A DATABASED MODEL TO PREDICT POSTSECONDARY EDUCATIONAL ATTAINMENT OF LOW-SOCIOECONOMIC-STATUS STUDENTS

By

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This dissertation is dedicated to the three most important women in my life: my mother, Myung Soon Kim; my wife, Sung Hee An; and my daughter, Rebecca Lee.
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By

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August 2004

Chair: M. Harry Daniels
Major Department: Counselor Education

This research identified patterns of influence on low-socioeconomic-status (SES) students' long-term educational development, thereby revealing areas for support and intervention by policy makers, counselors, parents, and other social service personnel. National Educational Longitudinal Study 1988-2000 data were used to examine the longitudinal educational development of low-SES students.

Participants were drawn from those who were in the lowest quartile of SES in the 1988 survey and were resurveyed in the 2000 survey (N=2460). Through simultaneous examination of variables associated with student demographic characteristics, student psychological characteristics, student behavioral characteristics, family characteristics, and school characteristics, a guiding theoretical model was proposed.

Using an ordinary least-squares estimation procedure, path coefficients for the model were calculated. Based on the strength of standardized regression weights and goodness-of-fit indicators, the original model was modified. The GFI index (.986), the
AGFI (.962), and the RMSR (.023) represent a good fit of the revised model. Regarding effect size, all variables collectively accounted for around 20% of the variability in educational attainment.

The results of the current study provided strong evidence that educational attainment of low-SES students can be facilitated by greater internal locus of control and higher student academic expectations during early adolescence. These two psychological variables were associated with greater academic performance (math and reading scores), greater student classroom preparedness behavior, and less student problem behaviors during early adolescence that, in turn, are associated with greater educational attainment. Student demographic variables also influenced educational attainment directly (by gender) as well as indirectly (by race). Interestingly, no statistically significant effects of parent and school related variables on educational attainment were found in this low-SES student group.

It is vital to identify the factors influencing educational attainment of low-SES students and the present research is an effort in that direction. Investigating these sources of variation, school counselors could be in a better position to provide appropriate educational interventions for low-SES students and, eventually, modify guidance service delivery models toward enhancing the learning and development of low-SES students as well as all students in schools.
CHAPTER 1
INTRODUCTION

Historically and now, school counselors have been involved in promoting students’ development in three domains--academic, career, and personal/social (Myrick, 2003). The American School Counselor Association’s (2003) National Model also supports the school's overall mission by promoting academic development, career planning, and personal/social development. Although their importance has fluctuated over time, based on different issues, the legitimacy of the three domains for school counselor involvement has remained constant (Paisley & Borders, 1995).

Given the advent of standards-based educational reform, particular attention is being given to the domain of academic development. Among other school personnel, school counselors are being held increasingly accountable for creating school contexts where all students can be academically successful (Dimmitt, 2003). Obviously, school counselors have an important role in ensuring students’ academic success. Because they have a school-wide perspective on serving the needs of every single student, including at-risk students (low-socioeconomic-status (SES) students), school counselors are in an ideal situation to serve as advocates for all students, and as agents for removing systemic barriers to academic success (Paisley & Hayes, 2003).

Despite the recent emphasis upon students’ academic development, practicing school counselors and the counselor educators who prepare them have shown little concern for how school counselors address the academic achievement of students
(Collison, Osborne, Gray, House, Firth, & Lou, 1998). To optimize learning environments and to maximize the potential of at-risk student groups who continue to achieve below the level of other student groups, school counselors must understand which factors contribute to academic success, and learn to identify the factors that interfere with academic success.

Additionally, to help ensure successful outcomes for the increasing number of students seeking postsecondary credentials, it is crucial for school counselors to understand the factors associated with degree completion. Currently, students can choose from a range of institution types and enrollment options to find the best fit for their degree objectives, abilities, and social and economic circumstances. Social and economic accomplishment for young people in the United States is increasingly associated with high levels of postsecondary education attainment (Trusty, 2000). According to Snyder & Shafer (1996), the earnings gap between those who have a bachelor’s degree and those who do not has widened significantly from the 1970s to the 1990s. As students’ awareness of the economic and social benefits of degree attainment has increased, so has their postsecondary enrollment.

Despite recent gains in academic achievement, low-SES students continue to achieve far below the level of high-SES students (Jordan & Plank, 2000). Finding sustainable and systematic ways to motivate low-SES students to achieve academic success continues to be a major task facing school practitioners, including school counselors.

Considering the current movement in the education system that emphasizes students’ academic achievement, there is an unquestionable need for all educators to use
their competency, knowledge, and skills to become educational specialists who can contribute to the objectives of current public education, and help build safe and sound schools for all students. While attempting to retain their historical positions and professional identity, educators in the educational system have modified or implemented educational reform.

Role designation for school counselors (like other educators) should be redefined to successfully support the national and state educational reform model. An adjustment in job description for school counselors may provide a significant contribution in attaining these standards, and would help serve all students by decreasing the achievement gap between low-SES and minority students in comparison with other student groups (Bemak, 2000).

Dimmitt (2003) said, “when school counselors deliberately make the effort to create proactive interventions to mediate the issue of academic achievement, they are faced with a dizzying array of possible places to intervene” (p.341). In an effort to better understand the context-specific factors impacting academic failure in a school setting, school counselors need to know the most salient factors for these low-SES students.

For school counselors, identifying the factors that interfere with academic success is a fundamental step in the process of selecting interventions. The best way to gain an accurate picture of interfering factors is from reliable research findings. Concrete information about why low-SES students are failing gives school counselors valuable knowledge to advocate for programs and interventions that may be effective. With reliable research results, school counselors can make informed decisions about what
interventions are needed, what they are doing that makes a difference, and how to best serve low-SES students.

Additional research is needed to generate greater understanding about why so many low-SES students are failing to attain academic achievement during and after high school. This process is as important as the product. School counselors and counselor educators together must think about which type of research would best determine the factors that hinder or improve academic success.

**Statement of the Problem**

In recent decades, few topics in American education have received more attention than the academic achievement of students from low-SES backgrounds. Yet, despite such concentrated attention, too many such students continue to perform at unacceptably low levels in U.S. public schools. This failure is particularly evident at the secondary school level. Between 1972 and 1996, students from low-income families were more likely to drop out of high school than were their counterparts from middle- and high-income families (Sanders, 2000).

Whether a person attends a postsecondary school (and the type of school he or she attends), has a major impact on life changes, occupational status, and wealth. Enrollment in higher education has expanded dramatically in the United States during the past century. While enrollment in college and universities increased by 66% between 1970 and 1993, the total U.S. population increased by only 27%. As access to higher education has expanded, the importance of postsecondary schooling in determining life changes, occupational status, and wealth has increased (U.S. Department of Education, 1995).

Despite these positive increases, Jordan and Plank (2000) found that low-SES, academically able students are less likely than are their high-SES counterparts to attend
colleges and universities directly after high school. According to the U.S. Department of Education National Center for Education Statistics (2002) the percentage of low-SES students who had bachelor’s degrees (6.9%), when they were 8 years beyond high school, is much smaller than the percentage for high-SES group (51.0%). This discrepancy has received attention from political leaders in the United States, and one of the current national education goals is to increase the participation of low-SES minority students in higher education (National Educational Goals Panel, 1999).

Because education may be the primary means of social mobility for individuals from disadvantaged groups, researchers need to devote attention to the postsecondary educational development of low-SES students. Unfortunately, current understanding of the factors that explain the achievement patterns of low-SES students is limited. Presently, most research focuses on differences between low-SES and middle and high-SES students; much less attention has been paid to variation among low-SES students, a group of particular interest to educational researchers. Analyses of this low-SES student within-group difference are necessary to understand why some students fail, some barely survive, and still others thrive in this low-SES high-risk environment. What makes some students succeed? Much of this success may be explained by the actions of students, families, and schools.

In considering the factors influencing students’ success in attaining postsecondary degrees, long-term and interaction effects of students’ family and school variables are not well known. Therefore this study analyzed the longitudinal direct and indirect effects of student demographic, psychological, and behavioral variables; family variables; and selected school-related variables on students’ educational attainment.
Theoretical Model

My study tested a general model of interpersonal, intrapsychic, and behavioral influences of students, families, and schools on postsecondary educational attainment. The guiding theoretical model for my study is outlined in Appendix A. The model is based on status-attainment theory, which has existed for several years, and is well supported by research (Kao & Tienda, 1998; Smith-Maddox, 1999; Trusty, 2002).

The idea of status attainment was begun by social mobility theorists (e.g., Marxian and Weberian; Blau & Duncan, 1967). Generally, social mobility refers to movement up (upward social mobility) or down (downward social mobility) in a system of social stratification (Dahrendorf, 1959). The study of social stratification and social mobility has passed through different phases during the 20th century. Before 1940, European scholars mainly studied social structure and relationships among groups in the society. After World War II, American theoretical and empirical contributions to social-mobility research increased significantly. Even though initial American researches dealt with issues of class, status, and power (Bendix & Lipset, 1953), Blau & Duncan (1967) led social-mobility research away from the work being done in Europe.

Initial work of Blau & Duncan’s (1967) status-attainment theory examined the linkage between fathers’ and sons’ occupations. Blau and Duncan (1967) assumed that understanding of social stratification in modern society is best promoted by the systematic investigation of occupational status and mobility. Rather than asking what influence a variable exerts on upward mobility, Blau and Duncan (1967) asked what influence it exerts on occupational achievement, and how it modifies the effect of social origins on these achievements. Unlike previous studies (which involved only one predicting variable), Blau and Duncan (1967) wanted to investigate the simultaneous
influence of several factors on occupational achievement and mobility. That is, Blau and Duncan (1967) examined the patterns of occupational mobility that were affected by multiple factors.

Finally, Blau and Duncan (1967) identified educational attainment as a pivotal mediating variable, explaining the linkage of fathers’ education and occupation and sons’ occupational attainment. Another major contribution of Blau and Duncan’s (1967) status-attainment model was the use of path-analysis models to study associations among more than two variables. Most importantly, indirect-effect calculations made it possible to quantify the role of education in social mobility, and to disclose its reproductive and mobility-promoting facets. Subsequent studies in the status-attainment tradition have investigated the ways in which gender, race, ethnicity, community size, and features of the family of origin (such as its intact character, the number of siblings, and birth order), influence the process of stratification (see Kerckhoff, 1995, for a review).

Even though status attainment research traces its historical roots to the seminal work of Blau and Duncan (1967), a major development in this model was the work of Sewell and Hauser (1971). The original model was transformed from one that included only behaviors, to one including a combination of behaviors and attitudes. Sewell and Hauser (1971) added achievement-related psychological variables to the model of educational and occupational attainment (Haas & Falk, 1981). Their revised model included academic ability, aspiration and performance, and encouragement of educational goals by significant others (such as friends, parents, and school personnel).

Using Sewell and Hauser’s (1971) status-attainment model, Kao & Tienda (1988) explained how educational aspirations are shaped, and reported how those aspirations led
to educational attainment. Smith-Maddox (1999) also examined the effect of social networks and resources on academic achievement of African Americans using the status-attainment model. Using NELS data, Trusty (2002) developed a guiding model of educational expectations with African Americans, which is also based on the status-attainment model.

The model for our study is also based on the model from Sewell and Hauser’s (1971) research, which included psychological as well as demographic and behavioral variables for predicting educational attainment. This model is consistent with Sewell and Hauser’s work, which emphasized the effect of significant others (e.g., family and school) as well as the effect of the student himself or herself. This conceptual model differs from other models, such as economic models (Kotler & Fox, 1985), that only focus on financial considerations and cost-benefit processes, to the degree that it illuminates an interactive process among social constructs and variables measuring individual characteristics.

Given an interactive process, three primary areas have been identified from this model: student, family, and school. First, consistent with Sewell and Hauser’s model, student variables comprised three categories: demographic variables, psychological variables, and behavioral variables. Student demographic variables include gender (male and female) and race (African American, Latino, White, and Asian American). According to the U.S. Department of Education, National Center for Education Statistics (2002), women now enroll at higher rates than men, and earn the majority of college degrees awarded each year. Smith (1997) indicates that African Americans and Latinos are less likely than White Americans and Asian Americans to attain a college degree.
Consistent with previous data results, both NELS:88 eighth-grade Asian and White American cohort members were also more likely than non-Asian minority groups to say that they had attained a bachelor’s degree or higher.

The three student psychological variables include locus of control, self-concept, and academic expectation during high school. Selection of these student psychological variables was based on significant findings in the educational development literature (Zsolnai, 2002; Cassidy & Eachus, 2000). Student behavioral variables include academic performance and school behavior. Most studies using the status-attainment model used a one-dimensional measure of early academic performance (Eccles, 1994; Trusty et al., 2000). In the eighth grade, however, all students completed both mathematics and reading tests, which were standard scores administered in NELS:88 (Curtin, Ingels, Wu, & Heuer, 2002). Consistent with models of Trusty (2002), high school behavior was added to the present model. The addition of high school behavior is also consistent with other models of educational attainment (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996, social-cognitive model of academic achievement; Connell, Spencer & Aber, 1994; Ogbu, 1991; Wong, 1990; Trusty & Harris, 1999). Several items from the Second Follow-Up Questionnaire assessed student behavior in and out of school.

Family variables include parental expectation and parental involvement. There have been several studies of parental influences on child educational attainment (Marjoribanks, 1986; T.E. Smith, 1989, 1991; Wilson & Wilson, 1992). According to Fisher and Padmawidjaja (1999), parental encouragement (in the form of communication with and support of students), emerged as the most important parental influences on educational attainment. High parental expectation also had a positive effect (DuBois & Eitel, 1994).
Finally, for school variables, academic counseling, vocational and financial aid guidance services were included. Students with higher SES are more likely to report having social capital (in the form of guidance and support for advanced schooling) than are students from lower-SES backgrounds. Interviews with school counselors shed light on some factors that may reduce the social capital on which low-SES students can draw (Plank & Jordan, 2001).

**Purpose of Study**

The purpose of our study was to examine the long-term academic development of low-SES students using the National Educational Longitudinal Study (NELS) database (a large, nationally representative, longitudinal database). Specifically, our study focused on examining the direct and indirect longitudinal effects of student demographic characteristics, psychological characteristics, behavioral characteristics, family characteristics, and school guidance-related characteristics on the postsecondary educational attainment of low-SES students. Our study attempted to identify patterns of influence on the low-SES students’ long-term educational development, thereby revealing areas for support and intervention by school counselors and counselor educators, as well as policy makers, parents, and other social service personnel. The main research question to be addressed in this study is

What are the direct and indirect effects of student demographic variables (race, and gender); student psychological variables (locus of control, self-concept, and early academic expectation); student behavioral variables (high school behavior and academic performance); family variables (parents educational expectation and involvement); and school-action-taken variables (academic counseling services, vocational guidance, and financial aid resource guidance) on the postsecondary educational attainment of low-SES students?
Significance of Study

Our study seeks to answer the critical educational issue of low-SES students’ educational development process and outcome, not just assessed in terms of entry (becoming students in postsecondary school) but in terms of final achievement (attaining a degree). The NELS:88 data collected in 1994 helped answer questions of access to institutions of postsecondary education. Data from 2000 helped answer the question of what level of attainment is, in fact, achieved. Many school counselors seeking to create caring learning environments for students should produce the various interventions to encourage more school, parent, and community involvement to achieve this goal. To ensure that schools serve all their students appropriately, these efforts must be supported and continually evaluated and improved.

Our study tested a model that points to important interpersonal, psychological, and behavioral points of entry for interventions designed to increase the educational success of low-SES youth. What is the impact of student, family, and school experience on postsecondary education attainment? Results (the answers to this research question) may drive change in the ways parent education, academic counseling, vocational education, and financial guidance are offered to students. This research may also provide insights into improving parent consultation, developing vocational courses and academic/career guidance programs for low-SES students who pursue postsecondary educational. Therefore, findings from this study could further inform policy decision makers and improve reform efforts in American high schools. There is undoubtedly a dynamic interplay of individual developmental characteristics, social environments, and psychological factors; and educational attainment. This study may provide a theoretical base for understanding the long-term educational development of young people from
low-SES backgrounds. It may also provide practical guidance for school counselors, counselor educators, policy makers, and other social service professionals who work with the low-SES students.

**Definition of Terms**

For the purpose of this study, the following terms are used in the manner defined.

**Academic counseling:** meetings with a school counselor to receive help with academic problems. In this study, this construct was operationalized in NELS with percentage of student body participation in academic-counseling programs.

**Academic expectation:** the perception a student holds about his or her academic achievement, which was operationalized in the NELS as the highest level of postsecondary educational attainment the student ever expected to complete.

**Academic performance:** the act of carrying out or accomplishing educational achievement. Our study used standardized mathematics and reading test scores as indicators of academic performance.

**Financial aid guidance:** guidance programs focused on delivery and administration of financial assistance in the form of scholarships, grants, work-study, and loans for education. This construct was operationalized in NELS with percentage of students attending programs about financial aid.

**Latent variables:** variables measured indirectly through observable variables. For example, self-concept (latent variable) is measured by a total of seven items (observed variables).

**Locus of control:** degree to which a person perceives a relationship between his or her actions and the outcomes of those actions (Rotter, 1966). For the purpose of this
study, this construct was operationalized in the NELS with the use of a base year student questionnaire using questions regarding locus of control.

**Parent academic expectation:** parents’ perception about their children’s academic achievement (operationalized in the NELS as the highest level of postsecondary educational attainment the parent ever expected his or her child to complete).

**Parent involvement:** parents’ support for their children's schooling by attending school functions. Parents’ can become more involved in helping their children improve their schoolwork--providing encouragement, arranging for appropriate study time and space, modeling desired behavior, monitoring homework, and actively tutoring their children at home. In NELS database, several items were identified that indicated various aspects of parents’ involvement in their children’s education.

**Postsecondary educational attainment:** various types of postsecondary degrees or certificates participants had attained. Our study measured this construct by graphing student educational attainment into four categories: (1) no postsecondary experience; (2) some postsecondary experience, but no bachelor degree; (3) Bachelor’s degree; (4) Master’s degree or higher.

**Race/ethnicity:** reflects new federal standards for collecting race and ethnicity data. Our study categorized race as “White, non-Hispanic;” “Black, non-Hispanic;” “Asian or Pacific Islander;” “American Indian or Alaska Native;” “Hispanic or Latino (any race);” and “More than one race.”

**School behavior:** the way a student behaves, acts, functions, or reacts in a particular way at school. Several items from NELS included in this study assessed student behavior at school.
**Self-concept:** one’s definition or description of oneself (who one is, and what one is) on the basis of one’s interaction, from infancy onward, with the physical and social environment. It is a social product and the self of experience made up of what really happened. For the purpose of this study, this construct was operationalized in the NELS with the use of a base-year student questionnaire using questions regarding self-concept.

**Sex or gender:** refers to a person based on their anatomy (external genitalia, chromosomes, and internal reproductive system). Sex terms are male and female. For the purpose of this study, sex is biological; although social views and experiences of sex are also cultural.

**Socioeconomic status (SES):** characterized by the economic, social, and physical environments in which individuals live and work, as well as by demographic and genetic factors. For the purpose of this study, measures for SES include five equally weighted, standardized components: father’s education, mother’s education, family income, father’s occupation, and mother’s occupation.

**Vocational counseling and guidance:** advice, counseling, or information sources given to students on career matters. In this study, this construct was operationalized in NELS with percentage of student body participation in vocational guidance programs.

**Organization of Study**

This study is presented in five chapters and appendices. This chapter provides background information and a rationale for the study. Chapter 2 reviews relevant literature about educational attainment and related variables. The research method, population, participants, data source, research variables, and data analysis are described in Chapter 3. Findings resulting from the analysis and evaluation of the data are presented
in Chapter 4. A brief summary of the study, discussion of the findings, conclusions, implications and recommendations for further research are presented in Chapter 5.
CHAPTER 2
REVIEW OF THE LITERATURE

This chapter contains a review of the literature related to the issues associated with postsecondary educational attainment of low-SES students. It also addresses investigations of the relationship of student, family, and school variables to degree attainment. Many of the latter studies demonstrate models of low-SES student educational development in identifying such factors.

Educational Attainment and Socioeconomic Status

Research indicates that socioeconomic status (SES) is the best predictor of academic attainment, and that low-SES forecasts low attainment (Hobbs, 1990; Tuma, 1989; Caldwell & Ginther, 1996). The U.S. Department of Education’s National Center for Education Statistics (2002) also shows that the likelihood of completing a bachelor's or higher degree increases with students' SES: 7% of low-SES students, 24% of middle-SES students, and 60% of high-SES students completed such a degree by 2000. Among high-achieving students, attainment of a college degree still increased along with SES. For example, among students who scored in the highest mathematics test quartile in 8th grade, the likelihood of earning a bachelor's or higher degree increased with SES: from 29% among those from low-SES families, to 47% among those in the middle two quartiles, to 74% among those with the highest SES.

Programs such as the Title I program, which began in 1960, have attempted to remediate the problems associated with being economically disadvantaged (Caldwell &
Ginther, 1996). Studies show that participation in this program initially increases achievement, but that these academic gains fade over time (Hubbell, 1983; Whiter, 1985).

Another similar project “Support to Affirm Rising Talent (START)” was also tried by a collaborative research effort between the University of Virginia site of the National Research Center on the Gifted and Talented (NRC/GT) and the public schools of Charlotte-Mecklenburg, North Carolina. Moon & Callahan (2001) investigated the efficacy of specific interventions (mentoring, parental involvement, and multicultural curricula) on academic achievement of primary grade students from low-socioeconomic environments who participated in this project. Their research results suggested that the interventions had no statistically significant effect on student achievement in any grade. Caldwell & Ginther (1996) state: “the methods currently being used to remediate the educational deficits associated with being economically disadvantaged should be revised” (p.141).

While low-SES is highly correlated with low educational attainment, some low-SES students successfully attained a postsecondary degree. What makes some low-SES students succeed? According to the National Center for Education Statistics (2002), strong academic preparation and achievement in school increased the likelihood that low-SES students, especially, will finish college. Among low-SES students, high achievers on 8th-grade mathematics tests were about 10 times more likely than low achievers to complete a degree by the year 2000. In contrast, among high-SES students, high achievers were only 2.4 times more likely than low achievers to complete a degree. Similarly, low-SES students who had studied calculus in high school were about 10 times more likely than those who had not studied calculus to have earned at least a bachelor's
degree by the year 2000. In contrast, middle-SES students were only 3 times more likely to complete a degree—and high-SES students 1.7 times more likely—if they had studied calculus in high school. Achieving higher test scores and studying calculus were associated with higher rates of college completion, and the association was stronger for low-SES students than for others in this cohort (National Center for Education Statistics, 2002).

According to Anderson and Keith (1997), academic ability, quality of schooling, student motivation, and enrollment in academic coursework make important contributions to the academic success of low-SES minority high school students. They reported individual ability, motivation, and completion of academic coursework exerted the most powerful direct effects on academic achievement, but found no evidence of an overall effect of parental involvement on achievement among low-SES students. In addition, the impact of quality of schooling on academic achievement, although indirect, was important. From these results, they concluded “educators might be able to enroll more at-risk students in academic classes by intervening in student motivation through quality of schooling. This finding, in turn, suggests that school reforms that increase school quality, student motivation, and enrollment in academic coursework may improve the learning of at risk” (p. 266).

**Educational Attainment Models**

Models of students’ academic development focus on hypothesizing and testing the simultaneous, direct and indirect, causal relations of environmental, personal, and background variables to educational attainment. Researchers can often use causal analysis or structural modeling analysis techniques to test such models with non-experimental data (Anderson & Keith, 1997). Anderson and Keith (1997) state
The advantages of causal analysis including reliance on theory-models are drawn a priori with important variables and causal relations specified- and the examination of direct, indirect, and total effects of variables in the model in contrast to simple prediction techniques that focus only on direct effects (p.259).

In this sense, many research methodologies and conceptual frameworks have been employed in an effort to cast light on the critical factors and social processes through which a high school student decides whether to go to college, chooses which institutions to apply to and ultimately does or does not attain the degree (e.g., Brint & Karabel, 1989; Hossler & Stage, 1992; Karen, 1991; Manski & Wise, 1983; Mcdonough, 1997; Orfield, 1992; Plank & Jordan, 2001). Within this extensive literature, much of the research on degree seeking and attainment can be summarized as falling into two broad categories: economic models and status-attainment models.

Economic models assume that students aim primarily to maximize their utility and minimize risk. That is, students weigh the relative costs and benefits of the degree attainment process. Because these models focus on financial considerations and cost-benefit processes, they illuminate an interactive process between social constructs and variables measuring individual characteristics. In economic models, according to Plank and Jordan (2001), it is largely assumed that the decision-making processes are rational and purposive, and that individuals will do what is in their best interest.

Status attainment models focus on how processes such as individual characteristics, family functioning, social network, and schooling conditions influence educational attainment (Hossler, Schmit, & Vesper, 1999). Unlike the economic model, the status-attainment models often reject the assumption of students and families as rational decision-makers (Plank & Jordan, 2001). The status attainment model has existed for
several years and has received much support in the research literature (Kao & Tienda, 1998; Smith-Maddox, 1999; Trusty & Harris, 1999).

Blau & Duncan (1967) initiated the status attainment model with the idea that the effects of social origin on destination were largely due to the effects of social origin on educational attainment and the effect of educational attainment on occupation. Unlike earlier models, which involved only one predicting variable, Blau and Duncan (1967) wanted to investigate the simultaneous influence of several factors on occupational achievement and mobility. That is, Blau and Duncan (1967) examined the patterns of occupational mobility that were affected by multiple factors. Blau and Duncan (1967) used path analysis for the study of associations among more than two variables.

Even though status attainment research traces its historical roots to the seminal work of Blau and Duncan (1967), a major development in this model was the work of Sewell and Hauser (1971). Sewell and Hauser (1971) added achievement-related psychological variables to the model of educational and occupational attainment (Haas & Falk, 1981). Their revised model included academic ability, aspiration and performance, as well as encouragement of educational goals by significant others such as friends, parents and school personnel.

Using Sewell and Hauser’s (1971) status attainment model, Kao & Tienda (1988) have explained how educational aspirations are shaped and reported how those aspirations lead to educational attainment. Smith-Maddox (1999) also examined the effect of social networks and resources on academic achievement of African Americans using the status attainment model. Using NELS data, Trusty (2002) developed a guiding
model of educational expectations with African Americans, which is also based on the status attainment model.

Educational degree attainment models can be highly meticulous and complex, and some researchers have asserted that the development of one comprehensive theory of students’ degree attainment is perhaps not an especially achievable goal (Hossler et al, 1999). Rather, researchers may use the available extensive models as frameworks for more narrow or focused aspects of the postsecondary degree attainment. This dissertation represents this line of thinking and draws upon the logic of the most widely known Sewell and Hauser’s (1971) status attainment models for explaining especially low-SES students’ educational development.

Connell et al (1994) developed a model of educational outcomes for lower SES, urban African Americans. They conducted research in an attempt to test and replicate a theoretical model of individual variation in lower SES young adolescents’ positive and negative outcomes in the academic domain. Their model is tested in three different samples that are predominantly poor – one is from upstate New York, one is from Atlanta, and one is from New York City, Baltimore, and Washington D.C. (NYC/B/DC). According to Trusty (2002), a main factor in Connell’s model is students’ engagement or involvement with the school, including students’ emotional and behavioral involvement (e.g., effort, homework). Parents’ involvement influences students’ involvement in school, and students’ involvement, in turn, influences students’ positive and negative school behavior and achievement (Connell et al., 1994). However, the outcome variable of this study was high school grade and test scores, which is limited to longitudinal educational achievement (e.g., degree attainment) after high school.
Trusty (2002) developed a guiding model of educational expectations with African Americans, which is also based on the status attainment model. He conducted a study to examine the longitudinal direct and indirect effects of background variables, family variables, and high school behavioral variables on the postsecondary educational expectations of African Americans. According to Trusty (2002), SES exerts a stronger influence for men than for women, but SES effects do not seem strong enough to totally subvert long-term attainment. Parents' expectations for their children and parents' support of and involvement in their children's education are salient influences, and there are some gender differences in these effects. Involvement in high school academic and extracurricular activities promotes long-term educational development (p.343).

Trusty (2002) concluded that his finding empirically supports a growth model more than a blocked opportunities model. It has been noted that low-SES African and Hispanic American students may have unrealistic educational expectations and aspirations (Kao & Tienda, 1998). Researchers need to examine whether educational expectations resulted in educational attainment. Trusty (2002) also suggested that studies that included modeling actual educational attainment are needed to strengthen his theoretical and practical base.

**Student Demographic Characteristics and Educational Attainment**

Student demographic variables include gender (male and female) and race (African American, Asian American, Hispanic, and White). According to the National Center for Education Statistics (2002), a slightly higher percentage of females than males completed high school in 2001 (89% compared to 87%). Higher proportions of Whites and Asian Americans than African Americans or Hispanic Americans completed schooling at each level of education.
Gains by African Americans over the last 30 years have substantially reduced the White-Black gap for high school completion (with 82% and 59% having completed high school in 1971; with 93% and 87%, respectively, having completed high school in 2001). Hispanic Americans have also shown gains since the 1970s, but have been unable to close the gap with White Americans (with 93% and 63%, respectively, having completed high school in 2001). Among those ages 25 to 29, the percentage of White Americans who attained at least a bachelor’s degree in 2001 was four times that of Hispanic Americans (36% compared to 9%) and twice that of African Americans (18%).

According to Corey (2001), since the early 1980s, more White females than males completed four or more years of high school. The trends for other racial and ethnic groups have been less clear. Gender differences have shown little consistency in the ratio of African American males to females since 1974, with no difference at all in 1998, when both males and females had an 88% completion rate. For Hispanics, the pattern has also been erratic, but since the early 1980s more females than males completed high school, and, in 1998, 66% of females did so, as contrasted with 60% of males (Corey, 2001).

While fewer females than males received at least a bachelor’s degree (13% compared to 21%) in 1971, significantly more females completed some college (63% compared to 54%) and received at least a bachelor’s degree (31% compared to 26%) in 2001. According to Corey (2001), the increase for females over the past 25 years was very substantial—almost 12 percentage points—whereas the increase for males was only 2 percentage points. Moreover, any previous male advantage—nearly none for African American, slight for Hispanics, and fairly large for Whites—has been erased: African American females have a 3 percentage point advantage; Hispanic females, 2 percentage
points and White females, 4 percentage points. There is still a substantial race and ethnicity gap, however, with the completion rate for Whites at 28%; African Americans, 16%; and Hispanics, 10%.

According to Smith (1997), Whites are still far more likely to take college preparatory courses in high school and to complete college, and thus to have advantages that other students do not have. While attempts are being made to eliminate educational inequities, Corey (2001) suggested that a more intensive effort is needed, particularly with African American and Hispanic males whose lag behind females in college completion is notable. Willingham and Cole (1997) suggested that educators need to take remedial action when a preponderance of students in a single ethnic or gender group are seen lagging behind students in other groups. It is perhaps even more important for them to individually assess the strengths and weaknesses of students. Such personal attention can help ensure that each can successfully take advantage of all available educational opportunities.

**Student Psychological Characteristics and Educational Attainment**

In this section, the relationship between the three student psychological variables (i.e., locus of control, self-concept, and academic expectation) and educational attainment was discussed. Theoretically, locus of control, self-concept, educational aspiration, and related student psychological factors are useful in explaining educational attainment (Huang, Salvucci, Peng, & Owings, 1996). In various educational situations, for example, a positive self-concept is considered a desirable effect that serves as a mediating variable in facilitating the attainment (Marsh, 1990). Self-concept is an individual’s perception of him or herself and one forms these perceptions through his or her experience with and interpretations of his or her environment.
The major antecedents of an individual’s self-concept include reinforcements, evaluation by significant others and attributions of his or her own behavior (Muhammad, 1993). It is also recognized that an individual's socioeconomic status greatly affects the self-concept in general (Rosenberg, 1979). As socioeconomic status represents differential prestige, respect, possessions, and power in society, it is arguable that socioeconomic status plays an important role in shaping the individual's views of self (Rosenberg, 1979).

Several studies (Coopersmith, 1967; Purkey, 1970; Wylie, 1979) examined the association between self-concept and educational attainment. These research studies stated that the students’ positive self-concept might be the foundation for educational progress. For example, researchers strongly agree that low self-concept is concomitant with unproductive behavior (Lehr & Harris, 1988; Silvernail, 1986). Therefore, there is a general agreement that the combination of underachievement and low self-esteem is one of the primary reasons for dropping out of school (Brodinsky, 1989). Conversely, healthy self-esteem and successful learning experiences are critical factors for successful postsecondary educational attainment (Waitley, 1987). However, some studies have indicated no significant relationship between self-concept and academic attainment (Thomas, 1973; Hart, 1985).

Many questions, therefore, remain unanswered regarding how self-concept affects educational attainment. Students’ educational attainment and self-concept factors may be related to one another in complicated ways. For example, unlike other groups, the low-SES students group has been found to have a high self-concept that is relatively independent of academic achievement (Collins, 1992).
Research generally shows that internal-external locus of control is a powerful variable both in predicting and explaining educational achievement. Rotter (1966) described that locus of control refers to the extent to which people ascribe the responsibility for the occurrence of reinforcement to themselves (internals) or to powerful others (externals). That is, those with an internal locus of control tend to believe in their own ability to control events, whereas people with an external locus of control believe other people or events determine their own circumstances.

Rotter (1966) reported significant relationships between higher socioeconomic status and internal locus of control on the one hand and lower socioeconomic status and external locus of control on the other. These relationships hold, even when controlling for demographic factors such as race. Several researchers (Morrison & McIntyre, 1971; Phares, 1975; Bar-Tal, Kfir, Bar-Zohar, & Chen, 1980) suggested that locus of control is an important psychological variable that relates to academic success in schools, internals tending to attain greater academic success.

Research evidence also indicated that internal locus of control is also associated with higher self-motivation, superior academic performance, and greater educational attainment (Nelson & Mathia, 1995). These results are consistent with Gurin, Gurin, and Battle (1969), who described students with an external locus of control got poorer grades than those with internal locus of control. Nelson and Mathia (1995) also reported that internal locus of control is positively correlated to academic achievement in university students. According to Hass (1989), persons with an internal locus of control receive higher test scores and attribute their success to internal factors rather than fate, luck, or powerful others.
Studies on the relationship between self-esteem and locus of control have determined that self-esteem is significantly associated with locus of control, suggesting that high self-esteem is related to internal locus of control (Abdallah 1989). Ickes and Layden (1978) also found a similar relationship between locus of control and self-concept. They described that individuals with high self-concept are more likely to attribute success to internal causes, whereas people with low self-concept generally attribute positive outcomes to external causes.

Several studies have shown that students’ academic expectation is an important variable both in predicting and explaining educational attainment (Trusty, 2002; Hanson, 1994; Mickelson, 1990). Educational aspirations and expectations are the most widespread variables of educational goals in the research literature. According to Hanson (1994), academic expectation means the level of education that students expected to achieve, while academic aspiration means the education they hope to achieve. Hanson described that some students may have the aspiration to earn a college degree, yet they may not expect to earn that degree. Trusty (2002) concurred, adding that academic expectations are a more concrete variable than academic aspirations for predicting and explaining educational attainment.

Several researchers found that self-perception variables such as educational expectation are related to academic achievement (See Trusty, 2000). The status attainment literature (e.g., Kao & Tienda, 1998) has explained how educational aspirations are shaped and reported how those aspirations lead to education attainment. According to Trusty (2000), however, many students with high aspirations and
expectations did not indicate plans for college preparatory course work in high school. Thus, their goals and behavior appear inconsistent.

Mickelson (1990) has discussed the attitude-achievement paradox among African American adolescents. Trusty (2000) described that this paradox as follows: low-SES students have positive attitudes and beliefs about education, but have demonstrated low achievement. If concrete attitudes (objective realities) are assessed, Mickelson (1990) stated, this attitude-achievement incongruity disappears. Trusty (2002) reported that at least African American students who have high educational achievement have relatively stable educational aspirations throughout their high school years.

Student Behavioral Characteristics and Educational Attainment

The relationship between the two student behavioral variables (i.e., academic performance and school behavior) and educational attainment was discussed in this section. According to previous research (Trusty, 2002; Anderson & Keith, 1997; Parkerson, Lomax, Schiller, & Walberg, 1984), one of important predictors of postsecondary educational attainment is high school academic performance. Academic performance can be measured through various indicators. The most widely used indicator is a standardized test score, deemed an appropriate measure of academic ability because it measures differences in terms of cognitive skills and abilities.

However, some argue that standardized tests penalize minority students. Keller and Deneen (1991) argue that standardized tests are a double-edged sword. Their point is that we must be sure that these tests are designed properly to measure aptitude and not cultural or linguistic peculiarities. Standardized tests, however, are not the only measure of academic ability. Perhaps actual high school academic performance is a more telling predictor of educational ability. Wilson and Portes (1975) found academic performance
to be the most important predictor of educational attainment. They stated that academic performance is a main criterion for admission into higher learning.

Consistent with previous research output, even among low-SES student, high achievers on 8th-grade mathematics tests were about 10 times more likely than low achievers to complete a degree by 2000. Similarly, low-SES students who had studied calculus in high school were about 10 times more likely than those who had not studied calculus to have earned at least a bachelor’s degree by 2000 (National Center for Education Statistics, 2002).

Several studies report that students’ school behavior is also an important variable in predicting educational attainment (Trusty, 2002; Anderson & Keith, 1997; Wong, 1990). A number of research studies have indicated that students who show problem behavior do worse on academic achievement tests than those who do not. Of these studies, some report greater deficits in mathematics (Schroeder, 1965), some report greater deficits in reading (Glavin, 1971), and others report no differences in the magnitude of these deficiencies (Graubard, 1964).

Trusty (2002) reported the effects of two high school behavior variables, high school involvement and behavior problems. He indicated that the direct effects on high school students’ involvement on educational expectations were positive and statistically significant. He also indicated that the students’ problem behavior was significantly negatively related to educational expectation. He reported that his research results are consistent with previous research (Connell et al., 1994; Ogbu, 1991).

Low-SES children frequently live in highly stressful and disadvantaged school environments characterized by multiple risk factors for the development of psychosocial
adjustment problems, including high rates of poverty, exposure to violence, and drug use. As a consequence of these environmental conditions, generalizations about student school behaviors from other samples (e.g., middle and high socioeconomic class) to high-risk low-SES children living in adverse conditions is probably inappropriate (Jones & Forehand, 2003). Research on the relationship between low-SES students’ school behavior and educational attainment should be examined to determine which student school behaviors need to be considered and to help in assessing the effectiveness of school based prevention and intervention efforts aimed at children who are at-risk.

**Family Characteristics and Educational Attainment**

Family variables appear to play a crucial role for predicting the level of educational attainment for an individual. Several researchers reported parents’ involvement in school (e.g., attending general meetings or school events and volunteering at school) was significantly associated with their children’s educational attainment (Coleman, 1987a; Dix, 1993; Eccles, 1993). The literature linking parent involvement behaviors to student achievement is extensive (for reviews, see Thorkildsen & Stein, 1998).

Researchers have reported many different types of parenting behaviors associated with positive student outcomes. These include high expectations and aspirations, parent-teacher communications, participation in school events or activities, parental assistance at home, and participation in and discussion about learning activities, participation in school-level governing or decision making roles, and strong parent social networks or social capital (Decimone, 1999).

Although there is no doubt about family influence on children’s academic characteristics, there seems to be a general belief that these characteristics are more relevant in shaping certain academic attitudes, academic self-concept, academic beliefs,
and academic competence (González-Pienda, Núñez, González-Pumariega, Alvarez, Roces, & García, 2002; García Bacete, 1998; Wigfield & Eccles, 1992). Therefore, the relationship between parents’ involvement and children’s academic learning and achievement is indirect, rather than direct (González-Pienda et al., 2002; Anderson & Keith, 1997); that is, the benefits of parent involvement include indirect effects on other variables in the status attainment model. For example, high parental expectations and home-based involvement increases students' involvement in high school, and home-based involvement decreases high school behavior problems. These, in turn, result in higher educational attainment.

Despite the sizable amount of research relating parent involvement to student academic achievement, Decimone (1999) stated that researchers do not have a clear understanding of how patterns and effects of parent involvement differ across different minority or SES groups. According to Decimone (1999), several scholars (Coleman, 1987b; Comer & Haynes, 1991; Powell, 1991) have hypothesized that inner-city minority and low-income students may be more positively affected by certain types of parent involvement than other students and that particular parent actions may increase the disadvantage that certain minority groups experience compared with White and Asian students. On the other hand, some researchers (Devaney, Ellwood, & Love, 1997; Lewit, Terman, & Behrman, 1997) have hypothesized that the role of parent involvement in explaining academic outcomes for low-SES children may be significantly less than for their peers, who do not have as many negative environmental influences, and because of the multitude of risk factors that influence the lives of children in poverty, including health, safety, and housing (Decimone, 1999).
Therefore, researchers should examine the relationship between student achievement and parent involvement within a multicultural context. For instance, Stevenson, Chen, and Uttal (1990) found that minority parents, more than White parents, perceive homework as a means of improving children's education. This result suggests that minority parents may be more likely to become involved in or to encourage their child's homework completion. According to Watkins (1997), low-SES parents have been less likely to help their child at home, although those parents may be more likely than other parents to understand the importance of such involvement. He stated that low-SES parents might be frustrated because they want to help their child but do not have the skills they deem necessary to be effective.

The results of strong effects of African American parents’ expectations and involvement on educational attainment, led Trusty (2002) to conclude that school counselors should encourage and support an early and active parental role in educating their children. School counselors are in an advantageous position for educating minority parents on the benefits of high expectations and involvement at home and at the school. Trusty stated that

Regarding home-based involvement, counselors and educators should help parents develop frequent, positive communication with children about their education. Parents' involvement with the school also seems important. Counselors and educators should examine school policies, procedures, and practices to ensure that parents are comfortable in becoming involved in school-based organizations. School counselors are somewhat limited by time and degree of influence, parents are able to serve continually and effectively as resources for adolescents while they move through school and through postsecondary education (p. 343).
School Characteristics and Educational Attainment

Students with higher SES are more likely to report having social capital in the form of guidance and support for advanced schooling than are students from lower SES backgrounds (Stanton-Salazar & Dornbusch, 1995). Low-SES students continue to leave school prior to graduation in alarming proportions, not because they are unable to succeed, but because they are under challenged academically and are placed disproportionately in special education and low-level, remedial classes (Martin, 2002).

Martin states:

In multiple ways, too many school administrators, teachers, and school counselors demonstrate by their actions that they hold low expectations for these students. Added to this conundrum is the fact that low-SES students often see no connection between what is being taught in school and a better future for themselves (p.149).

In some schools, however, low-SES students are succeeding at high levels. What makes this difference? According to Martin (2002), these are schools where all students are held to high academic standards, pushed to stretch and achieve, and given support throughout this process. In these schools there are significant school personnel who believe that low-SES students can succeed and who, through advocacy and action, create conditions to support this belief.

Using the National Educational Longitudinal Survey (NELS) database, Plank and Jordan (2001) found specific aspects of advocacy and action that are often absent for low-SES high school graduates. Conversely, when these aspects of information, guidance, and action are present, they identified that students’ likelihood of postsecondary enrollment is increased. They also found that receiving guidance and help at one's high school, visiting postsecondary educational institutions during the high school years, exploring financial
aid opportunities, and completing formal applications for admission and financial aid were found to be important steps in the transition to a postsecondary educational institutions. They stated that

Specifically, communication and discussion among students, parents, and school personnel about academic matters and postsecondary secondary preparation increase student’s chances of enrolling at a college. Also, receiving encouragement to take the SAT or ACT, preparing for these tests, and actually taking them increases the chances of postsecondary enrollment. In both the areas of parent-student discussion and SAT/ACT planning, the analyses demonstrate the importance of early and sustained efforts (p. 972).

School counselors are in a critical position to focus on issues, strategies, and interventions that will provide this information, guidance, and action to low-SES students. School counselor interventions are needed to help low-SES students to connect school preparation with future educational attainment. According to Whiston and Sexton (1998)’s review of school counseling outcome research, there are few research studies reporting that students are more academically successful in schools as a result of school counseling. On the other hand, they described that there are several research studies reporting that students are negatively impacted as the result of lack of supportive school counselor behaviors. For example, Schneider and Stevenson (1999) found that students who have a high school counselor who did not support them in planning for their futures underestimated the amount of education they would need to realize their occupational aspirations. Blustein, Phillips, Jobin-Davis, Finkelberg, and Roarke (1997) found similar results when examining the low satisfaction of recent high school graduates who had negative experiences with high school counselors.
Issues of equity, access, and supporting conditions for students’ postsecondary educational attainment come to rest at the school counselor’s desk in the form of data about students’ performance, family conditions, and reports of school behaviors (Martin, 2002). Therefore, school counselors who have served as record keepers of student data in schools are ideally positioned to use this data to advocate for traditionally underserved low-SES students. However, most school counselors are not prepared to provide such leadership (Myrick, 2003).

Bemak (2000) suggested that by revising school counselors’ position descriptions to include the advancement of student academic achievement, the highly publicized performance gap among low income, disadvantaged pupils and other student groups would diminish. In fact, if school counselors could simply provide low-SES students the same quantity and quality of information and guidance often received by their more affluent peers, and encourage more adolescents to complete the preparatory actions that are consistent with their stated educational goals, students could expect to see a weakening of the relationship between SES and low educational attainment (Plank & Jordan, 2001).
CHAPTER 3
METHODOLOGY

In this study, the long-term academic development of low-SES students was investigated using the National Educational Longitudinal Study (NELS) database, a large, nationally representative, longitudinal database. The purpose of this study was to identify the direct and indirect longitudinal effects of student demographic characteristics, psychological characteristics, behavioral characteristics, family characteristics, and school guidance related characteristics on the postsecondary educational attainment of low-SES students. By identifying patterns of influence on the low-SES students’ long-term educational development, school counselors, counselor educators, and other social service personnel may discover areas of needed support for students and develop counseling interventions, as appropriate.


In February 1988, data collection for the National Educational Longitudinal Study of 1988 (NELS:88) was initiated with a national sample of 24, 599 eighth-graders from across the United States. Representing more than 3 million students from the eighth-grade class of 1988, this sample reflected all segments of the U.S. population (U.S. Department of Education, National Center for Education Statistics, 2002). According to National Center for Education Statistics (NCES) Statistical Analysis Report (2002), these students were White, Black, Hispanic, Asian, and American Indian; they were from all regions of the nation, including all 50 states and the District of Columbia; they came from urban, suburban, and rural regions; they encompassed both advantaged and
disadvantaged life circumstances; and they attend public (88%), Catholic (8%) and other private schools (5%).

In the 12 years since completing the NELS: 88 Base-Year questionnaire and achievement tests, these students have been resurveyed four times – in 1990, 1992, 1994, 2000. In the three in-school waves of data collection (when most were eight-graders, sophomores, or seniors), students’ teachers, parents, and school administrators were also surveyed (U.S. Department of Education, National Center for Education Statistics, 2002).

In the NELS: 88 sampling procedure, a two-stage stratified probability design was used to select a nationally representative sample of eight grade schools and students (Ingels et al, 1994). According to the NELS: 88 users’ manual (1994), schools constituted the primary sampling unit; the target sample size for schools was 1,032. A pool of 1,032 schools was selected through stratified sampling with probability of selection proportional to eight-grade size and with oversampling of private schools. A replacement pool of 1,032 replacement schools was selected by the same method. Of the 1,032 initial selections, 30 were disqualified. Of the 1,002 eligible selections, 698 participated. An additional 359 schools (supplied by alternative selections available from the replacement pool) also participated, for a total school sample of 1,057 cooperating schools, of which 1052 schools contributed usable student data. For 1,035 of these 1,052 schools, both student and school administrator data were received.

According to Ingels et al (1994), in the NELS: 88 base year design, students were the secondary sampling unit. The second stage – student sampling – produced a random selection of 26,432 students, among sampled schools, resulting in total participation of
Figure 1. Timeline of milestones in NELS:88 study, average age of cohort members, and selected historical events:1974-12000
24, 599 spring 1988 eight graders. Twenty-three student participants represented each of
the participating schools, on average.

Figure 1 (direct extract from U.S. Department of Education, National Center for
Education Statistics, 2002) provides a timeline marking selected historical events that
took place since these students were born. Also included in this figure are the data
collection points for NELS: 88 and cohort members’ average age in those years.

Participants

Participants totaled 2460 low-SES students from the NELS:88 base year through
fourth follow-up panel sample. For the present study, students in the panel sample who
were in the less than 25th percentile SES in the 1988 survey and were resurveyed in the
2000 survey will be used. According to the U.S. Department of Education National
Center for Education Statistics (2002), the SES variable was based on five equally
weighted, standardized components: father’s education, mother’s education, family
income, father’s occupation, and mother’s occupation.

Approximately 44% were male, and 56% were female. There were approximately
53% “White, non-Hispanic,” 15% “Black, non-Hispanic,” 4% “Asian or Pacific
Islander,” 1.5% “American Indian or Alaska Native, 25% “Hispanic or Latino (any
race),” and 1.5% “More than one race”. Approximately 39%, were from the southern
U.S; about 15% were from the northeast; 26% were from the north central region; and
about 20% were from the western U.S. Approximately 28% of participants were from
urban areas, about 30% were from suburban areas, and roughly 42% were from rural
areas. At late adolescence, when the Fourth Follow-up Student Questionnaire was
administered, approximately 67% of these low-SES participants did not have any
postsecondary degree; 21% had received a certificate or license; about 11% had received
an associate degree; 11% had received a bachelor degree; and roughly 1% had received a master or higher degree.

This study utilized data from four waves of National Educational Longitudinal Survey (NELS:88) data collection: (a) the Base-Year Student Questionnaire, and the Base-Year Parent Questionnaire, both administered when students were eighth (8th) graders; (b) the First Follow-Up Student Questionnaire, and the First Follow-Up School Administrator Questionnaire, both administered when students were 10th graders; (c) the Second Follow-Up Student Questionnaire, and the Second Follow-Up Parent Questionnaire, both administered when students were 12th graders; and (d) the Fourth Follow-Up Student Questionnaire, administered when most participants were eight years beyond high school.

Independent variables are from Base-Year and First and Second Follow-Up waves of data collection. The dependent variable is from the Fourth Follow-Up (National Education Longitudinal Study, 2002). This four waves database presents a unique chance to study persistence by using a large, national sample with an extensive set of demographic, psychological, family, and school experience variables.

**Sampling Weights and Design Effects**

The NELS:88 data correspond to many different populations (e.g., 8th-graders in 1988; sophomores in 1990; seniors in 1992; 8th-graders who were still in school at 12th grade; 8th graders who dropped out of school by 10th grade; etc.). These groups can be identified through analysis weights.

Basically, NELS:88 samples were designed to be used as weighted samples. Weights are variables that are put onto the file to compensate for unequal probabilities of selection and to adjust for the effects of nonresponse. Using weights allows a researcher
to make generalizations to the national populations represented by NELS:88. From the base-year to fourth follow-up waves, there are nine different weights for the data presented. Each of these weights is specific for a given population. Depending on the group to whom the data are designed to generalize, the individual weights have positive values (>0) for respondents who are members of that particular group and zero (0) for all others. This relative weight redistributes the sample to represent the population, helps correct for nonresponse bias, and sets the number of participants in the analysis to the original number in the sample (Trusty, 2002). If the researcher does not use weights, the estimates that the data produce will not be representative of the population about which we are attempting to estimate (Quick Guide to Using the NELS:88/2000 Data, 2002).

Generally, there were two ways of weight system in NELS:88; a cross-sectional and a panel weight. For purposes of this study, a panel weight would be more appropriate because this study is following a group of students over time. In fact, there is a panel weight (i.e., 1988-2000 panel analysis of 8th grade class of 1988; F4PNLWT) that would be appropriate (see U.S. Department of Education, National Center for Education Statistics, National Longitudinal Study of 1988 (NELS:88), 2002). Also, since this study is only interested in students who graduated on schedule, high school non-completers will be dropped from the sample. For this purpose, the weight variable, "F2RTROUT," was also used. This variable is a composite variable created from high school transcripts showing high school completion status in 1992.

As mentioned previously, NELS:88 has a two-stage clustered sampling design; that is, U.S. schools were first sampled, then students within schools were sampled (see Ingels et al., 1994). Because the NELS:88 sample design involved stratification,
disproportionate sampling of certain strata (e.g., oversampling of Hispanics), and clustered (e.g., students within a school) probability sampling, the resulting statistics are more variable than they would have been had they been based on data collected from a simple random sample of the same size (Quick Guide to Using the NELS:88/2000 Data, 2002).

Trusty (2002) also stated this problem, “there is generally less variability within clustered samples than within simple random samples, and almost all statistical methods assume simple random sampling. Therefore, in NELS:88 samples, standard errors are spuriously small” (p.335). In order to correct for this phenomenon, the National Center for Education Statistics (NCES) calculated design effects. The design effect is the ratio of the estimate of the variance of a statistic derived when the sample design is taken into account to that obtained from the formula for simple random samples (i.e., var(y)/n).

A number of statistical packages (SUDAAN and STRATTAB are two of several possible examples) take into account complex sampling designs in the calculation of standard errors. For this study, the AM software (available for free download: am.air.org) was used for variance estimation.

**NELS:88 Questionnaire**

Questionnaire development for NELS:88 was guided by the National Opinion Research Center (NORC) at the University of Chicago. Questionnaires were designed to meet the longitudinal goals of the study and items were chosen based on their utility in predicting or explaining future outcome. Where appropriate, NELS:88 extracted test and questionnaire content from the National Longitudinal Study of 1972 (NLS:72), High School and Beyond (H&B), and other National Center for Education Statistics studies, such as the National Assessment of Educational Progress (NAEP), and the Schools and
Staffing Study (SASS), to ensure a common standard of measurement that would permit comparisons with other important data sources, and maximize the utility of NELS:88 data (Ingels et al, 1994).

According to U.S. Department of Education, National Center for Education Statistics (2002), on the questionnaire, students responded to items on a variety of topics including: school, work, and home experiences; educational resources and support; the role in education of their parents and peers; neighborhood characteristics; educational and occupational aspirations; and other student perceptions. Additional topics included self-reports on smoking, alcohol and drug use and extracurricular activities. For the three in-school waves of data collection (when most were eighth-graders, sophomores, or seniors), achievement tests in reading, social studies, mathematics and science were administered in addition to the student questionnaire. Coursework and grades from students' high school and postsecondary transcripts are also available in the restricted use dataset - although some composite variables have been made available in the public use file (Ingels et al., 1994).

**Research Variables**

**Educational Attainment Variable**

All variables of this study (see Appendix B) were measured by a questionnaire developed by the National Opinion Research Center (NORC). The educational attainment variable was derived from a set of questions (for example, “what type of high school qualification did you receive” and “what is the highest level of education you completed?” etc). Originally, participants indicated the various types of postsecondary degree or certificates they had attained. For example, initial categories were less than
high school, high school diploma or equivalent, less than 2 years vocational school, 2 or more years vocational school, less than 2 years of college, 2 or more years of college/associate’s degree, bachelor degree, master’s degree, doctoral degree or equivalent, and professional degree such as JD or MD.

For the purpose of simplicity in this study, four final categories were generated for this variable: (1) Had no postsecondary experience; (2) Had some postsecondary education but did not attain bachelor’s degree; (3) Attained a bachelor’s degree; and (4) Attained a master’s degree or higher. This information was collected by 2000, which was eight years after high school graduation for most respondents. This educational attainment variable was rescaled (see Data Analysis section) to better represent the true differences between the ordinal scale degrees.

**Background Variables and Latent Variables**

Student postsecondary educational attainment is the product of multiple influencing factors. With the various background and latent variables, this research delves much more deeply into the key processes that influence postsecondary educational attainment. In particular, data from the students’ high school period help address the question of how educational, familial and school antecedents influence students’ postsecondary access, persistence, and attainment. Whether students attain a degree is the direct result of student, family, and/or school variables, or the indirect result of relationships between student and family, student and school and/or family and school. Therefore, this study used the following categories of latent variables: student, family, and school.

**Student variables**

Student variables comprised three categories: (1) demographic variables, (2) psychological variables, and (3) behavioral variables. Student demographic variables
included gender (male and female) and race (African American, Latino, White, American Indian, and Asian American). In this study, gender was coded as a dichotomous variable (0 = male; 1 = female). Race was also a dichotomous variable coded 0 for students who checked “White” or “Asian” race/ethnicity, and coded 1 for those who checked “Black,” “Hispanic,” “Native American,” or “other” on the base-year survey. White and Asian students were grouped together because these two ethnic groups are not generally associated with educational disadvantage even though Asian students represent a minority in American schools (Anderson and Keith, 1997).

According to the U.S. Department of Education, National Center for Education Statistics (2002), women now enroll at higher rates than men and earn the majority of college degrees awarded each year. Smith (1997) indicated that African Americans and Latinos are less likely than White Americans and Asian Americans to attain a college degree. Consistent with the previous data result, both NELS:88 eighth grade Asian and White American cohort members were also more likely than non-Asian minority groups to say that they had attained a bachelor’s degree or higher.

The three student psychological variables include locus of control, self-concept, and academic expectation during high school. These three variables were measured on the NELS:88 Base Year Student Questionnaire, administered when adolescents were 8th graders. Selecting these student psychological variables is based on significant findings in the educational development literature (Zsolnai, 2002; Cassidy & Eachus, 2000). Theoretically, locus of control, self-concept, and related social psychological factors are useful in explaining educational attainment (NELS:88 Research Framework and Issue, 1996). Many questions, however, remain unanswered regarding how self-concept and
locus of control affect learning and behavior. Students’ educational attainment and these psychological factors may be related to one another in complicated ways. Unlike other ethnic groups, the African Americans group, for example, was found to have a high self-concept that is relatively independent of academic achievement (Collins, 1992).

The latent variable, locus of control, represents the extent to which the students feel they have control over their life. A student with a high (internal) locus of control feels that he or she makes things happen in life as opposed to a student with a low locus of control who feels that luck or someone/thing else is responsible for what happens to him or her. Participants answered to a total of six questions related to locus of control. For locus of control, sample items included: “Every time I try to get ahead, somebody or something stops me.” “Chance and luck are very important for what happens in my life.” The format was a four-point Likert-type scale ranging from “Strongly Agree” to “Strongly Disagree”. Internal consistency for all six items of the locus of control scale was calculated using Cronbach’s Alpha. The value achieved was 0.68, which suggests a moderately high degree of consistency across items.

The latent variable, self-concept, is indicative of the strength of a student’s sense of self-worth and overall self-esteem. Participants responded to a total of seven items related to self-concept. For self-concept, sample items included: “I feel good about myself.” “I am able to do things as well as most other people.” According to Marsh (1990), this self-concept variable is inferred from the positively worded items that were adapted from the Rosenberg (1979) scale for inclusion in the NELS88 database. Like the locus of control variable, the format was a four-point Likert-type scale ranging from “Strongly Agree” to “Strongly Disagree”. Internal consistency for all seven items of the self-concept was also
calculated using Cronbach’s Alpha. The value achieved was 0.78, which suggests a relatively high degree of consistency across items.

The latent variable, academic expectation is the perception a student holds about his or her academic achievement. Participants responded to the question: “What is the highest level of education you ever expected to complete?” Participant indicated 1 of 6 ordinal categories coded from 1 to 6. Categories are (1) less than high school, (2) high school diploma or equivalent, (3) vocational school, (4) college/associate’s degree, (5) bachelor degree, (6) master’s degree or higher. The ordering of categories was based on academic intensity, with expectations for college achievement ranked higher than vocational school achievement. Like the dependent variable, this variable was also rescaled (see Data Analysis section) to better represent the true differences between the ordinal scale degrees using the categorical regression method.

Student behavioral variables include academic performance and school behavior. Most research abiding by the status attainment model has used a one-dimensional measure of early academic performance (Eccles, 1994; Trusty, Robinson, Plata, & Ng, 2000). However, according to Trusty (2002), “there is evidence that mathematics performance has more influence on male adolescents’ educational development, whereas language-related performance has a greater influence on female adolescents’ educational development.” (p.336).

Therefore, for purposes of this study as indicators of early academic performance, both mathematics and reading scores were used. In the eighth grade, all students completed both mathematics and reading tests, which were standard scores administered in NELS:88 (Curtin et al., 2002). Trusty stated, “The reading tests was a reading
comprehension test. Item differences from multiple sources within passages.
Mathematics test items ranged from basic arithmetic calculations to complex word
problems requiring more advanced mathematical concepts. Both tests were in multiple
choice format.”(p. 336)

Consistent with models of Connell et al. (1994) and Trusty (2002), high school
behavior is added to the present model. The addition of high school behavior is also
consistent with other models of educational attainment (i.e., Bandura et al., 1996, social-
cognitive model of academic achievement). Several items from the First Follow-Up
Questionnaire assessed student behavior inside school.

Students’ behavior variables were developed through factor analysis by the
researcher. A principal component analysis yielded three eigenvalues greater than unity.
A plot of the eigenvalues also indicated a clear screen at three factors. On analysis of the
various solutions, the three-factor solution generated factor loadings that were the most
interpretable. From factor analysis with varimax rotation, finally, three factors/variables
were selected. The first quantified students’ behavior factor/variable, indicates students’
class preparedness; it has a total of three items that include: “how often I go to class
without pencil/paper,” “how often I go to class without homework,” “how often I go to
class without books.” The format was a four-point Likert-type scale ranging from
“Usually” to “Never”. In table 1, three items loaded above .71 in the rotated matrix. The
Cronbach’s Alpha for these three items was .69, which suggests a moderately high degree
of consistency across items.

The second factor/variable was student homework behavior in school. This
factor/variable is also composed of three items that included: “how much time do you
spend on homework in school each week?,” “how much time do you spend on math homework in school each week?,” “how much time do you spend on English homework in school each week?.” Participants indicated 1 of 8 ordinal categories coded from 1 to 8. Categories are “None,” “1 hour or less,” “2-3 hours,” “4-6 hours,” “7-9 hours,” “10-12 hours,” “13-15 hours,” “Over 15 hours”. In table 1, three items loaded above .75 in the rotated matrix. The Cronbach’s Alpha for these three items was .72, which suggests a relatively high degree of consistency across items.

Table 1. Rotated factor loading matrix, communalities, item-total correlations, and item means and standard deviation for students' school behavior variable

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>h²</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Often go to class without pencil/paper</td>
<td>0.822</td>
<td>0.009</td>
<td>-0.132</td>
<td>.601</td>
<td>2.05</td>
<td>1.54</td>
</tr>
<tr>
<td>Often go to class without books</td>
<td>0.822</td>
<td>-0.018</td>
<td>-0.177</td>
<td>.596</td>
<td>1.49</td>
<td>1.51</td>
</tr>
<tr>
<td>Often go to class without homework done</td>
<td>0.709</td>
<td>0.038</td>
<td>-0.054</td>
<td>.640</td>
<td>1.25</td>
<td>1.23</td>
</tr>
<tr>
<td>Time spent on English homework in school</td>
<td>-0.022</td>
<td>0.806</td>
<td>0.010</td>
<td>.583</td>
<td>1.29</td>
<td>1.15</td>
</tr>
<tr>
<td>Time spent on math homework in school</td>
<td>0.010</td>
<td>0.752</td>
<td>0.107</td>
<td>.496</td>
<td>0.62</td>
<td>0.91</td>
</tr>
<tr>
<td>Time spent on homework in school</td>
<td>0.037</td>
<td>0.750</td>
<td>-0.100</td>
<td>.670</td>
<td>0.60</td>
<td>1.01</td>
</tr>
<tr>
<td>How many times did student cut/skip classes</td>
<td>-0.073</td>
<td>0.026</td>
<td>0.816</td>
<td>.679</td>
<td>3.34</td>
<td>0.73</td>
</tr>
<tr>
<td>How many times was student late for school</td>
<td>-0.162</td>
<td>-0.013</td>
<td>0.722</td>
<td>.687</td>
<td>3.48</td>
<td>0.68</td>
</tr>
<tr>
<td>How many times student got in trouble</td>
<td>-0.110</td>
<td>0.004</td>
<td>0.701</td>
<td>.486</td>
<td>2.97</td>
<td>0.73</td>
</tr>
</tbody>
</table>

Note. h² = community estimate. Factor 1 = Class Preparedness Behavior; Factor 2 = Homework Behavior; Factor 3 = Problem Behavior. Factor loadings that underlined represent those selected for the three-factor Student School Behavioral Variable.
The third factor/variable was student problem behavior in school. This factor/variable is composed of three items that included: “How many times was student late for school in the first half of the current school year?,” “How many times did the student cut/skip classes in the first half of the current school year?,” “How many times did the student get in trouble in the first half of the current school year?” Participants indicated 1 of 5 ordinal categories coded from 1 to 5. Categories are “None,” “1–2 times,” “3–6 times,” “7–9 times,” and “Over 10 times”. In table 1, three items loaded above .70 in the rotated matrix. The Cronbach’s Alpha for these three items was .73, which suggests a relatively high degree of consistency across items.

**Family variables**

Family variables include parental expectation and parental involvement. There have been several studies of parental influences on child educational attainment (Marjoribanks, 1986; Smith, 1989, 1991; Wilson & Wilson, 1992). According to Fisher and Padmawidjaja (1999), parental encouragement, in the form of communication with and support of students, emerged as the most important parental influence on educational attainment. High parental expectation also had a positive effect (DuBois & Eitel., 1994).

The latent variable, parents’ educational expectations, were from one item on the Base-Year Parent Questionnaire. Students’ parents responded to the question: “What is the highest level of education you ever expected your child to complete?”

Originally, parents indicated the various types of postsecondary degree or certificates they had attained. For example, initial categories were less than high school, high school diploma or equivalent, less than 2 years vocational school, 2 or more years vocational school, less than 2 years of college, 2 or more years of
college/associate’s degree, bachelor degree, master’s degree, doctoral degree or equivalent, and professional degree such as JD or MD. For the purpose of simplicity in this study, four final categories were generated for this variable: (1) Had no postsecondary experience; (2) Had some postsecondary education but did not attain bachelor’s degree; (3) Attained a bachelor’s degree; and (4) Attained a master’s degree or higher. The ordering of categories was based on academic intensity, with expectations for college achievement ranked higher than vocational school achievement. Like other ordinal variables in this study, this variable was also rescaled (see Data Analysis section) to better represent the true differences between the ordinal scale degrees. According to Trusty (2002), most parent questionnaires were completed by the students’ mothers (about 70%) and mothers and fathers generally agreed on expectations for their children.

The latent variable, parents’ involvement, was developed through factor analysis by the researcher. From the Base-Year Parent Questionnaire, six items were identified that designated various aspects of parents’ involvement in their children’s education. These items represent parents’ involvement. One factor, parent involvement toward school, was chosen for use. This factor/variable comprised three items that indicated the degree to which parents contacted the school. For the parents’ school involvement variable, the three items included: “Since your eighth grader's school opened last fall, how many times have you or your spouse/partner contacted the school about (1) your eighth grader's academic performance, (2) your eighth grader's academic program for this year, (3) your eighth grader's behavior in school?” Participants indicated 1 of 4 ordinal categories coded from 1 to 4. Categories are “None,” “once or twice,” “three or four times,” “more than four times”. All three items loaded at or above .74 in the rotated matrix. The internal
consistency reliability coefficient (Cronbach’s Alpha) was .72, which suggests a relatively high degree of consistency across items.

Table 2. Rotated factor loading matrix, communalities, item-total correlations, and item means and standard deviation for parent involvement variable

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>2</th>
<th>$h^2$</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contacted the school about academic performance</td>
<td>0.859</td>
<td>0.105</td>
<td>.749</td>
<td>1.70</td>
<td>0.84</td>
</tr>
<tr>
<td>Contacted the school about academic program</td>
<td>0.799</td>
<td>0.120</td>
<td>.654</td>
<td>1.40</td>
<td>0.63</td>
</tr>
<tr>
<td>Contacted the school about behavior in school</td>
<td>0.735</td>
<td>0.040</td>
<td>.541</td>
<td>1.34</td>
<td>0.67</td>
</tr>
<tr>
<td>Talked to student about his or her plans for high school</td>
<td>0.055</td>
<td>0.867</td>
<td>.755</td>
<td>3.33</td>
<td>0.71</td>
</tr>
<tr>
<td>Talked to student about his or her educational plans for after high school</td>
<td>0.035</td>
<td>0.828</td>
<td>.687</td>
<td>3.20</td>
<td>0.76</td>
</tr>
<tr>
<td>Talked to student about his or her experiences in school</td>
<td>0.076</td>
<td>0.721</td>
<td>.526</td>
<td>3.75</td>
<td>0.52</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Factor 1</th>
<th>2</th>
<th>$h^2$</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eigenvalue</td>
<td>2.0</td>
<td>1.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Common variance</td>
<td>33.1</td>
<td>32.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Cumulative common variance</td>
<td>65.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. $h^2 =$ community estimate. Factor 1 = Parent School Involvement; Factor 2 = Parents’ Home Involvement; Factor 3 = Problem Behavior. Factor loadings that underlined represent those selected for the three-factor Student School Behavioral Variable.

The other factor/variable was parents’ home involvement that indicated the degree to which parents discussed the students’ school experience, high school education plan, and education plan after high school. Parents responded to the questions: “How often do you or your spouse/partner talk with your eighth grader about his or her experiences in school?” “How often do you or your spouse/partner talk with your eighth grader about his or her plans for high school?” “How often do you or your spouse/partner talk with your
“Eighth grader about his or her educational plans for after high school?” The format was a four-point Likert-type scale ranging from “Not at all” to “Regularly”. In table 2, three items loaded above .72 in the rotated matrix. The Cronbach’s Alpha for these three items was .74, which suggests a relatively high degree of consistency across items.

**School variables**

School variables, (i.e., academic counseling, vocational guidance, and financial aid guidance services) were from items on the First Follow-Up School Administrator Questionnaire. Students with higher SES are more likely to report having social capital in the form of guidance and support for advanced schooling than are students from lower SES backgrounds. Interviews with school counselors shed light on some factors that may reduce the social capital on which poor students can draw (Plank & Jordan, 2001).

The latent variable, the academic counseling variable was measured by percentage of the school’s student body to receive help with academic problems. Participants responded to the question: “In the first half of the current school year, about what percentage of your student body participated in the academic counseling programs?” Participants indicated 1 of 6 ordinal categories coded from 1 to 6. Categories are “Do not have,” “0-10%,” “11-24%,” “25-49%,” “50-74%,” and “75-100%”. The ordering of categories was based on participation ratio of student body on academic counseling program. Like other ordinal variables, this variable was also rescaled (see Data Analysis section) to better represent the true differences between the ordinal scale degrees with a categorical regression method.

The latent variable, vocational guidance variable was assessed by percentage of you’re the school’s student body to receive help with vocational guidance. Participants responded to the question: “In the first half of the current school year, about what
percentage of your student body participated in the vocational guidance programs?”

Participants indicated 1 of 6 ordinal categories coded from 1 to 6. Categories are “Do not have,” “0-10%,” “11-24%,” “25-49%,” “50-74%,” and “75-100%”. The ordering of categories was based on participation ratio of student body on vocational guidance program. Like the academic counseling variable, this variable was also rescaled (see Data Analysis section) to better represent the true differences between the ordinal scale degrees.

The latent variable, financial aid guidance services variable was measured by the degree of receiving help with financial aid guidance services. Participants responded to the question: “In the first half of the current school year, about how frequently your student body participated in the financial aid guidance services programs?” Participants indicated 1 of 4 ordinal categories coded from 1 to 4. Categories are “Never,” “Seldom,” “Sometimes,” and “Often”. The ordering of categories was based on participation ratio of student body on financial aid guidance services program. This variable was also rescaled (see Data Analysis section) to better represent the true differences between the ordinal scale degrees.

Appendix B provides a complete list of variables from the NELS 1988-2000 that will operationalize the components of the proposed model. Listed for each data element in the NELS 1988-2000, are the name, description, and the model variable measured.

**Data Analysis**

The analysis centered on determining the optimal operationalization of each variable in the model. The dependent variable, postsecondary educational attainment, is an ordinal variable with 4 scale levels of postsecondary educational expectation. The variable, in its original form, would not be appropriate for linear causal analysis (see
Berry, 1993). In addition, several latent variables are ordinal in their character (e.g.,
academic expectation). Therefore, taking the assumptions of linear models, all variables
are rescaled through a procedure called “categorical regression” (SPSS, 1988). Based on
how variables are defined, categorical regression rescaled variables to maximize the
relationships of a set of independent variables to a dependent variable. After rescaling
and linearizing relationships of the variables (demographic variables, student
psychological variables, student behavioral variables, family variables, and school-
action-taken variables), a path analysis model of educational development was
conducted. The AMOS program distributed by SPSS was used to conduct the structure
equation modeling analysis. With this analysis, one specifies a priori the factor structure
to be entered into the equations to assess the extent to which the theoretical model is
consistent with the empirical results. Using an ordinary least squares estimation
procedure, path coefficients for the model were calculated. The model specified is non-
recursive so there are no feedback loops among variables. Residual values specifying the
difference between the observed and expected values for the path coefficients, as well as
for several goodness-of-fit omnibus measures, are produced. Modifications of the results
made when the analysis is inconsistent with the original model structure.
CHAPTER 4
DATA ANALYSIS AND RESULTS

Chapter Overview

The purpose of this study was to explore the long-term academic development of low-SES students using the National Educational Longitudinal Study (NELS) database, a large, nationally representative, longitudinal database. This study focused on an examination of the direct and indirect longitudinal effects of multiple factors on the postsecondary educational attainment of low-SES students. Specifically, the study attempted to show relationships between the educational attainment variable and such multiple variables as (a) student demographic characteristics (i.e., race and gender), (b) psychological characteristics (i.e., locus of control, self-concept, and student academic expectation), (c) behavioral characteristics (i.e., academic performance and student school behavior), (d) family characteristics (i.e., parent academic expectation and parent involvement), and (e) school guidance related characteristics (i.e., academic counseling, vocational counseling, and financial aid counseling services).

In this chapter, the results are presented and the findings interpreted and discussed. Data were analyzed using the Statistical Program for Social Sciences (SPSS) Categories, AM software (available as free download: am.air.org), and AMOS (structural equation model software). Both descriptive and inferential statistics were provided in this chapter. Categorical regression, correlation analysis, and path analysis were computed to answer the research questions. For purposes of determining levels of statistical significance, the Type 1 error rate of .05 was established (Anastasi, 1996).
Descriptive Statistics

A total of 2640 participants’ cases were analyzed for this study. All 2640 participants in the panel sample were in the lowest quartile of the total database SES in the 1988 survey and were resurveyed in the 2000 survey. Table 3 shows the frequency information of all categorical research variables (i.e., nominal and ordinal scales). According to Table 3, approximately 67% of these low-SES participants did not have any postsecondary degree; about 21% had received an associate degree; 11% had received a bachelor degree; and roughly 1% had received a master’s or higher degree. This information was collected by 2000, which was eight years after high school graduation for most respondents.

Student demographic variables included race and gender. For the purpose of this study, race was coded as a dichotomous variable. White and Asian students were grouped together because these two ethnic groups are not generally associated with educational disadvantage even though Asian students represent a minority in American schools (Anderson and Keith, 1997). As noted in Table 3, 1412 (57)% participants checked “White” or “Asian” race/ethnicity, and 1048 (43%) participants checked “Black,” “Hispanic,” “Native American,” or “other” on the base-year survey administered when the adolescents were 8th graders. Of the 2640 participants included in this research, 1092 (44%) were males and 1368 (56%) were females.

Table 3 also shows the frequency of student academic expectation, which is one of the student psychological variables. Only forty-seven (2%) of the participants reported that they expected less than high school; 428 (17%) participants expected a high school diploma or equivalent; 354 (14%) participants expected a vocational school certificate; 444 (18%) responded they expected a college/associate’s degree; 854 (35%) responded
they expected a bachelor degree; and 354 (14%) responded they expected a master’s degree or higher. This academic expectation variable was administered when the adolescents were 8th graders.

Table 3 also shows the frequency of parent academic expectation, which is one of the family variables. 292 (12%) of students’ parents expected their child to receive a high school diploma; 672 (27%) of students’ parents expected their child to complete an associate degree; the majority 1092 (44%) of students’ parents expected their child to complete a bachelor degree; 404 (17%) of students’ parents expected their child to complete a master’s degree or higher. This information was collected from the Base-Year Parent Questionnaire when their children were 8th graders.

School variables, (i.e., academic counseling, vocational guidance, and financial aid guidance services) were taken from items on the First Follow-Up School Administrator Questionnaire. The academic and vocational counseling variable was scaled by percentage of the school’s student body to receive help with academic problems. As noted in Table 3, administrators of only 8 (0.3%) participants reported that no student received help from the academic counseling program at their school; 106 (4%) reported 1-10% of the school’s student body received help from the academic counseling program; 242 (10%) reported 11-24% of the school’s student body received help from the academic counseling program, 363 (15%) reported 25-49% of the school’s student body received help from the academic counseling program, 446 (18%) reported 50-74% of the school’s student body received help from the academic counseling program; and the majority 1295 (53%) reported 75-100% of the school’s student body received help from the academic counseling program.
Table 3. Frequency and rescaled value of categorical variables (total n = 2640)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Level</th>
<th>Total n (%)</th>
<th>Rescaled Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Educational Attainment</strong></td>
<td>High School Diploma</td>
<td>1657 (67%)</td>
<td>-.46</td>
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<tr>
<td></td>
<td>Associate Degree</td>
<td>512 (21%)</td>
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<tr>
<td></td>
<td>Bachelor Degree</td>
<td>271 (11%)</td>
<td>2.41</td>
</tr>
<tr>
<td></td>
<td>Master Degree Above</td>
<td>20 (1%)</td>
<td>5.14</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td>Majority + Asian</td>
<td>1412 (57%)</td>
<td>-.86</td>
</tr>
<tr>
<td></td>
<td>Underrepresented Minority</td>
<td>1048 (43%)</td>
<td>1.16</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>Male</td>
<td>1092 (44%)</td>
<td>-1.12</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>1368 (56%)</td>
<td>.89</td>
</tr>
<tr>
<td><strong>Academic Expectation</strong></td>
<td>Less than High School</td>
<td>48 (2%)</td>
<td>-1.24</td>
</tr>
<tr>
<td></td>
<td>High School Diploma</td>
<td>428 (17%)</td>
<td>-1.19</td>
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<tr>
<td></td>
<td>Vocational School</td>
<td>354 (14%)</td>
<td>-1.11</td>
</tr>
<tr>
<td></td>
<td>Associate Degree</td>
<td>444 (18%)</td>
<td>-.40</td>
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<td></td>
<td>Bachelor Degree</td>
<td>854 (35%)</td>
<td>.82</td>
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<tr>
<td></td>
<td>Master Degree Above</td>
<td>351 (14%)</td>
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<tr>
<td><strong>Parent Academic Expectation</strong></td>
<td>High School Diploma</td>
<td>292 (12%)</td>
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<td></td>
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<td>672 (27%)</td>
<td>-.72</td>
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<td>Bachelor Degree</td>
<td>1092 (44%)</td>
<td>.62</td>
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<tr>
<td></td>
<td>Master Degree Above</td>
<td>404 (17%)</td>
<td>1.03</td>
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</table>
Table 3 also shows the frequency of vocational counseling variables. According to Table 3, only administrators of 56 (2%) participants reported that no student received help through the vocational counseling program at their school; 242 (10%) reported 1-
10% of the school’s student body received help from the vocational counseling program; 486 (20%) reported 11-24% of the school’s student body received help from the vocational counseling program, 1191 (48%) reported 25-49% of the school’s student body received help from the vocational counseling program, 236 (10%) reported 50-74% of the school’s student body received help from the vocational counseling program; and the majority 249 (10%) reported 75-100% of the school’s student body received help from the vocational counseling program.

The financial aid counseling and guidance services variable was measured by the degree of help received with financial aid problems. Participants responded to the question: “In the first half of the current school year, about how frequently did your student body participate in the financial aid guidance services programs?” Administrators of only 3 (0.1%) participants indicated that no students participated in the financial aid guidance services programs; 68 (3%) reported that students “seldom” participated in the financial aid guidance services programs; 328 (13)% reported that students “sometimes” participated in the financial aid guidance services programs; the majority 2061 (84)% reported that students “often” participated in the financial aid guidance services programs.

Table 4 shows the mean and standard deviation values of all continuous research variables (i.e., interval and ratio scales). The two student psychological variables, which included locus of control and self-concept, were continuous variables. Six of the locus of control items and four of the self-concept items were standardized separately to a mean of zero and a standard deviation of one. The NELS database also provided this standardized value for the locus of control and self-concept variables. As illustrated in Table 4, for the
low-SES students group, the mean score on locus of control was -.15 with a standard deviation of .76 and the mean score on self-concept was -.09 with a standard deviation of .75. These two variables were measured on the NELS:88 Base Year Student Questionnaire, administered when the adolescents were 8th graders.

Table 4. Mean and standard deviation of original and rescaled value on continuous variables (total n = 2640)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Original Mean</th>
<th>Original St. D</th>
<th>Mean of Rescaled Value</th>
<th>St. D of Rescaled Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locus of Control</td>
<td>-.15</td>
<td>.76</td>
<td>.00</td>
<td>1.02</td>
</tr>
<tr>
<td>Self-Concept</td>
<td>-.09</td>
<td>.75</td>
<td>-.03</td>
<td>1.06</td>
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<tr>
<td>Math Score</td>
<td>44.95</td>
<td>7.43</td>
<td>-.08</td>
<td>.92</td>
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<tr>
<td>Reading Score</td>
<td>45.44</td>
<td>8.25</td>
<td>-.05</td>
<td>.99</td>
</tr>
<tr>
<td>Student Homework Behavior</td>
<td>1.56</td>
<td>1.18</td>
<td>-.02</td>
<td>1.02</td>
</tr>
<tr>
<td>Student Problem Behavior</td>
<td>2.14</td>
<td>2.97</td>
<td>.01</td>
<td>.97</td>
</tr>
<tr>
<td>Student Classroom Behavior</td>
<td>3.23</td>
<td>.60</td>
<td>-.03</td>
<td>1.00</td>
</tr>
<tr>
<td>Parent Home Involvement</td>
<td>1.24</td>
<td>.68</td>
<td>.02</td>
<td>1.01</td>
</tr>
<tr>
<td>Parent School Involvement</td>
<td>1.41</td>
<td>.59</td>
<td>.07</td>
<td>1.04</td>
</tr>
</tbody>
</table>

In the eighth grade, all students completed both mathematics and reading tests, which were standard scores administered in the NELS:88 (see Curtin et al., 2002). The reading comprehension test contained five short reading passages or pairs of passages, with three to five questions about the content of each passage. The mathematics test items
included word problems, graphs, equations, quantitative comparisons, and geometric figures. Some questions could be answered by simple application of skills or knowledge; others required that the student demonstrate a more advanced level of comprehension and/or problem solving. This study used the IRT Theta "T" score which has a mean of 50 and a standard deviation of 10 where the standardization was carried out on the weighted panel sample (Ingels et al, 1994). As table 4 shows, the mean score on the math scores was 44.95 with a standard deviation of 7.43 and the mean score on the reading scores was 45.44 with a standard deviation of 8.25 for the low-SES student group. These mean scores of the low-SES student group were much less than the mean of 50 (T score) for the total weighted panel sample.

Students’ behavior variables were developed through factor analysis by the researcher (refer to chapter 3 methodology section). From the factor analysis with varimax rotation, three factors/variables were selected; Student Homework Behavior, Student Problem Behavior and Student Classroom Behavior. The format of student homework behavior was an eight-point Likert-type scale. Therefore, the maximum score possible on this subscale was 8, which would indicate students spent more than 15 hours each week for homework. According to Table 4, for the low-SES student group, the mean score on the student homework behavior variable was 1.56 with a standard deviation of 1.18 This result would indicate that most low-SES students spend between “None” and “1 hour or less” on homework each week.

The format of student problem behavior was a five-point Likert-type scale. The possible maximum score of 5 would indicate that students presented problem behaviors “over 10 times” in the first half of the school year. According to Table 4, the mean score
on the student problem behavior variable of the low-SES students group was 2.14 with a standard deviation of 2.97. This result would indicate that that most low-SES students presented problem behaviors between “1–2 times” and “3-6 times” in the first half of the school year.

The format of student class preparedness behavior was a four-point Likert-type scale. Therefore, the maximum score possible on this subscale was 4, which would indicate students prepared class materials very well. According to Table 4, for the low-SES student group, the mean score on the student classroom behavior variable was 3.23 with a standard deviation of .60. This result would indicate that most low-SES students prepared class materials from “well” to “very well”.

Parent involvement variables were also developed through factor analysis by the researcher (refer to chapter 3 methodology section). From the factor analysis with varimax rotation, two factors/variables were selected; Parent Home Involvement and Parent School Involvement. The format of these three variables was a four-point Likert-type scale. A possible maximum score of 4 would indicate that students’ parents were highly involved. According to Table 4, for the low-SES student group, the mean score on the parent home involvement variable was 1.24 with a standard deviation of .68, and the mean score on the parent school involvement variable was 1.41 with a standard deviation of .59. These results show that low-SES students’ parents were relatively less involved with students at home as well as had less contact with school personnel.

**Categorical Regression**

A categorical regression method was used for linearizing relationships in a regression equation using an optimal scaling approach. In the initial categorical
regression equation for low-SES students, relationships for most variables were linear or non-decreasing curvilinear. No relationships were quadratic. Since all variables did not exhibit quadratic tendencies, variables were defined as ordinal in subsequent equations. The categorical regression transformation plot for the educational attainment variable is presented in Figure 2.

![Optimal scaling transformations plot for low-SES students' educational attainment](image)

Figure 2. Optimal scaling transformations plot for low-SES students' educational attainment

It is remarkable that there were small changes in the rescaled values across the first two levels of the original levels (no degree and associate degree). On the other hand, there were large differences across the original values 2, 3 and 4 (associate degree, bachelor degree, and master degree above). This means that the predicting variables, taken together, differentiated among an associate degree, a bachelor degree and a master’s degree or higher more effectively than they differentiated between no postsecondary degree and an associate degree. Table 3 also shows the rescaled values compared to the original values of the educational attainment variable.
The transformations for race and gender were linear; that is, there were no inconsistencies of effects across the scaled degrees of these variables. The transformation of mathematics and reading scores were also fairly linear. The transformation of two of the student psychological variables, locus of control and self-concept, were also fairly linear (see rescaled values of these variables in Table 3 and Figures in Appendix C).

The transformation for the student academic expectation variable was very similar to the transformation for the educational attainment variable. There were small changes in the rescaled values across the first three levels of the original values (less than high school, high school diploma or equivalent, and vocational school). On the other hand, there were large differences across the original values 4, 5, 6 (associate degree, bachelor degree, and master’s degree or higher). For the three student behavior variables, relationships were more curvilinear. Change between extremely low levels to low levels and change between high levels to extremely high levels of student behavior variables had relatively stronger effect on the educational attainment variable, whereas changes of middle levels had little effect (see Figures in Appendix C).

For the parent involvement variables, relationships were also more curvilinear. Change from low levels of parent involvement to moderate levels had relatively stronger effect on the educational attainment variable, whereas changes from moderate levels to higher levels had little effect. For the school variables (i.e., academic counseling, vocational counseling, and financial aid counseling), the transformation was very similar to the transformation for parent involvement. An increase from extremely low levels of school variables to low levels had relatively stronger effect on the educational attainment variable, whereas changes from moderate levels to higher levels had little effect.
Bivariate correlations of transformed research variables for low-SES students were presented in Table 5 using the Pearson product-moment correlation calculation. The most highly positively correlated variable with educational attainment was the mathematics score ($r=.26$) followed by the reading score ($r=.25$), student academic expectation ($r=.20$), and locus of control ($r=.13$). Thus, low-SES participants who had higher scores on the math and reading tests would have higher educational attainment. This result shows that the higher the student academic expectation and internal locus of control, the higher the educational attainment. On the other hand, the student problem behavior variable was negatively related to educational attainment ($r=-.16$). Thus, low-SES participants who exhibited fewer problem behaviors at school reported higher educational attainment.

**Weight and Design Effect**

Weighting survey data compensates for unequal probabilities of selection and adjusts for the effects of nonresponse. Using weighted data allows a researcher to make generalizations to the national populations represented by the NELS:88. In order to maintain consistency in weights across the various waves and across the various weights within waves, multidimensional ranking was also applied when creating the NELS:88 weights. For the purpose of this study, one of the panel weights (i.e., 1988-2000 panel analysis of the 8th grade class of 1988; F4PNLWT) was used. According to the National Center for Education Statistics (2002), this panel weight (F4PNLWT) was applied to sample members who completed questionnaires in all five rounds of NELS:88, so that it could be used in longitudinal analyses to make projections to the population of spring 1988 eighth graders. With this panel weight, the mean and standard deviation of weighted cases ($n = 579673$) of all research variables were calculated (Table 6).
Table 5. Bivariate correlations of transformed research variables for low-SES students

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</table>

Note. 1 = Educational Attainment; 2 = Race; 3 = Gender; 4 = Locus of Control; 5 = Self-Concept; 6 = Student Academic Expectation; 7 = Math Score; 8 = Reading Score; 9 = Student Homework Behavior; 10 = Student Problem Behavior; 11 = Student Classroom Behavior; 12 = Parent Academic Expectation; 13 = Parent Home Involvement; 14 = Parent School Involvement; 15 = Academic Counseling; 16 = Vocational Counseling; 17 = Financial Aid Counseling
Table 6. Mean, standard deviation, standard error, and square root of the design effects of weighted cases (n = 579673)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mean</th>
<th>St. D</th>
<th>St. Error</th>
<th>DEFTS*</th>
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<tr>
<td>Educational Attainment</td>
<td>-.09</td>
<td>.88</td>
<td>.02</td>
<td>1.16</td>
</tr>
<tr>
<td>Race</td>
<td>.11</td>
<td>1.01</td>
<td>.05</td>
<td>2.33</td>
</tr>
<tr>
<td>Gender</td>
<td>-.02</td>
<td>1.00</td>
<td>.04</td>
<td>1.73</td>
</tr>
<tr>
<td>Locus of Control</td>
<td>-.03</td>
<td>1.06</td>
<td>.05</td>
<td>2.08</td>
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<tr>
<td>Self-Concept</td>
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<td>1.00</td>
<td>.03</td>
<td>1.61</td>
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<tr>
<td>Student Academic Expectation</td>
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<td>1.02</td>
<td>.04</td>
<td>1.73</td>
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<tr>
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<td>.92</td>
<td>.03</td>
<td>1.36</td>
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<tr>
<td>Reading Score</td>
<td>-.05</td>
<td>.99</td>
<td>.03</td>
<td>1.55</td>
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<td>Student Homework Behavior</td>
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<td>1.02</td>
<td>.04</td>
<td>1.70</td>
</tr>
<tr>
<td>Student Problem Behavior</td>
<td>.01</td>
<td>.98</td>
<td>.04</td>
<td>1.73</td>
</tr>
<tr>
<td>Student Classroom Behavior</td>
<td>-.03</td>
<td>1.00</td>
<td>.03</td>
<td>1.53</td>
</tr>
<tr>
<td>Parent Academic Expectation</td>
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<td>1.01</td>
<td>.04</td>
<td>1.85</td>
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<td>Parent Home Involvement</td>
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<td>1.01</td>
<td>.03</td>
<td>1.64</td>
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<tr>
<td>Parent School Involvement</td>
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<td>.04</td>
<td>1.78</td>
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<td>Academic Counseling</td>
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<td>Vocational Counseling</td>
<td>.01</td>
<td>1.05</td>
<td>.05</td>
<td>2.14</td>
</tr>
<tr>
<td>Financial Aid Counseling</td>
<td>.02</td>
<td>.93</td>
<td>.03</td>
<td>1.71</td>
</tr>
</tbody>
</table>

Note. * Square Root of the Design Effects
A two-stage sampling design was used in the NELS:88. First, U.S. schools were sampled; then students were sampled within schools. This sampling practice and others produced smaller sample variances than variances from simple random samples, and typical statistical software programs calculate standard errors as if the data were from simple random samples. Therefore, the standard errors used to calculate the significance of statistics from the NELS:88 data are spuriously small.

Root design effects (DEFTS) should be employed with path analysis (Trusty, 2002). For the present study, AM software (American Institutes for Research) was used to produce standard errors that accounted for the complex sampling design. These standard errors were divided by simple-random-sample standard errors to produce DEFTS (Table 6). These DEFTS in Table 6 were then multiplied by the standard errors resulting from the path analysis with AMOS software; and these adjusted standard errors were used in calculations of statistical significance (Critical ratio), thereby accounting for the complex sampling design. The DEFTS ranged from 1.16 to 2.14, with a mean DEFT of 1.73.

**Path Analytic Results**

**Direct, Indirect, and Total Effects**

The direct, indirect and total effects on educational attainment for low-SES students are presented in Table 7. The term “effect” is used not to state that one variable causes the other. Rather, it is suggested that a change in preceding variable in the proposed model is related to a change in the subsequent variable. The total effect is a combination of the direct and indirect effects. While a direct effect represents the partial effect of a variable regressed on one or more other variables arranged in successive order, an indirect effect represents paths through other mediating variables (Pedhazur, 1982).
Error terms were adjusted for design effects. As noted in Table 7, several variables exerted a significant total effect on the educational attainment of low-SES students. The total effect of students’ eighth-grade math scores was by far the most powerful. The $\beta$ coefficient (.248) of the math score variable strongly suggests that the students who scored high on math and reading tests tend to attain a higher degree later on.

The second significant total effects on educational attainment were from the student academic expectation variable (.215). These results suggest that low-SES students who expected a higher degree when they were in 8th grade are more likely to attain a higher degree in later years. Locus of control provided the next best explanation of educational attainment. The path coefficient was moderately significant (.110) and suggests that students with higher internal locus of control tend to have higher educational attainment. The effect of the reading score (.100) was also statistically significant. The effect of gender (.063) was small, yet significant, and indicated that girls tend to attain higher degrees than boys. Finally, student problem behavior (-.068) and student classroom behavior (.067) had small but significant effects on educational attainment. While student problem behavior was negatively related to the educational attainment variable, student classroom behavior was positively related to the educational attainment variable.

According to Table 7, the total effect of student academic expectation consisted of its direct effect (.143), plus its influence on educational attainment as mediated by the math score, the reading score, and student problem behavior (refer to Figure 4) – its indirect effect (.072). While race did not exert a significant influence on educational attainment directly, through the math score and the student problem behavior variable, the race variable exerted a significant negative indirect effect (-.066) on educational
attainment, indicating that the majority (including Asian students) had a higher score in math and less problem behaviors than the minority group (Hispanic, African American, and American Indians).

Table 7. Direct, indirect, and total effect on educational attainment in models for low-SES students

<table>
<thead>
<tr>
<th>Factor</th>
<th>Direct Effect</th>
<th>Indirect Effect</th>
<th>Total Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race</td>
<td>.012</td>
<td>-.066 *</td>
<td>-.055</td>
</tr>
<tr>
<td>Gender</td>
<td>.066 *</td>
<td>-.003</td>
<td>.063 *</td>
</tr>
<tr>
<td>Locus of Control</td>
<td>.069 *</td>
<td>.040</td>
<td>.110 **</td>
</tr>
<tr>
<td>Self-Concept</td>
<td>.035</td>
<td>-.004</td>
<td>.031</td>
</tr>
<tr>
<td>Student Academic Expectation</td>
<td>.143 **</td>
<td>.072 *</td>
<td>.215 **</td>
</tr>
<tr>
<td>Math Score</td>
<td>.208 **</td>
<td>.045</td>
<td>.248 **</td>
</tr>
<tr>
<td>Reading Score</td>
<td>.100 **</td>
<td>.000</td>
<td>.100 **</td>
</tr>
<tr>
<td>Student Homework Behavior</td>
<td>-.043</td>
<td>-.002</td>
<td>-.045</td>
</tr>
<tr>
<td>Student Problem Behavior</td>
<td>-.068 *</td>
<td>.000</td>
<td>-.068 *</td>
</tr>
<tr>
<td>Student Classroom Behavior</td>
<td>.066 *</td>
<td>.002</td>
<td>.067 *</td>
</tr>
<tr>
<td>Parent Academic Expectation</td>
<td>-.023</td>
<td></td>
<td>-.023</td>
</tr>
<tr>
<td>Parent Home Involvement</td>
<td>.014</td>
<td></td>
<td>.014</td>
</tr>
<tr>
<td>Parent School Involvement</td>
<td>-.028</td>
<td></td>
<td>-.028</td>
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<tr>
<td>Academic Counseling</td>
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<td></td>
<td>.047</td>
</tr>
<tr>
<td>Vocational Counseling</td>
<td>-.044</td>
<td></td>
<td>-.044</td>
</tr>
<tr>
<td>Financial Aid Counseling</td>
<td>-.014</td>
<td></td>
<td>-.014</td>
</tr>
</tbody>
</table>

Note. * P < .05; ** P < .01

Interestingly, no statistically significant effects (greater than -.044 and less than .047) of parent and school related variables on educational attainment were found in this
low-SES student group. Pedhazur (1982), who provided an additional “qualitative aid” to interpretation of these path coefficients, described that a good rule for the interpretation of coefficients is to delete all paths whose coefficients are less than .05. Therefore, it may be reasonable to conclude that the effect of parental and school related variables on educational attainment, according to these data, is so small and negligible, that further empirical investigation is needed.

**Goodness of Fit**

One important goal of research when using a path analysis procedure is achieving parsimony, or deriving a model that explains the most variance with the fewest indicators (Maruyama, 1997). This model was estimated with all statistically non-significant paths at a probability level of less than .01 removed (See Figure 4). As noted in Table 8, this resulted in a small change in the fit of the model when compared to the original theoretical research model (refer to Appendix A).

<table>
<thead>
<tr>
<th></th>
<th>Original Model</th>
<th>Revised Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi Square ($\chi^2$)</td>
<td>1671.72</td>
<td>163.5**</td>
</tr>
<tr>
<td>Degrees of Freedom (df)</td>
<td>65</td>
<td>17</td>
</tr>
<tr>
<td>Goodness of Fit Index (GFI)</td>
<td>.987</td>
<td>.986</td>
</tr>
<tr>
<td>Adjusted Goodness of Fit Index (AGFI)</td>
<td>.964</td>
<td>.962</td>
</tr>
<tr>
<td>Root Mean Square Residual (RMSR)</td>
<td>.041</td>
<td>.040</td>
</tr>
<tr>
<td>Squared Multiple Correlation (R^2)</td>
<td>.196</td>
<td>.196</td>
</tr>
</tbody>
</table>

Note. * P < .05; ** P < .01
A significant chi-square ($\chi^2 (17) = 163.5, p<.01$) means rejection of the null hypothesis, indicating a significant difference between input and implied matrices. That is, this model was not shown to fit the data well according to the chi square test result. However, it is often found that with large sample sizes, even small differences between input and implied covariance matrices can lead to the rejection of the null hypothesis (Cool & Keith, 1991). Therefore, other indices of fit were also examined to evaluate the model. These include the goodness of fit (GFI) and the adjusted goodness of fit (AGFI) indices as well as the root mean square residual (RMSR).

The GFI index (.986) and the AGFI (.962) being close to one and interpreted like correlation coefficients, represent a good fit of the model. Likewise the RMSR of .023, being low and representing the average discrepancy between elements of the input and the implied covariance, represents a good fit. Regarding effect size, all variables together accounted for around 20% (i.e., Squared Multiple Correlation) of the variability in educational attainment. This Squared Multiple Correlation was the same for the revised model as the original model.

**Identified Revised Model**

The revised model for low-SES students excluded several variables. These included self-concept, student homework behavior, parent academic expectation, parent home involvement, parent school involvement, academic counseling, vocational counseling, and financial aid counseling. These variables did not appear to influence the educational attainment variable either directly or indirectly. The revised model also excluded several paths between variables that have effects on the educational attainment variable. These paths included (a) race and educational attainment, (b) race and student
classroom behavior, (c) gender and reading score, (d) gender and student problem behavior, (e) locus of control and student problem behavior, (f) locus of control and student classroom behavior, and (g) student academic expectation and student classroom behavior.

There were several statistically significant direct effects on educational attainment of low-SES students. The strongest direct effect were from math score and the effects were positive. Other significant positive direct effects on educational attainment were from student academic expectation, reading score, locus of control, gender, and student classroom behavior. There was a significant negative effect of student problem behavior on educational attainment.

There were significant effects on reading score, including positive effects of math score, locus of control, student academic expectation, and negative effects of race. There were significant positive and negative effects of variables on math score. While positive effects were from the locus of control and academic expectation variables, the negative effects were from race and gender. While positive effects were from the gender, there were significant negative effects on student classroom behavior from student problem behavior. There was a significant negative effect of student academic expectation on student problem behavior. There was a significant positive effect of race on student problem behavior. This revised model resulted in a $R^2$ of .20, almost the same as the original model. That is, little difference shows between the revised model and the original model in the variance explained. Therefore, the more parsimonious model appears to predict postsecondary educational attainment as well as the full model.
Figure 3. Identified revised model and path coefficients for low-SES student
CHAPTER 5
DISCUSSION

The purpose of this study was to test a conceptual model of low-SES students’ educational attainment, eight-years post high school. Specifically, the study focused on an examination of the direct and indirect longitudinal effects of student demographic characteristics (race and gender), psychological characteristics (locus of control, self-concept, and student academic expectation), behavioral characteristics (math score, reading score, student homework behaviors, student classroom behaviors, and student problem behaviors), family characteristics (parent academic expectation, parent school involvement, parent home involvement) and school guidance related characteristics (academic counseling, vocational counseling, and financial aid counseling service) on the postsecondary educational attainment of low-SES students. This chapter consists of a summary and discussion of the results, limitations and implications for research and practice.

Participants in the study were drawn from those who were in the lowest quartile of SES in the 1988 survey and were resurveyed in the 2000 survey (N=2460). A path analysis model of educational development was proposed to specify a priori the factor structure to be entered into the equations to assess the extent to which the theoretical model is consistent with the empirical results. Using an ordinary least squares estimation procedure, path coefficients for the model were also calculated. Based on the strength of standardized regression weights and goodness of fit indicators, the original full model
was modified. Finally, a newly revised model was tested and compared to the proposed model.

### Conclusion and Discussion

#### Effects of Student Background Variables on Educational Attainment

**Effect of gender**

The path coefficient from gender to educational attainment (.66), as reported in chapter 4, was small, yet significant. This result indicated that girls tend to attain higher degrees than boys. This finding raises a pertinent issue. The coefficient from gender to educational attainment, in the present study, is (1) higher than the path coefficient calculated in some studies and (2) significant, where in other studies it was not. For example, Anderson and Keith (1997) reported a path coefficient from gender of .003 for at-risk students who were of non-Asian minority race or ethnicity or whose family SES fell within the lowest quartile. Based on this finding, Anderson and Keith (1997) concluded that gender had little effect on educational attainment. It should be noted that Anderson and Keith’s (1997) study used a 1980s database, the National Center for Education Statistics’ High School and Beyond Longitudinal Study (National Center for Education Statistics, 1983), while the current study used a 1990s database (NELS:88).

Results of the present study reflect a trend for effect of gender on educational attainment over time. The National Center for Education Statistics (2002) also reported a slightly higher percentage of females than males completed high school in 2001 (89% compared to 87%). While fewer females than males received at least a bachelor’s degree (13% compared to 21%) in 1971, significantly more females completed some college (63% compared to 54%) and received at least a bachelor’s degree (31% compared to 26%) in 2001.
The path coefficient from gender to math score (-0.77), as reported in chapter 4, was also significant. This result indicated that boys tend to achieve a higher math score on standardized tests than girls. Anderson and Keith (1997) reported that gender did influence the achievement of at-risk students in math and science (boys scored higher) and in reading score (girls scored higher). Trusty (2002) also stated that influences of academic performance are domain specific, with language-related skills being more important for women and mathematics skills being more important for men. Unlike previous research findings, in the present study’s results, gender did not exert any effect on the reading score. Therefore, the finding of the present study is partially consistent with other studies (Anderson & Keith, 1997; Trusty, 2002). The inconsistency in findings regarding the effect of gender underscores the need for more research using different measures of academic performance in addition to standardized tests.

The students’ gender positively influenced classroom preparedness behavior. The path coefficient from gender to student classroom preparedness behavior (.122) indicated that female students were more prepared for class than male students. Furthermore, this student classroom preparedness behavior influenced educational attainment in later years. The finding of present study is partially consistent with other studies (Etxebarria, Apodaca, Eceiza Fuentes, & Ortiz, 2003). Etxebarria et al (2003) found that girls are more prosocial and less aggressive with peers and more cooperative with teachers than boys. In addition, inhibitory control increased in girls and decreased in boys, whereas aggressive behavior increased in boys and decreased in girls (Etxebarria et al, 2003). This finding draws attention to the need for more research regarding the effect of gender on low-SES students’ classroom preparedness behavior.
Effect of race

The path coefficient from race to educational attainment (-0.12) as reported in chapter 4, was insignificant. This result indicated that the race variable did not exert any direct effect on educational attainment. There are tentative explanations for the insignificant effects of the race variable on educational attainment. First, this finding could reflect the trend for effect of race on educational attainment over the years. Using the 1980’s database (High School and Beyond Longitudinal Study), Anderson and Keith (1997) reported that race did exert a direct (.142) as well as indirect (.134) effect on educational achievement. On the other hand, according to the National Center for Education Statistics (2002), non-Asian minorities over the last 30 years have substantially reduced the majority-minority difference for degree completion (with 82% and 52% having completed high school in 1971; with 93% and 85%, respectively, having completed high school in 2001).

Second, it is likely that the differences identified between majorities and minorities in educational attainment could be due to socioeconomic differences rather than to the unique characteristics of a given racial group. Therefore, it could be argued that the race factor in the model is likely not to show much effect on educational attainment due to the homogeneity of the sample (low-SES students).

Even though there was no direct effect of race on educational attainment, the race variable exerted a significant negative indirect effect (-.066) on educational attainment through the math score, the reading score, and the student problem behavior variables. Race negatively influenced the math score (-.216) and the reading score (-.186). Race also positively influenced student problem behavior (.088). The empirical model posited that majority group (including Asian) students had a higher score in math and reading tests
and acted out less problem behaviors than the minority groups (Hispanic, African American, and American Indians). In turn, it was posited that higher math and reading scores and less problem behaviors would result in greater post-secondary educational attainment eight years post high school.

The findings of the present study were consistent with earlier research (Smith, 1997). Smith (1997) reported that majority students are still far more likely to take college preparatory courses in high school and to have advantages that minority students do not have and thus to complete a degree. The finding of the present study draws attention to the need for more research to help ensure that minority students can successfully take advantage of all available educational opportunities.

**Effects of Student Psychological Variables on Educational Attainment**

**Effect of locus of control**

The direct effect of locus of control on postsecondary educational attainment (.143) is statistically significant. This suggests that students who had internal locus of control in the 8th grade will be the students who attain higher postsecondary educational attainment. Researchers have developed an extensive empirical and theoretical body of literature documenting the relationships between students' locus of control and their academic attainment (Ford, 1994; Graham, 1991; Weiner, 1986). Previous research generally shows that internal-external locus of control is a powerful variable both in predicting and explaining educational achievement (Morrison & McIntyre, 1971; Phares, 1975; Bar-Tal et al., 1980).

The path coefficient from locus of control to math score (.102) and reading score (.153) were also statistically significant. This finding is also consistent with earlier research (Gurin et al., 1969; Nelson and Marthia, 1995; Hass, 1989). According to
Nelson and Marthia (1995) internal locus of control was associated with superior academic performance, and in turn, greater educational attainment. Gurin et al. (1969) also described students with an external locus of control got poorer grades than those with internal locus of control. According to Hass (1989), persons with an internal locus of control receive higher test scores and attribute their success to internal factors rather than fate, luck, or powerful others.

Early studies reported that low-SES minority students often rated external factors such as luck, task difficulty, and ease as the most significant determinants of their failure (Rotter, 1966). According to Moore (2001), actual performance measures, such as grades, showed that minority students had lower-levels of performance but had higher internal locus of control. The finding of the present study shows that even low-SES students who had higher internal locus of control at an earlier age will have a higher chance to complete a degree later on. Consequently, it can be surmised that regardless of socioeconomic status, locus of control is a very important variable in later academic degree attainment.

**Effect of self concept**

The path coefficient from self-concept to educational attainment (0.35) as reported in chapter 4, was statistically insignificant. This result indicates that self-concept did not exert any direct or indirect effect on educational attainment. Several previous studies (Coopersmith, 1967; Purkey, 1970; Wylie, 1979) examined the association between self-concept and educational attainment. While some studies have indicated no significant relationship between self-concept and academic attainment (Thomas, 1973; Hart, 1985), others (Brodinsky, 1989; Waitly, 1987) reported healthy self-esteem and successful
learning experiences are critical factors for successful postsecondary educational attainment.

The finding of the present study is consistent with Collins’ (1992) study. Collins (1992) reported that unlike other groups, the low-SES students group has been found to have a high self-concept that is relatively independent of academic achievement. Collins (1992) also described that self-concept inconsistently may be predicting educational achievement when analyzed simultaneously with other factors in the model. Therefore, it should be noted that the independent contributions of self-concept might be difficult to detect because self-concept, as a construct, is complex and its’ usual measure may only represent certain aspects of self. This finding suggests that the effect of self-concept, as currently measured, is inconsistent and should be studied further in future research, using multiple measures of this construct.

**Effect of student academic expectation**

Significant direct effects (.143) as well as indirect effects (.072) on educational attainment were found from the student academic expectation variable. These results suggest that low-SES students who expected a higher level of educational degree when they were in 8th grade are more likely to attain a higher degree in later years. This finding is consistent with Hanson’s (1994) model. Hanson (1994) proposed that academic expectations are a more concrete variable than academic aspirations for predicting and explaining educational attainment. Several other researchers also found that self-perception variables, such as educational expectation, are related to academic achievement (See Trusty, 2000).

The paths coefficient from student academic expectation to math score (.203) and reading score (.199) were also statistically significant. Trusty (2000) has described the
paradox that low-SES students have positive attitudes and beliefs about education, but have demonstrated low academic performance. Hanson (1994) also reported that lower SES resulted in unrealized expectations. Inconsistent with Trusty’s (2000) and Hanson’s (1994) paradoxes, this study’s finding suggests that at least low-SES students in this research sample who have high educational expectation have relatively high educational attainment in later years. That is, results from this research suggest that at least for the low-SES student in this study, academic expectation appears attainable.

The path coefficient from student academic expectation to student problem behavior was also statistically significant (-.101). The result of the present study indicated that low-SES students who expected a higher degree were less likely to act out problem behaviors in the school. A significant effect of student academic expectation, the self perception variable, is extremely important, particularly in light of the fact that it suggests that students’ expectations about their future have a unique impact on their actual behavior and performance above and beyond the impact of the school environment, students’ prior levels of achievement, and student’ SES and gender.

Effects of Student Behavioral Variables on Educational Attainment

Effect of students’ academic performance

The effects of eight-grade students’ academic performance were the strongest effects on educational attainment in the models for low-SES students. That is, positive effects of the math score (.207) and the reading score (.100) indicated that educational attainment was based on the low-SES students’ skills and efforts. This finding is consistent with previous research. For example, Wilson and Portes (1975) found academic performance to be the most important predictor of educational attainment. They
also stated that academic performance is a main criterion for admission into higher
learning institutions.

The zero-order correlations between academic performance (i.e., math score and
reading score) and educational attainment for low-SES students found in this research
were almost the same as those found by Trusty (2004), using high school students in
general. Trusty (2002) stated that his findings were inconsistent with earlier findings
(Farrell et al., 1994; Kerckhoff & Campbell, 1977) that suggested a weak effect of
academic performance on educational expectation for at-risk students.

The blocked-opportunities model (Ogbu, 1985) suggested that low SES, at-risk
minority students have low academic expectation because they do not expect early
academic performance to yield educational attainment and economic success. In contrast,
the large effect of prior academic performance found in this study, appears to suggest that
earlier math and reading scores play a determining role in the later educational attainment
of low-SES students; just as it does for middle and high SES students. Therefore, findings
of the present research pertaining to significant academic performance on educational
attainment for low SES students support a growth model rather than a blocked
opportunities model (Trusty, 2002).

Since the role of eight-grade students’ academic performance is strong among low-
SES students, it seems that patterns of educational attainment (and conversely of low
performance) are determined much earlier for low-SES students. This finding suggests
several implications for school counselors. Since early academic performance is
important for low-SES students’ long-term educational development, school counselors
could help low-SES students in their long-term development by helping them acquire
academic skills early. Federal legislation such as the No Child Left Behind (NCLB) Act also places emphasis on and funds programs that will provide resources to help low-SES students achieve a state defined standard of proficiency.

**Effect of Students’ School Behaviors**

Students’ behavior variables were developed through factor analysis. From the factor analysis with varimax rotation, three factors/variables were selected: student homework behavior, student problem behavior and student classroom preparedness behavior. Among the above three categories, student problem behavior (-.068) and student classroom behavior (.067) had small but significant effects on educational attainment. This result suggests that the direct effects of high school students’ classroom preparedness behaviors on educational attainment were positive and statistically significant. This finding also indicates that the students’ problem behavior was significantly negatively related to educational attainment. This finding is also consistent with previous research. Several studies have reported that students’ school behavior is an important variable in predicting educational attainment (Trusty, 2002; Anderson & Keith, 1997; Wong, 1990).

Low-SES children frequently live in highly stressful and disadvantaged school environments characterized by multiple risk factors for the development of psychosocial adjustment problems, including high rates of poverty, exposure to violence, and drug use. Student school behavior seems to be a suitable goal, or entry point, for school counseling and educational support and intervention for low-SES students (Trusty, 2002). Therefore, further research on the relationship between low-SES students’ school behavior and educational attainment should be examined to determine which low-SES students’ school behaviors need to be considered and to help in assessing the effectiveness of school based
prevention and intervention efforts aimed at children who are at-risk. For example, mentoring programs in which school counselors provide social support for low-SES students have demonstrated that mentoring can enhance positive behavior changes of students and increase positive attitude toward school of most participants in such programs (Richman, Rosenfield & Bowen, 1998).

**Effects of Family Variables on Educational Attainment**

A big surprise of this research was the results that neither parental academic expectation for low-SES students nor parental involvement had significant effects on postsecondary educational attainment. Consistent with this research finding, Adams and Singh (1998) also used the NELS dataset and reported that parent variables (parent aspirations and involvement) have no influence on the academic achievement of African American students. However, Adams and Singh (1998) stated that the results of most previous studies (e.g., Keith, Keith, Bickley, & Singh, 1992; Singh, Bickley, Trivetter, Keith, Keith, & Anderson, 1995) using the NELS dataset were completely different: parental variables were significant.

Using the NELS: 88 dataset, for example, Trusty (2002) operationalized parental academic expectation and involvement in the same way as was done in the present study. Trusty’s (2002) research reported that parental variables significantly influenced African American students’ academic expectation. Finally, Trusty (2002) concluded that school counselors should encourage and support an early and active parental role in the children’s education.

Therefore, the present findings should not be interpreted to mean that low-SES parents have no influence on the educational attainment of their children, but they do suggest that when other variables such as race, gender, locus of control, student academic...
expectation, prior academic performance, and students’ school behavior are controlled for, parent academic expectation and involvement during eight grade does not affect educational attainment, as measured when the students were twenty-eight years old.

There are several tentative justifications for the trivial influence of parental variables on educational attainment. First of all, the very large effect of student variables (demographic, psychological, and behavioral variables) may have implications for the insignificant or marginal effects of parental variables. For example, it could be claimed that after controlling for other variables, parental factors in the model are likely not to show much effect on educational attainment. Therefore, the marginal effect from parental variables on educational attainment is an artifact of regression. It is endemic to path analysis, where temporal sequencing of variables is required, that the effects of a downstream variable may be attenuated merely by its position in the path diagram (Adams & Singh, 1998). It is only logical that student variables were posited before parent variables in the status attainment model, but once the effect of student variables is taken into account, other factors have a small amount of variance left to explain.

Second, it is vital to notice that the research shows a picture of parental effects when low-SES students were in high school. That is, prior levels of parental expectation and involvement (early childhood period) were not included. According to Adams and Singh (1998), during the high school period, parental variables could be of little or no effect on student achievement because high school students typically begin establishing their independence from family during this time.

The third explanation comes from low-SES parents’ characteristics. Although there is a sizable amount of research relating parent involvement to student educational attainment in general, Decimone (1999) stated that researchers do not have a clear
understanding of how patterns and effects of parental expectation and involvement differ across different minority or SES groups. The result of this study also shows that low-SES parents hold high expectations even when their children have relatively low scores on standardized academic tests (math and reading scores). According to Adams and Singh (1998), low-SES parents hold high expectations for their children’s postsecondary plans yet, in some instances, seemingly lack the information and perhaps the skills need to direct their achievement.

Several researchers (Devaney, Ellwood, & Love, 1997; Lewit, Terman, & Behrman, 1997) have hypothesized that the role of parental involvement in explaining academic outcomes for low-SES children may be significantly less than for their peers, who do not have as many negative environmental influences, and because of the multitude of risk factors that influence the lives of children in poverty, including health, safety, and housing (Decimone, 1999). For example, it is not unusual that students from a low-SES family could not be enrolled in a course to help prepare them to take a standardized test such as the SAT. Thus, the marginal effects of parental academic expectation and involvement on educational attainment may also reflect a different opportunity structure for low-SES students compared to their counterparts (i.e., middle and high-SES students).

**Effects of School Variables on Educational Attainment**

In this research study, none of the school variables (i.e., academic counseling, vocational counseling, and financial aid guidance) affected students’ educational attainment. This output does not mean that educational attainment is not affected by whether students receive help with academic counseling, vocational counseling, or financial aid guidance service. More likely, due to the temporal sequencing of these
variables, it may be that the variability in school related variables is no different from the variability of other variables in the model – it contributes nothing new. That is, like parent variables, school variables were posited after student variables in the status attainment model (see Appendix A), but once the effect of student variables is taken into account, school factors have a small amount of variance left to explain.

According to Stanton-Salazar and Dornbusch (1995), students with lower SES are less likely to report having social capital in the form of counseling and guidance for advanced schooling than are students from higher SES backgrounds. Using the same database as this study (NELS:88), Plank and Jordan (2001) found specific aspects of advocacy and action that are often absent for low-SES high school graduates. Since the school variables in the present study were reported by school administrators and not by the students themselves, there were no guarantees that low-SES students also received the same amount of counseling and guidance services as middle and high-SES students. Therefore, the insignificant effects of school counseling variables on postsecondary educational attainment in this research may also reflect a different opportunity structure for low-SES student compared to their counter parts (i.e., middle and high-SES students).

There is no doubt that high-quality counseling interventions help low-SES students to connect school preparation with future educational attainment. The counseling intervention variables should be evaluated by quality instead of by quantity. The effects of counseling variables in this study also may be difficult to detect because the counseling interventions provided do not reflect quality of services. Therefore, the effects of academic, vocational, and financial aid counseling on educational attainment should be
studied further in future research, using more sophisticated measures which could reflect high quality counseling interventions.

**Strengths and Limitations**

To date, most studies have focused on differences on educational attainment between low-SES and middle and high-SES students; much less attention has been paid to variation among individuals within the low-SES group, a group of particular interest to educational researchers. It is meaningful that this study focused on analyses of this low-SES students’ within-group differences to understand why some students fail, some barely survive, and still others thrive in this low-SES high-risk environment.

The current research results provide strong evidence that postsecondary educational attainment of low-SES students can be facilitated by greater internal locus of control and higher student academic expectations during early adolescence. These two psychological variables were associated with greater academic performance (i.e., math and reading scores), greater student classroom preparedness behavior, and less student problem behaviors during early adolescence that, in turn, are associated with greater postsecondary educational attainment. Student demographic variables also influenced postsecondary educational attainment directly (by gender) as well as indirectly (by race).

The results of the present study are consistent with the status attainment model from Sewell and Hauser’s (1971) research, which included psychological variables (e.g., locus of control and student academic expectation) as well as behavioral variables (math scores, reading scores, student classroom preparedness behavior, and student problem behavior) and demographic variables (e.g., gender and race) for predicting educational attainment. However, the findings of the present study are inconsistent with Sewell and Hauser’s (1971) work, which emphasized the effect of significant others (e.g., family and
school). That is, no statistically significant effects of parental and school related variables on educational attainment were found in this low-SES student group.

The present study also overcomes many of the limitations of previous research in that a longitudinal design and large nationally representative sample were used. However, one limitation of the current study may be related to its greatest strength, a very large sample size. As stated earlier, the chi-square is biased by large sample sizes. This probably resulted in finding some differences between groups that were statistically different, but not meaningfully different. Caution should be used when interpreting the statistically significant results.

Another limitation of this study is that when using an existing dataset, items available for analyses are limited. That is, even though the internal consistency among items was relatively high, the item validity in the NELS:88 database may not reflect the construct measuring the variables. For the current research, a measure of school related variables would have added an important dimension to school counseling influence, however, such indicators were not available. The items that were related to school counseling variables only reflected the quantity of guidance services based on the school administrators’ perspective. Such items could not clearly discriminate school counseling effects on postsecondary educational attainment.

In all longitudinal studies, especially one such as the NELS:88, many respondents do not participate in all waves of data collection. Students who dropped out of the NELS:88 prior to the 2000 wave data collection were more likely to be low-SES students. This disproportionate drop-out rate may bias the results. It is likely that students from a low-SES background are underrepresented in the current research and their
relative absence may have biased the results. In addition, currently, many school districts are mandating tests to measure student performance and to hold individual schools and school systems accountable for that performance. Since the current study used only the 1988 through 2000 database, it is unknown how the use of high-stakes testing would affect student drop-out rates, graduation rates, and postsecondary educational attainment. Therefore, additional research in this area should be a priority so we may learn more about the long-term effect of high-stakes testing on student educational attainment.

Finally, the total variance explained regarding postsecondary educational attainment of low-SES students in this study is not nearly perfect (20%). This result shows further studies are needed to explain the rest of the variance (80%) of educational attainment. One of the possible factors could be peer influence in high school. Viadero (2003) has studied 141,000 students in San Diego public schools over three years and teased out some of the factors that were key to their academic success. According to Viadero (2003), students’ peer factors had more consistent and higher effects on academic success than their parents’ and teachers’ factors did. Another factor that may play a role in low-SES students’ postsecondary degree attainment is their college experience. According to Anderman and Anderman (1999), low-SES students who attend colleges that have more resources for adjustment and learning are more motivated to succeed educationally and more engaged in the university experience.

**Implications for Further Research**

The analyses presented here used data from a large, nationally representative sample to test a status attainment model for low-SES students’ educational development. The results provided evidence as to the nature and extent of the influence of several factors cited previously as being important to low-SES student’s educational attainment.
Several issues raised by this study warrant further investigation. Some critical areas for research and practice suggested by the study include the following: First of all, additional empirical research is needed to investigate whether degree of educational attainment is affected at an earlier age for low-SES students. This research would examine the earlier influence on educational attainment of elementary grades variables. Also, further research is needed to investigate later adolescent age factors (i.e., college factors) that would influence degree attainment.

Secondly, since postsecondary educational attainment was not influenced by parental variables in this study, it supports the research that effects of parental involvement may be age specific. Previous research has reported that the effect of parental involvement is stronger in younger years than in adolescent years (Adams & Singh, 1998). As Adams and Singh (1998) suggested, more empirical research on parental involvement and its effect on educational attainment should be focused on low-SES students. As noted in the limitations section regarding school related variables, the parental variables used in this study were measured by items provided by the NELS:88 dataset; additional research is needed to determine if effects hold when parental variables are defined or measured differently.

Thirdly, comparing low-SES students and middle/high-SES students might suggest differential effects of some variables for the low-SES students. Some variables in the model of the present study may have a stronger or weaker influence on low-SES students than on middle and high SES students. For example, in this study, the marginal effects of parental academic expectation and involvement on educational attainment may reflect a different opportunity structure for low-SES students compared to their counterparts.
(middle and high-SES students). In the current study, the low mean and standard deviation scores of parental variables show most of the low-SES students’ parents were relatively less involved with the students at home as well as had less contact with school personnel. Therefore, further study is needed to compare the mean and standard deviation of parental variables as well as to investigate the different effects of parental variables on educational attainment among different SES groups.

Finally, while the model presented here was designed specifically to address low-SES students as a group, it will be important to determine if the effects noted here also apply to subgroups of the low-SES populations. Previous research indicated that influences of academic performance are domain specific, with language-related skills being more important for women and mathematics skills being more important for men (Trusty, 2002). Therefore, similar models may be developed and examined for subgroups (race and gender) to determine whether there are differences in factors that affect educational attainment for different groups.

In conclusion, it is vital to identify factors influencing the educational attainment of low-SES students and the present research is an effort in that direction. Investigating these sources of variation, school counselors and counselor educators could be in a better position to provide appropriate educational intervention for low-SES students and, eventually, modify guidance service delivery models toward enhancing the learning and development of low-SES students as well as all students in schools at every educational level.
Figure 4. Conceptual model of low-SES student educational attainment

- **Student Demographic Variables**: Race, Gender
- **Student Psychological Variables**: Locus of Control, Self-Concept, Academic Expectation
- **Student Behavioral Variables**: Academic Performance, School Behavior
- **School Variables**: Academic Counseling, Vocational Guidance, Financial Aid Guidance
- **Family Variables**: Parent Academic Expectation, Parent Involvement
- **Students’ Educational Attainment**
APPENDIX B
CONSTRUCT NAME AND DESCRIPTION
<table>
<thead>
<tr>
<th>Construct</th>
<th>Variable name and description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational attainment</td>
<td>F4HHDG Highest postsecondary degree attained by 2000</td>
</tr>
<tr>
<td>Gender</td>
<td>SEX Gender (male or female) of student</td>
</tr>
<tr>
<td>Race</td>
<td>RACE Race and ethnicity data</td>
</tr>
<tr>
<td>Locus of control</td>
<td>BYLOCUS1 Standardized Z score using six locus of control items (Base year)</td>
</tr>
<tr>
<td>Self-concept</td>
<td>BYCNCPT1 Standardized Z score using seven locus of control items (Base year)</td>
</tr>
<tr>
<td>Academic expectation</td>
<td>BYPSEPLN Postsecondary school plans of the student and chance to go to college</td>
</tr>
<tr>
<td>Math score</td>
<td>BY2XMSTD Standardized Math Test Score</td>
</tr>
<tr>
<td>Reading score</td>
<td>BY2XRSTD Standardized Reading Test Score</td>
</tr>
<tr>
<td>School behavior</td>
<td>F1S10, F1S36 Nine items that related school behavior – Variables will be developed through factor analysis with these items</td>
</tr>
<tr>
<td></td>
<td>F1S40</td>
</tr>
<tr>
<td>Parental academic expectation</td>
<td>BYP76 Postsecondary school parents want their teenager to go to</td>
</tr>
<tr>
<td>Parental involvement</td>
<td>BYP58, BYP66 to 68 Total six items that related parental involvement – Variables will be developed through factor analysis with these items</td>
</tr>
<tr>
<td>Academic counseling</td>
<td>F1C13C Percent of 10th grade students who received academic counseling service</td>
</tr>
<tr>
<td>Vocational education &amp; guidance</td>
<td>F1C13D Percent of 10th grade students who received vocational counseling service</td>
</tr>
<tr>
<td>Financial aid guidance</td>
<td>F2C12D Item that related financial aid guidance</td>
</tr>
</tbody>
</table>
APPENDIX C
OPTIMAL SCALING TRANSFORMATIONS PLOT
Figure 5. Optimal scaling transformations plot for low-SES students’ race

Figure 6. Optimal scaling transformations plot for low-SES students’ gender
Figure 7. Optimal scaling transformations plot for low-SES students’ locus of control

Figure 8. Optimal scaling transformations plot for low-SES students’ self-concept
Figure 9. Optimal scaling transformations plot for low-SES students’ academic expectation

Figure 10. Optimal scaling transformations plot for low-SES students’ math score
Figure 11. Optimal scaling transformations plot for low-SES students’ reading score

Figure 12. Optimal scaling transformations plot for low-SES students’ homework behavior
Figure 13. Optimal scaling transformations plot for low-SES students’ classroom behavior

Figure 14. Optimal scaling transformations plot for low-ses students’ problem behavior
Figure 15. Optimal scaling transformations plot for low-SES parents’ school involvement

Figure 16. Optimal scaling transformations plot for low-SES parents’ home involvement
Figure 17. Optimal scaling transformations plot for low-SES parents’ academic expectation

Figure 18. Optimal scaling transformations plot for academic counseling
Figure 19. Optimal scaling transformations plot for vocational counseling

Figure 20. Optimal scaling transformations plot for financial counseling
LIST OF REFERENCES


Trusty, J. (2004). *Effects of students’ middle-school and high-school experiences on completion of the bachelor’s degree.* (Research Monograph no. 1) Center for School Counseling Outcome Research, University of Massachusetts-Amherst.


BIOGRAPHICAL SKETCH

Sang Min Lee was born in Seoul, Korea on November 2nd, 1972. After graduating from Yeido High School in February, 1991, he attended Hanyang University, where he received his bachelor’s degree in education in 1997. Dr. Lee obtained a Master of Education in educational counseling from Seoul National University (Seoul, Korea) in 1999. He realized that his counseling knowledge was far from enough to deal with real-life problems. Therefore, he decided to go abroad for an advanced degree. He was accepted into the School Counseling and Guidance program at the University of Florida (Gainesville) and went to the US in August 2000. He earned his doctoral degree in August 2004.