$sR^2$</th>
<th>$E(sR^2)$</th>
<th>$df$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Composite</td>
<td>.064</td>
<td>-------</td>
<td>-------</td>
<td>1/162</td>
</tr>
<tr>
<td>ACT Composite plus:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable 19</td>
<td>.233</td>
<td>.170</td>
<td>32.95**</td>
<td>2/161</td>
</tr>
<tr>
<td>Var19, Var13</td>
<td>.258</td>
<td>.025</td>
<td>5.49*</td>
<td>3/160</td>
</tr>
<tr>
<td>Var19, Var13, Var9</td>
<td>.278</td>
<td>.020</td>
<td>4.33*</td>
<td>4/159</td>
</tr>
<tr>
<td>Var19, Var13, Var9, Var5</td>
<td>.294</td>
<td>.016</td>
<td>3.72</td>
<td>5/158</td>
</tr>
<tr>
<td>Var19, Var13, Var9, Var5, Var16</td>
<td>.309</td>
<td>.015</td>
<td>3.39</td>
<td>6/157</td>
</tr>
<tr>
<td>Var19, Var13, Var9, Var5, Var16, Var4</td>
<td>.325</td>
<td>.016</td>
<td>3.69</td>
<td>7/156</td>
</tr>
<tr>
<td>Var19, Var13, Var9, Var5, Var16, Var4, Var12</td>
<td>.345</td>
<td>.020</td>
<td>4.70*</td>
<td>8/155</td>
</tr>
<tr>
<td>Var19, Var13, Var9, Var5, Var16, Var4, Var12, Var15</td>
<td>.352</td>
<td>.007</td>
<td>1.68</td>
<td>9/154</td>
</tr>
<tr>
<td>Var19, Var13, Var9, Var5, Var16, Var4, Var12, Var15, Var17</td>
<td>.378</td>
<td>.026</td>
<td>6.35*</td>
<td>10/153</td>
</tr>
<tr>
<td>Var19, Var13, Var9, Var5, Var16, Var4, Var12, Var15, Var17, Var7, Var11, Var14, Var3, Var8, Var6, Var10</td>
<td>.394</td>
<td>.016</td>
<td>5.24**</td>
<td>18/145</td>
</tr>
</tbody>
</table>

* $p < .05$
** $p < .01$
The results in Table 5 suggest that it is possible to account for 39.41% of the variance in BSE using the complete set of variables in the study even though only four variables have statistically significant parameter estimates: ACT, PHD, RB, and CLIMA.

It is possible that not all of the variables are needed in order to provide an explanation of the dependent variables. In addition, precise estimates of the coefficients of the variables cannot always be obtained due to the problem of multicollinearity, i.e., the explanatory variables are correlated. Mansfield (1983, p. 458) noted that if a dependent variable is a function of more than one independent variable, the observed relationship between the dependent variable and any of the independent variables may be misleading because the observed relationship may reflect variation in other independent variables. Consequently, it is necessary to evaluate each of the variables to determine which are relevant and should be included and which are not and therefore should not be included. For this purpose, the data was subjected to a stepwise regression analysis using the Maximum-$R^2$ improvement procedure. The results of this analysis will be discussed after the consideration of the results concerning Hypothesis 2 and Hypothesis 3.

**Hypothesis 2 and Hypothesis 3.** The second and third research hypotheses predicted that various combinations of measured variables in the model would predict variation in Black student enrollment beyond that which could be accounted for by ACT scores alone. These hypotheses were tested using a series of hierarchical multiple regression analyses, with Black student enrollment as the dependent variable and ACT score as the first independent variable in each analysis. In a separate analysis, each set of variables was tested by adding it to the model containing the ACT variable. The increment in $R^2$, $sR^2$, is the statistic of interest when the new
variable or set of variables is added to ACT score in the regression model (Cohen & Cohen, 1975).

The results of these analyses are presented in Table 6. ACT alone accounted for 6.4% of the variance in BSE. When the 18 measured variables in the original covariance structure model are added as a set to the equation without regard to a selection criterion for inclusion, the proportion of variance accounted for is 39.4%, a significant increment in $R^2$ of 33% [$F(sR^2) = 5.24, \rho < .01$]. Based on these results, Hypothesis 2 [i.e., a significant portion of the variance in Black student enrollment will be accounted for by the entire set of variables in the model than which can be accounted for by ACT score (Variable 1) alone] is confirmed.

Table 6 also contains the results of the analysis used to test Hypothesis 3. Hypothesis 3 predicted that each of the intervening variables in the model would account for a significant portion of the variance in BSE beyond that which can be accounted for by ACT score (Variable 1) alone. The results indicated that when the stepwise forward selection procedure with a 15% significance level as the selection criterion is used, Hypothesis 3 is rejected, since only nine of the possible 17 measured variables other than ACT met the selection criterion and were thus included in the model. The variables that met the selection criterion were CLIMA, RB, ACCEP, PHD, SVC, SFR, OUTFEE, COLED, and PCI.

The "best" model using the Maximum-$R^2$ improvement technique. Table 7 presents the summary of the improvement in $R^2$ that result when the data was subjected to the Maximum-$R^2$ improvement technique with BSE as the dependent variable. As indicated in Table 7, the best six-variable model (CLIMA, ACT, RB, ACCEP, SFR, and SVC) accounted for 31% of the variance in Black student enrollment. This value differs from the 37.8% of the variance
in BSE accounted for ten variable model, shown in Table 6, that resulted from the forward selection procedure multiple regression model. Although a lower proportion of variance accounted in BSE resulted from the use of the Maximum-$R^2$ improvement technique, this technique with its more stringent criteria for variable inclusion yielded a more parsimonious and statistically sound explanation of the data.

Table 8 presents the summary source table and inferential statistics for the best model using the Maximum-$R^2$ improvement technique. The regression model, as well as each of the variables included in the model, have statistically significant F-ratios. The standardized regression equation associated with this model, which can be used to predict the percentage BSE of an institution, is:

$$Y = \left[-.5067(ACT)\right] + \left[-.1565(SFR)\right] + \left[-.0653(ACCEP)\right] + \left[-.0012(RB)\right] + \left[-.0005685(SVC)\right] + \left[-.1851(CLIMA)\right] + 39.13$$ \hspace{1cm} (4.2)

It should be noted that all of the standardized regression weights in the model are negative, which indicates that one unit increase in any of the independent variables in the model would result in a predicted decrease in $Y$, or predicted BSE. For example, a one unit increase in ACT score predicts a decrease in BSE of (.5067); a one unit increase in SFR is predicted to result in a (.1565) change in BSE; and a one unit increase in ACCEP is predicted to result in a (.0653) change in BSE; etc. These results suggest that BSE decreases as the average ACT score of enrolled students increases; as student-faculty ratio decreases (e.g., from 1/30 to 1/15); as colleges become more selective based on their acceptance rate; as room and board increases; as the size of the service area increases; and for extremely hot or extremely cold climates.
<table>
<thead>
<tr>
<th>Number in Model</th>
<th>$R^2$</th>
<th>Variables in Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.169</td>
<td>Var19 (CLIMA)</td>
</tr>
<tr>
<td>2</td>
<td>.233</td>
<td>Var19 (CLIMA) Var2 (ACT)</td>
</tr>
<tr>
<td>3</td>
<td>.258</td>
<td>Var19 (CLIMA) Var2 (ACT) Var13 (RB)</td>
</tr>
<tr>
<td>4</td>
<td>.278</td>
<td>Var19 (CLIMA) Var2 (ACT) Var13 (RB) Var9 (ACCEP)</td>
</tr>
<tr>
<td>5</td>
<td>.294</td>
<td>Var19 (CLIMA) Var2 (ACT) Var13 (RB) Var9 (ACCEP) Var5 (PHD)</td>
</tr>
<tr>
<td>6</td>
<td>.309</td>
<td>Var19 (CLIMA) Var2 (ACT) Var13 (RB) Var9 (ACCEP) Var5 (PHD) Var16 (SVC)</td>
</tr>
<tr>
<td>6*</td>
<td>.310</td>
<td>Var19 (CLIMA) Var2 (ACT) Var13 (RB) Var9 (ACCEP) Var4 (SFR) Var16 (SVC)</td>
</tr>
</tbody>
</table>

*Variable 5 replaced by Variable 4
Table 8: "Best" model using the Maximum-$R^2$ Improvement Procedure

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>6</td>
<td>1409.318</td>
<td>234.886</td>
<td>11.78</td>
<td>.0001**</td>
</tr>
<tr>
<td>Error</td>
<td>157</td>
<td>3131.611</td>
<td>19.947</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>163</td>
<td>4540.929</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta value</th>
<th>Standard Error</th>
<th>F</th>
<th>prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERCEPT</td>
<td>39.1300</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT (Var2)</td>
<td>-0.5067</td>
<td>0.1432</td>
<td>12.52</td>
<td>.0005**</td>
</tr>
<tr>
<td>SFR (Var4)</td>
<td>-0.1565</td>
<td>0.0658</td>
<td>5.66</td>
<td>.0186*</td>
</tr>
<tr>
<td>ACEPT (Var9)</td>
<td>-0.0653</td>
<td>0.0261</td>
<td>6.26</td>
<td>.0134*</td>
</tr>
<tr>
<td>RB (Var13)</td>
<td>-0.0012</td>
<td>0.0006</td>
<td>4.07</td>
<td>.0452*</td>
</tr>
<tr>
<td>SVC (Var16)</td>
<td>-0.5685(-3)</td>
<td>0.2276(-3)</td>
<td>6.24</td>
<td>.0135*</td>
</tr>
<tr>
<td>CLIMA (Var19)</td>
<td>-0.1851</td>
<td>0.0306</td>
<td>36.49</td>
<td>.0001**</td>
</tr>
</tbody>
</table>

* $p < .05$
** $p < .01$
Overview

The enrollment of Black students at the postsecondary education level is receiving increased attention from not only academic administrators but also state and national policy-makers. For example, Herman D. Lujan indicated in *The Chronicle of Higher Education* that state boards and campus administrators must make increasing minority-student enrollments a priority ("More Minority Programs," 1989). Still, the symbiotic interaction of academic, institutional, and environmental variables has not been fully explored. The need is great to understand the interrelationships among these factors given the fact that institutions of higher education are increasingly forced to compete for scarce resources.

The Covariance Structure Model

Figure 1 presented the hypothesized model of the relationships among the variables and Figure 4 shows the final model. Even though the inferential chi-square test in covariance structure modeling has been described by Bentler and Bonnett (1980) as potentially too stringent, the completely descriptive measure of overall goodness of fit that the $\rho$ statistic provides also indicated that it was appropriate to modify the initial hypothesized model. After modifications were made during the specification search, the final
model (Model P) resulted in a $\rho$ value of .920, indicating that the model fits the data well.

As reported in Chapter IV, RESULTS, the estimation and analysis of Model P resulted in this model being a plausible representation of the "true" relationships among these variables in the population. Although the final model represents a substantial improvement over the initial model, it is not possible to claim that Model P is the only way in which the relationships among the variables selected for this study may be depicted, because competing models may fit the same data equally well (Pedhazur, 1982).

The changes made in the structural equation model during the specification search must be justified on substantive theoretical grounds, since the fit of a model to a set of data can always be improved at least slightly by adding any relationship that is non-zero in the data to the model (Bentler, 1980; Cliff, 1983).

Major Changes to the hypothesized model

Deletion of six measured variables. The decision to delete parameters from the model was based on the logic of inferential hypothesis testing. In each case where a parameter was deleted, a significance test failed to reject the hypothesis that the parameter was equal to 0 (zero) (i.e., a $t$ - value of less than 2.00). The following paragraphs attempt to elucidate why the data did not contain the predicted relationships.

Because each of the measures had a low squared multiple correlation (i.e., not good indicators of their corresponding latent variables), the first modified model (Model B) deleted six MVs from the model: DORM, CONT, RETEN, RB, STEM P, and CLIMA. The squared multiple correlation indicates the proportion of variance in each of the MVs accounted for by the hypothetical LV; in factor
analysis, this statistic is equivalent to a "communality" (Long, 1983). It is possible that these variables were redundant in terms of the amount of unique variance that they could account for in BSE because of the selection of many of the other variables in the study. For example, DORM and RB may not be needed as indicators since OUTFEE is in the model. Also, the variable RETEN may not be needed since the institutional graduation rate (IGR) is included in the model. It is not known whether other variables in the model masked the effects of CONT, STEMP, or CLIMA, or if these variables truly do not impact the enrollment patterns of Black students in the present study.

**Deletion of path from environmental latent variable to BSE.** A surprising finding of this research was the lack of a significant path coefficient ($\gamma_{13} = -1.75, p > .05$) linking the environmental latent variable to Black student enrollment. Consequently, this path was deleted from the final model. This may be due to several factors. First, given that the current research is in essence a freeze-frame analysis of the enrollment pattern of Black students instead of a longitudinal analysis with multiple recordings of the enrollment, the predicted relationship may not have surfaced.

**Additions to the hypothesized model.** Additions of parameters were based on substantive theoretical considerations and the "modification index" (MI) provided by the LISREL program. A modification index is an estimate of the expected decrease in $\chi^2$ which will be obtained by adding the missing parameter to the model. This, in effect, corrects the misspecification of the original model by adding a statistically significant path between two variables or between a measured variable and a latent variable.
Correlation of error terms of measured variables. The original model implied a correlation of error terms between IGR and RETEN, between OUTFEE and RB, and between COLED and SVC because these pairs of variables seem to be mutually dependent. None of these assumed correlations surfaced during the specification search; however, five other patterns of intercorrelations among the error terms did. First, IGR and ACT have correlated error terms, implying that these two factors are themselves correlated. Second, LIB and UGE have correlated error terms; generally, institutions of greater size can be expected to expend larger sums and maintain more books in the library than smaller institutions. Third, UGE and CRIME have correlated error terms; larger campuses have a greater opportunity for higher levels of crime. Fourth, CRIME and PCI have correlated error terms; typically, locations (or college locations?) with higher per capita income generally have higher crime rates. Lastly, the correlated error terms for the variables SVC and COLED indicate that it is likely that college educated persons will locate in areas with a substantial service industry.

Summary, Implications, and Directions for Future Research

The primary research hypothesis proposed a covariance structure model (shown in Figure 1) of the interrelationships among academic, institutional, and academic variables and Black student enrollment in historically white institutions. The initial model was rejected statistically as a plausible representation of the relationships among the variables in the population. Subsequent modifications made during the specification search, however, resulted in a model which closely fit the obtained data. In sum, the final model (see Figure 4) retains the basic causal structure proposed in the original model except for the substantive changes described previously. Generally, the final model posits both direct effects and indirect
effects. The direct effects (i.e., that the institutional and academic latent variables directly influence BSE without other intervening influences) are opposite in nature: The institutional latent variable negatively impacts BSE, while the academic latent variable positively impacts BSE. Each of the measured variables remaining in the model through its associated latent variable provides an indirect effect on BSE. The institutional and academic latent variables are highly correlated; the environmental latent variable exhibits slight though nonsignificant correlations with both the institutional and academic latent variables. With the absence of a significant path from the environmental latent variable, the indicators of the environmental latent variable may have only an indirect effect through the intercorrelation of their error terms with other measured variables.

The ability of the variables in the model to predict Black student enrollment beyond the predictive power of the ACT variable alone was also tested in the study. The use of the technique increment in $R^2 (sR^2)$ from multiple regression analysis revealed that factors which influence Black student enrollment are multidimensional; reliance on the ACT score alone would present an inaccurate picture. As mentioned previously in Chapter IV, RESULTS, when the 18 measured variables in the original covariance structure model were added as a set to the equation without regard to a selection criterion for inclusion, the proportion of variance in Black student enrollment accounted for is 39.4%, a significant increment in $R^2$ of 33% $[F(sR^2) = 5.24, p < .01]$ over the proportion of variance in BSE accounted for by ACT score alone. Hypothesis 2 predicted that a significant portion of the variance in Black student enrollment would be accounted for by the entire set of variables in the model.
Hypothesis 3 predicted that each of the intervening variables in the model would account for a significant portion of the variance in BSE beyond that which can be accounted for by ACT score (Variable 1) alone. This hypothesis was rejected since only nine of the possible 17 measured variables other than ACT (i.e., CLIMA, RB, ACCEP, PHD, SVC, SFR, OUTFEE, COLED, and PCI) met the selection criterion for inclusion in the model.

The best six-variable model using the Maximum- $R^2$ improvement technique (CLIMA, ACT, RB, ACCEP, SFR, and SVC) accounted for 31% of the variance in Black student enrollment (see Table 8). The standardized regression equation associated with this model is:

$$Y = [-0.5067(\text{ACT})] + [-0.1565(\text{SFR})] + [-0.0653(\text{ACCEP})] + [-0.0012(\text{RB})] + [-0.0005685(\text{SVC})] + [-0.1851(\text{CLIMA})] + 39.13 \tag{4.2}$$

The standardized regression coefficients in the equation suggest that BSE decreases as the average ACT score of enrolled students increase; as student-faculty ratios decrease (e.g., from 1/30 to 1/15); as colleges become more selective based on their acceptance rate; as room and board increases; as the size of the service area increases; and for extremely hot or extremely cold climates.

**Implications for Institutions.** Several tentative implications for administrators may be found within this study. First, the results of the covariance structure model analysis indicated that absolute expense (i.e., OUTFEE) significantly influences BSE. Although this investigation did not include as a variable the number or percentage of students receiving financial aid or the amount of financial aid received, it might be argued that absolute costs are what students attend to, and not relative costs which can vary depending upon the particular aid package that a student receives. This may be an important distinction, since Black students and white students have
equally favorable attitudes towards educational loans (Mortenson, 1988); Hispanic students, however, do not. In addition, the equation for the "best" model using the Maximum-$R^2$ improvement procedure indicates that room and board (RB) is also an important factor, a finding which lends converging support to the idea that students may attend more to absolute versus relative costs.

These findings have important implications, since as Ewell (1985) pointed out, prospective students must pass through three important decision points in order to be enrolled at an institution: The student must successfully seek application, be accepted by the institution, and actually decide to enroll. Excessive tuition and room and board fees could reasonably impact Stage 1 and Stage 3. At Stage 1, excessive fee structures may keep students from even applying to the institution, and at Stage 3, students may eliminate choices based on fees.

It is interesting that the variable OUTFEE did not enter into the best model based on the Maximum-$R^2$ improvement procedure. It may be that it is easier to plan for tuition costs, which remain relatively stable during the school year but may change annually; room and board costs, which depend on such factors as whether the student lives on or off campus, and where on or off campus the student lives, however, may be more variable and uncertain. Room and board fluctuations may be subject to more market influences than tuition fees alone. Consequently, a Black student may be forced to change the selection of a college or not attend college at all based simply on how expensive it will be for the student to live. This is consistent with findings in the literature that availability of scholarships and financial aid are important factors in attracting students to attend an institution, as well as whether the institution is selective or not (Burrell, 1980; Thomas and Braddock, 1981).
Second, the cost of room and board influences not only the ability to live in the dorm but also the academic performance of the students: Voorhees (1985) found that high-need freshmen living in university residence halls had better cumulative grade point averages. He suggested that proximity to campus life and social interaction with peers fosters higher levels of academic performance. Because cumulative grade point average is the most important variable in explaining student persistence, and living in a dorm tends to positively influence cumulative grade point average, institutions should design programs that facilitate peer interaction and integration in campus life. The cost of room and board should be a critical part of developing strategies for such programs, since as Mortenson (1988) noted, the amount and form of financial aid may be an important contributing factor in the loss of minority participation in higher education during the 1980's.

Third, the results of the Maximum- \( R^2 \) improvement technique presented in Chapter IV suggest that BSE decreases as the average ACT score of enrolled students increase; as student-faculty ratios decrease (e.g., from 1/30 to 1/15); as colleges become more selective based on their acceptance rate; as room and board increases; as the size of the service area increases; and for extremely hot or extremely cold climates. Institutions which possess only one of the factors negatively associated with decreasing Black student enrollment may not be negatively affected in terms of Black student recruitment. For institutions which possess several of the factors which the analysis shows are associated with decreasing BSE, however, it may be very difficult to recruit Black students to the institution. Consequently, institutions could in effect rate themselves on these factors in order to determine effective strategies for student recruiting to specifically address the influence of combinations of negative factors.
Successful institutional responses might include highlighting some of the factors which positively impacts Black student enrollment (see Figure 4). Four of the five indicators of the institutional latent variable have positive coefficients, which suggests that these variables (IGR, OUTFEE, LIB, UGE) could be used for institutional self-assessment in determining how well the institution might do in enrolling Black students. Previous research indicated that high school preparation, rank, and standardized test scores predict choice of a selective vs. nonselective institution (Thomas and Braddock, 1981). Institutions which do not have a particularly high institutional graduation rate (IGR) or which do not have especially high fee structures will find themselves losing the competition for students with very good high school preparation, evidenced by class rank, when competing with highly selective institutions.

The results also suggest that it is important to assess whether an individual student can be matched to a particular institution in order to optimize the probability of student success. For example, high school guidance counselors should use all available information in order to advise students on which colleges to apply in order that both student characteristics and talents can be matched to institutions where the student would have a high probability of success. It is likely that mismatches between qualities of the student and characteristics of the institution could result in high levels of student frustration during the freshman year, frustrations that could lead to the student performing poorly academically or to the student dropping out of the institution entirely.

The results of the covariance structure model analysis are consistent with this finding, since the variable ACT had a positive coefficient. Although there is general agreement between the covariance structure model analysis and the regression analysis, the
results of the regression analysis, where ACT had a negative coefficient, are inconsistent with the covariance structure model analysis results. This inconsistency may be due to the manner in which the Maximum-$R^2$ improvement procedure treats missing data, which resulted in the deletion of 213 of the 377 colleges and universities in the covariance structure model analysis. What is most problematic, however, is that the pattern of the deletions is not known. It is possible, then, that the disparate parameter estimates for some of the variables is due primarily to the pattern of missing values in the data that were treated differently by LISREL VI and by the Maximum-$R^2$ improvement procedure.

Implications for Researchers. This study demonstrated that academic and institutional factors are important in explaining the enrollment of Black students in historically-white public four-year colleges and universities. While the proposed model shows that academic and institutional factors have a significant effect on Black student enrollment, it does not explain why. Future studies should investigate why, for example, certain variables have a positive effect on enrollment and not others. For example, a complete and reliable source of data on the percentage, or number, of Black faculty and administrative staff at each public college could provide a valuable resource relative to testing not only whether these factors influence the pattern of Black student enrollment but also could be used to test assumptions concerning how these factors influence the mentoring of Black and other minority students. In subsequent efforts to study the enrollment of Black students, these variables, or related constructs, could be posited as key components with the potential to explain substantial variation in enrollment.

It was not expected that the environmental latent variable would not significantly influence Black student enrollment. One might
argue that environment in general does not impact enrollment or that it is not a dissuader; however, the recent interest in "campus climate" issues suggests that the environmental latent variable in this investigation needs to be assessed using more, and possibly different indicators. In a sense, the current study used global indicators of the physical and economic environment; future studies might include local indicators in order to assess the environmental latent variable at a finer grain of analysis, an analysis which addresses the psycho-social environment which the term "campus climate" encompasses. This may be a difficult issue to address, as "campus climate" is subsumed under the general conception of "environment" and environmental variables.

In addition, it is possible that at least one important indicator of the environmental latent variable should be added to future investigations; the error terms for several measured variables are correlated (e.g., CRIME with PCI; SVC with COLED; and CRIME with UGE), indicating that one or more variables not included in the study may be influencing the pattern of correlations of variables included in the study. Given the pattern of the correlations of the error terms found in the present investigation, future researchers might include a variable which assesses or measures how "urban" an institution is, since urban areas typically have a higher crime rate, higher per capital income, a larger service base, and have a high number of college graduates in the area.

Summary. As Voorhees (1985) noted in his structural model analysis of the persistence of high need freshmen relative to student finances and campus-based financial aid, LISREL is clearly an advance over traditional path analysis. For example, LISREL provides for the correlation of the error terms of endogenous variables and a chi-square test of the fit of the model to the data. The
merit of the chi-square test is in its use to improve the fit of a given model to observed data. LISREL can be successfully applied to problems which allow for the specification of models with reciprocal causation, i.e., the hypothesizing of relationships between variables that are thought to mutually influence each other. An example of this is the Tinto (1975) model, which specifies that low levels of student academic integration within an institution may be compensated for by high levels of social integration and vice-versa.

The structural equation model developed in this study could be estimated with other minority group members. The impact of the variables in the present investigation may or may not be critical to the enrollment patterns of other groups such as American Indians and Hispanics. These results might be useful in determining what types or combinations of variables appear to be most strongly associated with the enrollment pattern of these subgroups.

It is important to note that the results of this investigation are based on Black students enrolled in public colleges that offer at least the baccalaureate degree. Generalization to Black students enrolled in private colleges should be approached with caution. Consequently, the model developed in this study should be used as a preliminary estimation of private institutions. The extent to which the study can be replicated will determine if it will make any contribution to Black student enrollment theory. The model developed here utilized data easily accessible to other researchers in various data bases.
APPENDIX A

Raw data
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**Table:**
- **Obs:** Observations number.
- **BSE Act Lib Sfr Phd Dorm Stemp Cont Accep:** Columns represent different categories.
- **Ig Ret Outfee Rb Uge Coled Pci Svc Crime Clima Jan:** Columns represent different measurements or values.
APPENDIX B

Descriptive Statistics
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