Black and White Adolescents' Aspirations and Achievement in Mathematics: A Regional Comparison

Kenneth E. Hinson

Dissertation submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY
in
Educational Research and Evaluation

Gabriella Belli, Chair
Marvin G. Cline
Karen H. Rosen
Dan Saurino
Josiah Tlou

March 28, 2002
Falls Church, Virginia

Keywords: Aspirations, Achievement, Curriculum, Mathematics, Region, NELS 88

Black and White Adolescents' Aspirations and Achievement in Mathematics: A Regional Comparison

by

Kenneth E. Hinson

Gabriella Belli, Ph.D., Chair

(Abstract)

Research on the comparison of educational aspirations among Black and White students has produced conflicting results. Some studies at the national level have shown that the level of educational aspirations for college between these two groups is similar, while other studies at the state, regional, or local level have shown differences. The National Education Longitudinal Study (NELS: 88) database and its 1990 and 1992 follow-ups were used to answer questions and test hypotheses about these differences. The NELS: 88 database is comprised of data initially collected on almost 25,000 eighth graders and over 22,000 parents together representing more 1,000 public and private schools. The study sample was comprised of approximately 1,500 Black and over 9,500 White high school seniors who were part of the tenth to twelfth grade cohort, attended public school, and remained in the same region between tenth and twelfth grade. Data were examined to determine if there were regional influences on the relationship between students' educational aspirations and their achievement in mathematics.

Educational aspiration did not explain different amounts of variance in mathematics achievement across the four U.S. census regions. Region, however, was related to differences in White students' aspiration but indicated no differences for Blacks.

Sex and mathematics-curriculum were related to differences in aspirations within race for both Black and White students. For both races and regardless of region, a greater proportion of females aspired to attend 4-year college than males did. Students with aspirations, for 4-year college or more, tended to score higher on mathematics achievement tests than those students with aspirations for less than 4-year college. Whether students' tenth-grade aspirations were the same or different from their twelfth-grade aspirations, no statistically significant difference was detected between their tenth

and twelfth-grade achievement.

As previous studies have shown, background variables (race, sex, and socioeconomic level) were statistically significant predictors of mathematics achievement. Prior mathematics achievement was an overwhelmingly strong predictor of future mathematics achievement. Once prior mathematics achievement was controlled, the aspirations of significant others (parents and teachers) played no role in explaining achievement in mathematics.

DEDICATION

Dedicated

to

my wife

Elma Hinson

and our daughter

Kesha Evette Hinson

ACKNOWLEDGMENTS

Thanks to my committee chairperson, Dr. Gabriella Belli, who was always available to encourage, guide and direct me to complete this endeavor. Thanks to my other committee members, Dr. Dan Saurino for supporting me and believing in me in other research projects, to Dr. Josiah Tlou for providing encouragement and inspiration, to Dr. Karen Rosen for her wonderful willingness to support and inspire me. Thanks to Dr. Cline for his encouragement, inspiration and very insightful thoughts.

A special thanks to Dat Le, my cohort mate, whose youthful enthusiasm and wonderful friendship provided the spark that kept me focused on success. In addition, a special thanks to Rear Admiral Osie Combs, Dr. Charles E. Tatum and Dr. Raymond Carreathers who are friends, mentors and role models that supported me in applying for and starting my doctoral program.

I offer a very special thanks to my family. To my deceased parents, Cleo and J.T. Hinson, thanks for lighting the flame that burned until completion of this endeavor. To my wife, Elma, who agreed with my decision to embark on this uncertain journey at a time when a more prudent mind might have felt differently, thank you. To my daughter, Kesha, whose youthful desire and fearless attitude toward change kept my eye on the prize, thank you. I love you all. THANKS!

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

Statement of the Problem

The purpose of the study was to investigate the relationship between Black and White aspirations for college and achievement in mathematics, and determine if region moderated that relationship. Today, successful achievement in mathematics and science is a requirement for enrollment in many colleges and universities. Typically, aspirations for attending college have been shown to impact achievement. According to Astone and McLanahan (1991) "…high aspirations are a critical factor predicting educational achievement" (p. 310). Jencks, Crouse and Mueser (1983) indicated that students with college plans tended to enroll in college preparatory courses and thereby improved their achievement scores. Hanson (1994) reported that "…males and individuals from upper SES [socioeconomic status] backgrounds are more likely to have high [educational] expectations" (p. 170) and score higher on mathematics standardized tests.

In general, most studies have shown little or no difference between Black students' aspirations and White students' aspirations to attend college, but there are some anomalies. For example, in a comparison between African American and White students, the National Center for Education Statistics (1995) showed that African American and White sophomores' aspirations for attending college were similar, both near 60 percent in 1990. In a statewide study, Mahoney and Merritt (1993) conducted exploratory research to compare college aspirations and expectations among Black and White high school seniors in Virginia. Although they found no statistically significant difference between Black students' and White students' aspirations, Black male students tended to have lower aspirations to attend college. McCracken, Barcinas and Wims (1991) looked at rural schools in Ohio and Georgia and showed that students in the academic curriculum were more likely to plan to further their education beyond high school. Using the NELS: 88 data on eighth-grade students, Braddock and Dawkins (1993) showed that across all racial/ethnic subgroups, students enrolled in the higher ability mathematics groups were significantly more likely to express high aspirations than students in the lower mathematics groups. However, McCracken, Barcinas and Wims (1991) showed that in the predominantly Black sample three fourths (almost all) of the students in lesser curricula desired college compared to one half of the students in lesser curricula in the predominantly White sample.

Somewhat similar to McCracken, Barcinas and Wims (1991), Signer, Beasley, and Bauer (1997) conducted a small-scale study of one locality (New York City) that compared students in compensatory mathematics courses with students in non-compensatory mathematics courses. Results were consistent for White students in that White students enrolled in compensatory mathematics courses were least likely to aspire to attend college than White students enrolled in non-compensatory mathematics courses. The latter group was 13 times more likely to expect a college education. Results for African American students, however, were different. African American students in compensatory mathematics courses were as likely to anticipate college attendance as were African American students in non-compensatory mathematics courses.

Given that a relatively high percent of students desired to attend college, let us look at college enrollment rates. Wilds and Wilson (1998) reported that for high school graduates the college enrollment rate for African American students rose slightly from almost 34% in 1976 to 36% in 1996 as compared to the White college enrollment rate, which rose from 33% in 1976 to 44% in 1996.

These statistics seem to support the notion that even though the percentage of Black students with aspirations for college is similar and sometimes greater than the percentage of White students, a smaller percentage of Black students actually attend college (Hallinan & Williams, 1990). Campbell, Hombo, and Mazzeo (2000) noted that across the National Assessment of Educational Progress (NAEP) subjects of reading, mathematics, and science there was a gap between Black students and White students in achievement. They indicated that "…the differences in scores for White students and Black students at all ages have generally decreased between the first [1971] and the most recent [1999] assessment across subject areas, although White students continued to outperform Black students in each subject area at each age in 1999" (Campbell, Hombo, & Mazzeo, 2000, p. 38). By 1990 the differences between Black and White average mathematics scores across the ages of nine, 13, and 17 were 27, 27, and 21 points respectively. By 1999 the differences for ages nine, 13, and 17 were 28, 32, and 31 points respectively, on a 500-point scale. Campbell, Hombo, and Mazzeo (2000) indicated that although these differences were not statistically significant, they seemed to show an increasing gap in achievement between Black students and White students.

If there is a gap between Black and White achievement, and if college aspirations are associated with achievement, then it seems reasonable to expect Black aspirations to be lower

than White aspirations. However, this does not appear to be the case, but why not? Perhaps one explanation comes from Mickelson (1990), who examined the paradox of Blacks' high regard for education when their overall performance was at lower levels, not reflective of their high regards. She measured differences between abstract and concrete attitude scores and their contributions to achievement, which was based on grade point average. Abstract attitudes were "…based on cultural values that express the ideal connection between education and opportunity" and concrete attitudes were based on "…different material realities that people experience with respect to the actual returns on education within the opportunity structure" (Mickelson, 1990, p. 48). For the Black students in her study, Mickelson (1990) implied "…it is their concrete attitudes that underlie their achievement" (p. 54).

What else could moderate the relationship between aspirations for college and achievement? Mac Iver (1991) showed that remediation was approached differently by region. Kominski and Adams (1992) noted how the proportion of students graduating from high school differed according to region; and Steele, Rai, Appel, and Jensen (1994) highlighted differences in scholastic performance by region. In addition to what these studies have noted about region, other studies have implied that national evaluations or national databases may be limited in what they can provide to policy makers and educators for decisions and instruction. For example, Cline, Endahl, and McBee (1980) analyzed secondary data from an evaluation of Head Start children's transition into public schools. After comparisons across four regions these researchers concluded "there are very strong regional variations in the effects of Head Start. This suggests that the strategy of large national evaluations may be missing much of the importance to policy planners and to educators" (Cline, Endahl & McBee, 1980, p. 42).

In another study, which addressed the question of whether or not national and state assessments produced consistent results on students' proficiency level and academic growth, Lee (2000) conducted analyses on mathematics' assessment data from the states of Kentucky and Maine and the National Assessment for Education Progress (NAEP) database. When comparing the national achievement gains from 1992 to 1996 with gains resulting from Kentucky and Maine's own states' assessments, Lee (2000) determined that the size of the gain was greater on the states' assessments. Lee (2000) attributed this result to state assessments playing a more critical role than national assessments in states' curriculum and instruction. Lee (2000) concluded that "…policy-makers and educators need to become more aware of the utilities and

limitations of current national and state assessments as educational information databases" (p. 21).

Summary and Hypotheses

Educational research has shown that practices, programs, and students' achievement may vary according to different regions. Achievement in mathematics and science has become a major focus at the state, regional, and national levels.

Research on the topics of achievement and aspirations has highlighted several factors that are related to these variables. They include but are not limited to race/ethnicity, sex, socioeconomic level, parents' education level, parents' and teachers' desires for students to attend college, peers' plans to attend college, and academic performance. Many of these factors have been typically used in other studies. The Wisconsin Model of Status Attainment has been a model studied and applied over the last three decades. The model has used these typical factors in a causal way to explain the variance in occupational attainment and educational attainment. Aspirations, which have been considered an important contributor to achievement, have been the subject of many studies. Comparing educational aspirations among Black and White students has produced conflicting results. Some research at the national level has shown that the level of educational aspirations between these two groups is similar, while other studies at the state, regional, or local level have shown differences.

When region was considered in studies it seemed to explain various differences. Perhaps it can explain some of the variability in students' levels of aspirations. With that in mind, I developed the following hypotheses for testing in this study.

1. Educational aspirations explain different amounts of variance in mathematics achievement across the four U.S. census regions.
2. For Black students, aspiration for college will differ depending on sex and region, but not on curriculum.
3. For White students, aspirations for college will differ depending both on curriculum and region, but not on sex.
4. After the typical predictors, based on prior research, have been entered into a prediction model, region and mathematics curriculum level make evident differences in the relationship between aspiration and achievement.

These themes are developed in Chapter 2. The methods used to test the hypotheses are explained in Chapter 3.

CHAPTER 2
LITERATURE REVIEW

This chapter provides an overview of the literature related to educational aspirations, educational achievement, occupational and educational attainment, and region and education. Although the main focus is mathematics, some of the research described is more general in nature.

Educational Aspirations

Students' educational aspirations are related to educational attainment (Wilson & Portes 1975; Hanson 1994; and Horn & Carroll 1997) and achievement (Jencks, Crouse & Mueser, 1983; Astone & McLanahan, 1991; and Hanson, 1994). Many think of aspirations as strong desires for some object or condition. They often represent the beginning of an enormous possibility for many students and if they are supported and encouraged, many aspirations evolve into reality. How are aspirations perceived in the research arena? An early opinion by Reissman (1953) was that "…aspirations refer to a future time period and consequently there often is no opportunity to check upon the reliability of a subject's aspirations" (p. 233). He indicated that most research involving college student aspirations during the 1950s revealed what was expected, "…that success leads to the raising of the level of aspirations and failure to a lowering of that level" (Reissmann, 1953, p. 234). Spenner and Featherman (1978) provided an additional perspective shared by Reismann (1953) where *aspiration* was defined as a desire to go to college or to improve one's a job status. According to Williams (1972), *aspiration* "…refers to the desires individuals have to attain some future state for themselves. *Expectations* refer to the desires individuals have for the future of others" (p108). However, Williams (1972) also implied that educational *aspirations* were students' hopes and *expectations* were students' forecasts of future action. More recently, Hauser and Anderson (1991) said, "aspirations are desired outcomes that are not limited by constraints on resources" (p. 270). In the following paragraphs are summarized studies on students' educational aspirations from various perspectives. In most of the literature reviewed, the terms *aspiration* and *expectation* were used interchangeably.

Gender, Race, and Aspirations

A study of gender and aspirations was done by Hanson (1994) using the 1986 High School and Beyond (HSB) data. She studied a sample of students that demonstrated early indications for attending college. Findings showed that young women were more likely than young men to aspire to go to college but did not expect a college degree, and that Whites were less likely to desire college than non-Whites.

In a study of 30 African American youth, Hubbard (1999) found that although students showed similar educational aspirations, gender revealed some differences in outlook on education. She indicated that the girls aspired to go to college for the academic credentials that would enhance career prospects. On the other hand, the boys wanted to go to college for the opportunity to play sports as a way of becoming a professional athlete.

Race has been the subject of a number of studies on aspiration. Hauser and Anderson (1991), for example, used the Monitoring the Future (MTF) survey data to study trends of post-high school plans and aspirations of Black and White twelfth-graders between 1976 and 1986. For 4-year college aspirations, Hauser and Anderson (1991) found that Blacks and Whites had similar upward trends.

Solorzano (1992) looked at Black and White eighth-grade students using the NELS: 88 data. He used the question, “As things stand now, how far in school do you think you will get?" to study aspirations. Before controlling for socioeconomic status (SES), 82% of Black females and 83.5% of White females desired to attend college along with 80.2% of Black males and 78.6% of White males. Although distinctions were relatively minor, the percentage of females aspiring to college was greater than the percentage of males regardless of race. After controlling for socioeconomic status, Solorzano (1992) found that the lowest socioeconomic status quartile showed only a minor decrease of percentage points in the percentage of Black students aspiring for college (70.9% of Black males and 73% of Black females). In contrast there was a major decrease of percentage points in the percentage of White students aspiring for college (48.9% of White females and 58.9% of White males). Solorzano (1992) noted four patterns from the data analysis. First, as students’ SES increased, so did their aspirations. Second, when SES was controlled, Black male and female students’ aspirations only failed to exceed Whites in the highest SES quartile. Third, excluding high-SES Blacks, females had higher aspirations than males. Fourth, Solorzano (1992) indicated that all who aspired did not attain a college education.

Mahoney and Merritt (1993) compared aspirations and expectations among 53, 000 Black and White Virginia high school seniors. Approximately 41,000 (77%) expressed a desire to attend college. Only slightly more than two thirds of Black males (68%) aspired for at least a two-year degree compared to 75% of Black females and White males and 81% of White females. The researchers felt that the statistics for the Black male were similar to a national trend of Black males having lower college aspirations than Black female students and White students of either sex. However, this notation by Mahoney and Merritt (1993) does not hold up when compared to Solarzano's (1992) results, which showed that Black male students did not have the lowest aspirations. Of the students who desired college, Mahoney and Merritt (1993) indicated that approximately 2 out of 5 Blacks and about 3 out of 5 Whites participated in high school courses needed for college preparation. Overall, there was no statistically significant difference between Black and White students' aspirations for attending college.

Signer, Beasley, and Bauer (1997) conducted a study of 100 White and African American urban secondary students to investigate interactions among gender, ethnicity, socioeconomic status, and mathematics achievement level. Educational aspiration was a variable used that was based on how students responded to a question asking how far they thought they would get in school. The researchers classified responses to the question as either " 'less than college' or 'college or beyond' " (Signer, Beasley, & Bauer, 1997, p. 380). They found a statistically significant interaction between mathematics achievement level and ethnicity, which represented 6.4% of the response variance in educational aspirations. Of the students taking compensatory mathematics courses, the researchers determined that African Americans showed a six times greater chance of aspiring for college than their White counterparts. A different perspective on students in compensatory math occurred in a comparison between African Americans assigned to low and those assigned to high socioeconomic high schools. The researchers' results indicated that "...low-SES African American students enrolled in compensatory mathematics courses, as well as high-SES African Americans enrolled in non-compensatory mathematics courses, were up to seven times more likely than their White counterparts to show interest in advanced mathematics courses" (Signer, Beasley, & Bauer, 1997, p. 383-384).

Kao and Tienda (1998) used the NELS: 88 data to study aspirations from eighth to twelfth grades. Their findings showed that in general those minority youth that have high

aspirations in eighth grade maintain them throughout high school. Kao and Tienda (1998) showed that SES positively influenced those aspirations between the eighth and twelfth grades.

Using the NELS: 88 survey of eighth and tenth graders, Peng, Wright and Hill (1995) studied achievement of Black, Hispanic, and American Indian secondary students in mathematics and science in comparison to Asians and Whites. In answer to the question, "As things stand now, how far in school do you think you will get?" Asian students had the highest college aspirations in eighth and tenth grades. Whites had the next highest followed by Blacks, Hispanics and American Indians.

At-Risk Students and Aspirations

Following are two studies on at-risk students using the NELS: 88 data. First, Kaufman and Bradby (1992) used the NELS: 88 data from eighth-graders to check the characteristics of at-risk students. They defined at-risk students as those who dropped out of school or failed to attain the minimum levels of competency on mathematics and reading achievement tests. Mathematics performance levels were categorized as "…advanced; intermediate, basic, and below basic. Students performing below the basic level could not perform arithmetic operations (addition, subtraction, multiplication, and division) on whole numbers" (Kaufman & Bradby, 1992, p. 2). This study highlighted the importance of the role of significant others to achievement of at-risk students. Specifically, Kaufman and Bradby (1992) showed that parents' educational expectations of the students were related to how well they performed on achievement tests. Students whose parents expected less than a high school diploma had a much greater chance of performing below the minimum level in mathematics and reading than students whose parents expected a college degree.

Horn and Carroll (1997) used the NELS: 88 data to look at the resilient population of at-risk students who actually graduated from high school. Their students were designated as at-risk based on the following factors, which increased chances for dropping out of school.

- "Lowest SES quartile;
- Single parent family;
- Older sibling dropped out of school;
- Changed schools two or more times;
- Average grades of at most C's or lower from sixth to eighth grade; and

- Repeated a grade" (Horn & Carroll, 1997, p. 6)

Horn and Carroll (1997) differentiated the students' level of risk from low to high based on the number of risk factors students had. Based on the NELS: 88/94 question, "As things stand now, how far in school do you think you will get?" 81% of the not-at-risk students wanted to complete four years of college and 56% of the at risk students had the same desires.

Significant Others and Aspirations

The following research gives a glimpse of the impact of parents and friends on aspirations. Williams (1972) looked at nearly 4,000 Canadian students in putting together a causal model that reflected the formation of high school students' educational aspirations. His model was based on the students' socioeconomic background, intellectual ability, academic achievements, and three reference groups (peers, teachers, and parents). Williams' (1972) model adopted a theoretical stance "…that an individual's attitudes and behaviors are, in part, a function of both the expectations held by significant others and the normative climate of the group of which he is (or aspires to be) a member" (p. 110). He showed that in the case of these students, parents had a strong influence and teachers had a moderate influence on student educational goals. Williams (1972) said his model derived its theoretical perspective from reference group theory. Kemper (1968) defined the central concept of this theory: "A reference group is a group, collectivity, or person which the actor takes into account in some manner in the course of selecting a behavior from among a set of alternatives, or in making a judgment about a problematic issue. A reference group helps to orient the actor in a certain course, whether of action or attitude" (p. 32).

According to (Horn & Nunez, 2000), approximately 2 out of 5 first-generation students (students whose parents' education did not exceed a high school diploma), surveyed while eighth-graders in 1988, wanted to complete a bachelor's degree. An additional 30% wanted vocational school or some college. Horn and Nunez's (2000) study highlighted a relationship between parents' education level and students' aspiration for college. Their study results showed that students of parents with some college or a bachelor's degree were more likely to aspire to a college degree than first-generation students were. Horn and Nunez's (2000) follow-up of these students as sophomores revealed that first-generation students were still less likely to want a college degree than students of parents that had some college or a college degree.

Hallinan and Williams (1990) provided different scenarios of peer influence on student aspirations to go to college. They used 20,000 friendship dyads from the High School and Beyond longitudinal survey. Students were coded as belonging to the academic (general) track or the vocational track. Hallinan and Williams (1990) showed that Blacks had slightly higher aspirations to attend college than Whites but were less likely to attend. Students in the academic track had higher aspirations than did those students in the vocational track. Analysis of the friendship dyads showed that males with female friends had greater aspirations than did males with male friends. White students with Black friends demonstrated higher aspirations than did Whites with White friends. This study identified different combinations of peer influence based on race and gender, which interacted to play different roles in students' desire to attend college.

In the case of at-risk students, Horn and Chen (1998) conducted a study to resolve if 'significant other' factors that were considered key to attaining a high school diploma remained salient in the pursuit of education beyond high school. Their findings indicated that parental interaction and concern for future education, along with peer plans for future education, increased the chances of some at-risk students registering in a post-secondary institution.

School Effects and Aspirations

To develop a model for predicting college attendance Cutright (1960) examined data on 8,500 high school students in Northern Illinois. School selection was based on "…the drawing of nearly equal numbers of large and small schools as well as having schools of different degrees of athletic and social orientations" (Cutright, 1960, p. 293). Results showed that school effect was more pronounced for girls' desire to attend college than it was for boys. However, Cutright (1960) implied that once students were inspired to attend college, actual enrollment was correlated with desire for future jobs for boys and the effect of the school for girls.

Boyle (1966) reviewed and summarized research from four separate studies. Although the studies showed that SES of the school was related to student aspirations, Boyle (1966) concluded that the extent of the relationship depended upon the size of the schools' neighborhoods. "In large cities, the effect of the high school is roughly the same as the effect of the family, but in smaller communities, this effect is much weaker" (Boyle, 1966, p. 630). In contrast to Boyle's (1960) summary, after analyzing data collected between 1964 and 1965 on

students in the state of Washington, Alwin and Otto (1977) found that "…school context variables do not substantially influence college plans" (p. 259).

Curriculum Effects and Aspirations

The following studies highlight the relationship between curriculum and educational aspirations. McCracken, Barcinas and Wims (1991) chose rural schools to determine how high school curriculum (academic, general, and vocational) related to students' educational and occupational aspirations. The study was conducted in Ohio with a predominant White sample of 529 high school seniors and it was replicated in Georgia with a predominant Black sample of 266 twelfth-graders. For both samples, findings indicated that students in the academic curriculum were more likely to plan to further their education beyond high school. However, lesser curricula reflected differences between the two samples. Almost 3 out of 4 students in the predominant Black sample, that were enrolled in lesser curricula, wanted college compared to about 1 out of 2 students in similar curricula from the predominant White sample.

In contrast to McCracken, Barcinas and Wims' (1991) study, Braddock and Dawkins (1993) found different results. Braddock and Dawkins (1993) used the NELS: 88 data on eighth and tenth-grade students to examine the relationship of educational aspirations and outcomes with academic ability placement. In general, ability levels were designated as advanced, regular and remedial. Braddock and Dawkins (1993) concluded that regardless of race "…high ability-group placement leads to high (college preparatory) aspirations, and low placement leads to low (non-college preparatory) aspirations" (p. 331).

In another study related to course levels, Ponec (1997) noted that the educational environment endorsed a philosophy of increased scholastic readiness, but the Black students were not subscribing to it. Instead of college preparatory courses, they elected to enroll in the lowest levels of mathematics and other core subjects.

Socioeconomic Status Effects and Aspirations

It is generally thought that socioeconomic status is related to how well a student does in the educational process. In this section, the relationship between SES and educational aspirations is noted by three sets of researchers.

While controlling the effects of intelligence, Sewell, Haller and Straus (1957) studied the relationship between educational aspirations of high school students with family socioeconomic status. Their findings showed that the relationship was statistically significant. Specifically, "…high level educational aspirations or college plans are most characteristic of those from high status families…" (Sewell, Haller & Straus, 1957, p. 71).

Weiner and Murray (1963) summarized findings of Weiner and Graves' (as cited in Weiner and Murray, 1963) study of a school system that was considered one of the nation's finest. Over half of the low SES students aspired for a college education compared to almost all of the students with a high SES. The trend continued with only one third of the lower SES students and all of the high SES students enrolled in college preparatory classes.

Sewell and Shah (1968b) noted that "an important and consistent finding in the area of stratification research is that the children of higher social-class origins are more likely to aspire to high educational and occupational goals than are the children of lower social class origins" (p. 191). Regardless of the vast inconsistency in study samples and methodology, this finding was held as true (Sewell & Shah, 1968a). A recent study by Solarzano (1992) continued to reflect similar findings.

Trends and Aspirations

Spencer (1976) noted that by mid 1970 sociologists were more and more concerned about how educational aspirations arose. He discussed how early works focused on the correlation between educational aspirations and factors like intelligence and socioeconomic status but did not investigate how these variables influenced educational aspirations.

Picou and Wells (1976) reviewed theory and research on student aspirations. They noted that the early phase of research focused on improving the chances of rural youth to transition into society followed by a concentration on "…specifying the reference group determinants of motivation and achievement" (Picou & Wells, 1976, p.3). They indicated that by the late 1960s a breakthrough in aspiration research came with the introduction of path analysis techniques, which was used in Blau and Duncan's (1967) occupational attainment model and later in Sewell, Haller, and Portes' (1969) "Wisconsin Model" of occupational attainment. The use of path analysis techniques "…shifted emphasis of mobility studies from aggregate level analysis of movements from origin statuses to achieved statuses, to concern with the individual's movement

through status hierarchies as influenced by various ascribed and achieved characteristics…" (Picou & Wells, 1976, p.6).

Throughout the educational aspiration research, some themes seem to remain constant. Females seem to have had more aspiration for college than males. The comparison between Blacks and Whites was mixed in that some studies showed that Blacks aspired more for college, while others showed that aspirations were on par with Whites or Blacks had less aspiration. High achievers and High SES students continued to show more aspiration for educational attainment than other groups.

Most studies reviewed on educational aspirations used the terms *aspiration* and *expectation* interchangeably. Such use of these terms may have had varying consequences as to interpretation by respondents and thus had different effects on statistical analysis. A question that arises is how should these terms be defined and used in studies? In some studies, Black students may have based their educational aspirations on idealistic views of education whereas some White students may have based their aspirations on realistic views. What seems to be at issue is whether this phenomenon is a common occurrence. Various articles indicated that Black students in lower and upper curricula had similar educational aspirations whereas White students in these curricula had different educational aspirations. Is this a common observation? There were mixed reviews on whether the context of the school had an effect on students' educational aspirations. Do schools effect students' aspirations or not? Mixed reviews on school effects along with the other issues and questions that have been highlighted are potential topics for additional study with educational aspirations.

Achievement

There has been extensive research on the topic of achievement. Researchers have shown that aspirations for attending college are related to achievement (Jencks, Crouse & Mueser, 1983; Astone & McLanahan, 1991; and Hanson, 1994). Following are recent studies that addressed general achievement and achievement in mathematics.

Factors Related to Achievement

Researchers have noted several factors related to successful academic achievement. For example, Bempechat (1998) identified student motivation, parents' role, and the quality of instruction and textbooks as influences on student achievement. However, she stressed that future research should also focus on "…individual beliefs and attitudes about learning" (Bempechat, 1998, p. 119).

The *Journal of Blacks in Higher Education* (1998) cited parents' educational attainment, number of family members, and unique efforts tailored to improving minority education as predictors of student achievement. Elliott (1997) related that "individual and family background characteristics explain most of the variation in student achievement" (p. 3). Others noted additional factors that were related to achievement. Ford (1993) found that parents' attitudes and beliefs toward schooling were associated with the students' attitudes and beliefs. These attitudes and beliefs were referred to as achievement orientation. In addition, Ford (1993) found that family SES had a small relationship with students' achievement orientation. Mac Iver (1991) showed that extra subject classes, Saturday classes, and adult tutors were related to higher achievement in mathematics. Anderson, Hollinger and Conaty (1992) showed a relationship between the socioeconomic level of the school and students' achievement.

Past research has shown that the influence of significant others (parents and teachers) has been associated with student achievement. Specifically, studies by Johnson (2000), Fejgin (1995), and Gross (1993) noted the link between parental aspirations and student achievement. Other research by Yeung and McInerney (1999); Griggs, Copeland and Fisher (1992); and Johnson (1992) showed a relationship between teacher aspirations and achievement.

Attitudes and Achievement

Attitudes of parents and students and their relationship to achievement have been the subject of various studies. Mickelson (1990) examined the issue of Blacks having "…consistently positive attitudes toward education, coupled with frequently poor academic achievement" (p. 44). As mentioned by Mickelson (1990), Coleman et al. (1966), Patchen (1982), and Mickelson (1984) also noted the paradox of Blacks' high regard for education except their overall performance was at lower levels, not reflective of their high regards. Mickelson (1990) used questionnaire data from a non-random sample of almost 1,200 seniors who were

taking social studies classes in eight Los Angeles area public high schools. She analyzed these data to determine if the "attitude/achievement paradox" could be explained by measured differences between abstract and concrete attitudes scores and their contributions to achievement measured by grade point average. Abstract attitudes were "…based on cultural values that express the ideal connection between education and opportunity" (Mickelson, 1990, p. 48). Concrete attitudes, however, were based on "…different material realities that people experience with respect to the actual returns on education within the opportunity structure" (Mickelson, 1990, p. 48). She concluded that the difference between abstract and concrete attitude scores was statistically much wider for Black students than for White students. Also, she found that abstract attitudes had no effect on grades whereas concrete attitudes had a statistically positive effect. Mickelson (1990) noted that the achievement of Black students was based on their concrete attitudes.

Anderson (1990) conducted a study of 33 high school African American students to determine if "…African American athletes were being hurt by unrealistic aspirations" (p. 515) to become professional athletes. He showed that these athletes played sports three times as much as non-athletes, but they devoted about the same amount of time to homework as non-athletes. There was no statistical difference between the athletes and non-athletes' grade point average.

Ford (1993) conducted a study of 148 Black fifth and sixth grade students in a predominantly low SES Black urban community in the Midwest. The purpose of her study was to examine what young Black students perceived as their parents feelings about education and how the students' perceptions affected their own thoughts about educational achievement. Ford (1993) found only a minor association between family characteristics and the students' achievement orientation. As noted by Ford (1993), other researchers such as Boyd-Franklin (1989), Clark (1983), and McAdoo (1988) had similar findings**.** However, perhaps Ford's (1993) more important finding was that the way parents felt about achievement had a much stronger association with the attitudes students had about their own educational achievement.

In an examination of the NELS: 88 data on eighth-graders, Catsambis (1994) determined that female students showed "…less interest in mathematics and less confidence in their mathematics abilities" (p. 199) than male students did. Males tended to view attending mathematics classes with eagerness and anticipation. Catsambis (1994) noted other studies that showed this trend - Berryman (1983), Brush (1985), and the American Association of University

Women (1992). Catsambis (1994) indicated that minority students looked favorably upon mathematics even though their achievement was not up to par. This observation seems to be supported partially by the statement that "although the majority of the research indicates that poor attitudes toward mathematics are related to lower levels of achievement in the subject, it has not always been found to be so" (Rech, 1994, p. 212).

Rech (1994) conducted her own study to determine the relationship between achievement and attitude based on data from 133 elementary and 118 junior high school Black students in a Mid-western school system. Her findings were similar to other studies in that males had a more favorable attitude toward mathematics than girls did. In addition, an unexpected finding revealed that eighth-grade high achievers were more apprehensive about mathematics than the low-achieving eighth-graders were. Although Rech (1994) was working with primary and secondary school students, she cited a study by Brown (1979) that was based on college data. Using a sample of students that attended predominantly Black universities Brown (1979) failed to show statistical significance in an association between feelings about mathematics and achievement in mathematics.

School Characteristics and Achievement

The following researchers addressed various school characteristics that related to how well students achieved. Mac Iver (1991) examined the NELS: 88 data on eighth graders for the effects of remedial activities on achievement. He concluded that providing "…extra subject periods or summer classes…Saturday classes and adult tutors seemed to improve mathematics achievement " (Mac Iver, 1991, p. 7). However, "…peer-tutoring, mentoring programs, and after-or before-school coaching classes…were not reliably effective in increasing student achievement" (Mac Iver, 1991, p. 7). These findings implied that the eighth-grade students responded better to adult tutors than they did to peer tutors.

In another examination of NELS: 88 eighth-graders; Anderson, Hollinger and Conaty (1992) examined the relationship between public school poverty and student achievement. They concluded that regardless of family-SES, students in low poverty schools performed better than students in high poverty schools did.

Significant Others and Achievement

The following studies highlight the way in which parents' and teachers' aspirations for students to attend college relate to students' academic achievement. In a comparison of tenth-grade Jewish students with other ethnic groups in the NELS: 88 database, Fejgin (1995) found that parental aspirations were statistically significant in predicting achievement in mathematics. Similar findings were reported in Yeung and McInerney's (1999) research on a sample of 226 middle school students in Phoenix, Arizona. However, in Johnson's (2000) study on approximately 6000 eighth-graders from the NELS: 88 database, parental aspirations were statistically significant in predicting mathematics achievement, but only for female students.

Trends and Achievement

The *Journal of Blacks in Higher Education* (1998) indicated that Black students made substantial progress in closing the gap with White students on achievement test scores. This is supported by the National Center for Education Statistics. Through the National Assessment of Education Progress project under the National Center for Education Statistics, Campbell, Hombo and Mazzeo (2000) provided trends in student achievement over the last three decades in reading, mathematics, and science. Trends were compared by race/ethnicity, gender, parents' level of education, and type of school, public or nonpublic. Specifically, for mathematics, from 1973 to 1999 overall achievement scores increased for 9 year-olds (219 to 232), 13 year-olds (266 to 276), and 17 year-olds (304 to 308). The differences between 1973 and 1999 scores for all age groups were statistically significant. Trends showed that White and Black students' mathematics achievement scores were statistically higher in 1999 than in 1973 for all age groups. Campbell, Hombo and Mazzeo (2000) noted that from 1973 to 1986 the gap between mathematics achievement scores for Whites and Blacks had narrowed. However, the gap began to expand between 1990 to 1999, but "…the apparent changes in the size of the gap between White and Black students were not statistically significant" (Campbell, Hombo & Mazzeo, 2000, p. 38).

Occupational and Educational Attainment

Educational attainment is considered the number of years of schooling completed at some level less than high school, completing high school only, a level beyond high school but below

four years of college, or at a level of completing fours of college or beyond. This section is devoted to providing a partial chronological evolvement of occupational and educational attainment and the role that educational aspiration has played. Some early work on status attainment was conducted by Blau and Duncan (1967) who developed a basic path model for occupation attainment. The model was comprised of five variables with the basic assumption that the variables were placed in the model with respect to their priority. The variables were 1) *father's educational attainment,* 2) *father's occupational status,* 3) *respondent's educational attainment,* 4) *status of the respondent's first job,* and 5) *status of respondent's occupation in 1962*. Using path analysis, they were able to explain 26% of the variance in educational attainment and 42% of the variance in the job held in 1962.

Subsequently Sewell, Haller, and Portes (1969) revised Blau and Duncan's (1967) model to include social psychological concepts. The social psychological model was based on a follow-up in 1964 of 929 randomly selected subjects (White males from farm backgrounds), which represented about one third of the subjects in an original survey of all seniors in Wisconsin in 1957. The focus of the survey of Wisconsin seniors in 1957 was educational and occupational aspirations. The Sewell, Haller, and Portes' (1969) model was comprised of eight variables, which included 1) *occupational attainment,* 2) *educational attainment,* 3) *level of occupational aspiration,* 4) *level of educational aspiration,* 5) *significant others' influence,* 6) *academic performance,* 7) *socioeconomic status* (SES), and 8) *mental ability*. Although the overall concept of attainment in Blau and Duncan's (1967) model was retained in Sewell, Haller, and Portes' (1969) model, the variables differed. Nevertheless, Sewell, Haller, and Portes (1969) found that the social psychological model worked when applied to the random sample of 929 young Wisconsin White males from an original study in 1957. Using path analysis they were able to explain 50% of the variance in educational attainment. This increase appeared to be based on the addition of the variables, *level of educational aspiration, significant others' influence, academic performance,* and *mental ability*. The researchers noted that the model should be examined, using individuals that were different from the White male youths from Wisconsin.

Sewell, Haller, and Ohlendorf (1970) took the next step and set out to test the social psychological model on young men from communities of varying sizes. The original eight variables were used except that *level of educational attainment* and *level of educational*

aspiration were redefined. With small changes, the original social psychological model was also applicable to male youths from different urban and rural communities. Based on this finding the researchers felt that the model should be assessed in very large cities.

Sewell (1971) reviewed the previous research that he and his colleagues had conducted on attainment. A decision was made to further refine the social psychological model by "disaggregating socioeconomic status into its component parts – parents income, mother's education, father's education, and father's occupation – and by decomposition of 'significant others' influence into parental encouragement, teacher's encouragement, and peer's plans" (Sewell, 1971, p. 798). This change provided Sewell (1971) with a better understanding of how these variables were impacting the educational attainment process. In his review, Sewell (1971) stated that the model continued to work well for males in the basically all White state of Wisconsin, but he acknowledged that the model overstated the level of educational attainment that females actually achieved. Sewell (1971) indicated that academic ability accounted for a large increase in the variance of educational attainment. In addition, he noted that even though the model accounted for "more than 55% of the variance in higher educational attainment, socioeconomic origins continue to influence directly one's chances for attainment" (Sewell, 1971, p. 799). He also raised the issue of nonexistent data analysis on minorities.

Haller and Portes (1973) compared the Blau-Duncan (1967) and Wisconsin (Sewell, Haller, and Portes' 1969 model) models of status attainment and found they "…are similar in the causal ordering of positional variables and yield similar empirical estimates of paths of influence, despite being based on different samples. The main focus of the Blau-Duncan model is on the structure of status transmission while the Wisconsin Model focuses on social psychological dynamics mediating interpersonal influences on individual attainment" (p.51).

Porter (1974) looked at the applicability of the Wisconsin Model on data from a national study known as Project Talent. Data for Project Talent were initially collected from almost 39,000 male high-school seniors in 1960. Porter (1974) based his study on a sample of 14, 891 Whites and 435 Blacks that Lohnes (as cited in Porter, 1974) had gotten as a result of a follow-up study in 1965. Porter (1974) felt that the Wisconsin Model was not applicable to Blacks since "no social-psychological model published to date has been based on the Black population of the United States" (p.304). With that in mind he revised the Wisconsin Model with new variables that he felt were more appropriate for measuring Black occupational and educational attainment.

Porter (1974) used ten variables compared to the eight in the 1970 Sewell-Haller-Ohlendorf model. Porter (1974) discovered an unmeasured construct that he named *ambition*, which seemed to explain more the educational attainment for Whites than for Blacks. *Ambition* was considered "…an expression of one's sense of the possible and of the necessary…" (Porter, 1974, p. 304). On the other hand, he found that *conformity* (extent to which young students adopted middle-class social values) influenced educational attainment more for Blacks than for Whites.

Wilson and Portes (1975) applied the Sewell-Haller-Ohlendorf (1970) model to data gathered on over 2000 boys from another national longitudinal study (1966 – 1970). Although some variables were redefined, the Wilson-Portes (1975) model maintained similarity with the 1970 Sewell-Haller-Ohlendorf model and it explained 57% of the variance in educational attainment.

In another effort to test the model on Black males, Portes and Wilson (1976) used data from the Institute of Social Research of the University of Michigan to study data collected between 1966 and 1970 on over 2200 high school boys. The variables used were similar to the original eight variables except that *occupational attainment* and *occupational aspiration* were excluded and *self-esteem* was added for a total of seven variables used. The Portes-Wilson (1976) model showed that "the direct path from academic performance to educational attainment…is absent among Blacks, while it represents the strongest influence on attainment among Whites" (Portes & Wilson, 1976, p. 428). Educational aspirations and self-esteem had the stronger influence on educational attainment for Blacks in the model.

Kerchoff and Campbell (1977) used the "Wisconsin Model" (1970 Sewell-Haller-Ohlendorf model) to compare Black and White attainments. They used data that had been collected on almost 400 White and just over 100 Black ninth grade boys in Fort Wayne, Indiana. The eight variables from the 1970 Sewell-Haller-Ohlendorf model were modified such that *occupational attainment*, *occupational aspiration*, and *significant others' influence* were excluded. The variable, *disciplinary problems,* was added and *academic performance* was expanded to two variables (*junior high* and *high school*) for a total of seven variables. They found that SES provided a better explanation of educational attainment for Whites than it did for Blacks. Academic performance did a poor job of accounting for variance in Black educational attainment, however, discipline, then studied for the first time in the model "…proved to be

particularly important in bringing the power of the model for Blacks closer to that for Whites" (Kerchoff & Campbell, 1977, p.25).

In another review of race, Hout and Morgan (1975) combined the 1970 Sewell-Haller-Ohlendorf model with that of Duncan, Haller and Portes (1968) to investigate race and sex variations on attainment, using data on high school seniors in Louisville, Kentucky. The Hout-Morgan (1975) model had two parts, one represented the respondent and the other represented a best friend. The key finding was that the model was best suited for data on White males. They attributed this finding to sociologists having more knowledge about the achievement of White males than other groups.

Alexander, Eckland and Griffin (1975) replicated the Wisconsin Model (Sewell & Hauser, 1975) by using 1970 follow-up data on male respondents who were sophomores in 1955. The variables used in their model were 1) *background status,* 2) *academic aptitude,* 3) *sophomore class standing,* 4) *index of perceived college orientations,* 4) *significant others influence,* 5) *educational expectations,* 6) *occupational aspiration,* 7) *educational attainment,* 8) *occupational attainment,* and 9) *earnings*. The researchers concluded that the study provided "rather strong independent support for most of the Wisconsin conclusions regarding social psychological influences in the attainment process" (Alexander, Eckland & Griffin, 1975, p. 341).

DeBord, Griffin, and Clark (1977) studied 1972 data on about 3000 adolescents (approximately 1,000 Blacks) from small towns in Mississippi. They used the Wisconsin Model (Sewell & Hauser, 1975) to investigate performance and aspirations. The model was revised and the designated variables were 1) *socioeconomic background,* 2) *academic aptitude,* 3) *academic performance,* 4) *encouragement from teacher/counselor,* 5) *father/mother influences,* 6) *significant others' influence,* 7) *student's educational expectations,* and 8) *occupational expectations*. They showed that Blacks' "…educational plans are slightly higher than those of Whites" (DeBord, Griffin, & Clark, 1977, p.90), supporting earlier findings on Black and White comparisons.

Gottfredson (1981) analyzed studies that had compared Black and White males on educational attainment. Her objective was to assess the plausibility of conclusions. Part of her results is stated as follows:

> Substantive inferences about race differences in the educational attainment process are unwarranted on the basis of differences in regression coefficients in the published literature. Studies examining racial differences in the attainment process over the past decade do not agree on the nature of the differences observed, and inconsistencies persist even when major differences in the samples, models and methods are held constant. Additional doubt is cast on substantive interpretations of the observed differences when different specifications of the measurement model are shown to imply different substantive interpretations. (Gottfredson, 1981, p. 553).

By the early 1980s researchers were still testing the Wisconsin Model. Jencks, Crouse, and Mueser (1983) replicated a version of the Wisconsin Model previously studied by Sewell and Hauser (1975). Although some variables were modified in the Jencks-Crouse-Mueser (1983) model, their findings were not dissimilar enough to contest those of Sewell and Hauser (1975). After the article by Jencks and associates was published in 1983, Hauser, Tsai, and Sewell's (1983) study discussed the use of the Sewell-Haller-Portes (1969) model to develop a more powerful attainment model, which would include response error. Data on the same Wisconsin men from the survey taken in 1957 were updated in a follow-up survey in 1975. This Hauser-Tsai-Sewell (1983) model was constructed within the LISREL framework based on Jöreskog and Sörbom's study (as cited in Hauser, Tsai & Sewell 1983). The model was comprised of 17 variables: 1) *father's educational attainment*, 2) *mothers educational attainment*, 3) *father's occupational status*, 4) *parents' income*, 5) *socioeconomic status of family of orientation*, 6) *mental ability*, 7) *rank in high school class*, 8) *academic performance*, 9) *parents' encouragement to attend college*, 10) *teachers encouragement to attend college*, 11) *friends' plans to attend college*, 12) *significant others' influence on college attendance*, 13) *educational aspiration*, 14) *occupational status aspiration*, 15) *educational attainment*, 16) *early occupational status*, and 17) and *mid-life occupational status*. Using path analysis, Hauser, Tsai, and Sewell (1983) were able to explain 68% of the variance in educational attainment. As a result, this latest version of the Wisconsin Model was more powerful than its predecessors were.

Another researcher, Wolfle (1985), used data from the National Longitudinal Study (NLS) of 1972 to reassess the differences between Blacks and Whites in the post-secondary educational attainment process. Wolfle (1985) incorporated controls for measurement error in his analysis. He concluded, "the process of educational attainment is not different for Blacks and Whites" (Wolfle 1985, p. 516). His outcome was a major contradiction to previous research by Porter (1974), Portes and Wilson (1976) and Kerchoff and Campbell (1977) who had declared that educational attainment was different for Blacks. Other opinions on model fit for Blacks came from Hauser and Anderson (1991, p. 264) who said "…although critics have doubted the validity of this model for Blacks, there is solid support for it." Also, Johnson (1992) highlighted the success of Epps and Jackson (1985) who showed that socioeconomic status was almost as influential as ability on Black male achievement test scores. Epps and Jackson (1985) conducted their study using 1972 National Longitudinal Study (NLS) data on 324 Black males and 259 Black females. Their data suggested "…aspirations may be more important for educational attainment among Blacks than measured achievement" (Epps & Jackson, 1985, pp. 44-45).

In a recent study, Inoue (1999) used data from the National Longitudinal Study of the High School Class of 1972 (NLS-72) in conjunction with the Sewell-Haller-Portes (1969) version of the Wisconsin Model to develop a theorized model of educational and occupational attainment. In part, the NLS-72 emphasized variables that influenced the aspirations of students moving from high school to college. For the NLS-72 sample, Inoue's (1999) findings indicated that educational aspirations heavily influenced the level of education attained. He noted that "… educational aspiration still arises as a primary contributor to educational attainment, strongly mediating the influences of ability and SES" (p. 54). Inoue (1999) concluded that "… in spite of the fact that women's high school academic performance is superior to that of men, not only [do] women have lower levels of both educational and occupational aspirations than do men, but also women's educational attainment levels are lesser than men's" (p. 59). Inoue's (1999) study was based on 1972 data and recent studies by Solarzano (1992), Mahoney and Merritt (1993) and Hanson (1994), showed that, regardless of race, females were equally or more likely to aspire for college than males.

Review of the literature on the Wisconsin Model showed how it evolved over many years. The model has continually been a subject of debate with respect to the order of variables,

kinds of variables, definitions of variables, sample size and content, and methodology. Nevertheless, in recent years the Wisconsin Model was still being used in research.

Region and Education

For many years regional organizations have promoted and worked for the advancement of education in the states within their regions. There is a network of 10 Regional Educational Laboratories (http://www.relnetwork.org) that serves various geographic regions. With support from the U. S. Department of Education these organizations work to provide regional, state and local officials access to the best available information from research and practice. The Laboratories work in concert with community members, policymakers, and educators to improve and reform education within their region through the use of research. Following, the laboratories are listed along with their lead specialty areas.

- Appalachia Educational Laboratory (Student Achievement in Small, Rural Schools)
- Laboratory for Student Success (Urban Education)
- Mid-continent Research for Education (Curriculum, Learning, and Instruction)
- North Central Regional Educational Laboratory (Technology in Teaching and Learning)
- Northeast and Islands Regional Laboratory at Brown University (Language and Cultural Diversity)
- Northwest Regional Educational Laboratory (School Change Process)
- Pacific Resources for Education and Learning (Language and Cultural Diversity)
- SERVE (Early Childhood Education)
- Southwest Educational Development Laboratory (Language and Cultural Diversity)
- WestEd (Assessment)

Aside from their specialty area work and specific regional educational issues, these laboratories share a common interest in improving student achievement in mathematics and science. The following studies and statistics provide a view of the literature that is related to programs and achievement from a regional perspective.

In a study on providing remedial help to students, Mac Iver (1991) found that pullout programs were more prevalent in schools in the Northeast. He showed that schools in the West were more likely to have after-school or before-school classes, summer school programs and

peer tutoring. He also noted that Northeast schools were least likely to have Saturday classes. The use of adult tutors was significantly more prevalent in Western and North Central schools. Mac Iver's (1991) study seemed to show that some regions have dealt differently with the issue of remediation.

Statistics shared by Kominski and Adams (1992) showed that the proportion of individuals completing high school in the South was 74.2%. This was significantly lower than the Northeast (80.3%), the Midwest (80.7%) and the West (80.9%), areas that did not differ significantly. This study seems to imply that something related to education was different in the South than in the other regions.

Cline, Endahl, and McBee (1980) analyzed secondary data from an evaluation of Head Start children's transition into public schools. They showed that Head Start centers in the Southeastern and Southwestern regions focused more on academic activity than other regions whereas centers in the Northeast and West placed the least emphasis on academics. Assertiveness was an effect strongly associated with Head Start but was found lacking in the Southwest where the majority of Head Start children were Hispanic and Native American. These researchers concluded "there are very strong regional variations in the effects of Head Start. This suggests that the strategy of large national evaluations may be missing much of the importance to policy planners and to educators" (Cline, Endahl & McBee, 1980, p. 42).

In examining a sample of only African Americans, Smith (1989) set out to answer the question; "Do social class differences exist in the extent to which contemporary Black Americans emphasize educational attainment?" (p. 417). Smith (1989) combined two samples, the 1982 and 1987 General Social Surveys (GSS) to form a national survey with over 1,000 Black cases for use in analyses. Smith (1989) found a significant interaction between region of residence (south versus north), education, and class-consciousness. Blacks in the South "…attached greater stigma to those [Blacks] having less than a high school education" (Smith, 1989, p. 424). He also noted that "…southern Blacks required more education to be or to call themselves (and presumably others) middle class" (Smith, 1989, p. 427). In contrast to southern Blacks who used education level for class distinction, Smith (1989) indicated that northern Blacks looked at education level, specifically, a college degree, more as a means to gain the attention of prospective employers.

In a study of the NELS: 88 database, Steele, Rai, Appel, and Jensen (1994) analyzed data on tenth graders from the 1990 follow-up. They concluded that NELS test scores (scholastic performance) were substantially different with respect to region. Region also seemed to make a substantial difference in the number of students taking pre-algebra, geometry and algebra II. Pre-algebra was the course most likely taken by students in the West, and geometry and algebra II by students in the Northeast. Geometry was least likely to have been taken by students in the South as was algebra II for students in the South and North Central regions. The authors arbitrarily defined substantial difference as "a difference of more than ten percentage points in the range between the lowest and highest subgroups" (Steele, Rai, Appel, &Jensen, 1994, p. 242). They acknowledged that in some cases the differences were meaningful and in other cases they were not.

Lee (2000) conducted analyses on mathematics' assessment data from the states of Kentucky and Maine and the National Assessment for Education Progress (NAEP) database. The objective was to examine the question of whether or not national and state assessments produced consistent results on students' proficiency level and academic growth. Lee (2000) found that Kentucky and Maine's assessment standards were consistent with national standards in that the percentage of students who reached or exceeded the proficiency level in mathematics in these two states was similar to the national percentage. Lee (2000) also noted that when comparing the national achievement gains from 1992 to 1996 with those from Kentucky and Maine, the size of the states' gain was greater. Lee (2000) attributed this result to state assessments playing a more critical role than national assessments in states' curriculum and instruction. Lee (2000) concluded that "…policy-makers and educators need to become more aware of the utilities and limitations of current national and state assessments as educational information databases" (p. 21).

Studies have highlighted regional differences in the delivery of remedial support to students (Mac Iver, 1991), graduation rate (Kominski & Adams, 1992), and achievement test scores (Steele, Rai, Appel, & Jensen, 1994). The studies conducted by Cline, Endahl and McBee (1980) and Lee (2000) raised questions as to whether or not national assessments and databases can provide all the information educators and policy makers need.

Summary

Studies on educational aspiration indicated that females were more likely to aspire to attend college than males were. With respect to Blacks and Whites, research showed various outcomes - educational aspirations were similar, Blacks were higher than Whites, or Whites were higher than Blacks. High achievers and students from high SES seemed to show more aspiration for attending college than others did.

Several factors were identified as related to successful academic achievement. Some examples were educational aspiration, socioeconomic background, previous academic performance, and the influence of parents and teachers. Specifically, achievement in mathematics has increased since the early 1970's; however, based on the National Assessment of Educational Progress tests (0 – 500 scale) in mathematics the gap between achievement for Blacks and Whites seems to have grown wider.

The Wisconsin Model played a continuous role in research concerning the level of education that students attained and the occupation they chose. Although used in research up to recent years, the model evolved with debates regarding the variables chosen and the order of their use in models, and the size and make-up of samples. Region has also been studied in educational research. Regional differences were shown in the execution of remediation programs, high school graduation rates, and scholastic performance.

The review of literature revealed several issues and questions that could be considered for study. Most studies on educational aspirations used the terms *aspiration* and *expectation* to mean the same. Could the use of these terms have had varying consequences as to interpretation by respondents and thus had different effects on statistical analysis? How should these terms be defined and used in studies? In some studies, Black students appeared to have based their educational aspirations on idealistic views of education whereas some White students seemed to base their aspirations on realistic views. Is this a common occurrence? Various articles indicated that Black students in lower and upper curricula had similar educational aspirations whereas White students in these curricula had different educational aspirations. Is this a common observation? There were mixed reviews on whether the context of the school had an effect on students' educational aspirations. Why does SES seem to better explain the educational attainment of Whites than Blacks? Is the educational attainment process the same for Blacks and Whites? Comparing educational aspirations among Black and White students has produced

conflicting results. Some research at the national level has shown that the level of educational aspirations between these two groups is similar, while other studies at the state, regional, or local level have shown differences. When region was considered in studies it seemed to explain various differences. Perhaps it can explain some of the variability in students' levels of aspirations. After review of these issues, I developed the hypotheses outlined in chapter 1 to test in this study.

CHAPTER 3
METHOD

In this chapter the sample, variables and analyses used are discussed. In order to answer questions and test the hypotheses about differences in educational aspirations and achievement in mathematics depending on region and mathematics curriculum, data from the National Education Longitudinal Study (NELS: 88) were used. Additionally, sex was considered as a control variable.

Sample

The NELS: 88 Users Manual (1994, Second Follow-up: Student Component Data File) holds information on the National Education Longitudinal Studies (NELS) program. According to the manual, the program was established to study the educational, vocational, and personal development of young people starting from elementary through high school years and into post-secondary education or the work force. The NELS program is presently comprised of three major studies: the National Longitudinal Study of the High School Class of 1972 (NLS-72), High School and Beyond (HS&B), and the National Education Longitudinal Study of 1988 (NELS: 88) with follow-ups in 1990, 1992, 1994, and 1996. Approximately 1,000 public and private schools, which agreed to participate in the NELS: 88, were randomly selected from a population of about 40,000 public and private eighth grade schools in the United States. Complete eighth grade rosters were established for each of the approximately 1,000 public and private schools. Twenty-four students were randomly selected from each roster. Students left over from each roster were grouped by race/ethnicity. Subsequently, two or three additional Asian and Hispanic students were selected for each school. The first and second follow-ups were increased with students who were not selected during the base year because they were not available or were incorrectly designated with a handicap that limited participation. Also, more students were added because of dropouts.

The NELS: 88 survey covered almost 25,000 eighth graders from over 1,000 public and private schools and included data from over 22,000 parents. The study identified those students who dropped out of school prior to tenth grade and discussed the transition of students into secondary school. The second follow-up was conducted in 1992 while most students in the

sample were seniors on the eve of graduation. The 1992 study provided an overall measurement of achievement during the course of secondary school and collected data appropriate for investigating the students' transition from high school on to post-secondary school or the work force.

For this study, region was defined as the four United States census regions, Northeast, South, Midwest, and West. Based on the NELS: 88 second follow-up (1992), I chose, as an overall sub-sample, Black and White public high school seniors who were part of the tenth to twelfth grade cohort and remained in the same region between tenth and twelfth grade. This resulted in a sample of approximately 11,000 students (almost 1,500 Black students and over 9,500 White students).

Variables

The variables that were used in the analyses are listed in Table 3.1 through Table 3.3. Variable names and information in the following tables were taken from the National Education Longitudinal Study: 1988-94 Data Files and Electronic Codebook System (1999) Re-release.

Table 3.1 shows the variables used to select members of the tenth-to-twelfth-grade cohort that were used in the study sub-sample. It also provides the categories for region and family background variables. The specific states in each of the four census regions are listed in Appendix A.

Student aspiration was a multi-category variable. As shown in Table 3.2, for these analyses, it was re-coded to represent high school or less, more than high school but less than 4-year college, and 4-year college or more. Based on the low frequencies in the original categories, aspiration was re-coded to represent less than 4-year college or 4-year college or more for hierarchical regression analyses. To aid in analysis, additional aspiration composite variables were computed. Students' reports of parents' and teachers' desires for the students to attend college were also multi-category variables, which were also re-coded to either represent college or other desires.

In Table 3.3 the mathematics scores represent scores on the NELS: 88-mathematics test given during the students' sophomore and senior years. No data are available in the NELS: 88 data set to indicate if a student is in compensatory classes. However, there are several variables indicating number of years of coursework completed in mathematics. These were used to create a new variable to serve as a measure of level of math curriculum. The groups produced were

basic math (proxy for compensatory/lower curricula math) and advanced math (proxy for non-compensatory/higher curricula math). In addition, the mathematics test score variables were used to create an achievement difference variable for comparing tenth and twelfth grade scores.

Data Analysis

Analysis of Covariance (ANCOVA), nominal logistic regression, and hierarchical regression were used for data analyses. In hierarchical regression the predictor variables are entered in some logical order determined by the researcher. I used the 1983 version of the Wisconsin Model of Status Attainment (Hauser, Tsai, & Sewell, 1983) as a frame of reference in designating the order of entry for the predictor variables.

The four hypotheses for this study are restated as follows:

1. Educational aspirations explain different amounts of variance in mathematics achievement across the four U.S. census regions.
2. For Black students, aspiration for college will differ depending on sex and region, but not on curriculum.
3. For White students, aspirations for college will differ depending both on curriculum and region, but not on sex.
4. After the typical predictors, based on prior research, have been entered into a prediction model, region and mathematics curriculum level make evident differences in the relationship between aspiration and achievement.

My first hypothesis is that educational aspirations explain different amounts of variance in mathematics achievement across the four U.S. census regions. This is comparable to saying that aspirations and region interact with respect to achievement. Initially, the plan was to use a 3x4 ANCOVA, but due to the nature of the data (see Chapter 4), a 2x4 ANCOVA was used in the final analysis. In the 2x4 ANCOVA the dependent variable was the NELS: 88 NELS mathematics test scores for senior year and the covariate was the same scores from the sophomore year. The independent variables were the region of the student's school and aspirations, a 2-level variable representing low aspirations (less than 4-year college) and high aspirations (4-year college or more). The expectation was a significant interaction. The interaction and the two main effects determined the amount of variance in senior mathematics achievement scores, adjusted for sophomore mathematics achievement.

Table 3.1

Case Selection, Region, Demographic, and SES Variables

Variable	Variable Name	Value	New Composite Variable
Member of the first follow-up/second follow-up panel sample (tenth grade [1990] to twelfth grade [1992] longitudinal panel)	F2F1PNFL	0 'not in F1/F2 panel' 1 'F1/F2 panel, not in 10th grade' 2 'F1/F2 panel' Blank 'non-response/not in sample this wave'	
School classification reported by school a) in 10th grade b) in 12th grade	 G10CTRL1 G12CTRL1	1 'public' 2 'Catholic' 3 'private, other religion' 4 'private, non-religion' 5 'private, not ascertained' Blank 'non-response/not in sample this wave' 98 'missing'	
Census region of student's school (10th grade) Census region of student's school (12th grade)	G10REGON G12REGON	1 'Northeast' 2 'Midwest' 3 'South' 4 'West' 98 'missing'	Effect-coded TENREG1 =1 if Northeast TENREG2 =1 if Midwest TENREG3 =1 if West all three = –1 if South, else = 0
Composite race (12th grade)	F2RACE1	1 'Asian, Pacific Island' 2 'Hispanic' 3 'Black, not Hispanic' 4 'White, not Hispanic ' 5 'American Indian' 8 'missing'	REGRACE re-coded to 0 'Black not Hispanic' 1 'White not Hispanic'
Sex (12th grade)	F2SEX	1 'male' 2 'female'	TWELVSEX Re-coded to 0 'male' 1 'female'
Socioeconomic quartiles (10th grade)	F1SESQ	1 'quartile 1 low' 2 'quartile 2' 3 'quartile 3' 4 'quartile 4 high' 8 'missing'	TENQ1 =1 if Quartile 1 TENQ2 =2 if Quartile 2 TENQ3 =3 if Quartile 3 all three equal -1 if Quartile 4, else equal 0

Table 3.2

Aspirations and Related Variables

Variable	Variable Names	Values	New Composite Variables
Student Aspiration (10th grade)	F1S49	1 'less than high school' 2 'high school grad only' 3 'less than 2 years trade school' 4 'more than 2 years trade school' 5 'less than 2 years college' 6 '2 or more years college' 7 'finish college' 8 'master's degree' 9 'Ph.D. , M.D.' 96 'multiple response' 97 'refusal' 98 'missing'	TENASLVL re-coded F1S49 to 1 'less than high school' 2 'high school only' 3 'more than high school' ASLVL10 re-coded F1S49 to 1 'high school or less' 2 'more than high school but less than 4-year college' 3 '4-year college or more' TENASPIR re-coded F1S49 to 0 'less than 4-year college' 1 '4-year college or more ASP4YEAR re-coded F2S43 to 0 'less than 4-year college' 1 '4-year college or more'
Student Aspiration (12th grade)	F2S43	1 'less than high school' 2 'high school only' 3 'less than 2 years/school' 4 'more than 2 years/school' 5 'trade school degree' 6 'less than 2 years college' 7 'more than 2 years college' 8 'finish college' 9 'master's or equal' 10 'Ph.D, M.D., other' 11 'don't know' 96 'multiple response' 98 'missing'	TENASPOS re-coded to 0 'system missing' 1 ' 10th-grade aspiration = 12th-grade aspiration' 2 ' 10th-grade aspiration < 12th-grade aspiration' 3 ' 10th-grade aspiration > 12th-grade aspiration'

Table 3.2 (Continued)

Aspirations and Related Variables

Variable	Variable Name	Value	New Composite Variable
Student's report of father's desire for student after high school Student's report of mother's desire for student after high school	F1S48A F1S48B	1 'less than high school' 2 'graduate from high school' 3 ' vocational after high school' 4 'attend 2-yr college' 5 'attend 4-yr college' 6 'graduate from college' 7 'post graduate education' 8 'don't know' 9 'parent doesn't care' 10 'does not apply' 96 'multiple response' 98 'missing'	DAD10 re-coded FIS48A to 0 'other' 1 'graduate college or more' 99 'system missing' MOM10 re-coded F148B to 0 'other' 1 'graduate college or more' 99 'system missing' PAR10DES re-coded to 0 'other' 1 'graduate college or more'
Student's report of school counselor's desire for student after high school Student's report of favorite teacher's desire for student after high school	F1S47E F1S47F	1 'does not apply' 2 'go to college' 3 ' get a full-time job' 4 'enter trade school' 5 'enter military' 6 'get married' 7 'do what respondent wants' 8 'they don't care' 9 ' I don't know' 96 'multiple response' 98 'missing'	CONSLTEN re-coded F1S47E to 0 'other' 1 'go to college' 99 'system missing' FAVTETEN re-coded FS41F to 0 'other' 1 'go to college' 99 'system missing' TEA10DES re-coded to 0 'other' 1 'go to college'

Table 3.3

Math Achievement and Related Variables

Variable	Variable Name	Value	New Composite Variable
NELS mathematics test score: Sophomore year (first follow-up) → Senior year (second follow-up) →	 F12XMSTD F22XMSTD	 99.98 'missing' 99.99 'test not complete'	 TENMSTD re-coded F12XMSTD to only represent applicable values TWELMSTD re-coded F12XMSTD to only represent applicable values ACHDIFF (score differences) Computed from VALUE (TWELMSTD) minus VALUE (TENMSTD)
Coursework completed in: algebra 1 (by 10th grade) → geometry (by 10th grade) → algebra 2 (by 10th grade) → trigonometry (by 10th grade) → pre-calculus (by 10th grade) → calculus (by 10th grade) →	 F1S22C F1S22D F1S22E F1S22F F1S22G F1S22H	 0 'none' 1 '1/2 year' 2 '1 year' 3 '1 1/2 years'	 ALG1TEN GEOMTEN ALG2TEN TRIGTEN PRCALTEN CALCTEN re-coded F1S22C through F1S22H 0 'basic math' (none) 1 'advanced math' 99 'system missing' CURICTEN computed from sum of values of ALG1TEN through CALCTEN CRCLMTEN re-coded CURICTEN to 0 'basic math' (none) 1 'advanced math' (1/2 or more years) 99 'system missing' CRCULM10 re-coded CURICTEN to 0 'basic math' (none) 1 'advanced math' (1/2 or more years)

Two main hypotheses, related to comparisons of low aspirations (less than 4-year college) and high aspirations (4-year college or more) across mathematics curricula (basic or advanced), sex, and four regions of the United States, are derived from the different results of national, state, and local studies.

- For Black students, aspiration for college will differ depending on sex and region, but not on curriculum.
- For White students, aspirations for college will differ depending both on curriculum and region, but not on sex.

These hypotheses were tested using nominal logistic regression, which is a technique to test for associations involving more than two categorical variables. The interactions between aspiration and sex, aspiration and region, and aspiration and curriculum were tested.

The final hypothesis states that after the typical predictors, based on prior research, have been entered into a prediction model, region and mathematics curriculum level make evident differences in the relationship between aspiration and achievement. To test this hypothesis I conducted a hierarchical regression. In the proposal stage for this study the specifics of the hierarchical regression were to depend on the results of the ANCOVA, which was used in analyzing the first hypothesis. Because the ANCOVA revealed a strong association between the tenth-grade NELS mathematics test score and the twelfth-grade NELS mathematics test score (representing senior year math achievement), I decided to look at the relationship between the tenth-grade score and other tenth-grade variables used as predictors. I chose the order of the variables based on the order of similar variables used in the 1983 version of the Wisconsin Model of Educational and Occupational Attainment (Sewell, Haller & Portes, 1983). The first block of predictor variables included race, sex, and three effect-coded variables (tenq1, tenq2, and tenq3) representing socioeconomic quartiles that were a composition of total family income, and parents' highest education level. In the second block the predictor variable was past performance (sophomore NELS mathematics test score). The third block contained students' reports of parent's desire for students to attend college and students' reports of teacher's desire for students to attend college. Parent's desire was

computed from the student's report of the mother's desire and the father's desire for the student to attend college. Teacher's desire for the student to attend college was computed from the student's report of the school counselor and the favorite teacher's desire for the student to attend college. These variables represented some of the known, typical predictors of achievement based on earlier research. The fourth block of predictor variables were three effect-coded variables (tenreg1, tenreg2, and tenreg3) representing the four census regions and a 0/1 variable for math curriculum. Math curriculum was computed from separate variables representing the number of years of coursework completed in algebra 1, geometry, algebra 2, trigonometry, pre-calculus, and calculus. The fifth and final block included student's educational aspirations. The aspiration variable was a 0/1 variable defined as attending 4-year college or more or "other." These variables were tested and results observed for changes in R^2. Specific and detailed analyses, which address each hypothesis, are discussed in Chapter 4.

CHAPTER 4
RESULTS

The purpose of this study was to analyze the relationship between students' aspirations for attending college and achievement in mathematics from a regional perspective. Specifically, four hypotheses were addressed.

1. Educational aspirations explain different amounts of variance in mathematics achievement across the four U.S. census regions.
2. For Black students, aspiration for college will differ depending on sex and region, but not on curriculum.
3. For White students, aspirations for college will differ depending both on curriculum and region, but not on sex.
4. After the typical predictors, based on prior research, have been entered into a prediction model, region and mathematics curriculum level make evident differences in the relationship between aspiration and achievement.

Analyses were completed on Black and White seniors, who were part of the tenth to twelfth grade cohort in the National Education Longitudinal Study of 1988 (NELS: 88). These students attended public schools and remained in the same region from the tenth to the twelfth grade. In the remainder of this chapter, a summary of descriptive statistics related to students in the sample will be provided, followed by the results of quantitative analyses conducted for each hypothesis.

Sample Distribution by Region

The analysis group, which was a cohort of 10,839 Black and White public school students, was a group of sophomores in 1990 and seniors in 1992 that remained in the same region between the tenth and twelfth grades. As shown in Table 4.1, approximately one of eight students was Black. The regional distribution of students indicates that the Midwest and South each had approximately one third of the student sample. The greatest concentration of Black students was in the South where one of four students in the sample was Black. In the Northeast approximately one in ten and in the Midwest and West about one in twenty was Black. Overall, males and females each represented

Table 4.1

Distribution of the Analysis Group by Region

Group	Northeast	Midwest	South	West	Total
Black					
Male (*n*)	85	105	454	41	685
(row %)	(12.4%)	(15.3%)	(66.3%)	(6.0%)	(100%)
(column %)	(4.3%)	(3.0%)	(11.9%)	(2.6%)	(6.3%)
Female (*n*)	87	93	484	50	714
(row %)	(12.2%)	(13.0%)	(67.8%)	(7.0%)	(100%)
(column %)	(4.4%)	(2.7%)	(12.7%)	(3.2%)	(6.6%)
White					
Male (*n*)	877	1,620	1,429	742	4,668
(row %)	(18.8%)	(34.7%)	(30.6%)	(15.9%)	(100%)
(column %)	(44.0%)	(47.0%)	(37.4%)	(47.0%)	(43.1%)
Female (*n*)	944	1,627	1,456	745	4,772
(row %)	(19.8%)	(34.1%)	(30.5%)	(15.6%)	(100%)
(column %)	(47.4%)	(47.2%)	(38.1%)	(47.2%)	(44.0%)
Totals					
Overall (*n*)	1,993	3,445	3,823	1,578	10,839
(%)	(18.4%)	(31.7%)	(35.4%)	(14.5%)	(100%)
Black	(12.3%)	(14.2%)	(67.1%)	(6.5%)	(100%)
White	(19.3%)	(34.4%)	(30.6%)	(15.8%)	(100%)

Note. The row % is within race and the column % is within region

approximately one half of the student population. With only minor variations, this was consistent for both races and within each region.

Aspiration and Achievement

Aspiration Level for Race and Region

The first hypothesis addressed is that educational aspirations explain different amounts of variance in mathematics achievement across the four U.S. census regions. This is the same as saying there will be an interaction between aspirations and region with respect to achievement. Before addressing the first hypothesis, an analysis was performed to determine the distribution of aspirations within each region. Although the original hypothesis did not include race, the aspiration by race crosstabulation was also looked at separately for Black and White students. Results displayed in Table 4.2 show that the number of students with aspirations in the categories, (1) less than high school (54 students) and (2) high school only (982 students) was miniscule compared to those in the category (3) more than high school (9,698 students). Such a skewed distribution of students across aspiration levels could not provide for accurate analysis.

As a result, the aspiration literature was reviewed, and it revealed no particular breakdown of low, medium or high aspirations. For example, Horn and Nunez (2000) defined levels of aspirations as (1) no post-secondary education, (2) some college or university training, (3) bachelor's degree, and (4) advanced degree. Krauss (1964) looked at post high school plans as (1) no further education, (2) technical school, and (3) college. Horn and Carroll (1997) defined aspiration levels as (1) less than bachelor's degree and (2) bachelor's degree or higher. Peng, Wright, and Hill (1995) categorized parents'expectations of eighth graders as (1) high school or less, (2) some college, and (3) college degree. In an attempt to develop a more logical and better-distributed categorization for this analysis of student aspirations, aspiration levels were redefined as follows:

- Low aspiration (high school or less)
- Medium aspiration (more than high school but less than 4-year college)
- High aspiration (4-year college or more)

Table 4.2

Tenth-Grade Aspiration Level by Race and Region

Group	Aspiration Level[a]			Total
	Low	Medium	High	
Northeast				
Black (*n*)	3	12	152	167
(row %)	1.8%	(7.2%)	(91.0%)	(100%)
White (*n*)	5	145	1,665	1,815
(row %)	0.3%	(8.0%)	(91.7%)	(100%)
Midwest				
Black (*n*)	1	22	173	196
(row %)	(0.5%)	(11.2%)	(88.3%)	(100%)
White (*n*)	21	301	2,905	3,227
(row %)	(0.7%)	(9.3%)	(90.0%)	(100%)
South				
Black (*n*)	9	116	797	922
(row %)	(1.0%)	(12.6%)	(86.4%)	(100%)
White (*n*)	11	288	2,552	2,851
(row %)	(0.4%)	(10.1%)	(89.5%)	(100%)
West				
Black (*n*)	-	8	77	85
(row %)		(9.4%)	(90.6%)	(100%)
White (*n*)	4	90	1,377	1,471
(row %)	(0.3%)	(6.1%)	(93.6%)	(100%)
Total (*n*)	54	982	9,698	10,734
(row %)	(0.5%)	(9.1%)	(90.3%)	(100%)

[a]Low = less than high school
Medium = high school only
High = more than high school

Table 4.3, which gives the redefined aspiration levels, shows a consistent distribution of Black students' and White students' aspirations by region. Using this revised categorization, 10% of the students had low aspirations and 30% had medium aspirations. These two categories jointly made up two fifths of the student sample compared to three fifths of the sample with high aspirations. In the Northeast almost two thirds of the Black students aspired to 4-year college or more compared to almost three fifths in the South and West, and just over one half in the Midwest. Approximately two thirds of the White students in the Northeast aspired to 4-year college or more. The number was about three fifths in the Midwest, South, and West.

Figure 1 demonstrates that the aspiration patterns within each region appear to be very similar for Black and White students. Based on Chi-square analyses within each region, the only statistically significant relationship between race and aspiration level was in the South ($c^2 = 10.115$ and $p < .05$), but even here the relationship was extremely weak (Cramers $V = .05$).

Using the definition of high school or less for low aspiration still left very few students in this category. This situation, combined with the fact that the patterns for Black and White low and medium aspiration levels were quite similar within region, resulted in collapsing low and medium aspiration levels into one level, low aspiration. From this point in the current study, analyses were conducted with aspiration as a two-level variable (low = less than 4-year college and high = 4-year college or more).

Changes in Aspiration. Using "high aspiration" to mean four years of college or more and "low aspiration" to mean anything less than four years of college, a chi-square analysis indicated a statistically significant and moderately strong relationship between aspirations in tenth and twelfth grades for Black and White students combined ($c^2 = 2858.117$, $p < .001$, and phi = .55). As shown in Table 4.4, overall, about two-thirds of the Black and White students as a group aspired to at least a four-year college education. This was true both in 10^{th} grade (64%) and in 12^{th} grade (67%). Only a small fraction of the students who had high aspirations in 10^{th} grade lowered their aspirations to something less than a college degree by 12^{th} grade (13% of the White students and 16% of the Black students did so). A much higher proportion of students with initial low aspirations desired a four-year college education or more by their senior year. Almost a third of

Table 4.3

Revised Aspiration Level by Race and Region

Group	Aspiration Level[a]			Total	c^2	Cramer's
	Low	Medium	High		(*p* value)	*V*
Northeast					.173 (.92)	.01
Black (n)	15	43	109	167		
(row %)	(9.0%)	(25.7%)	(65.3%)	(100%)		
White (n)	150	488	1,177	1,815		
(row %)	(8.3%)	(26.9%)	(64.8%)	(100%)		
Midwest					1.125 (.57)	.02
Black (n)	23	68	105	196		
(row %)	(11.7%)	(34.7%)	(53.6%)	(100%)		
White (n)	322	1,064	1,841	3,227		
(row %)	(10%%)	(33.0%)	(57.0%)	(100%)		
South					10.115 (.006)	.05
Black (n)	125	283	514	922		
(row %)	(13.6%)	(30.7%)	(55.7%)	(100%)		
White (n)	299	814	1,738	2,851		
(row %)	(10.5%)	(28.6%)	(61.0%)	(100%)		
West					1.392 (.50)	.03
Black (n)	8	27	50	85		
(row %)	(9.4%)	(31.8%)	(58.8%)	(100%)		
White (n)	94	449	928	1,471		
(row %)	(6.4%)	(30.5%)	(63.1%)	(100%)		
Total	1,036	3,236	6,462	10,734		
(row %)	(9.7%)	(30.1%)	(60.2%)	(100%)		

[a]Low aspiration = high school or less
Medium aspiration = more than high school but less than 4-year college
High aspiration = 4-year college or more

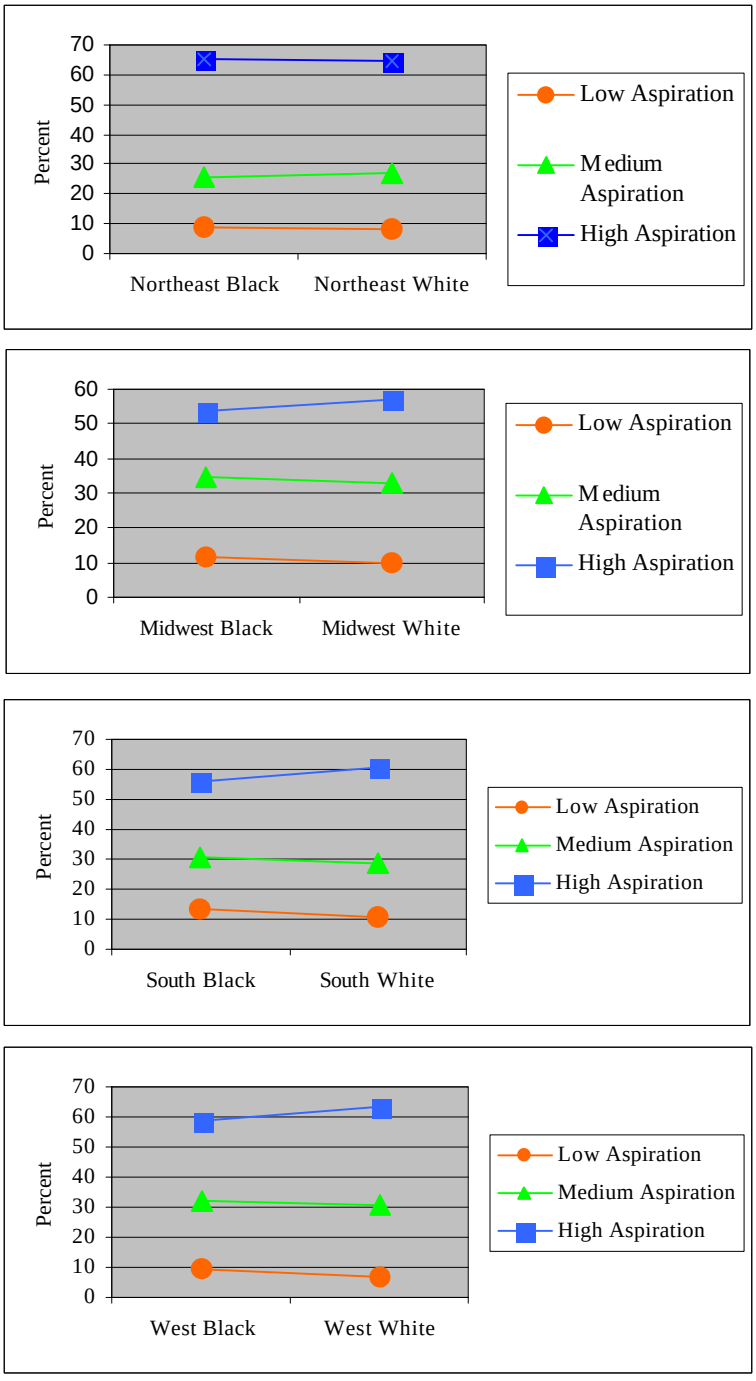

Figure 4.1. A comparison of the percent of Black and White student aspirations in the Northeast, Midwest, South, and West.

Table 4.4

Cross-tabulation of 10th Grade Aspiration by 12th Grade Aspiration

10th Grade Aspiration Level	12th Grade Aspiration Level[a] Low	High	Total
Black and White			
Low			
(*n*)	2,257	1,096	3,353 (36.0%)
Row %	67.3%	32.7%	
High			
(*n*)	784	5,169	5,953 (64.0%)
Row %	13.2%	86.8%	
Total (*n*)	3,041 (32.7%)	6,265 (67.3%)	9,306
Black			
Low			
(*n*)	226	197	423 (39.1%)
Row %	53.4%	46.6%	
High			
(*n*)	104	556	660 (60.9%)
Row %	15.8%	84.2%	
Total (*n*)	330 (30.5%)	753 (69.5%)	1,083
White			
Low			
(*n*)	2,031	899	2,930 (35.6%)
Row %	69.3%	30.7%	
High			
(*n*)	680	4,613	5,293 (64.4%)
Row %	12.8%	87.2%	
Total (*n*)	2,711 (33.0%)	5,512 (67.0%)	8,223

[a]Low = less than 4-year college
High = 4-year college or more

White students (31%) and almost half of the Black students (47%) switched from low to high aspirations in those two years.

Based on these results, the following question was developed. How did the changes in mathematics achievement from tenth to twelfth grade differ for those students whose tenth-grade aspirations were either the same as, lower, or higher than their twelfth-grade aspirations? Results from a one-way ANOVA (Appendix B) indicated no statistically significant difference in changes in mathematics achievement from tenth to twelfth grade among these three groups of students. Overall, math achievement scores went down about one fourth of a point. Correlation analysis showed a very strong relationship (r = .92) between the tenth-grade and twelfth-grade mathematics scores. This relationship was also examined separately for Black and White students whose tenth-grade aspirations remained the same as, were lower, or higher than their twelfth-grade aspirations. A strong correlation (*r @ .90)* still existed for each aspiration group within each race.

Mathematics Achievement across Aspiration Levels and Region

The first hypothesis addresses whether region interacts with educational aspirations with respect to mathematics achievement. A 2x4 ANCOVA was used. The dependent variable for the ANCOVA was the NELS mathematics test score for senior year, and the mathematics score from the sophomore year was the covariate. The independent variables were region and tenth-grade aspiration, a 2-level variable representing low aspiration (less than 4-year college) and high aspiration (4-year college or more). Table 4.5 reflects the results of the ANCOVA, which are detailed in Appendix C. In contrast to expectation, there was not a statistically significant interaction between region and aspiration for the combined group. However, the main effects, region (p < .001) and aspiration (p < .001), were both statistically significant. Based on Appendix C, Table C2, the model explained 85% of the variance in NELS mathematics test scores for the combined group, 80% (Table 4.5) of which was explained by the covariate. To determine if there was a difference in how much variance the covariate explained for Blacks and Whites, separate ANCOVAs were run. The separate sections for Blacks and Whites in Table 4.5 indicate that the covariate explained about 79% of the variance for

each group. Descriptive statistics are shown in Tables 4.6 and 4.7 (based on Tables C1, C3, and C5 of Appendix C). As depicted in Table 4.6, the South consistently had lower mean mathematics scores than other regions, although not significantly for Black students. Table 4.7 indicates that the mean score for students with high aspirations ranged from almost six points (for Blacks) to nine points (for Whites) higher than means for students with low aspirations.

The overshadowing question that remains, is what additional factors could perhaps mediate some of the variance explained by the tenth grade mathematics score? This question will be discussed further as part of the analysis of the fourth hypothesis.

Table 4.5

ANCOVA of Twelfth-Grade NELS Mathematics Test Score for Region by Aspiration with Tenth-Grade Mathematics Score as Covariate

	Black			White			Combined		
	F	*p*	h^2	*F*	*p*	h^2	*F*	*p*	h^2
Covariate	3754.85	.000	.79	26994.70	.000	.79	33365.60	.000	.80
Region (R)	1.61	.185	.01	5.99	.000	.00	8.00	.000	.00
Aspiration (A)	2.74	.098	.00	170.45	.000	.02	165.39	.000	.02
R x A	.591	.621	.00	.80	.493	.00	.91	.437	.00

Table 4.6

Overall Means and Standard Deviations for Black and White Twelfth-Grade NELS Mathematics Test Scores by Region

Region	Mean	Standard Deviation	*N*
Black and White			
Northeast	53.1	9.5	1,561
Midwest	52.1	9.6	2,759
South	49.6	9.5	2,980
West	52.5	9.6	1,084
Total	51.5	9.6	8,384
Black			
Northeast	45.6	7.9	105
Midwest	45.5	9.5	128
South	44.1	8.2	730
West	48.2	9.8	49
Total	44.7	8.5	1,012
White			
Northeast	53.7	9.3	1,456
Midwest	52.4	9.4	2,631
South	51.4	9.2	2,250
West	52.7	9.6	1,035
Total	52.4	9.4	7,372

Table 4.7

Overall Means and Standard Deviations for Black and White Twelfth-Grade NELS Mathematics Test Scores by Aspiration

Aspiration[a]	Mean	Standard Deviation	N
Black and White			
High	54.9	8.7	5,219
Low	45.9	8.3	3,165
Black			
High	47.1	8.6	585
Low	41.3	7.1	427
White			
High	55.8	8.2	4,634
Low	46.6	8.3	2,738

[a]Low = less than 4-year college
High = 4-year college or more

Aspiration by Sex, Region and Curriculum

The next phase of analysis addressed the second and third hypotheses:

- For Black students, aspiration for college will differ depending on sex and region, but not on curriculum.
- For White students, aspiration for college will differ depending both on curriculum and region, but not on sex.

Curricula Enrollment Rates. Before starting the analysis of aspiration by sex, region, and curriculum, a preliminary step was taken to determine the rates of student enrollment in the basic and advanced mathematics curricula. Table 4.8 demonstrates that overall 17% of the students were enrolled in the basic mathematics curriculum. With the greatest concentration of Black students in the South, it was the only region where Blacks represented almost one fourth of the enrollment in the advanced curriculum. In other regions, Blacks represented less than 10% of this enrollment (from 5% in the Midwest to 8% in the Northeast). Within each region, the distribution of Black and White students in the advanced mathematics curriculum was almost a perfect reflection of the Black and White distribution of the study sub-sample.

Male and Female Aspiration. In order to review patterns of aspiration based on sex, a cross-tabulation of sex by aspiration was completed separately for Blacks and Whites. The variables were very weakly related for both races (c^2 = 10.067, $p < .05$, and phi = .09 for Blacks; c^2 = 45.506, $p < .001$, and phi = .07 for Whites). Table 4.9 displays the results that indicate a slightly greater percentage of females have aspiration for 4-year college or more than males. One half of Black males have high aspiration compared to three fifths of Black females. For Whites, almost three fifths of White males have high aspiration compared to two thirds of White females.

Analysis of Aspiration by Sex, Region, and Curriculum

Nominal Logistic Regression was used to analyze data for the second and third hypotheses. The dependent variable was aspiration (tenth grade) and sex, region, and mathematics level (curriculum) were the independent variables. The first regression was run to determine, in the case of Black students, whether there were statistically significant interactions between aspiration and sex; and aspiration and region; but not aspiration and

Table 4.8

Enrollment Rates in Basic and Advanced Mathematics Curricula

Group	Basic	Advanced	Total
Northeast			
Black (*n*)	14	82	96
(row %)	(14.6%)	(85.4%)	(100%)
(column %)	(8.9%)	(7.9%)	(8.0%)
White (*n*)	143	955	1,098
(row %)	(13.0 %)	(87.0%)	(100%)
(column %)	(91.1%)	(92.1%)	(92.0%)
Midwest			
Black (*n*)	22	83	105
(row %)	(21.0%)	(79.0%)	(100%)
(column %)	(6.9%)	(5.0%)	(5.3%)
White (*n*)	298	1,593	1,891
(row %)	(15.8%)	(84.2%)	(100%)
(column %)	(93.1%)	(95.0%)	(94.7%)
South			
Black (*n*)	138	453	591
(row %)	(23.4%)	(76.6%)	(100%)
(column %)	(24.6%)	(24.4%)	(24.4%)
White (*n*)	423	1,404	1,827
(row %)	(23.2%)	(76.8%)	(100%)
(column %)	(75.4%)	(75.6%)	(75.6%)
West			
Black (*n*)	8	49	57
(row %)	(14.0%)	(86.0%)	(100%)
(column %)	(6.7%)	(5.4%)	(5.6%)
White (*n*)	111	857	968
(row %)	(11.5%)	(88.5%)	(100%)
(column %)	(93.3%)	(94.6%)	(94.4%)
Total (*n*)	1,157	5,476	6,633
(row %)	(17.4%)	(82.6%)	(100%)

Note. The row % is within race and the column % is within region.

Table 4.9

Distribution of Aspiration by Sex

Sex	Aspiration[a]		Total
	Low	High	
Black*			
Male			
n	316	348	664
Row (%)	(47.6%)	(52.4%)	(100%)
Column (%)	(53.4%)	(44.7%)	(48.5%)
Female			
n	276	430	706
Row (%)	(39.1%)	(60.9%)	(100%)
Column (%)	(46.6%)	(55.3%)	(51.5%)
Total			
n	592	778	1,370
Row (%)	(43.2%)	(56.8%)	(100%)
Column (%)	(100%)	(100%)	(100%)
White**			
Male			
n	1,977	2,648	4,625
Row (%)	(42.7%)	(57.3%)	(100%)
Column (%)	(53.7%)	(46.6%)	(49.4%)
Female			
n	1,703	3,036	4,739
Row (%)	(35.9%)	(64.1%)	(100%)
Column (%)	(46.3%)	(53.4%)	(50.6%)
Total			
n	3,680	5,684	9,364
Row (%)	(39.3%)	(60.7%)	(100%)
Column (%)	(100%)	(100%)	(100%)

[a]Low = less than 4-year college
High = 4-year college or more
*c^2 = 10.067, $p < .05$, and phi = .09
**c^2 = 45.506, $p < .001$, and phi = .07

curriculum. For Whites, a similar analysis was conducted to determine if there were statistically significant interactions between aspiration and curriculum; and aspiration and region; but not aspiration and sex. The results of the nominal regressions (Appendix D) are condensed in Table 4.10. Blacks and Whites each had one result that was counter to stated hypotheses. For Blacks there was no statistically significant interaction between aspiration and region, and for Whites, there was a statistically significant ($p < .001$) interaction between aspiration and sex.

Table 4.10

Comparison of Hypothesized and Actual Statistically Significant Results from the Nominal Logistic Regression

Interaction[a]	Black (n = 832)		White (n = 5,739)	
	Hypothesized	Actual	Hypothesized	Actual
A x R	Yes	No	Yes	Yes**
A x S	Yes	Yes*	No	Yes**
A x C	No	No	Yes	Yes*

[a]A = aspiration
S = sex
C = curriculum
R = region
*$p < .05$
**$p < .001$

Mathematics Achievement: Typical Predictors, Region and Mathematics Curriculum

For the fourth hypothesis, the objective was to conduct a hierarchical regression to determine if, after certain typical predictors were entered, region and mathematics curriculum made evident differences in the relationship between aspiration and achievement. Before addressing this hypothesis it was apparent that findings from analyses of the first hypothesis had to be considered. The ANCOVA from the first hypothesis showed that the sophomore NELS mathematics test score explained almost all of the variance in senior mathematics achievement. An important question that remained was what additional factors may have mediated some of the variance explained by the tenth grade mathematics score? Answering this question seemed to fit well into the analyses to test the fourth hypothesis. For the fourth hypothesis, it was felt that a logical

approach would include variables from the tenth grade to predict the dependent variable, the twelfth grade NELS mathematics test score. The Wisconsin Model of Educational and Occupational Attainment (Hauser, Tsai & Sewell, 1983) used an order of entry for variables in its causal model that included background and socioeconomic variables first, followed by mental ability, academic performance, significant others' influence, educational, and occupational aspirations. The Wisconsin Model was used as a frame of reference for designating the order of entry for the variables in the hierarchical regression.

Hierarchical Regression (Twelfth-Grade Dependent Variable). The first block of predictor variables was comprised of race, sex, and three effect-coded variables (tenq1, tenq2, and tenq3) representing four socioeconomic quartiles. The second block included the tenth-grade NELS mathematics test score. The third block of predictor variables included the student's report of the parent's desire for the student to attend college and the students' report of the teacher's desire. Three effect-coded variables (tenreg1, tenreg2, and tenreg3), representing the four U.S. census regions, and mathematics curriculum made up the fourth block. The fifth block included student's educational aspiration. All predictor variables except effect coded variables were dummy coded 0/1. The means and standard deviations of the regression variables and the complete list of predictor variable coefficients are shown in Appendix E. The regression summary in Table 4.11 indicates that the addition of each block, except the third block, produced a statistically significant change in R^2. In the first block the background variables represented an R^2 of 20%. The tenth grade mathematics score accounted for an increase of 64% in R^2 from first block to the second block. The addition of teachers' and parents' desire for students to attend college to the second block produced no increase in R^2 in the third block. The addition of region and curriculum in the fourth block and aspiration in the fifth block produced statistically significant increases of less than half a percent in R^2. The coefficients listed in Table 4.12 indicate that after the fifth and final block of predictor variables was entered, the contribution of a number of variables to the change in NELS mathematics test scores was not statistically significant. Specifically, these variables were race, teacher's desire, parent's desire, and the effect-coded variables, region 2 (Midwest) and region 3 (West), and curriculum.

Table 4.11

Hierarchical Regression Model Summary with the Twelfth-Grade Mathematics Score As the Dependent Variable

Model	*R*	R^2	Adjusted R^2	Std. Error of the Estimate	Change Statistics R^2 Change	*F* Change	*df*1	*df*2	Sig. *F* Change
1[a]	.45	.20	.20	8.62	.202	183.16	5	3615	.000
2[b]	.92	.84	.84	3.82	.642	14826.16	1	3614	.000
3[c]	.92	.84	.84	3.82	.000	1.12	2	3612	.326
4[d]	.92	.84	.84	3.81	.001	4.30	4	3608	.002
5[e]	.92	.85	.85	3.77	.003	79.17	1	3607	.000

[a]Model 1 variables = race, sex, and SES
[b]Model 2 variables = Model 1 + 10th-grade mathematics score
[c]Model 3 variables = Models 1 and 2 + teacher's desire and parent's desire for college
[d]Model 4 variables = Models 1, 2, and 3 + region and curriculum
[e]Model 5 variables = Models 1, 2, 3, and 4 + aspiration

Table 4.12

Hierarchical Regression Predictor Variable Coefficients with the Twelfth-Grade Mathematics Score as the Dependent Variable

Model	Variable	Unstandardizd Coefficients	Std. Error	Standardized Coefficients	*t*	Sig.
		B		Beta		
5	(Constant)	5.78	.46		12.56	.000
	Block 1					
	Race	.25	.21	.01	1.16	.245
	Sex	-.58	.13	-.03	-4.62	.000
	SES Quartile 1	-.45	.13	-.03	-3.46	.001
	SES Quartile 2	-.32	.11	-.02	-2.96	.003
	SES Quartile 3	.28	.11	.02	2.66	.008
	Block 2					
	10th Grade Math Score	.87	.01	.87	112.14	.000
	Block 3					
	Teacher’s desire	-.14	.20	-.01	-.71	.476
	Parent's desire	-.20	.16	-.01	-1.24	.216
	Block 4					
	Region (Northeast)	.49	.13	.04	3.88	.000
	Region 2 (Midwest)	-.17	.11	-.02	-1.65	.099
	Region 3 (West)	-.21	.14	-.01	-1.48	.139
	Curriculum	.20	.20	.01	1.01	.314
	Block 5					
	Aspiration	1.35	.15	.07	8.90	.000

Hierarchical Regression (Tenth-Grade Dependent Variable). After controlling for background variables, the tenth-grade NELS mathematics test score accounted for almost two thirds of the variance in senior mathematics achievement. To determine if the tenth-grade score was mediating variance of other tenth-grade predictors, a second regression analysis was performed. The tenth-grade mathematics score was the dependent variable and was excluded as a predictor variable. All other predictor variables were the same as those used in the hierarchical regression with the twelfth-grade mathematics score as dependent variable. The means and standard deviations of the regression variables and the complete list of predictor variable coefficients are shown in Appendix F. In Table 4.13, the regression summary shows that only the second model did not produce a statistically significant change in R^2. The background variables (race, sex, and SES) in the first block accounted for 19% of the variance in the tenth-grade mathematics score. The addition of teachers' and parents' desire for students to attend college in the second block produced a non-statistically significant increase of less than 1% in R^2. The addition of region and curriculum in the third block again showed a statistically significant increase of less than 1% in R^2. Aspiration increased R^2 an additional 10% in the fourth block. By the fourth block, the regression model accounted for almost one third of the variance in the tenth-grade mathematics score, almost all of this was attributable to demographic variables and aspiration. The coefficients listed in Table 4.14 indicate that after the fourth block of predictor variables was entered, similarity was noticed with the hierarchical regression that used the twelfth-grade mathematics score as the dependent variable. Some of the same variables (teacher's desire, parent's desire, and curriculum) still failed to attain statistical significance in the presence of other independent variables for this regression. Results indicated that the tenth-grade mathematics score was not a mediator for other variables that would contribute to change in the twelfth-grade mathematics score.

Comparing the two models, race, sex and SES explained about the same amount (19%) of variance in the tenth and twelfth-grade mathematics scores. For this regression, aspiration accounted for 10% of the tenth-grade mathematics score, over and above the other variables. However, when competing with other independent variables in the previous hierarchical regression (twelfth-grade math score as dependent variable),

Table 4.13

Hierarchical Regression Model Summary with the Tenth-Grade Mathematics Score As the Dependent Variable

Model	*R*	R^2	Adjusted R^2	Std. Error of the Estimate	Change Statistics R^2 Change	*F* Change	*df*1	*df*2	Sig. *F* Change
1[a]	.44	.19	.19	8.81	.194	212.61	5	4424	.000
2[b]	.44	.19	.19	8.80	.001	2.08	2	4422	.125
3[c]	.45	.20	.20	8.78	.005	6.40	4	4418	.000
4[d]	.55	.30	.30	8.20	.103	649.89	1	4417	.000

[a]Model 1 variables = race, sex, and SES
[b]Model 2 variables = Model 1 + teacher's desire and parent's desire for college
[c]Model 3 variables = Models 1 and 2 + region and curriculum
[d]Model 4 variables = Models 1, 2, and 3 + aspiration

Table 4.14

Hierarchical Regression Predictor Variable Coefficients With The Tenth-Grade Mathematics Score As The Dependent Variable

Model	Variables	Unstandardized Coefficients	Std. Error	Standardized Coefficients	*t*	Sig.
		B		Beta		
4	(Constant)	40.97	.64		64.55	.000
	Block 1					
	Race	6.15	.40	.20	15.22	.000
	Sex	-.70	.25	-.04	-2.83	.005
	SES Quartile 1	-2.66	.25	-.18	-10.60	.000
	SES Quartile 2	-1.20	.21	-.09	-5.67	.000
	SES Quartile 3	.47	.21	.04	2.24	.025
	Block 2					
	Teacher’s desire	.26	.40	.01	.65	.516
	Parent's desire	.40	.32	.02	1.26	.209
	Block 3					
	Region 1 (Northeast)	.24	.25	.02	.97	.333
	Region 2 (Midwest)	.47	.21	.04	2.26	.024
	Region 3 (West)	.26	.27	.02	.99	.324
	Curriculum	.64	.38	.02	1.68	.093
	Block 4					
	Aspiration	7.04	.28	.35	25.49	.000

aspiration's statistical significance accounted for a miniscule change of less than 1% in the dependent variable.

Summary

The analyses used to investigate the hypotheses for this study had the following results. Based on a non-statistically significant interaction between region and aspiration, the hypothesis that educational aspirations explain different amounts of variance in mathematics achievement across the four U.S. census regions was not supported. However, aspiration and region interacted separately with mathematics achievement. The hypothesis that Black students' aspiration for college will differ depending on sex and region, but not curriculum was partially supported. There was a statistically significant ($p < .05$) interaction between aspiration and sex and no interaction between aspiration and curriculum. In the case of White students, the hypothesis that aspirations for college will differ depending both on curriculum and region, but not on sex was also partially supported. There were statistically significant interactions between aspiration and region ($p < .001$), and aspiration and curriculum ($p < .05$), but also between aspiration and sex.

The fourth and final hypothesis was not supported by the analyses. After typical predictors (generally categorized as race, sex, SES, previous academic performance, and significant others' influence) had been entered into the hierarchical regression, region and curriculum made basically no statistically significant contributions to the variance in the twelfth-grade mathematics score. The tenth-grade mathematics score accounted for almost all (64%) of the variance in the senior NELS mathematics test score with about 20% explained by sex, race, and SES.

CHAPTER 5
DISCUSSION

Analyses were conducted on various relationships that included aspiration and mathematics achievement; aspiration by sex, region, and curriculum; and mathematics achievement and its predictors. Results from these analyses are subject to interpretation and speculation, and they are discussed in this chapter along with conclusions, limitations, implications for research, and implications for educators and policy makers.

Aspiration and Mathematics Achievement

In contrast to expected results, educational aspirations did not explain different amounts of variance in mathematics achievement across the four U.S. census regions. This was demonstrated by the non-statistically significant interaction between aspiration and region with respect to mathematics achievement. The ANCOVA model for this 2 x 4 analysis explained about 85% of the variance in the senior year NELS mathematics test score. However, 80% of the 85% was accounted for by the sophomore NELS mathematics test score, which is partially explained by the high correlation (r = .92) between the tenth and twelfth-grade math scores. It appears that for this sample, once prior achievement is taken into account, aspiration and region only explain 5% of the variance in senior mathematics achievement.

Aspiration had a statistically significant ($p < .001$) main effect, which resulted in a very small (2%) contribution to the variance in senior mathematics achievement. This may be explained by the moderately large (9-point) difference in the overall mean of the senior mathematics scores between low and high aspiring students. The effect size for this difference was medium (.47 of a standard deviation). Region produced a statistically significant ($p < .001$) main effect with basically no contribution to the variance in the senior NELS mathematics test score. Although the South consistently had the lowest senior mathematics score, the small differences (2.5 to 3.5 points) between regions seem to explain why no contribution was made to the variance in the senior mathematics score. The effect size for the greatest difference (3.5 points) was small (0.18 of a standard deviation).

Comparing students (Appendix B, Table B1) whose tenth-grade aspiration remained the same as, was less than, or more than their twelfth-grade aspiration, analyses (Appendix B, Table B2) showed no statistically significant difference in the changes in their mathematics achievement score from sophomore to senior year. Also, regardless of aspiration-group membership, there was no difference in sophomore and senior year achievement. This is partially explained by the high correlation ($r \cong .90$) between sophomore and senior-year math achievement scores, regardless of race and aspiration-group membership. This finding appears to be similar to conclusions in an issue brief (National Center for Education Statistics) that was prepared by Ralph and Crouse (1997) on mathematics and reading achievement. Based on the NELS: 88 data, the brief indicated that if race or ethnicity is excluded, achievement in twelfth grade was no different from achievement in eighth grade. In addition to highly correlated test scores, what else could possibly explain this phenomenon? Ralph and Crouse (1997) may have provided a partial answer. They implied that the high school mathematics educational process made no drastic difference in student achievement and that any differences in achievement were associated with differences that existed between these groups before high school. Such implications raise questions as to why the process may not have worked in high school. Lee and Smith (1995), who also did research with the NELS: 88 database, may have touched on why the process may not have worked in some schools. It seems that "…students' gains in achievement…were significantly higher in schools with restructuring practices and lower in schools without reforms" (Lee & Smith, 1995, p. 241).

A review of the descriptive statistics raised a question on the high percent of students aspiring for college. Why did three fifths of the students aspire to attend a four-year college or higher, especially when statistics showed that by 1996 the enrollment rate for high school graduates was over 35 percent for Blacks and 40 percent for Whites (Wilds & Wilson, 1998)? Particularly for Black students, high aspiration may have been partially explained by Mickelson (1990). She indicated that both Black and White students' aspirations were based on ideal links between education and opportunity and that actual achievement was based on more realistic attitudes. However, she noted that the discontinuity between ideal and realistic attitudes was much greater for Blacks than

for Whites. This discontinuity could be related to why a large percentage of Black students had aspiration for attending college, but a smaller percentage actually enrolled. Another explanation is that the sample of Black and White students for this study could be biased. The sample was comprised of students who were stable. These were students who remained in public school and in the same region between tenth and twelfth grade. Also, they all made it to twelfth grade, therefore, any students who dropped out of school were excluded from the sample. In addition, based on the NELS: 88 1988-1994 Data Files and Electronic Codebook System (1999) Re-release, the distribution of all students (18,543), with responses to the socioeconomic quartile variable, was close to 25% for each of the four quartiles. The distribution for the present study sub-sample (10,621) was about 20% for the lowest quartile and just over 25% for the each of the three higher quartiles. The distribution for the hierarchical regression on senior-year achievement (3,621 cases) was 19% for the lowest quartile and about 27% for each of the three higher quartiles. These distributions suggest that the students in the current study sub-sample were slightly better off, from a socioeconomic perspective, than the overall sample in the NELS: 88 database. The combination of these factors indicates that the current study sub-sample may be different from the overall NELS: 88 sample. Contributions to the analyses and possible impacts on the results for the current study lacked the perspective of other race/ethnic groups, private school students, dropouts, and additional students from the lowest SES quartile.

Aspiration by Sex, Region, and Curriculum

As hypothesized, aspiration differences in Black students were statistically significant at the .05 level based on sex and not on curriculum. However, contrary to the hypothesis, the interaction with region did not hold. Region is the only variable that was inconsistent for Blacks. In the discussion of the first hypothesis, it was noted that within region the percentage of students with aspiration was similar for Blacks and Whites. However, for the second and third hypotheses, results showed that region was statistically significant for Whites and not for Blacks. The small relatively sample of Blacks in each region compared to the relatively large sample of Whites in each region may partially explain this lack of significance.

For White students, all three interactions were statistically significant. Aspirations differed by region and curriculum, both of which were hypothesized, but aspiration also differed by sex, which was not hypothesized. Sex was the only variable that was inconsistent with the hypothesis for Whites. Sex was statistically significant for Blacks and Whites. Based on Table 4.9 of Chapter 4, 61% and 64% of Black and White females respectively aspired for 4-year college or more. Black and White males had lower rates of 52% and 57% respectively. Previous studies by Solarzano (1992) and Hanson (1994) have demonstrated similar findings.

Signer, Beasley, and Bauer (1997) conducted a study on a small group of 100 Black and White secondary students in New York City. The 1997 study was the impetus for developing the second and third hypotheses. In their study, they showed that White students' aspiration was associated with curriculum. For Black students, the opposite occurred in that curriculum was not related to aspiration. In the current study, there were similar findings. The relationship between curriculum and aspiration was statistically significant for Whites but not for Blacks. However, this statement is made with some reservation. In the present study, curriculum was developed as a two-level variable (basic mathematics and advanced mathematics) that served as a proxy for compensatory and non-compensatory mathematics courses, respectively, which were used in the New York study. The variable for compensatory and non-compensatory mathematics in the New York study was not available in the NELS: 88 database. As a result, advanced mathematics, which was a substitute for non-compensatory mathematics, was coded as the number of years (one half or more) of coursework completed either in algebra 1, algebra 2, geometry, trigonometry, pre-calculus, or calculus. Basic mathematics, which represented compensatory mathematics, was coded as zero years of coursework completed in algebra 1 through calculus. It is possible that the proxy developed using the NELS: 88 data was not an appropriate substitute. Even though the variables differed, there was similarity between the present study and the study completed by Signer, Beasley, and Bauer (1997). Both studies showed that mathematics curriculum made no difference in Black students' educational aspirations but did make a difference for Whites.

Mathematics Achievement: Typical Predictors, Region and Mathematics Curriculum

As stated in the fourth hypothesis, after the typical predictors (race, sex, and SES, previous academic performance, and significant others' influence) were entered into the prediction model for senior year mathematics achievement, region and mathematics curriculum made a statistically significant, but meaningless contribution (0.1%) to the variance in senior year NELS mathematics test scores. Other than race, sex, and SES, which accounted for 20% of the variance in scores on the senior-year mathematics achievement test, the tenth-grade NELS mathematics achievement test score was the single most overwhelming contributor, accounting for 65% of the variance. This is partially explained by the strong relationship (r = .92) between these two math achievement test scores. Other studies have also shown the statistical significance of race/ethnicity and gender (Fejgin, 1995), SES (Fejgin, 1995; Sui-Chu & Willms, 1996; and Johnson, 2000) and prior mathematics achievement (Johnson, 2000) as predictors for mathematics achievement. Elliott (1997) noted that student and family background characteristics accounted for most of the variance in student achievement. Analyses from a second hierarchical regression with the tenth-grade mathematics score as the dependent variable revealed additional information. Results showed that race, sex, and SES accounted for 19% of the variance in the tenth-grade mathematics score, which was about the same for the twelfth-grade mathematics score, and aspiration explained another 10%.

Contrary to previous studies by Fejgin, 1995; Yeung & McInerney, 1999; and Johnson, 2000; in the current study, significant others (parents and teachers) failed to make statistically significant contributions to the variance in mathematics achievement. Astone and McLanahan (1991) may have a partial explanation for this failure. "One potential problem with these measures is that they are reported by the student and not by a parent. More accurately, they are the student's perception of parental socialization for school…" (Astone & McLanahan, 1991, p. 313). Perhaps a similar argument can also be made for perceived teacher's desire. At a glance, another possible explanation of the disparity among previous and current findings was that different dependent variables, different samples, sample sizes, and sample compositions (race/ethnicity and gender) were used in previous studies (Fejgin, 1995; Yeung & McInerney, 1999; and Johnson,

2000) compared to the current study. However, this reasoning does not seem very sound when you consider that the same conditions existed for similarity that was shown in results among the current and previous studies.

Conclusions

An important premise of this study was that educational aspirations for college were associated with achievement. Focusing specifically on mathematics achievement, the findings for the present study sample indicate that educational aspirations did not explain different amounts of variance in mathematics achievement across the four U.S. census regions. Region, however, was related to differences in White students' aspiration but indicated no differences for Blacks. On the other hand, sex and mathematics-curriculum were related to differences in aspirations within race for both Black and White students. Conclusions drawn from these findings are that Blacks and Whites had basically the same educational aspirations across the United States. Mickelson (1990) highlighted a dilemma where Blacks tended to have high educational aspirations, but low academic achievement. The high aspirations expressed by Blacks in this study may have also been based more on idealistic rather than realistic consequences.

A review of male-female comparison show that a slightly greater proportion of females aspired to attend 4-year college than males did. Overall, about two thirds of the students aspired to attend 4-year college. These students tended to score higher on mathematics achievement tests than those students with aspirations for less than 4-year college. Although approximately two thirds of the students aspired to 4-year college, actual enrollment for high school graduates reached a high of only 44% by 1996. Student aspiration tended to be much higher than post-secondary accomplishment. Several students' educational aspirations changed between tenth and twelfth grade while others' aspirations remained the same. Whether students' tenth-grade aspirations were the same or different from their twelfth-grade aspirations, no difference was reflected between their tenth and twelfth-grade achievement. These results suggest three conclusions. First, students with high aspirations were generally higher achievers. Second, as similar to Ralph and Crouse's (1997) results, mathematics achievement stability at various high school milestones implied that the high school mathematics pedagogical process made no

drastic differences in high school mathematics achievement. Third, as a corollary to the second conclusion, students' foundation in primary school mathematical concepts was critical to the success they achieved in mathematics in secondary school.

Background variables (race, sex, and SES) were moderate predictors of mathematics achievement. Prior mathematics achievement was a very strong predictor of future achievement. The aspirations of significant others (parents and teachers) have been shown in prior research to be good predictors of achievement. The conclusion drawn from these results is that students' perceptions of their parents' and teachers' desires for students to attend college did not reflect the same impact on analyses as parents' and teachers' self-reported desires might have.

Limitations

Perhaps the major limitation of this study was the sample composition. The sample was restricted in that it was comprised of a selective, stable group of students (Blacks and Whites only) who all progressed from the tenth to the twelfth grade. Dropouts, private school students, and students that migrated from one region to another were excluded from the analyses. Due to non-responses and listwise deletion of missing data, the number of students used in analyses was sometimes less than half of the study sub-sample (almost 11,000 students).

Collapsing educational aspirations from a three-level variable into a two-level variable may have masked relevant differences. This action more than likely reduced the strength of the analyses involving the two level variable**.**

The development of proxies for variables not specifically defined in the NELS: 88 database may not have been consistent and could be associated with bias in the results. Measurement of the key variable of interest, educational aspiration, has been defined differently in many studies, some including the NELS: 88 database. Lack of a standard measurement for educational aspiration impacts ones ability to properly interpret analysis results. Although the combination of these limitations precludes generalizing findings to any general population, they could generalize to students who remain in the same locality and stay in school throughout their senior year in high school.

Implications for Research

Williams (1972) noted that educational *aspirations* were students' hopes and *expectations* were students' predictions of future action. However, as displayed in Table 5.1, researchers seem to have measured educational aspiration in different ways. The four categories in Table 5.1 represent various wording used by the authors in questions designed to measure aspiration. It is not known to what extent these wording differences impact the results in any of the studies. These wording differences may be critical when making Black and White comparisons, especially if the two groups respond to the words differently. Future researchers should look at better ways to measure educational aspirations and expectation and reveal distinctions between the two. Related research should include questions that are developed carefully to solicit responses that measure true aspiration (wants and likes without boundaries) or expectations. The discontinued interchangeable use of these terms would provide richer, more meaningful analyses for future interpretation and use.

Over the last several years we have often seen the news media discuss the immigration of foreign-born Blacks to various locations in the United States. Today foreign-born Blacks make up a sizable portion of the overall Black population in a number of locales. For example, according to Fears (2002), the proportion of the Black population represented by foreign-born Blacks is about one half in Miami, Florida and about one third in New York City and the state of Massachusetts. Also, Fears (2002) indicated that other locales experiencing growth, but at very small rates, are Maryland and Washington, D. C. Fears (2002) further noted the following:

> This is an important story for demographers and policymakers who are used to lumping together the Black population, said Frey, a White University of Michigan demographer. The foreign-born African Americans and native-born African Americans are becoming as different from each other as foreign-born and native-born Whites, in terms of culture, social status, aspirations and how they think of themselves. (Frey cited in Fears, 2002, p. A1).

Table 5.1

Review of Literature Matrix on the Categories of Questions Used to Measure Educational Aspirations

Authors	Educational Aspiration for College[a]			
	Wants/Likes	Thoughts	Plans	Expectations
Sewell, Haller, and Strauss(1957)			X	
Cuthright (1960)			X	
Weiner and Murray (1963)				X
Krauss(1964)			X	
Sewell and Shah (1968a)			X	
Sewell and Shah (1968b)			X	
Sewell, Haller, and Portes (1969)			X	
Williams (1972)			X	
Alexander, Eckland, and Griffin (1975)		X		
Wilson and Portes (1975)			X	
Hout and Morgan (1975)	X			X
Sewell and Hauser (1975)			X	
Portes and Wilson (1976)			X	
Spencer (1976)	X			X
Alwin and Otto (1977)	X			
Kerchoff and Campbell (1977)				X
Jencks, Crouse, and Mueser (1983)			X	
Hauser, Tsai, and Sewell (1983)			X	
Epps and Jackson (1985)	X			
Hallinan and Williams (1990)			X	
Astone and McLanahan (1991)				X
Hauser and Anderson (1991)	X			
McCracken, Barcinas, and Wims (1991)	X			
Solarzano (1992)		X		
Mahoney and Merritt (1993)	X			X
Hanson (1994)	X			X
Peng, Wright, and Hill (1995)				
Fejgin (1995)		X		
Horn and Carroll (1997)		X		
Signer, Beasley, and Bauer (1997)		X		
Kao and Tienda (1998)		X		
Inoue (1999)	X			
Horn and Nunez (2000)		X		

[a]Wants/Likes = options students wanted or liked with respect to education levels
Thoughts = how far students thought they would go or what they thought they would do
Plans = what students planned to do
Expectations = what students expected to do or how far they expected to go

In addition to demographers and policymakers, this story is also important to researchers. Blacks have been traditionally categorized as a relative homogenous group when compared to Whites or other groups. It now appears that "America's Black community…is no longer the monolithic group that many politicians, civil rights advocates and demographers say it is" (Odehyee Abena Owiredua cited in Fears, 2002). In that regard, for certain locations, future research on Blacks as a separate or comparative entity should be sensitive to the fact that the group cannot be considered monolithic in the traditional sense. Future research must consider that "…culture and nationality are becoming more important than skin color" (Fears, 2002, p. A1).

Future research that is conducted on Black students from a regional perspective should use samples large enough within each region to allow more robust statistical analyses. When data become available, additional research on the completed, but not yet published fourth follow-up to NELS: 88 should be conducted. Studies could determine the relationship between aspirations for college and actual college completion, mathematics curriculum and college completion, and high school mathematics achievement and college completion.

Implications for Educators and Policy Makers

As would be expected, while testing the first and last hypotheses, the tenth-grade NELS mathematics test score played an overwhelming, statistically significant role in explaining most of the variance in senior year mathematics achievement. Today there are many educators and policy makers who are on opposite sides of the issue as to whether or not standardized tests properly measure academic achievement. Although arguing the pros and cons of the issue is not a focus of this study, it should be noted that prior mathematics achievement was a very strong indicator of future mathematics achievement. But, because this relationship may have indicated that the high school mathematics pedagogical process made no drastic differences in math achievement, policy makers and educators should ensure that proper teaching and learning environments exist. Educators should engage low achievers in more rigorous academic activities that improve student understanding of mathematical concepts and thereby improve mathematics achievement in primary and secondary schools.

Aspirations for 4-year college formed an important relationship with students' mathematics achievement. Teachers should seek out students that have high aspirations but are considered low achievers. Teachers should continue to endorse and support high aspirations through more involved efforts to improve academic achievement.

The current study showed that there were statistically significant, small regional differences in mathematics achievement. Also, region had a statistically significant main effect on aspirations for White students but not for Black students. Comparable studies that focus on differences across states within a geographic region or school districts within a state might produce different results. With the possibility that there are other educational differences that are based on region, future researchers should take advantage of studies conducted at the aggregate level (national/state). They should break apart samples and data, and conduct analyses at lower levels to really see what the data are offering in the way of interpretation and information. In national studies, regional and state differences need to be reviewed and understood. Knowledge and consideration of regional and smaller locale profiles or differences could help educators and policy makers implement policies, programs, and interventions more effectively.

REFERENCES

Alexander, K. L., Eckland, B. K. & Griffin, L. J. (1975). The Wisconsin Model of socioeconomic achievement: A replication. *American Journal of Sociology, 81*(2), 324-342.

Alwin, D. F. & Otto, L. B. (1977). High school context effects on aspirations. *Sociology of Education, 50*(4), 259-273.

American Association of University Women (1992). *How schools shortchange girls: A study of major findings of girls and education*. Washington, DC: American Association of University Women Foundation.

Anderson, J., Hollinger, D. & Conaty, J. (1992). *Poverty and achievement: Re-examining the relationship between school poverty and student achievement: An examination of eighth grade student achievement using the National Education Longitudinal Study of 1988*. (ERIC Document Reproduction Service No. ED346207)

Anderson, K. S. (1990). The effect of athletic participation on the academic aspirations and achievement of African American males in a New York City high school. *Journal of Negro Education, 59*(3), 507-517.

Astone, N. M. & McLanahan, S. S. (1991). Family structure, parental practices and high school completion. *American Sociological Review, 56*(3), 309-320.

Bempechat, J. (1998). *Against the odds: How "at-risk" students exceed expectations.* San Francisco: Jossey-Bass Publishers.

Berryman, S. E. (1983). *Who will do science? Minority and female attainment of science and mathematics degrees: Trends and causes*. New York: Rockefeller Foundation.

Blau, P. M. & Duncan, O. D. (1967). *The American occupational structure.* New York: John Wiley & Sons, Inc.

Boyd-Franklin, N. (1989). *Black families in therapy: A multisystems approach*. New York: Guilford Press.

Boyle, R. P. (1966). The effect of the high school on students' aspirations. *American Journal of Sociology, 71*(6), 628-639.

Braddock, J. H. & Dawkins, M. P. (1993). Ability grouping, aspirations, and attainments: Evidence from the National Educational Longitudinal Study of 1988. *Journal of Negro Education, 62*(3), 324-336.

Brown, R. (1979*). A determination of attitudes toward mathematics and an analysis of factors which are associated with negative attitudes toward mathematics, of students at an urban community college: A descriptive study*. (ERIC Document Reproduction Service No. ED257658)

Brush, L. R. (1985). Cognitive and affective determinants of course preference and plans. In S. S. Chipman, L. R. Brush & D. M. Wilson (Eds.), *Women and mathematics: Balancing the equation*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Campbell, J. R., Hombo, C. M., & Mazzeo, J. (2000). *Trends in academic progress: Three decades of student performance*. (National Center for Education Statistics No. NCES 2000-469)

Catsambis, S. (1994). The path to math: gender and racial-ethnic differences in mathematics participation from middle school to high school. *Sociology of Education, 67*(3), 199-215.

Clark, R. (1983). *Family life and school achievement: Why poor black children succeed or fail.* Chicago: The University of Chicago Press.

Cline, M. G., Endahl, J. R., & McBee, J. K. (1980). *Executive summary of secondary analysis of the data from the evaluation of the transition of Head Start children into public schools*. (ERIC Document Reproduction Service No. ED206381)

Coleman, J. C., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D. & York, R. L. (1966). *Equality of educational opportunity*. Washington, DC: U.S. Government Printing Office.

Cutright, P. (1960). Students' decision to attend college. *Journal of Educational Sociology, 33*(6), 292-299.

DeBord, L. W., Griffin, L. J. & Clark, M. (1977). Race and sex influences in the schooling processes of rural and small town youth. *Sociology of Education, 50*(2), 85-102.

Duncan, O. D., Haller, A. O. & Portes, A. (1968). Peer influences on Aspirations: A reinterpretation. *American Journal of Sociology, 74*(2), 119-137.

Elliott, P. R. (1997). *The use of probability of proficiency scores in the study of relationships between education indicators and student mathematics learning at different skill levels*. Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, IL, March 24-28, 1997). (ERIC Document Reproduction Service No. ED409372)

Epps, E. G. & Jackson, K. W. (1985). *Educational and occupational aspirations and early attainment of black males and females*. (ERIC Document Reproduction Service No. ED263818)

Fears, D. (2002, February 24). A diverse and divided Black community: As foreign-born population grows, nationality trumps skin color. *The Washington Post*, p. A1.

Fejgin, N. (1995). Factors contributing to the academic excellence of American Jewish and Asian students. *Sociology of Education, 68*(1), 18-30.

Ford, D. Y. (1993). Black students' achievement orientation as a function of perceived family achievement orientation and demographic variables. *Journal of Negro Education, 62*(1), 47-66.

Gottfredson, D. C. (1981). Black-white differences in the educational attainment process: What have we learned? *American Sociological Review, 46*(5), 542-557.

Griggs, M. B., Copeland, E. J. & Fisher, T. A. (1992). *Factors That Influence the Academic and Vocational Development of African American and Latino Youth.* Berkeley, CA: National Center for Research in Vocational Education, University of California (ERIC Document Reproduction Service No. ED351566)

Gross, S. (1993). Early mathematics performance and achievement: Results of a study within a large suburban school system. *Journal of Negro Education, 62*(3), 269-287.

Haller, A. O. & Portes, A. (1973). Status attainment processes. *Sociology of Education, 46*(1), 51-91.

Hallinan, M. T. & Williams, R. A. (1990). Students' characteristics and the peer-influence process. *Sociology of Education, 66*, 122-132.

Hanson, S. L. (1994). Lost talent: Unrealized educational aspirations and expectations among U.S. youths. *Sociology of Education, 67*, 159-183.

Hauser, R. M. & Anderson, D. K. (1991). Post-high school plans and aspirations of black and white high school seniors: 1976-86. *Sociology of Education, 64*(4), 263-277.

Hauser, R. M., Tsai, S. & Sewell, W. H. (1983). A model of stratification with response error in social and psychological variables. *Sociology of Education, 56*(1), 20-46.

Horn, L. J. & Carroll C. D. (1997). *Confronting the odds: students at risk and the pipeline to higher education* (Statistical Analysis Report). (National Center for Education Statistics No. NCES 98-094)

Horn, L. J. & Chen, X. (1998). *Toward resiliency: At-risk students who make it to college*. (ERIC Document Reproduction Service No. ED419463)

Horn, L. J. & Nunez, A. (2000). *Mapping the road to college: First-generation students' math track, planning strategies, and context of support* (Statistical Analysis Report). (National Center for Education Statistics No. NCES 2000-153)

Hout, M. & Morgan, W. R. (1975). Race and sex variations in the causes of the expected attainments of high school seniors. *American Journal of Sociology, 81*(2), 364-394.

Hubbard, L. (1999). College aspirations among low-income African American high school students: Gendered strategies for success. *Anthropology & Education Quarterly, 30*(3), 363-383.

Inoue, Y. (1999). *The educational and occupational attainment process*. Lanham, MD: University Press of America, Inc.

Jencks, C., Crouse, J. & Mueser, P. (1983). The Wisconsin Model of Status Attainment: A national replication with improved measures of ability and aspiration. *Sociology of Education, 56*(1), 3-19.

Johnson, R. M. (2000). *Gender Differences in Mathematics Performance: Walberg's Educational Productivity Model and the NELS: 88 Database.* Paper presented at the annual meeting of the AERA (New Orleans, LA, April 24-28, 2000). (ERIC Document Reproduction Service No. ED440872)

Johnson, S. T. (1992). Extra-school factors in achievement, attainment, and aspiration among junior and senior high school-age African American youth. *Journal of Negro Education, 61*(1), 99-119..

Journal of Blacks in Higher Education, 0(18), 94-97 (1998**).** Explaining the gap in black-white scores on IQ and college admission tests.

Kao, G. & Tienda, M. (1998). Educational aspirations of minority youth. *American Journal of Education, 106*(3), 349-

Kaufman, P. & Bradby, D. (1992). *Characteristics of at-risk students in NELS:88. National EducationLongitudinal Study of 1988*. Contractor Report. (ERIC Document Reproduction Service No. ED349369)

Kemper, T. D. (1968). Reference groups, socialization and achievement. *American Sociological Review, 33*(1), 31-45.

Kerchoff, A. C. & Campbell, R. T. (1977). Black-white differences in the educational attainment process. *Sociology of Education, 50*(1), 15-27.

Kominski, R. & Adams, A. (1992). *Educational attainment in the United States: March 1991 and 1990.* Washington, D. C.: U. S. Department of Commerce. (ERIC Document Reproduction Service No. ED366620)

Krauss, I. (1964). Sources of educational aspirations among working-class youth. *American Sociological Review, 29*(6), 867-879.

Lee, J. (2000). *Using national and state assessments to inform the performance of education systems*. Paper presented at the annual meeting of the AERA (New Orleans, April 28, 2000).

Lee, V. E. & Smith, J. B. (1995). Effects of high school restructuring and size on early gains in achievement and engagement. *Sociology of Education, 68*(4), 241-270.

Mac Iver, D. J. (1991). *Helping students who fall behind: remedial activities in the middle grades* (Report No. 22). The Johns Hopkins University: Center for Research on Effective Schooling for Disadvantaged Students. (ERIC Document Reproduction Service No. ED339545**)**

Mahoney, J. S. & Merritt, S. R. (1993). Education hopes of black and white high school seniors in Virginia. *The Journal of Educational Research, 87*(1), 31-38.

McAdoo, H. P. (Ed.). (1988). *Black families* (2nd ed.). Newbury Park, CA: Sage.

McCracken, J. D., Barcinas, J. D. T. & Wims, D. (1991). Aspirations of rural twelfth-grade students in vocational, general, and academic curricula in Ohio and Southwest Georgia. *Journal of Vocational Education Research, 16*(1), 51-77.

Mickelson, R. A. (1984). *Race, class, and gender differences in adolescents' academic achievement attitudes and behaviors*. Unpublished doctoral dissertation, University of California, Los Angeles.

Mickelson, R. A. (1990). The attitude-achievement paradox among black adolescents. *Sociology of Education, 63*(1), 44-61.

National Center for Education Statistics (1995). *Findings from the condition of education 1994* (No. 2). The educational progress of black students. (National Center for Education Statistics No. NCES 95-764)

National Education Longitudinal Study: 1988-94 data files and electronic codebook system (1999) Re-release [CD-ROM]. (National Center for Education Statistics No. NCES 2000-328)

NELS: 88 User's Manual (1994). Second follow-up: Student component data file. (National Center for Education Statistics No. NCES 94378)

Patchen, M. (1982). *Black-white contact in schools: Its social and academic effects*. West Lafayette, IN: Purdue University Press.

Peng, S. S., Wright, D. & Hill, S. T. (1995). *Understanding racial-ethnic differences in Secondary science and mathematics achievement* (Research and Development Report). (ERIC Document Reproduction Service No. ED381342)

Picou, J. S. & Wells, R. H. (1976*). Sociological theory and youth aspiration research: A critical overview*. (ERIC Document Reproduction Service No. ED124353)

Ponec, D. L. (1997). *African-American females: A theory of educational aspiration*. (ERIC Document Reproduction Service No. ED415457)

Porter, J. N. (1974). Race, socialization and mobility in educational and early occupational attainment. *American Sociological Review,* 39(3), 303-316.

Portes, A. & Wilson, K. L. (1976). Black-white differences in educational attainment. *American Sociological Review, 41*(3), 414-431.

Ralph, J. & Crouse, J. (1997). *Reading and mathematics achievement* (Issue Brief). (National Center for Education Statistics No. NCES 98-038)

Rech, J. F. (1994). A comparison of the mathematics attitudes of black students according to grade level, gender, and academic achievement. *Journal of Negro Education, 63*(2), 212-220.

Regional Educational Laboratory Network (http://www.relnetwork.org/).

Reissman, L. (1953). Levels of aspiration and social class. *American Sociological Review, 18*(3), 233-242.

Sewell, W. H. (1971). Inequity of opportunity for higher education. *American Sociological Review, 36*(5), 793-809.

Sewell, W. H., Haller, A. O. & Ohlendorf, G. W. (1970). The educational and early occupational status attainment process: Replication and revision. *American sociological Review, 35*(6), 1014-1027.

Sewell, W. H., Haller, A. O. & Portes, A. (1969). The educational and early occupational attainment process. *American Sociological Review, 33*(1), 82-92.

Sewell, W. H., Haller, A. O. & Straus, M. A. (1957). Social status and educational and occupational aspiration. *American Sociological Review, 22*(1), 67-73.

Sewell, W. H. & Hauser, R. M (1975). *Education, occupation, and earnings: Achievement in the early career*. New York: Academic Press.

Sewell, W. H. & Shah, V. P. (1968a). Parents' education and children's educational aspirations and achievements. *American Sociological Review, 33*(2), 191-209.

Sewell, W. H. & Shah, V. P. (1968b). Social class, parental encouragement, and educational aspirations. *American Journal of Sociology*, 73(5), 559-572.

Signer, B., Beasley, T. M., & Bauer, E. (1997). Interaction of ethnicity, mathematics Achievement level, socioeconomic status, and gender among high school students' mathematics self-concepts. *Journal of Education for Students Placed at Risk. 2*(4), 377-393.

Smith, A. W. (1989). Educational attainment as a determinant of social class among black Americans. *Journal of Negro Education, 58*(3), 416-429.

Solorzano, D. G. (1992). An exploratory analysis of the effects of race, class, and gender on student and parent mobility aspirations. *Journal of Negro Education, 61*(1), 30-44.

Spencer, W. A. (1976). Interpersonal influences on educational aspirations: A cross-cultural analysis. *Sociology of Education, 49*(1), 41-46.

Spenner, K. I. & Featherman, D. L. (1978). Achievement ambitions. *Annual Review of Sociology, 4*, 373-420.

Steele, S. M., Rai, K., Appel, M. A., & Jensen, R. W. (1994). *Getting acquainted with U. S. tenth graders: Implications for nonschool programs.* University of Wisconsin-Madison: Department of Continuing and Vocational Education. (ERIC Document Reproduction Service No. ED392801)

Sui-Cho, E. H. & Willms, J. D. (1996). Effects of parental involvement on eighth-grade achievement. *Sociology of Education,69*(2), 126-141.

Weiner, M. & Murray, W. (1963). Another look at the culturally deprived and their levels of aspirations. *Journal of Educational Sociology, 36*(7), 319-321.

Wilds, D. J. & Wilson, R. (1998). *Minorities in higher education* (1997-98 Sixteenth Annual Status Report). Washington, DC: American Council on Education.

Williams, T. H. (1972). Educational aspirations: Longitudinal evidence on their development in Canadian youth. *Sociology of Education, 45*(2), 107-133.

Wilson, K. L. & Portes, A. (1975). The educational attainment process: Results from a national sample. *American Journal of Sociology, 81*(2), 343-363.

Wolfle, L. M. (1985). Postsecondary educational attainment among whites and blacks. *American Educational Research Journal, 22*(4), 501-525.

Yeung, A. S. & McInerney, D. M. (1999). *Students' Perceived Support from Teachers: Impacts on Academic Achievement, Interest in Schoolwork, Attendance, and Self-Esteem.* Paper presented at the International Conference on Teacher Education (Hong Kong, February 22-24, 1999). (ERIC Document Reproduction Service No. ED429097)

APPENDIX A
Bureau of the Census Region Classifications

Table A1

States Categorized by Regions According to the U.S. Census Bureau

Northeast	Midwest	South	West
Connecticut	Illinois	Alabama	Alaska
Maine	Indiana	Arkansas	Arizona
Massachusetts	Iowa	Delaware	California
New Hampshire	Kansas	District of Columbia	Colorado
New Jersey	Michigan	Florida	Hawaii
New York	Minnesota	Georgia	Idaho
Pennsylvania	Missouri	Kentucky	Montana
Rhode Island	Nebraska	Louisiana	Nevada
Vermont	North Dakota	Maryland	New Mexico
	Ohio	Mississippi	Oregon
	South Dakota	North Carolina	Utah
	Wisconsin	Oklahoma	Washington
		South Carolina	Wyoming
		Tennessee	
		Texas	
		Virginia	
		West Virginia	

SOURCE: U.S. Census Bureau. See http://www.census.gov/econ/www/RegDivpdf.html

APPENDIX B
One-Way ANOVA on Group Achievement Differences

Table B1

Group means and Standard Deviations of Differences (Twelfth Grade Minus Tenth Grade) in NELS Mathematics Test Scores

Group[a]	*N*	Mean	Std. Deviation	Std. Error
Equal	6,082	-.27	3.83	.05
Raised	823	-.08	4.09	.14
Lowered	643	-.50	4.20	.17
Total	7,550	-.27	3.89	.04

[a]Equal = (10^{th} grade aspiration is the same as 12^{th} grade aspiration)
Raised = (10^{th} grade aspiration is less than 12^{th} grade aspiration)
Lowered = (10^{th} grade aspiration is more than 12^{th} grade aspiration)

Table B2

ANOVA for Achievement Difference Computed from Twelfth-Grade Minus Tenth-Grade NELS Mathematics Test Scores

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between Groups	61.49	2	30.75	2.031	.131
Within Groups	114,252.45	7,547	15.14		
Total	114,313.94	7,549			

APPENDIX C
Univariate Analysis of Variance
Combined and Separate Tests of Between-Subjects Effects for Black and White Students

Table C1

Means and Standard Deviations of Combined Black and White Twelfth-Grade NELS Mathematics Test Scores (Region by Aspiration)

Region	Mean			Total Std. Deviation	Total *N*
	Low[a]	High	Total		
Northeast	46.7	56.5	53.1	9.5	1,561
Midwest	46.7	55.8	52.1	9.6	2,759
South	44.2	52.9	49.6	9.5	2,980
West	47.0	55.5	52.5	9.6	1,084
Total	45.9	54.8	51.5	9.6	8,384

[a]Low = less than 4-year college
High = 4-year college or more

Table C2

Tests of Between-Subjects Effects for Black and White Students Combined
Dependent Variable: Twelfth-Grade NELS Mathematics Test Score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Eta Squared
Corrected Model	656274.75[a]	8	82034.34	5694.23	.000	.845
Intercept	6748.55	1	6748.55	468.44	.000	.053
Covariate[b]	480683.59	1	480683.59	33365.60	.000	.799
Region (R)	345.36	3	115.12	7.99	.000	.003
Aspiration (A)	2382.69	1	2382.69	165.39	.000	.019
R x A	39.16	3	13.05	.91	.437	.000
Error	120654.98	8,375	14.41			
Total	22979880.89	8,384				
Corrected Total	776929.72	8,383				

[a]R^2 = .845 (Adjusted R^2 = .845)
[b]Covariate = Tenth-Grade NELS Mathematics Test Score

Table C3

Means and Standard Deviations of Black Twelfth-Grade NELS Mathematics Test Scores (Region by Aspiration)

Region	Mean			Total Std. Deviation	Total *N*
	Low[a]	High	Total		
Northeast	41.5	48.2	45.6	7.9	105
Midwest	42.9	47.4	45.5	9.5	128
South	40.9	46.5	44.1	8.2	730
West	43.5	51.4	48.2	9.8	49
Total	41.3	47.1	44.7	8.5	1,012

[a]Low = less than 4-year college
High = 4-year college or more

Table C4

Tests of Between-Subjects Effects for Black Students
Dependent Variable: Twelfth-Grade NELS Mathematics Test Score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Eta Squared
Corrected Model	59406.35	8	7425.79	555.81	.000	.816
Intercept	639.25	1	639.25	47.85	.000	.046
Covariate[b]	50165.97	1	50165.97	3754.85	.000	.789
Region (R)	64.56	3	21.52	1.61	.185	.005
Aspiration (A)	36.56	1	36.56	2.74	.098	.003
R x A	23.69	3	7.90	.59	.621	.002
Error	13400.40	1,003	13.36			
Total	2090462.56	1,012				
Corrected Total	72806.75	1,011				

[a]R^2 = .816 (Adjusted R^2 = .814)
[b]Covariate = Tenth-Grade NELS Mathematics Test Score

Table C5

Means and Standard Deviations of White Twelfth-Grade NELS Mathematics Test Scores (Region by Aspiration)

Region	Mean			Total Std. Deviation	Total *N*
	Low[a]	High	Total		
Northeast	47.1	57.1	53.7	9.3	1,456
Midwest	46.9	56.2	52.4	9.4	2,631
South	45.5	54.7	51.4	9.2	2,250
West	47.2	55.7	52.7	9.6	1,035
Total	46.6	55.8	52.4	9.4	7,372

[a]Low = less than 4-year college
High = 4-year college or more

Table C6

Tests of Between-Subjects Effects for White Students
Dependent Variable: Twelfth-Grade NELS Mathematics Test Score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Eta Squared
Corrected Model	543924.90	8	67990.61	4686.38	.000	.836
Intercept	6489.84	1	6489.84	447.32	.000	.057
Covariate[b]	391642.43	1	391642.43	26994.70	.000	.786
Region (R)	260.64	3	86.88	5.99	.000	.002
Aspiration (A)	2472.89	1	2472.89	170.45	.000	.023
R x A	34.86	3	11.62	.80	.493	.000
Error	106823.33	7,363	14.51			
Total	20889418.33	7,372				
Corrected Total	650748.23	7,371				

[a]R^2 = .836 (Adjusted R^2 = .836)
[b]Covariate = Tenth-Grade NELS Mathematics Test Score

APPENDIX D
Nominal Logistic Regression

Table D1

Nominal Logistic Regression Likelihood Ratio Tests for Blacks and Whites

Effect	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
1. Blacks (*n* = 832)				
Intercept	61.88	.00	0	
Sex	72.50	10.62	1	.001
Region	65.16	3.28	3	.351
Curriculum	61.95	.07	1	.794
2. Whites (*n* = 5,739)				
Intercept	107.49	.00	0	
Sex	132.44	24.96	1	.000
Region	137.87	30.39	3	.000
Curriculum	111.35	3.86	1	.049

APPENDIX E
Hierarchical Regression Analysis
Twelfth-Grade NELS Mathematics Test Score as Dependent Variable

Table E1

Means and Standard Deviations of Hierarchical Regression Variables (*N* = 3,621)

Variable	Mean	Std. Deviation
Dependent Variable		
12th Grade Math Score	51.80	9.65
Block 1		
Race	.88	.32
Sex	.51	.50
SES Quartile 1	-.09	.68
SES Quartile 2	-.01	.73
SES Quartile 3	-.002	.74
Block 2		
10th Grade Math Score	52.09	9.64
Block 3		
Teacher's desire	.88	.32
Parent's desire	.79	.41
Block 4		
Region1 (Northeast)	-.19	.72
Region2 (Midwest)	-.05	.83
Region3 (West)	-.24	.67
Curriculum	.87	.33
Block 5		
Aspiration	.64	.48

Table E2

Coefficients of Hierarchical Regression Predictor Variables

Model		Unstandardized Coefficients *B*	Std. Error	Standardized Coefficients Beta	*t*	Sig.
1	(Constant)	47.03	.45		104.02	.000
	Race	5.11	.46	.17	11.10	.000
	Sex	-.38	.29	-.02	-1.32	.189
	SES Quartile 1	-4.88	.28	-.34	-17.34	.000
	SES Quartile 2	-1.74	.25	-.13	-7.09	.000
	SES Quartile 3	1.14	.24	.09	4.69	.000
2	(Constant)	5.40	.40		13.62	.000
	Race	-.02	.21	-.00	-.09	.928
	Sex	-.45	.13	-.02	-3.56	.000
	SES Quartile 1	-.71	.13	-.05	-5.46	.000
	SES Quartile 2	-.39	.11	-.03	-3.55	.000
	SES Quartile 3	.35	.11	.03	3.27	.001
	10^{th} Grade Math Score	.89	.01	.89	121.76	.000
3	(Constant)	5.66	.44		12.97	.000
	Race	-.01	.21	.00	-.06	.955
	Sex	-.44	.13	-.02	-3.50	.000
	SES Quartile 1	-.70	.13	-.05	-5.45	.000
	SES Quartile 2	-.39	.11	-.03	-3.57	.000
	SES Quartile 3	.35	.11	.03	3.27	.001
	10^{th} Grade Math Score	.89	.01	.89	121.76	.000
	Teacher's desire	-.18	.20	-.01	-.89	.376
	Parent's desire	-.16	.16	-.01	-1.01	.314

Table E2 (Continued)

Coefficients of Hierarchical Regression Predictor Variables

Model		Unstandardized Coefficients *B*	Std. Error	Standardized Coefficients Beta	*t*	Sig.
4	(Constant)	5.58	.46		12.02	.000
	Race	-.01	.21	.00	-.05	.959
	Sex	-.46	.13	-.02	-3.63	.000
	SES Quartile 1	-.68	.13	-.05	-5.29	.000
	SES Quartile 2	-.38	.11	-.03	-3.46	.001
	SES Quartile 3	.35	.11	.03	3.23	.001
	10^{th} Grade Math Score	.89	.01	.89	121.51	.000
	Teacher's desire	-.19	.20	-.01	-.94	.350
	Parent's desire	-.20	.16	-.01	-1.22	.223
	Region 1 (Northeast)	.49	.13	.04	3.90	.000
	Region 2 (Midwest)	-.22	.11	-.02	-2.09	.036
	Region 3 (West)	-.19	.14	-.01	-1.36	.174
	Curriculum	.20	.20	.01	1.01	.314
5	(Constant)	5.78	.46		12.56	.000
	Race	.25	.21	.01	1.16	.245
	Sex	-.58	.13	-.03	-4.62	.000
	SES Quartile 1	-.45	.13	-.03	-3.46	.001
	SES Quartile 2	-.32	.11	-.02	-2.96	.003
	SES Quartile 3	.28	.11	.02	2.66	.008
	10^{th} Grade Math Score	.87	.01	.87	112.14	.000
	Teacher's desire	-.14	.20	-.01	-.71	.476
	Parent's desire	-.20	.16	-.01	-1.24	.216
	Region 1 (Northeast)	.49	.13	.04	3.88	.000
	Region 2 (Midwest)	-.17	.11	-.02	-1.65	.099
	Region 3 (West)	-.21	.14	-.01	-1.48	.139
	Curriculum	.20	.20	.01	1.01	.314
	Aspiration	1.35	.15	.07	8.90	.000

APPENDIX F
Hierarchical Regression Analysis
Tenth-Grade NELS Mathematics Test Score as Dependent Variable

Table F1

Means and Standard Deviations of Hierarchical Regression Variables (*N* = 4,430)

Variable	Mean	Std. Deviation
Dependent Variable		
10th Grade Math Score	51.62	9.80
Block 1		
Race	.88	.32
Sex	.51	.50
SES Quartile 1	-.08	.68
SES Quartile 2	-.004	.73
SES Quartile 3	.0009	.74
Block 2		
Teacher's desire	.89	.32
Parent's desire	.79	.41
Block 3		
Region1 (Northeast)	-.18	.71
Region2 (Midwest)	-.05	.82
Region3 (West)	-.22	.68
Curriculum	.87	.34
Block 4		
Aspiration	.63	.48

Table F2

Coefficients of Hierarchical Regression Predictor Variables

Model		Unstandardized Coefficients *B*	Std. Error	Standardized Coefficients Beta	*t*	Sig.
1	(Constant)	46.17	.41		111.66	.000
	Race	5.85	.42	.19	13.91	.000
	Sex	-.12	.27	-.01	-.45	.652
	SES Quartile 1	-4.55	.26	-.31	-17.69	.000
	SES Quartile 2	-1.69	.23	-.13	-7.51	.000
	SES Quartile 3	.94	.23	.07	4.19	.000
2	(Constant)	45.52	.58		78.99	.000
	Race	5.84	.42	.19	13.89	.000
	Sex	-.13	.27	-.01	-.48	.635
	SES Quartile 1	-4.54	.26	-.31	-17.65	.000
	SES Quartile 2	-1.69	.23	-.13	-7.50	.000
	SES Quartile 3	.94	.23	.07	4.19	.000
	Teacher's desire	.21	.42	.01	.49	.624
	Parent's desire	.61	.33	.03	1.85	.064
3	(Constant)	45.65	.65		70.16	.000
	Race	5.38	.43	.18	12.46	.000
	Sex	-.10	.26	-.01	-.40	.693
	SES Quartile 1	-4.46	.26	-.31	-17.31	.000
	SES Quartile 2	-1.72	.23	-.13	-7.61	.000
	SES Quartile 3	.92	.22	.07	4.12	.000
	Teacher's desire	.11	.42	.00	.25	.802
	Parent's desire	.38	.34	.02	1.12	.264
	Region 1 (Northeast)	.40	.26	.03	1.53	.126
	Region 2 (Midwest)	.24	.22	.02	1.08	.278
	Region 3 (West)	.32	.29	.02	1.11	.268
	Curriculum	.81	.41	.03	1.97	.049

Table F2 (Continued)

Coefficients of Hierarchical Regression Predictor Variables

Model		Unstandardized Coefficients *B*	Std. Error	Standardized Coefficients Beta	*t*	Sig.
4	(Constant)	40.97	.64		64.55	.000
	Race	6.15	.40	.20	15.22	.000
	Sex	-.70	.25	-.04	-2.83	.005
	SES Quartile 1	-2.66	.25	-.18	-10.60	.000
	SES Quartile 2	-1.20	.21	-.09	-5.67	.000
	SES Quartile 3	.47	.21	.04	2.24	.025
	Teacher's desire	.26	.40	.01	.65	.516
	Parent's desire	.40	.32	.02	1.26	.209
	Region 1 (Northeast)	.24	.25	.02	.97	.333
	Region 2 (Midwest)	.47	.21	.04	2.26	.024
	Region 3 (West)	.26	.27	.02	.99	.324
	Curriculum	.64	.38	.02	1.68	.093
	Aspiration	7.04	.28	.35	25.49	.000

VITA

Kenneth E. Hinson

Education: Doctor of Philosophy (Ph.D.), 2002
Educational Research and Evaluation
Virginia Polytechnic Institute and
State University, Blacksburg, Virginia

Masters of Arts (M.A.), 1999
Education
Virginia Polytechnic Institute and
State University, Blacksburg, Virginia

Masters of Science (M.S.), 1976
Computer Systems Management
Navy Postgraduate School
Monterey, California

Bachelor of Science (B.S.), 1970
Mathematics
Prairie View A. & M. University
Prairie View, Texas

Experience: Evaluation Specialist, April, 2002 to Present

Graduate Assistant, 2000-2001
Provided administrative support to professors. As a research assistant, conducted interviews, completed analyses, and helped develop preliminary reports.

Project Leader and Director, 1994-1998
At BDM Federal, Incorporated worked as a manager, director, and Project Leader for systems software development projects. Ensured system development, testing, and implementation were executed within prescribed budgets and time schedules. Developed and administered the execution of computer systems development project budgets in excess of $28 million. Participated in strategic planning to take advantage of anticipated future changes in software development tools, computer hardware, and employee skills and training requirements in order to improve our employee base and provide better quality products and services.

United States Naval Officer, 1970-1994
Served over twenty-four years as a Navy Supply Corps Officer. Held positions of increasing responsibility in logistics management and systems development support. Demonstrated exceptional leadership and skills in managing inventories, personnel, and budgets. Highly motivated problem solver who can communicate and work with executives at all levels.

1. Deputy for Information Technology, 1992-1994
At the Military Traffic Management Command, Falls Church, VA directed and monitored computer systems development projects for Department of Defense transportation systems. Ensured system development, testing, and implementation were executed within prescribed budgets and time schedules Managed budgets in excess of $30 million. Used strategic planning to enable the system development function to satisfy future changes and new Department of Defense transportation requirements.

2. Department Head, 1988-1990
Onboard USS Sierra (AD-18) served as Supply Officer. Managed all parts inventory, accounting, payroll, and retail sales functions aboard ship. Managed and administered execution of budget in excess of $3.5 million.

3. Branch/Division/Department Head 1972-1987
Served on various United States Ships and shore commands as a Supply Officer. Primary functions were accounting, inventory management, payroll, retail sales.

Teaching
1. 1974 - Taught high school courses to naval personnel through Olympic College of Bremerton, Washington.
2. 1978-1980 - Taught Computer Science and Resources Management at the United States Naval Academy, Annapolis Maryland
3. 1979-1980 - Taught Computer Science at Anne Arundel Community College, Arnold, Maryland.
4. 1998 - Taught algebra and geometry as a teacher intern at J. E. B. Stuart High School, Falls Church, Virginia during fall semester 1998.
5. 1999 - Taught algebra and eighth grade mathematics as a teacher intern at Rachel Carson Middle School, Herndon, Virginia during spring semester 1999.

Related Experience:

Chairman (2000-2002), Membership Committee, Phi Delta Kappa International professional education association, Virginia Tech/University of Virginia Northern Virginia Chapter

Presenter, National Middle School Association (NMSA) Conference, Washington, D.C., 2001

Personal Data:

Spouse Elma R. Hinson

Children Kesha E. Hinson