

## ABSTRACT

BRASIER, TERRY GALE. The Effects of Parental Involvement on Students' Eighth and Tenth Grade College Aspirations: A Comparative Analysis. (Under the direction of Dr. Marvin A. Titus).

Following scholarly calls (e.g., Crosnoe, 2001; Perna & Titus, 2005) for studies related to students' academic trajectories, the purpose of this study was to examine whether the relationship between students' college aspirations and parental involvement differed between the eighth grade and tenth grade years; two critical time periods when students typically initiate and subsequently reassess future college plans. Utilizing base-year and first follow-up data from the restricted-use version of the National Educational Longitudinal Survey (NELS: 88/90), results from fixed-effects logistic regression analyses indicated that parental involvement had a significant positive effect on the likelihood of students having high college aspirations (desire to finish college) during both the eighth and tenth grade years. Additionally, a cross-model hypothesis test indicated that the magnitude of the relationship between students' college aspirations and parental involvement was significantly weaker during the tenth grade year. In conclusion, findings from this study provided statistical support for previous claims that the relationship between college aspirations and parental involvement weakens as students ascend through the educational pipeline. Results from this study imply that scholars should view the relationship between students' college aspirations and parental involvement as dynamic as students ascend through the secondary school grades and the student college choice process. Additionally, this study's findings imply that revisions to federal, state, and school-level parental involvement policies (e.g., Section 1118 of the No Child Left Behind Act of 2001) should emphasize the importance of both proactive forms of parental involvement (e.g., parent-child discussions regarding things

studied in school, school activities, and course selection) and motivational forms of parental involvement (e.g., encouragement and expectations for future college attainment) throughout the secondary school years.

The Effects of Parental Involvement on Students' Eighth and Tenth Grade College  
Aspirations: A Comparative Analysis

by

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## DEDICATION

This doctoral dissertation is dedicated to my wife, Wendy and my sons, Zackary Gale and William Stone. Wendy, Zack, and Will, thank you for your support throughout this journey.

## BIOGRAPHY

Terry Gale Brasier was born in Midwest City, Oklahoma. He graduated from NC State University in 1990 and was awarded a BS degree in Textile Management. In 1998, he was awarded a MS degree in Vocational Industrial Education from NC A&T State University. He has worked within both secondary and postsecondary school systems for over ten years, serving as a high school teacher and coach and a pre-college outreach program coordinator. He is currently the Associate Director of Student Services at NC State University's College of Textiles.

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## **Chapter I: Introduction**

The lifelong impact of attending college has been well documented. In general, research indicates that a person's educational attainment is highly correlated with their eventual salary, career duration and mobility, and overall quality of life (Hossler, Schmidt & Vesper, 1999). In support of this generalization, the National Center for Educational Statistics (NCES) recently reported that the annual income was nearly 33 percent higher for persons having attained a baccalaureate degree versus those having attained no postsecondary education. This same survey data supports the existence of a positive relationship between a person's educational attainment and their job satisfaction, with those having at least a baccalaureate degree reporting generally higher levels of fringe benefits, job security, and opportunities for further training and promotions (Ingels, Curtin, Kaufman, Alt, & Chen, 2002). Recent reports also indicate that the positive relationship between educational attainment and economic well-being is stronger than ever. For example, utilizing 2002 Census Bureau data, Day and Newburger (2002) reported that the difference of annual earnings between persons holding a baccalaureate degree and those with only a high school diploma increased from 1.5 to 1.8 times between the years of 1975 and 1999.

Despite the well-known connection between educational attainment and economic well-being, many students, especially those from low-income and underrepresented race or ethnic backgrounds, still choose to forgo the college opportunity altogether. For example, utilizing NELS data, Choy and associates (2000) reported that 25 percent of high school graduates in 1992 had not enrolled in any type of postsecondary institution within two years of graduation. Furthermore, in contrast to their middle- and upper-income peers who enrolled in college at high percentages, nearly 37 percent of the 1992 NELS twelfth-grade

cohort from low-income households elected not to enter college. Moreover, among African American and Hispanic students, the majority of whom came from low-income families, almost 30 percent chose not to enroll in any type of college. Perhaps most disturbing is the increasing baccalaureate degree attainment gap between race or ethnic minority populations and the majority White population. According to the National Center for Educational Statistics (NCES), although the overall percentage of persons between the ages of 25 and 29 having completed at least a baccalaureate degree has gradually increased to nearly 30 percent from 1971 to 2005, the baccalaureate degree attainment gap between African Americans, Hispanics, and Whites has nearly doubled during the same time period (U.S. Department of Education, 2006). These reported educational attainment gaps, coupled with the increased reliance on a knowledge-based economy, make college access increasingly important, as the individual student and his or her family benefit from a higher quality of life resulting from higher levels of educational attainment (Perna, 2000).

Recognizing the importance of increasing college access and attainment among underrepresented student populations, educational administrators along with federal and state governmental agencies have initiated and implemented a variety of college preparatory programs (e.g., federally-funded TRIO programs). Although these programs serve to increase college access and attainment among underrepresented student populations, many face possible elimination due to the lack of empirical research supporting their effectiveness (Corwin, Colyar & Tierney, 2005). Thus, developing a more complete understanding of the factors impacting college access represents a research topic worthy of further investigation.

### *Prior College Aspirations Research*

Recent studies pertaining to college access have been based in the student college choice literature. Defined by Hossler, Braxton, and Coopersmith (1989) as a “complex, multistage process during which an individual develops aspirations to continue formal education beyond high school, followed later by a decision to attend a specific college, university or institution of advanced vocational training” (p. 234), student college choice has been a topic of interest to education administrators, policy-makers, and scholars. Although there have been various conceptual perspectives (e.g., Manski & Wise, 1983; Young & Reyes, 1987) used to guide student college choice research, a three-stage model posited by Hossler and Gallagher (1987) has been used to guide most recent college choice studies. Drawing from prior student college choice models (e.g., Jackson, 1982; Litten, 1982), the Hossler and Gallagher (1987) model asserts that at some point in their educational lives, students develop aspirations to attend college (predisposition), seek information about certain colleges (search), and ultimately make the decision to apply and attend a particular college (choice). The student college choice literature (e.g., Cabrera & LaNasa, 2000a) indicates that each of these stages (predisposition, search, and choice) are interrelated, correspond with certain student grade levels, and are impacted by various student, family, school, and other environmental factors that ultimately result in educational outcomes that may or may not lead to college access. Scholars (e.g., Adelman, 1999; Attinasi, 1989; Hossler et al., 1989; Stage & Hossler, 2004; St. John, Paulsen & Starkey, 1996) have also argued that the student college choice process could be related to students’ college persistence and eventual graduation from college.

The college predisposition stage coincides with a critical point in the student's life—the transition from middle school to high school—during which significant others at home or school could positively influence the student to acquire the necessary academic qualifications and information needed for eventual college access. Thus, scholars (e.g., Cheng & Starks, 2002; Choy, Horn, Nunez & Chen, 2000; Hossler et al., 1999; McDonough, 1997; Perna, 2000; Tierney, Corwin & Colyar, 2005) have called for further research focusing on exploring factors impacting students' college aspirations. In support of this scholarly call, recent studies have found evidence empirically linking students' formation of college aspirations during the secondary school years to eventual college access. For example, in a study utilizing data from the National Longitudinal Survey of Youth (NLSY), Reynolds and Pemberton (2001) found that only 43 of the 1,648 fifteen and sixteen year old high school students who did not aspire to obtain a college degree actually completed a baccalaureate degree. In contrast, Reynolds and Pemberton (2001) reported that 416 of the 1,440 fifteen and sixteen year old students who did expect to complete a college degree actually completed a baccalaureate degree. Similarly, utilizing National Education Longitudinal Survey (NELS) data sponsored by the National Center for Educational Statistics (NCES), Choy and associates (2000) reported that students who formed at least four-year college degree aspirations by the tenth grade had much better chances of becoming academically qualified, completing necessary standardized tests (e.g., SAT or ACT), and matriculating into a four-year college than students aspiring to attend a two-year college or less.

Although studies have established the importance of students forming high levels of college aspirations (e.g., Finish College, Attain a master's degree, or Ph.D.) early in their educational lives, some studies (e.g., Cabrera & LaNasa, 2000b; Hossler et al, 1999; Kao &

Tienda, 1998) have also indicated that a large percentage of students who initially form high levels of college aspirations during middle school years (7<sup>th</sup> & 8<sup>th</sup> grades) subsequently fail to maintain high college aspirations during their early high school years (9<sup>th</sup> & 10<sup>th</sup> grades). Why do some adolescents fail to maintain high college aspirations while others maintain or even increase levels of college aspirations over time? Scholars have established that college aspirations vary by race or ethnicity (Hurtado, Inkelas, Briggs, & Rhee, 1995; Kao & Tienda, 1998; Mau, 1995; Teranishi, Ceja, Antonio, Allan, & McDonough, 2002), socioeconomic status (Hossler & Stage, 1992; Levine & Nidiffer, 1997; Paulsen, 1990), and academic preparation (Chenowith & Gallagher, 2004; McDonough, 1997; Trusty, 2002). According to other researchers (Cabrera & LaNasa, 2000; Cohen, 1983; Flowers, Milner, & Moore, 2003; Goldsmith, 2004; Gonzalez, Stoner, & Joval, 2003; Hamrick & Stage, 2004; Hubbard, 1999; Kao, 2002; Kim, Rendon, & Valadez, 1998; Reynolds & Pemberton, 2001), significant others (e.g., family members, school personnel and peers) can also positively or negatively effect students' college aspirations.

Although some scholars have identified race or ethnic background, gender, social class, academic preparation, and interactions with teachers, counselors, and peers as explanatory factors, other researchers (Cabrera & LaNasa, 2000a; Hossler et al., 1999; Paulsen, 1990) have generally concurred that various forms of parental influence are significant predictors of students' college aspirations. Recognizing parents as important definers and role models of expected educational attainment for their children, scholars (e.g., Cohen, 1987) have explored the relationships between various operational forms of parental influence and students' college aspirations. These studies (e.g., Flowers et al., 2003; Kao, 2002; Kim et al., 1998; Levine & Nidiffer, 1997; Mau et al., 1995) have reported positive

relationships between parental encouragement and expectations and students' college aspirations. Additionally, research also suggests that positive relationships exist between students' college aspirations and the frequency of parental involvement in school activities (McGrath, Swisher, Elder, & Conger, 2002), student-parent discussions regarding educational plans and preparation (Kao, 2002; Kao & Tienda, 1998; Perna, 2000), and the propensity of the parent to save money for college expenses (Hossler & Vesper, 1992). Cheng and Starks (2001) explained the potential impact of parental influence on students' educational aspirations in the following manner:

A child conceptualizes a particular socio-cultural reality through perceptions and the internalization of information provided by his or her significant others vis-à-vis daily communications. As a result, significant others shape students' educational expectations through children's perceptions of how significant others define and value educational categories (p. 307).

Why do some parents have more positive influence on the formation and maintenance of their adolescent's college aspirations than other parents? Scholars interested in this question have reported that various forms of parental influence are often mediated by both parent and child background characteristics. For example, it has been established that high levels of parental encouragement, expectations, and support for adolescents' educational attainment are correlated with having high socioeconomic parents (e.g., McDonough, 1997). Studies (e.g., Goyette & Xie, 2000; Kao & Tienda, 1998) have also found that Asian American parents tend to have higher levels of college expectations and provide more educational encouragement and support for their children than African American, Hispanic, and White parents. Other studies (e.g., Hamrick & Stage, 1998; Hamrick & Stage, 2004)

have shown that African American parents are more likely to have college degree expectations for their children than White parents. With few exceptions, studies (e.g., Cheng & Starks, 2004; Goyette & Xie, 2000; Kao, 2002) have found that Hispanic parents tend to have lower levels of college expectations and provide lower levels of encouragement and support than African American, Asian, and White parents. Furthermore, studies (e.g., Kao, 2002; Levine & Nidiffer, 1997; McGrath et al., 2002) have reported that children of immigrant parents and those living in two-parent households generally receive higher levels of parental encouragement and support than do children of native-born parents or those children living in single-parent households.

The impact of parental influences on the educational aspirations of their children has also been found to vary by the adolescent's academic ability, gender, and co-curricular participation. For example, researchers (e.g., Hossler & Vesper, 1992; Howard, 2003; Trusty, 2002) have found positive relationships between levels of parental expectations, encouragement, support, and involvement and students' academic ability, achievement, and preparation. Furthermore, although males have traditionally received higher levels of parental encouragement than females, recent studies (e.g., Tierney, Corwin & Colyar, 2005) have found that females now receive higher levels of parental encouragement than males. Moreover, although studies have traditionally indicated a positive correlation between parental encouragement and their child's involvement in extracurricular school activities, some recent studies (e.g., Hamrick & Stage, 1998; Hamrick & Stage, 2004) have found negative associations.

Scholars have also explored differences in the manner students react to various forms of parental influences. Although mixed, results from these studies indicate that gender and

race or ethnicity impact the manner in which the student reacts to certain parental influences. For example, Mau and associates (2004) found that parental educational expectations had the greatest effect on college aspirations for Asian American students, when compared to African American, Hispanic, and White students. Furthermore, Kao (2002) found that Hispanic students' college aspiration levels were unaffected, despite low levels of parental encouragement and support. Moreover, Cheng and Stark (2004) found that Asian American and Hispanic American mothers and African American fathers had less effect on their child's college aspirations than White mothers and fathers.

### *Research Problem*

Despite all that is known about the relationships between students' college aspirations and parental influences, many questions remain. One persisting question concerns whether the relationship between students' college aspirations and parental involvement differs between the middle school and early high school years. Although studies (e.g., Hamrick & Stage, 1998; Hamrick & Stage 2004; Kao, 2002) have explored the relationships between students' college aspirations and various forms of parental involvement during specific middle school and early high school grades (e.g., 7<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup>, or 10<sup>th</sup> grades), no known study has explored whether the effects of parental involvement on college aspirations differs as students ascend through these grades. This gap in the literature is quite surprising given these grade levels coincide with the general time students develop college aspirations (7<sup>th</sup> or 8<sup>th</sup> grades) and the time many students subsequently reassess their college aspirations (9<sup>th</sup> or 10<sup>th</sup> grades) (Cabrera & LaNasa, 2000b; Hossler et al., 1999; Kao & Tienda, 1998).

Though limited in number, a few scholars (e.g., Crosnoe, 2001; Hossler et al., 1999; Paulsen, 1990) have found evidence suggesting students may rely more on parents for

educational encouragement and support during early secondary school years (e.g. 7<sup>th</sup> and 8<sup>th</sup> grades) and more on school personnel and peers during later secondary school years (e.g., 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> grades). For example, in their extensive reviews of student college choice literature, both Hossler and colleagues (1999) and Paulsen (1990) found greater impacts of parental involvement during the college predisposition stage (8<sup>th</sup> and 9<sup>th</sup> grades) than during both the college search and choice stages (10<sup>th</sup> through 12<sup>th</sup> grades). Additionally, when examining whether the effects of students' academic orientation (affinity towards school) on parental involvement changed over time, Crosnoe (2001) found a general downward trend in the frequency of parental involvement throughout the high school grades.

Scholars have speculated as to why such a change may take place. Most commonly, scholars (e.g., Muller, 1998) have attributed declines in the positive effects of parental involvement on educational outcomes during later secondary school years to students' desire for autonomy as they grow older. Additionally, some parents, particularly those with low educational attainment, may feel less knowledgeable about more complex educational issues as their student progresses through the secondary school system. Mickelson (1990) argued that parents may feel more and more powerless as their student fails to respond academically to their involvement in school matters over time. Moreover, Crosnoe (2001) speculated that schools may become less receptive to the involvement of parents as their students transition through the secondary school system. Crosnoe (2001) further posited that parental involvement could be effected by the race or ethnic composition of the school's student and faculty. For example, Crosnoe (2001) speculated that minority parents may feel more comfortable involving themselves in schools composed of students and teachers of like race or ethnic backgrounds.

The scholarly findings described above suggest that changes in the relationship between students' college aspirations and parental involvement may account for students' ability (or inability) to maintain high levels of college aspirations (e.g., desire to finish college) between the middle school and high school years. Although studies (Gonzales et al., 2003; Hossler & Stage, 1998; Kao & Tienda, 1998; Mau, 1995) indicate that the relationship between students' college aspirations and parental involvement are impacted by certain student and school-level characteristics, no known study has investigated whether this relationship might change over time.

#### *Purpose of the Study*

Following scholarly calls (e.g., Crosnoe, 2001; Perna & Titus, 2005) for studies related to students' academic trajectories, the purpose of this study was to examine whether the relationship between students' college aspirations and parental involvement differed between the eighth grade and tenth grade years. Because recent studies (e.g., Cabrera & LaNasa, 2000a; Choy et al., 2000) have found a strong positive relationship between the formation of high college aspirations, matriculation into college, and eventual completion of a college degree, this study recognized students having high college aspirations as those students desiring to at least finish a college degree during the eighth or tenth grade years, respectively. The primary predictor variable of interest, parental involvement, was defined as the frequency of parent-child discussions regarding educational issues. The control variables included gender, race or ethnicity, academic ability, mother's (maternal) and father's (paternal) educational expectations, and socioeconomic status (SES).

### *Research Questions*

Using data from the restricted-use version of the National Educational Longitudinal Survey's base-year (1988) and first follow-up year (1990), this study answered three research questions:

- 1) What is the relationship between students' college aspirations and parental involvement during middle school (8<sup>th</sup> grade), while taking into account other variables?
- 2) What is the relationship between students' college aspirations and parental involvement during high school (10<sup>th</sup> grade), while taking into account other variables?
- 3) Does the relationship between students' college aspirations and parental involvement, while taking into account other variables, differ between middle school (8<sup>th</sup> grade) and high school (10<sup>th</sup> grade)?

### *Data*

In order to answer the research questions, secondary analysis of restricted-use data collected via the National Educational Longitudinal Survey (NELS) was utilized. Sponsored by the National Center for Educational Statistics (NCES), the general purpose of the NELS is to allow researchers the ability to examine "change in young people's lives and the role of schools in promoting growth and positive life outcomes" (Curtin et al., 2002, pp. 151).

Secondary analysis of restricted-use NELS data as a research methodology was employed because it was an efficient and reliable means of obtaining data. Furthermore, the restricted-use NELS dataset provided nationally representative samples of both eighth grade and tenth grade students.

## *Methods*

In order to answer the research questions, several statistical methods were utilized. First, fixed-effects multiple logistic regression analysis was used to determine the significance of the relationship between students' college aspirations and parental involvement during the eighth and tenth grade years, while controlling for the effects of certain student and parent background factors. Additionally, due to the complex sampling strategy and weighting schemes used by the NCES when collecting the NELS data, a design-based estimation technique recommended by Hosmer and Lemeshow (2000) was utilized to obtain unbiased and consistent estimates for both the eighth and tenth grade fixed-effects logistic regression models. In order to account for the inherent NELS sampling bias, sampling weights and school-level dummy variables were utilized. To determine whether the relationship between students' college aspirations and parental involvement differed between the eighth grade and tenth grade years, seemingly unrelated estimation (suest) analysis was used to combine the eighth and tenth grade models into one matrix. Utilization of *Stata*<sup>®</sup> statistical analysis software's suest<sup>®</sup> command allowed for reliable cross-model hypotheses tests to detect whether or not differences existed between the eighth and tenth grade models' coefficients.

## *Limitations*

Based on the nature of the restricted-use NELS: 88/90 dataset, there were several important limitations that threatened the internal validity and the generalizability of this study. First, the measurement of key variables was limited to student responses to survey items gauging perceptions about certain phenomena. For example, this study was limited to measures regarding students' perception of the quantity of parental involvement in school-

related matters. Whereas, multidimensional forms of parental involvement or qualitative data collected from the student's parents may have provided more precise measures of parental involvement.

Second, although the sample weighting procedure utilized by the NCES allows researchers using NELS data to generalize findings to the population of students attending public and private schools in the United States, the initial school-level sampling procedure did not include U.S. Department of the Interior supported Bureau of Indian Affairs (BIA) schools, special education schools for persons with severe disabilities, vocational schools that did not enroll students directly, or U.S. Department of Defense dependent's schools. Finally, due to low number of responses from Native American students, this study was limited to students self-identified as African American, Asian, Hispanic, or White.

### *Significance*

This study has the potential to inform educational practice and policy and contribute to theory in several ways. First, this study could potentially contribute to the understanding of why some middle and high school students form and maintain aspirations to finish a college degree, a prerequisite for eventual college access, while other students fail to form and maintain college aspirations throughout high school. Second, a better understanding of how the relationship between students' college aspirations and parental involvement differs between middle school and high school has the potential to inform student and parent behavior as well as policy and programming efforts for both secondary and postsecondary education professionals. Finally, by studying whether or not the relationship between students' college aspirations and parental involvement differs as students ascend through the educational pipeline has the potential to add to both a fledgling line of academic trajectory

research (e.g., Crosnoe, 2001) and the well-established student college choice literature (e.g., Perna & Titus, 2005).

## Chapter II: Review of Literature

This review of college aspirations' research literature served several purposes. First, this review provided an in-depth understanding of the varied conceptual and theoretical perspectives utilized to examine the college aspiration phenomenon. Particular interest was placed on reviewing and critiquing student college choice theory (e.g., Hossler & Gallagher, 1987), since it provided the primary foundation from which this study was based. Finally, based on limitations gleaned from existing college aspirations' research, topics in need of further explication were discussed, including the line of research to which this study added.

### *College Aspiration Research Background*

The study of college aspirations as an important educational outcome emerged from its inclusion in a line of status attainment research (e.g., Blau & Duncan, 1967) nearly four decades ago. Haller and Portes (1973) referred to the status attainment process as “sets of events by which individuals come to occupy their positions in the social hierarchies of wealth, power, and prestige” (p. 54). Sewell, Hauser, and Portes (1969) argued that educational aspirations merited inclusion into a list of key status attainment outcomes (e.g., occupational attainment, college attainment, community leadership) based on its value in predicting a student's eventual educational and occupational attainment. In the original presentation of their model, Sewell, Hauser, and Portes (1969) hypothesized that students' initial social class position and perceived academic ability affected the motivation received from significant others. Sewell and associates (1969) further hypothesized that significant others effected students' motivation to form both educational and occupational aspirations, which, in turn, had long-term impacts on educational attainment, and ultimately, occupational attainment.

Over the years, research has consistently supported Sewell, Hauser, and Portes' (1969) college aspirations' hypothesis. For example, in a study utilizing data from the National Longitudinal Survey of Youth (NLSY), Reynolds and Pemberton (2001) found that 416 of the 1,440 fifteen-to-sixteen year old high school students who expected to complete a college degree actually went on to complete a four-year baccalaureate. In contrast, Reynolds and Pemberton (2001) reported that only 43 of the 1,648 fifteen-to-sixteen year old high school students who did not expect to obtain a college degree went on to complete a four-year bachelorette. Similarly, utilizing National Education Longitudinal Survey (NELS) data sponsored by the National Center for Educational Statistics (NCES), Choy and associates (2000) found that students who formed college degree aspirations by the tenth grade had much better chances of becoming academically qualified, completing necessary standardized tests (e.g., SAT or ACT), and matriculating into a four-year college than students aspiring to attend a two-year college or less.

Based on empirical support for college aspirations as an important educational outcome, scholars have continued to investigate the stratification of college aspirations among various student populations. Most scholars have viewed college aspirations based on students' expressed perception of their future plan to attain a college education. This view, primarily based within the status-attainment tradition (Sewell, Hauser, and Portes, 1967), argues that aspirations reflect a state of mind that motivates youth to strive for academic success. Although Sewell and associate's (1967) perspective of college aspirations has been the most prevalent perspective used in research, some scholars have criticized this perspective as simplistic. For example, scholars (e.g., Kao & Tienda, 1998; Mickelson, 1990) have argued that college aspirations reflect students' realistic evaluation of likely

educational outcomes after taking into account cultural and socioeconomic restrictions. In her attempt to explain the attitude-achievement paradox (incongruence between aspiration levels and eventual educational attainment) among African American students, Mickelson (1990) hypothesized that students have both abstract and concrete attitudes towards education. On one hand, Mickelson (1990) explained that students' abstract attitudes are influenced by the context of their cultural norms regarding educational attainment (e.g., the belief or disbelief that education is the primary means of economic mobility). On the other hand, Mickelson (1990) described concrete attitudes towards education as beliefs based on actual educational experiences (e.g., prior school withdrawal, grades, participation in college preparatory or vocational program).

Some scholars have also questioned college aspirations' status as a valid educational outcome. For example, scholars (e.g., Farmer, 2001; McGrath et al., 2002) have argued that more concrete factors such as students' academic ability, curricula track in high school (e.g., college preparatory or vocational), or active planning for college, represent better predictors of eventual college access than students' expressed college aspirations. Farmer (2001) suggested that future college attendance could be more precisely predicted through the frequency of students' active involvement in college planning activities. Similarly, McGrath and colleagues (2002) utilized the concept of planful competence to describe students' realistic college plans. McGrath and colleagues (2002) argued that students who were more involved in college planning activities (e.g., SAT preparation, discussions with significant others regarding college plans) would have a more realistic view of their future college plans. Additionally, Howard (2003) found that students often equated academic identity (college-bound, non-college-bound) with their college aspirations.

Similar to Mickelson's (1990) attitude-attainment paradox, scholars (e.g., Reynolds & Pemberton, 2001; St. Hilaire, 2002) have argued that college aspirations and college expectations represent two different concepts. Reynolds and Pemberton (2001) explained that although students may aspire to complete college degrees in the future, the same students may not expect to fulfill wishes to complete a college degree after taking into account lack of financial resources or family support and other commitments (e.g., work, marriage, family). Similarly, St-Hilaire (2002) argued that students who expressed high aspirations for continuing their education were more likely to temper these aspirations with a dose of perceived limitations. St-Hilaire (2002) reported that although eighty-eight percent of students aspired to complete at least some college, only eighty percent of the same students indicated that the completion of some college was a realistic expectation. Additionally, St-Hilaire (2002) found that although nearly fifty percent of the students expressed aspirations for a graduate-level degree (e.g., Masters, Ph.D.), less than thirty percent of the students actually considered graduate degree completion within their realistic reach. The notion of differentiation between aspirations and expectations was also evident in Levine and Nidiffer's (1997) study of low-income high school students. Levine and Nidiffer (1997) reported that though most of the students expressed a desire to go to college, their expectations of actual college attainment were lowered when taking into account their lack of financial resources.

Although most scholars have utilized the terms college aspirations or expectations to represent the amount of education the student hopes to attain in the future (e.g., high-school diploma, trade school, two-year college, baccalaureate, Masters, M.D., Ph.D.), other researchers have utilized the terms ambition (e.g., Howard, 2003; McGrath et al., 2001),

beliefs, (e.g., Cheng & Starks, 2002; Goyette & Xie, 1999; Trusty, 2002), intentions (e.g., Farmer, 2001), goals, optimism (Goldsmith, 2004), plans (e.g., Gonzalez et al., 2003; Hossler & Stage, 1992), and predisposition (Hamrick & Stage, 2004; Stage & Hossler, 1989) to view this phenomenon. Regardless of the terminology used, most scholars have viewed these various terms as being congruent and as representing students' expressed levels of education they hoped to attain at some point in the future.

Research findings have established that the process of students initiating and maintaining college aspirations throughout the educational pipeline differs according to gender and race or ethnic background. Additionally, although studies have established that parental influences have a direct effect on students' college aspirations, research findings have also indicated that this relationship differs according to certain student and parental characteristics (e.g., race or ethnicity, gender, and socioeconomic background). In their attempt to explain these differences, scholars have utilized various conceptual and theoretical perspectives. Kao and Tienda (1998) identified two general perspectives from which educational aspiration studies have been viewed: the status attainment perspective (Sewell, Hauser, & Portes, 1969) and the blocked-opportunities perspective (e.g., Ogbu, 1990). On one hand, status attainment scholars (e.g., Hossler & Stage, 1992) primarily view social class background as the primary reason for differential levels of college aspirations among students. On the other hand, blocked-opportunity scholars (e.g., Kao & Tienda, 1998) theorize that students' college aspirations are stratified because of social and structural barriers (e.g., racism, sexism, federal, state, and school-level discriminatory policies and practices, or cultural beliefs).

Recent theoretical perspectives utilized by college aspirations' scholars which could be categorized as being based on the status attainment or blocked-opportunity viewpoints have included segmented assimilation (St-Hilaire, 2002), Ogbu's caste theory of educational attainment (Farmer, 2001), race and feminist critical framework (Knight et al., 2004), Bronfenbrenner's ecological systems theory of human development (Chenoweth & Galliher, 2004), cultural deficit framework (Solorzano, 1992), social capital/networking theory (Gonzales et al., 2003; Smith-Maddox, 1999), gender theory (Hubbard, 1999), racial identity theory (Farmer, 2001; Mau, 1995), social networks theory (Smith-Maddox, 1999), perceived opportunity framework (Yun & Kurlaender, 2004), theory of resiliency (Ceja, 2004), school ethnic or racial composition perspective (Goldsmith, 2004), the socio-cultural concept of identity (Howard, 2003), ethnic differences framework (Goyette & Xie, 1999), and significant others theory (Cheng & Starks, 2002). Although discussion of some of the aforementioned theoretical perspectives were included within the recent college aspiration findings section below, this study was primarily guided by student college choice theory.

*Student college choice theory.* According to Hossler and colleagues (1999), student college choice theory (e.g., Hamrick & Stage, 1998; Hossler & Gallagher, 1987; Hossler & Stage, 1992) provides a beneficial foundation to guide college aspirations studies since it provides a practical basis from which to understand how the process of college aspiration formation is undertaken, how the formation of college aspirations is related to other processes in the student college choice process (e.g., search and choice processes), and how college aspirations vary from person to person. Defined by Hossler and associates, (1989) as a "complex, multi-stage process during which an individual develops aspirations to continue formal education beyond high school, followed later by a decision to attend a specific

college, university or institution of advanced vocational training” (p. 234), student college choice has been a topic of interest to education administrators, policymakers, and scholars. Although some researchers have drawn on multiple student college choice models (e.g., Manski and Wise, 1983; Young & Reyes, 1987) over the years, most scholars have utilized the Hossler and Gallagher (1987) model.

Hossler and Gallagher (1987) based their combined model on theoretical models proposed by Litton (1982) and Jackson (1982). Litton (1982) proposed a three-stage, longitudinal model in an attempt to explain the college choice process. Litton (1982) explained that the first stage consists of both the student’s desire to attend college, followed closely by planning to attend college. Stage two consists of the student’s investigation of available college opportunities. The culminating third stage consists of actions taken by both the student and the college. From the student perspective, he or she submits an application for admissions to the institution. The action of submitting the admissions application is followed by the institution’s decision to either admit or deny the student admission. Based on the institution’s decision, the student then either enrolls into the college or chooses an alternative (e.g., enter the workplace, or attend another college).

Jackson (1982) proposed a similar three-phase process beginning with the student’s decision to attend college (preference). According to Jackson (1982), the initial college preference phase is followed by the student’s act of narrowing their college choice set (exclusion) to their top colleges of interest. The culminating phase (evaluation) consists of a process in which the student rates his or her top college choices and chooses to attend the top choice.

Based on the works of Litton (1982) and Jackson (1982), Hossler and Gallagher (1987) proposed a three-stage student college choice model. The Hossler and Gallagher (1987) model asserts that at some point in their educational lives students develop aspirations to attend college (predisposition), seek information about certain colleges (search), and ultimately make the decision to apply to and attend a particular college (choice).

Recognizing the formation of college aspirations as a critical predecessor for college access, scholars (e.g., Cabrera & LaNasa, 2000a) have recommended further studies examining the college predisposition stage.

*College predisposition stage.* Defined by Hossler, Braxton and Coopersmith (1989) as a “developmental phase in which students determine whether or not they would like to continue their education beyond high school” (p. 209), the college predisposition stage coincides with a critical point in the student’s life (the transition from middle school to high school) during which the student can be positively influenced by significant others at home or school to acquire the necessary academic qualifications and information needed for eventual college access. Hossler and Gallagher’s (1987) model posits that college aspirations are influenced by a variety of individual and social background characteristics. Specifically, Hossler and Gallagher (1987) argued that race or ethnic background, gender, academic ability, and the attitudes of both the student’s parents and peers impact college aspirations. Additionally, Hossler and Gallagher (1987) hypothesized that school organizational factors and school experiences influence the student’s college predisposition stage.

Hossler and Gallagher’s (1987) model also recognizes the college predisposition stage as a longitudinal developmental phase involving the initial formation and subsequent reassessment of college aspirations. Though studies (Hossler et al., 1999; McDonough,

1997; Paulsen, 1990; Stage & Hossler, 1989) have indicated that the initial formation of college aspirations can vary dramatically from early childhood years through high school and beyond, scholars have generally agreed that students initially form college aspirations around the sixth grade and continually reassess their initial college aspirations until the tenth grade, the general beginning of the college search process. Scholars (e.g., Cabrera & LaNasa, 2000a; Hossler et al., 1989; Hossler et al., 1999; McDonough, 1997; Paulsen, 1990) have also concurred that initial formation of students' college aspirations coincides with the formation of early occupational goals and the realization of the type of training or education needed to obtain these goals.

Early formation and subsequent maintenance of college aspirations between the eighth and tenth grades have been proven crucial due to their relationship with other educational outcomes associated with college attendance. For example, in their examination of NELS data, both Choy and associates (2000) and Cabrera and LaNasa (2000b) reported that students who possessed college aspirations by the tenth grade enrolled in more academically rigorous courses, completed necessary standardized testing (SAT, ACT), gathered more information about financing college, and subsequently matriculated into four-year colleges at higher rates than students who had lower initial levels of tenth grade college aspirations or students who delayed college aspirations until the twelfth grade. Similarly, Hossler and associates (1999) found that nearly seventy percent of the participants in the quantitative portion of their study followed through on tenth grade college aspirations and enrolled in either two or four-year colleges immediately following high school graduation. Additionally, Levine and Nidiffer (1997) found that the common denominator for the twelve ninth grade students who went on to attend highly selective universities was the formation of

college aspirations early in their educational careers. As a result, the students in Levine and Nidiffer's (1997) qualitative study indicated that applying to and ultimately enrolling at a selective college seemed almost a natural occurrence.

Although Hossler and Gallagher's (1987) college predisposition stage served as the general foundation for this study, this study's conceptual framework was also based on generalizations gleaned from a variety of college aspirations studies utilizing a variety of perspectives. Thus, this study viewed students' college predispositions synonymously with other terms used to describe students' future college plans, including aspirations, expectations, plans, ambitions, and goals.

*Race, ethnicity, and gender.* Historically, studies (e.g., Hossler et al., 1989; Paulsen, 1990) have indicated that the formation and maintenance of college aspirations differ by certain student background characteristics (e.g., race or ethnicity, gender, and academic preparation). Findings from these studies (e.g., Hamrick & Stage, 1998; Kao & Tienda, 1998; Paulsen, 1990) indicate that some students, especially African American males, Hispanic males and females, and those from low-socioeconomic backgrounds, are less apt to form college aspirations during early secondary school grades (e.g., 8<sup>th</sup> and 9<sup>th</sup> grades) and are less likely to maintain college aspirations throughout the high school years (9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, and 12<sup>th</sup> grades), when compared to their White and higher socioeconomic peers. For example, utilizing NELS data and descriptive statistical analysis, Hurtado and colleagues (1997) reported that African American and Hispanic tenth grader students had lower levels of college aspirations than Asian and White tenth grade students. Likewise, utilizing the same NELS data and a social capital perspective, Perna (2000) found that African American and Hispanic students aspired to complete college degrees at lower rates than their Asian and

White peers. Similarly, Mau and associates (1998) reported that Asian American and White students aspired to attain college degrees at significantly higher rates than African American, Hispanic, and Native American students during both the tenth and twelfth grades. Kao and Tienda's (1998) study utilizing NELS data also confirmed that Asian students had the highest levels of college aspirations and Hispanic had the lowest levels of college aspirations.

Although the review of literature indicated stratification of college aspiration levels among African American, Asian, Hispanic, Native American, and White students, there was also evidence of college aspiration differences among certain ethnic subgroup populations. For example, utilizing NELS data, Kim and associates (1998) found a wide disparity in the college aspirations among Asian ethnic subgroups, despite the fact that Asians, as a whole, generally report higher levels of college aspirations than any other race or ethnic group. Kim and associates (1998) reported that South Asian tenth grade students had significantly higher college aspirations than did Korean, Japanese, Chinese, Filipino, and Southeast Asian students. Similarly, utilizing data drawn from interviews with Filipino and Chinese students at four California public high schools, Teranishi and colleagues (2002) found that although almost all Chinese students aspired to graduate with a four-year bachelor's degree, less than one-third of the Filipino students indicated they would pursue a college degree of any kind.

Studies have also indicated that certain race or ethnic groups may delay initiating college aspirations and have more difficulty sustaining college aspirations throughout the educational pipeline. For example, in his review of student college choice studies, Paulsen (1990) reported that although most Asian and White students had already formed college aspirations prior to their tenth grade year, the majority of African American and Hispanic students started the process during the tenth grade or later. Similarly, in a more recent study

utilizing NELS data, Hamrick and Stage (2004) provided evidence that African American and Hispanic students formed college aspirations later, on average, than Asian or White students. Additionally, in the qualitative portion of their study, Hossler and associates (1999) reported that three of the four African American ninth grade students were undecided as to whether they planned to attend college after high school.

In a comprehensive longitudinal study utilizing NELS data, Kao and Tienda (1998) found that while every race or ethnic group experienced a downward trajectory in their expressed educational aspirations from the eighth to tenth grade school years, the decline by African American males was the most dramatic during this time period. Specifically, although sixty-three percent of African American males aspired to complete a college degree in the eighth grade, only forty-eight percent of the same students aspired to complete a college degree by the tenth grade. Comparatively, the proportion of White students with college degree aspirations dropped only nine percentage points, from sixty-seven to fifty-eight percent. Additionally, Kao and Tienda (1998) reported that twenty-five percent of African American and Hispanic male students lowered their educational aspirations from going to graduate school to completing some college or less between the eighth and tenth grades. Comparatively, Kao and Tienda (1998) reported that only ten percent of Asian and White males lowered their aspirations from going to graduate school to completing some college or less between the eighth and tenth grades.

Research also indicates the effects of race or ethnic background on students' college aspirations are often mediated by gender. Although past studies have indicated that male students reported higher college aspirations than female students, more recent studies (e.g., Chenowith & Gallagher, 2004; Mau et al., 2000; Reynolds & Pemberton, 2003) have

indicated that females, with the exception of Hispanic females, have higher college aspirations than male students. For example, when utilizing Bronfenbrenner's ecological systems theory of human development to examine the cultural effects of growing up in rural West Virginia had on the college aspirations of twelfth grade students, Chenowith and Gallagher (2004) found that 74.6 percent of females, compared to 63.3 percent of the males, aspired to attend college. Similarly, using NELS data, Mau's (1995) two-way ANOVA analysis found significant effects of race and race by sex interaction on students' college aspirations. Overall, Mau (1995) found that for each race or ethnic group, female students had significantly higher college aspirations than male students. Additionally, Mau (1995) reported that Asian American males had significantly higher college aspirations than did any other male race or ethnic group. Conversely, Mau (1995) reported that Native American males had significantly lower educational aspirations than did any other male group. Mau (1995) reported that African American and White males had significantly higher college aspirations than did Hispanic, and Native American males. As for females, Mau (1995) reported that Asian American females had significantly higher college aspirations than African American, Hispanic, Native American, and White females. Conversely, Hispanic and Native American females reported significantly lower college aspirations than African American, Asian and White females.

Scholars have posited various theoretical rationales in their attempts to explain the stratification of college aspirations by race or ethnicity and gender. For example, Hubbard (1999) utilized cultural inversion and gender theory to examine the differences in the college aspirations among male and female African American students enrolled in a college preparatory program (AVID). Hubbard (1999) reported that although both male and female

students aspired to attend college, the factors impacting their decision to attend college differed. Hubbard (1999) explained that males were motivated predominately by the thought of playing collegiate athletics and females were motivated by the career and economic benefits of college attainment. Hubbard's (1999) findings indicated that females aspired to attend four-year colleges at higher rates than males, despite the fact that females also reported higher rates of day-to-day occurrences of racism. These findings were contrary to Hubbard's (1999) hypothesized cultural inversion theory positing that students with frequent racial discrimination experiences would tend to have lower college aspirations as a result.

In a similar blocked opportunities study utilizing a cultural deficit perspective, Solorzano (1992) hypothesized that because African American students place less value on education and upward mobility they would have lower college aspirations than White students, even when controlling for parental SES. Analyzing NELS data via descriptive cross-tabular statistical techniques, Solorzano (1992) reported that African American female and male students had higher college aspirations in the lowest SES quartiles when compared to White male and female students. Additionally, Solorzano (1992) found that both female and male African American students' college aspirations either exceeded or matched White female and male students' college aspirations in the higher SES quartiles. Solorzano (1992) concluded that the findings challenged Ogbu's (1990) notion that involuntary minorities suffer from a cultural frame of reference that does not encourage educational success. Based on these findings, Solorzano (1992) called for studies focusing on school contextual characteristics as explanatory factors effecting the formation and maintenance of college aspirations among underrepresented minority students.

In a study noting theoretical and methodological limitations of Solorzano's (1992) work, Farmer (2001) hypothesized that White students' college aspirations would be higher than their African American counterparts due to the higher likelihood that White students had spoken with parents about college plans and the higher likelihood that the White students had made plans to take college-entry exams (e.g., SAT, ACT). Utilizing base-year, first, and second follow-up NELS data (NELS: 88/90/92) and multiple logistic regression statistical analyses, Farmer (2001) found that African American students' college aspirations exceeded those of their White counterparts. Additionally, Farmer (2001) reported that African American students were significantly more likely to talk with their parents about college plans than White students and were significantly more likely to have taken steps to prepare to take a college entrance test than their White counterparts. Contrary to his hypothesized cultural deficit theory, Farmer (2001) concluded that African American students and their parents had high educational expectations and took the necessary steps needed to achieve their educational expectations at levels higher than their White peers. In conclusion, Farmer's (2001) conclusions extended Solorzano's (1992) findings by discounting parental college expectations as an explanation for the college aspiration differences between African American and White students. Like Solorzano's (1992) study, Farmer's (2001) findings questioned the tendency of Whites to downplay societal and structural explanations for lack of educational or economic achievement among minority students in favor of minority student background explanations.

In another thread of research, scholars (e.g., Goyette & Xie, 1999; Hamrick & Stage, 1998; Hamrick & Stage, 2004; Hossler & Gallagher, 1987) have utilized traditional status attainment variables in their attempt to explain college aspiration differences by race or

ethnicity. For example, Goyette and Xie (1999) hypothesized that differences between socioeconomic background, academic ability, and parental educational expectations constituted a plausible explanation for the gap in the reported college aspirations between Asian American and White eighth and tenth grade students. Analyzing base-year and first follow-up NELS data using both linear and logistic regression models, Goyette and Xie (1999) found that socioeconomic status explained much of the differences between the college aspirations of Filipino, Japanese, Southeast Asian, and White students, but none of the differences in college aspirations between Chinese, Southeast Asians, and White students. Goyette and Xie (1999) did find that academic ability explained some of the high college aspirations of Chinese, Korean, and Southeast Asian students, but had little explanatory power for the college aspirations of Filipino and Japanese students. Additionally, Goyette and Xie (1999) found that parental expectations played an important role in explaining the Asian-White gap for all the Asian sub-ethnic groups, except in the case of South Asian students. To explain the consistently high college aspirations among Asian students, as compared to other minority groups, Goyette and Xie (1999) speculated that Asian American students shared a strong common view that educational attainment was a way to overcome racial discrimination.

In another study utilizing variables drawn from the status attainment perspective, Hossler and Stage (1992) posited that family background characteristics effected students' college aspirations both directly and indirectly through parental expectations, peer expectations, and high school experiences. Hossler and Stage (1992) hypothesized that family background characteristics (e.g., parental socioeconomic status) directly influenced levels of parental and peer expectations and encouragement, students' academic

achievement, and school experiences. In turn, Hossler and Stage (1992) argued that parental encouragement and expectations and high school experience factors directly influenced students' college aspirations. Results from Hossler and Stage's (1992) study indicated that parental expectations (level of expected educational attainment for their child) had a positive and direct effect on students' college aspirations for all students, regardless of gender, race or ethnicity, and socioeconomic backgrounds.

Building on Hossler and Stage's 1992 model, Hamrick and Stage (1998) argued that participation in school activities may help explain the differences in the college aspirations among African American, Asian, Hispanic, and White students. Utilizing base-year NELS data and structural equations modeling, Hamrick and Stage (1998) found differences with respect to the effects of gender, race or ethnicity, SES, and participation in school activities in predicting the college aspirations of eighth grade students. Although Hamrick and Stage's 1998 model accounted for at least 30 percent of the variance in the college aspirations for Asian, Hispanic, and White eighth grade students, it only accounted for 21 percent of the variance in college aspirations for African American students. In conclusion, Hamrick and Stage (1998) argued that high SES was not directly related to college aspirations for African American students. Instead, Hamrick and Stage (1998) explained that college aspirations among African American students was strongly and positively related to academic success in school and the reinforcing roles of significant others (e.g., parents, siblings, extended family members).

In an extension of their 1998 model, Hamrick and Stage (2004) added measures of educational mentors in an attempt to explain the stratification of college aspirations among African American, Asian American, Hispanic, and White eighth grade students. Utilizing

NELS base-year data, Hamrick and Stage (2004) found similar differences to their 1998 model with regards to the more recent model's ability to predict the college aspirations of African American eighth grade students. Although the more recent Hamrick and Stage (2004) model explained between 30 and 50 percent of the variance in the college aspirations of Asian, Hispanic, and White students, it explained only 20 percent of the variance for African American students.

Studies have analyzed other factors impacting the college aspirations of students from the same race or ethnic backgrounds. For example, utilizing data drawn from the third follow-up NELS (NELS: 92) and an attribution perspective, Moore (2003) investigated the impact of locus of control on the college aspirations of African American twelfth grade students. Accounting for family, student, and school characteristics, Moore (2003) found that African American high school seniors who reported higher levels of locus of control were more likely to have high college aspirations than African American high school seniors who reported lower levels of locus of control. Results also indicated that perceptions of high school teacher's expectations for their educational future had a significant effect on the student's college aspirations.

In another study examining the effects of immigration status on college aspirations, St-Hilaire (2002) hypothesized that measures of segmented assimilation would adversely impact the college aspirations of Mexican immigrant eighth and ninth grade students attending inner-city schools in San Diego. Using length of residency in the United States, ability to speak both Spanish and English, and perceptions of discrimination from school peers, St-Hilaire (2002) found that American-born, Mexican-origin students had lower college aspirations than their Mexican-born peers. In other words, recent immigrants from

Mexico aspired to attain higher levels of education than their earlier arriving, native-born counterparts. Ironically, St-Hilaire (2002) reported that students with aspirations to attain a college degree tended to report discrimination from school peers with greater frequencies than students with lower educational aspirations.

*Academic background.* Studies have shown mixed results when examining the relationship between students' college aspirations and academic background. Most studies, however, have found that students who take more academically rigorous courses and earn higher grade point averages and test scores coincidentally report higher college aspirations, when compared to those students who are tracked in non college-preparatory curricula and earn lower grade point averages and test scores. For example, in their comprehensive review of college aspiration studies, Hossler and associates (1989) reported substantial support of a direct and positive relationship between students' college aspirations and academic ability and achievement as measured by test scores. More recently, Hossler and Stage (1992) found that college aspirations were positively related to grade point averages, as measured by ninth grade students' high school transcripts. Additionally, Hossler and colleagues (1999) found that college aspirations were also directly related to self-reported grade point averages of high school students. Hossler and his colleagues (1999) also reported a consistently positive relationship between four-year college degree aspirations and academic performance throughout high school. Moreover, McDonaugh's (1997) qualitative study of female twelfth grade students revealed strong evidence of a positive relationship between college aspirations and both the students' academic ability as measured by grade point average and standardized test scores (e.g., SAT). Similarly, utilizing NELS data, Kim and associates (1998) found a positive relationship between high college aspirations and high standardized math scores.

In addition to grades and test scores, scholars have also explored the relationship between college aspirations and other measures of academic preparation. For example, Kao and Tienda (1998) reported a negative relationship between college aspirations and students who had repeated a grade level, either early or late in their educational career. Additionally, utilizing Bronfenbrenner's ecological systems theory of human development to study the college aspirations of 242 twelfth grade students attending rural schools in West Virginia, Chenoweth and Galligher (2004) found strong relationships between college aspirations and both students' curricula track and perceptions of academic preparation and intelligence. Results from Chenoweth and Galligher's (2004) stepwise logistic regression analysis found that students' perceived intelligence was among the most significant predictors of college aspirations for males. Chenoweth and Galligher's (2004) study also revealed that high school curricula and perceived intelligence were the most significant predictors for females. Additionally, Chenowith and Galligher (2004) found that, while 97 of the 108 students enrolled in a college preparatory curriculum indicated college aspirations, only 57 of the 97 enrolled in a general education curriculum indicated college aspirations.

Other studies (e.g., Bonous-Hammarth & Allen, 2005) have indicated that students' ability to form and maintain college aspirations could be limited by discriminatory academic placement into non-college bound tracks. For example, Mau and associate's (1998) reported that greater percentages of female, Asian American, and White students were enrolled in college preparatory programs when compared to the percentages of male, African American, Hispanics, and Native American students, who were over-represented in vocational programs. Similarly, Gonzalez and colleagues (2002) found that Hispanic students were often underrepresented in Advanced Placement and Honors courses when compared to other

race and ethnic groups. As a result of this differential tracking, both Mau and associates (1998) and Gonzalez and colleagues (2002) reported that students in the lower academic tracks reported lower college aspirations than those students enrolled in college preparatory tracks. Similarly, in a study utilizing NELS data, Smith-Maddox's (1999) multiple regression analysis indicated that African American eighth grade students placed in low academic ability groups reported lower college aspirations than those placed in high academic ability groups. Smith-Maddox (1999) speculated that placement into low academic ability groups heightened or perpetuated the educational inequalities between race and ethnic lines by institutionalizing the unequal distribution of academic resources.

Although positive relationships between students' college aspirations and academic abilities (e.g., standardized test scores, grade point average) have been reported, other studies have found evidence that the two may be unrelated. For example, in their examination of NELS data, Hossler and Stage (1992) found that although African American and Hispanic students had lower grade point averages than White students, there were no significant differences in the college aspirations between the groups. Similarly, in another study utilizing NELS data, Farmer (2001) found that academic achievement was not a significant predictor of African American students' college aspirations during the eighth grade.

Results from other studies suggest that students' college aspirations and academic background could be conflated. For example, Howard (2003) reported that interviews with twenty high school students revealed that while students described their academic identity (whether they thought they were good students or not), they frequently mentioned whether or not they were eventually going to college. In their review of student college choice literature, Cabrera and LaNasa (2000b) found evidence that supported the notion that

students' college aspirations and academic ability may have reciprocal effects on one another. Cabrera and LaNasa (2000b) argued that students' college aspirations had a direct effect on their pursuit of college-preparatory academic preparation and vice-versa. Similarly, Levine and Nidiffer's (1997) qualitative study revealed that low-income students who gained access to prestigious four-year universities had developed a sense of specialness early in their academic careers through making good grades, enrolling in honors classes, and receiving academic awards. According to Levine and Nidiffer (1997), these students exhibited a sense of independence and self-reliance which made their college aspirations seem second nature. Ceja (2004) reported that the college aspirations of first-generation Hispanic female students may have been simultaneously effected by parents who stressed the importance of making good grades in school. Ceja (2004) explained that although parent-student discussions about the importance of educational success did not explicitly mention college or the importance of attending a particular type of college, the motivational discussions to get good grades and to do well in school were critical to the formation of college aspirations.

Scholars have also examined the mediation effects of gender and race or ethnicity on the relationship between students' college aspirations and academic ability. For example, Trusty (2002) found that the effect of reading scores on college aspirations were stronger for female students and the effect of math scores on college aspirations were stronger for male students. Utilizing NELS base-year data, Mau (1995) investigated the relationship between college aspirations and academic achievement and whether this relationship differed according to the race or ethnic background and gender of the student. Using chi-square tests of independence and analysis of variance (ANOVA) statistical procedures, Mau (1995) found that college aspirations were significantly and positively related to students' current

academic achievements. Mau (1995) reported that, while White students who scored highest on science and reading tests had the second highest college aspirations levels, Asian American students who scored highest on standardized math tests had the highest college aspiration levels. Though Mau (1995) found positive associations between college aspirations and academic ability for African American, Asian, Hispanic, Native American, and White students, the association was weaker for Hispanic and Native American students. Contrary to the myth that high college aspirations among African American and Hispanic students are transitory or have little correlation with actual school performance, Mau (1995) argued that results from her study provided evidence that minority students who do well academically tend to have high college aspirations.

Studies have also found evidence that students' academic ability or academic track could determine the amount of support and encouragement provided by parents, family members, teachers, counselors, and other educational mentors. In turn, studies have shown that family or school support (or lack thereof) has a direct effect on students' college aspirations. For example, in a study comparing the college aspirations of African American, Asian, Hispanic, and White eighth grade students, Hamrick and Stage (2004) found that grades significantly impacted college aspirations indirectly through parental encouragement. Moreover, Hossler and Stage (1992) concluded that parental SES had a positive effect on students' academic success, which, in turn, influenced the levels of encouragement and expectations for college attendance the students received from both parents and school personnel. Similarly, Hossler and associate's (1989) study found that parents provided the most encouragement to students with the highest academic ability. Additionally, in their qualitative study comparing two groups of equally academically-gifted students, Gonzales

and associates (2003) found that the students who went on to attend four-year colleges reported having highly supportive counselors. Contrarily, Gonzales and associates (2003) reported that those students who went on to attend a community college often suffered from institutional neglect during their elementary and secondary school grades which limited their opportunities to participate in academic preparatory program needed for four year college access.

*Parental influence.* Scholars (e.g., Cabrera & LaNasa, 2000a; Tierney & Colyer, 2005) have consistently identified various forms of parental influence as significant predictors of students' college aspirations. Tierney and Colyer (2005) explained that positive parental effects on students' educational outcomes could be more important than ever due to a growing lack of guidance and support from school personnel throughout the secondary school grades. In support of Tierney and Colyer's (2005) explanation, Mau and colleagues (2004) reported that the majority of tenth grade students participating in the first follow-up NELS were more likely to receive encouragement for college attendance from their parents than they were from counselors, teachers, peers, and other educational mentors. Similarly, Levine and Nidiffer (1998) found that the students from low-income backgrounds who eventually matriculated into prestigious universities identified parents as their primary source of motivation, more so than teachers, counselors, and other educational mentors.

In their recent comprehensive review of student college choice research, Cabrera and LaNasa (2000a) found that parental influences were directly and positively related to the initial formation and subsequent maintenance of college aspirations. Cabrera and LaNasa (2000a) identified two dimensions of parental influences: motivational and proactive. Cabrera and LaNasa (2000a) explained that scholars utilizing motivational forms of parental

influences examine the impact that parents' expressed levels of encouragement and expectations have on adolescents' college aspirations. In contrast, scholars utilizing proactive forms of parental influence examine the impact of parental involvement in the form of active participation in the schooling process have on adolescents' college aspirations. Examples of proactive forms of parental involvement used in college aspirations' studies have included participation in school activities, engaging in educational-related discussions with their child, monetary savings for their child's college education, and assisting their child with homework or class projects.

Typically, studies utilizing motivational forms of parental influence have found positive correlations between students' college aspirations and parental encouragement and expectations. For example, utilizing NELS first follow-up survey data (NELS:90), Kao (2002) reported that tenth grade students whose parents expected them to attain a college degree were four times more likely to have college aspirations than tenth grade students whose parents did not expect them to go to college. Likewise, utilizing the same NELS data, Kim and associates (1998) found that parental educational expectations had the greatest impact on the college aspirations of Asian American students, regardless of the student's ethnic origin. Similarly, Flowers and associates (2002) found a positive correlation between the college aspirations of tenth grade students and parental college expectations.

Studies have also indicated that proactive forms of parental influence (e.g, parent-student discussions concerning educational matters, involvement in school activities) were directly and positively related to students' college aspirations. For example, utilizing NELS base-year data, Kao's (2002) study found that students whose parents started saving money for their child's college education prior to their child's eighth grade year reported higher

college aspirations than those students whose parents started saving later than the eighth grade. Similarly, Hossler and Vesper (1992) found that students whose parents indicated a propensity to save for their child's education had higher educational aspirations than students whose parents had not saved for their child's college expenses.

Studies have also examined the effects that parental involvement in school activities and parent-student discussions regarding educational planning have on students' college aspirations. For example, utilizing NELS data, Perna (2000) found that parental involvement in school activities was a significant predictor of the type of college or university (two-year or four-year) the student aspired to attend after high school. In another study utilizing NELS base-year data and social networking theory, Smith-Maddox (1999) examined the relationships between African American eighth grade students' college aspirations and their access to social and cultural resources. Smith-Maddox's (1999) ordinary least squares regression analysis revealed that discussions with parents regarding educational issues, parental education attainment, and parental expectations all had positive effects on students' college aspirations. In accordance with social network theory, Smith-Maddox (1999) suggested that the positive relationship between parental involvement and college aspirations indicated that benefits accrue to students whose parents participate in their academic affairs.

Studies have also suggested that amounts or levels of parental encouragement, expectations, involvement, and support could be stratified by race or ethnicity. For example, Kao (2002) found that over eighty percent of Asian parents hoped their eighth grade student would eventually attend and graduate from college. At the same time, only sixty percent of African American and White and fifty percent of Hispanic parents in Kao's (2002) study had similar expectations. Additionally, Cheng and Starks (2004) reported that African American

and Asian parents held higher educational expectations for their children than did Hispanic and White parents. Likewise, Goyette and Xie (1999) found that Asian American parents had higher college expectations for their children than did African Americans, Hispanic, and White parents. Similarly, utilizing NELS data, Farmer (2001) found that tenth grade African American students were one and one-half times more likely to have discussed their college plans with their parents than were White students. Additionally, when controlling for parental education and income, Kao (2002) found that Asian American parents' college expectations for their children were two and one-half times higher than the college expectations of White parents. Kao (2002) also found that African American and Hispanic parents were almost one and one-half times more likely than White parents to have college degree expectations for their children.

Kao (2002) also found that Asian parents, regardless of socioeconomic status, had saved more money for their child's college expenses than White parents. Kao (2002) reported that African American and Hispanic parents were less likely than both Asian and White parents to have saved money for their child's college education. Additionally, the only two factors in Hamrick and Stage's (2004) study having a direct effect on the college aspirations of African American students were parental education levels and parental education expectations. Although the educational background of parents in Hamrick and Stage's (2004) study exerted a direct effect on college aspirations, every causal variable in the model was found to converge on the parental expectations variable.

Research (e.g., Cheng & Sparks, 2002; Hossler et al., 1999; Paulsen, 1990) has also indicated that the relationship between students' college aspirations and parental influence differs by the race or ethnicity, gender and socioeconomic status of the student's parents. For

example, Kao (2002) found that parental expectations had less of an effect on Hispanic tenth grade students' college aspirations than for African Americans, Asians, and White tenth grade students. Additionally, Kao (2002) reported that Asian and Hispanic eighth grade students were more likely than White eighth grade students to form high college aspirations, despite low parental encouragement and expectations. Utilizing NELS data, Mau and associates (1998) reported that the effect of maternal educational expectations and encouragement on tenth and twelfth grade students' college aspirations was much stronger than that of paternal educational expectations and encouragement. Similarly, Flowers and colleagues (2003) reported that the relationship between students' college aspirations and maternal educational expectations was stronger than the relationship between students' college aspirations and paternal educational expectations.

Mau and associate's (1998) also found that college aspirations of African American students were more positively effected by encouragement received from their high school counselors than from their own father. Surprisingly, Mau and associates (1998) also found that the effect of Asian American mother's educational expectations on their child's college aspirations was nearly sixty percent smaller than the effect of White mothers. Additionally, Cheng and Starks (2002) found that although minority parents had higher educational expectations for their children than did White parents, Asian and Hispanic mother's educational expectations and African American father's educational expectations had less of an effect on students' college aspirations than did White parents educational expectations.

Scholars have speculated as to why the effect of parental influences on students' college aspirations differs by the race or ethnicity and gender of the parent. Drawing from Coleman's (1988) social capital theory, Cheng and Starks (2002) hypothesized that minority

parents may exert greater influence on minority students' college aspirations because of the importance of social support perceived among minority groups when faced with racism and discrimination at school. Similarly, when examining data from the Iowa Youth and Family Project Longitudinal Study of Rural Families, McGrath and colleagues (2001) found that the college aspirations for students from rural schools was linked to the strong social ties that parents had with the local schools and general community. Additionally, in a qualitative study using life history research methods and a social capital perspective, Gonzales and his colleagues (2003) sought to understand how the relationships with family and school personnel impacted the college opportunities for Latina students. Building on the work of Ceja (2004), Gonzales and associates (2003) reported that frequency of exposure to and/or the accumulation of social capital or institutional neglect either expands or limits students perceived college opportunities. Gonzales and associates (2003) viewed high-volume agents of social capital as those parents and teachers who would be able to negotiate the transmission of valued resources and opportunities, despite school neglect. In line with student college choice literature, Gonzales and associates (2003) found that extended family members, teachers, counselors, peers, and specialized honors programs within schools acted as potential agents of social capital which either positively or negatively impacted the college opportunities of the students.

Cheng and Starks (2002) also hypothesized that because minority students may feel that significant others are less credible sources of accurate information regarding educational matters, significant others may have less of an effect on minority students' college aspirations than for White students. Utilizing NELS first follow-up data and binary logit regression models, Cheng and Starks (2002) found partial support for their hypotheses.

Cheng and Starks (2002) found that although minority parents had higher educational expectations for their children, Asian and Hispanic mothers and African American fathers had less influence on students' college aspirations than did White parents. Cheng and Starks' (2002) findings suggested that the less influence imparted by African American fathers was due, in large part, to the fact that the likelihood of the African American students living apart from their father was greater than students from other race or ethnic backgrounds. Additionally, Cheng and Starks (2002) speculated that students from African American families may view educational expectations from their fathers as less credible when developing their own educational aspirations. The positive effects imparted on African American students' college aspirations by their close relatives suggested that extended-kin communities were especially important in developing African American tenth grade students' college aspirations. Cheng and Starks (2002) also found that Asian American students tend to perceive higher educational expectations and Hispanic students tend to perceive lower educational expectations from their teachers and friends than do African American and White students. Based on their findings, Cheng and Starks (2002) suggested that the process through which the relationship between significant others and agents outside the family and students' college aspirations takes shape varies by race or ethnicity.

In addition to findings indicating varied effects of parental influences on students' college aspirations by parental race or ethnicity and gender (maternal/paternal effects), studies have also found differences between the relationship of students' college aspirations and parental socioeconomic status (SES). Perna (2000) pointed out that many minority students are placed in double jeopardy given that higher percentages of minority students versus White students are from low-income households where parents have attained little

college education. Most studies have found a direct and positive relationship between students' college aspirations and parental SES. For example, in their comprehensive review of student college choice studies, Hossler and associates (1989) found a consistent positive relationship between students' college aspirations and parental SES. Similarly, reviews by Paulsen (1990) and Hossler and Stage (1992) found that students with high SES parents reported consistently higher college aspirations when compared to students whose parents reported lower levels of socioeconomic status. More recently, utilizing data collected from the Children of Immigrants Project, St-Hilaire (2002) reported that parental SES was the single most significant factor in predicting the college expectations of eighth and ninth grade Mexican-immigrant students.

Scholars have posed various theoretical rationales in their attempts to understand why parental SES generally has a direct and positive effect on students' college aspirations. In general, scholars have theorized that higher SES parents provide higher levels of encouragement and set higher educational expectations for their children than parents from lower SES backgrounds. Additionally, McDonough (1997) argued that parents who had attended college themselves were more proactive in preparing their daughters for college. Similarly, Reynolds and Pemberton (2001) argued that higher levels of parental education and income had positive effects on students' college aspirations due to parental knowledge of the student college choice process. Moreover, McGrath and colleagues (2001) found that students' college aspirations were linked to having well-educated and high socioeconomic status parents who were actively involved in the local schools.

Despite the generally positive indirect effects of parental SES on college aspirations, some studies have also indicated that parental SES has little effect on students' college

aspirations. For example, McGrath and colleague's (2001) study indicated that some students formed high levels of college aspirations despite the fact that their parents were middle to low-SES status and were not involved with their child's school activities.

Likewise, the Columbian immigrant mother who never finished primary school in Levine and Nidiffer's (1997) study made up for her deficiency by cultivating her daughter's teachers through one-on-one meetings and by sending them gifts.

Recognizing the importance of positive parental influences on students' ability to form and maintain college aspirations through the educational pipeline, researchers (e.g., Hamrick & Stage, 2004; Hossler & Stage, 1992; Hossler et al., 1999) have also examined factors effecting the levels of parental expectations, encouragement, involvement, and propensity to save for their child's college education. These studies generally indicated that parental influences were often mediated by parent SES, family structure (e.g., marital status, number of children), race or ethnicity, and immigration status. For example, Hamrick & Stage (2004) found that having at least one college educated parent, being from a higher income family, and being female all had significant positive effects on parental educational expectations for their children. Utilizing NELS data, Kao and Tienda (1998) reported that parental educational expectations were mediated by the parent's socioeconomic status. Kao and Tienda (1998) reported that higher SES parents tended to have higher educational expectations for their children, which, in turn, positively influenced the student's ability to both form and maintain college aspirations between the eighth and twelfth grades. When examining NELS base-year data, Hamrick and Stage (2004) reported that parent's educational expectations were negatively related to their child's participation in extracurricular activities. Based on their findings, Hamrick and Stage (2004) speculated that

parents did not want their children to participate in school activities due to the time taken away from their studies and due to potentially negative peer effects. Additionally, when utilizing NELS data to study the effects of immigrant status on parental influences, Kao (2002) reported that recent immigrant parents were more likely than non-immigrant parents to expect their children to attain a college degree.

In conclusion, this review of literature revealed that the college aspiration phenomenon is an often ambiguous, complex, and longitudinal process impacted by a multitude of student and parent characteristics. In particular, this review revealed that students' college aspirations vary by academic ability or preparation, gender, and race or ethnic background. Additionally, this review of literature indicated that both motivational and proactive forms of parental influences have direct effects on students' college aspirations.

In closing, this review revealed that developing and maintaining college aspirations can be particularly challenging for Hispanic students (particularly females), African American students (particularly males), certain Asian ethnic groups, as well as those students from low-income or first-generation households. Additionally, this review of literature revealed that in order for students to successfully form and maintain high college aspirations through the college choice process, consistent parental encouragement, involvement, and support is needed. Students need early and continuous support and intervention similar to Anita, one of the poor immigrant students identified in Levine and Nidiffer's (1997) study. Anita was encouraged by her mother, befriended a small group of college-bound friends at her school, and encountered teachers with high levels of educational expectations and encouragement through her enrollment in college preparatory classes, select extracurricular

activities, and pre-college summer programs. Every significant person in Anita's life reinforced every other one resulting in her ability to form and maintain high college aspirations.

#### *Limitations of College Aspirations Research*

Despite all that this review of literature revealed about factors impacting college aspirations among secondary school students, much more research is needed. For example, there remain questions regarding the factors impacting the college aspirations of African American and Hispanic students. Hamrick and Stage (1998) recognized a need for new conceptual models accounting for the school experiences of African American students in order to identify the influences and processes impacting their ability to form and maintain college aspirations. Similarly, Farmer (2001) indicated that studies have been limited due to their inability to assess minority student experiences with discriminatory school practices. Farmer (2001) explained that research inquiries were needed to assess whether or not these experiences could be related to students' ability to form and sustain college aspirations throughout the educational pipeline.

Another limitation concerns the lack of recent studies accounting for school contextual effects (e.g., student and faculty race or ethnic composition, average school SES) on students' college aspirations. Although studies (e.g., Hamrick & Stage, 2004; Hamrick & Stage, 1998) have examined college aspirations of at-risk students attending predominately low-income, high-minority schools, only a few studies (e.g., Goldsmith, 2004; Yun & Kurlander, 2004) have studied the college aspirations among students attending multi-racial schools.

Yet another limitation concerns the lack of longitudinal studies. Most studies have been cross-sectional in nature, only examining the effects of student background, school experiences, and school effects on students' college aspirations during a single point in time. Although literature (e.g., Kao & Tienda, 1998) has established that many students, especially African Americans and Hispanic students and those students with parents from low socioeconomic backgrounds, fail to maintain previously high college aspirations throughout their secondary school years, few studies have examined why this change takes place. Recognizing this limitation, St-Hilaire (2002) called for longitudinal research comparing college aspirations at two or more points in time in order to shed greater light on the social adaptation of Mexican-origin youth. Additionally, although Perna and Titus (2005) found that parental involvement was positively and directly related to college access for twelfth grade students, they speculated that much of the effect of parental involvement on college access could be explained through its impact on students' ability to form and maintain college aspirations during earlier school years (e.g., 8<sup>th</sup> and 10<sup>th</sup> grades). Moreover, although studies have consistently found positive relationships between college aspirations and parental involvement during a single point in time, there have been no known studies that have examined whether the relationship between college aspirations and parental involvement differs over time. Based on this limitation, longitudinal studies examining the relationship between students' college aspirations and parental involvement are warranted.

While no known study has examined whether the relationship between college aspirations and parental involvement changes over time, a very limited number of studies have indicated that the effect of parental involvement on students' educational outcomes may change over time. For example, utilizing transcript and survey data from a sample of

California high school students, Crosnoe (2001) revealed that in spite of the fact that students placed within college-preparatory academic tracks began high school with high levels of academic orientation and parental involvement rates, the same students also experienced sharp declines in both over time. Crosnoe's (2001) study further revealed that the sharpest declines in the frequency of parental involvement during high school years were among the highest achieving and minority students. Additionally, Crosnoe's (2001) study revealed that parental involvement promoted academic orientation, but only among students who were enrolled in non-college preparatory tracks.

Recognizing the limitations of his study, Crosnoe (2001) called for further research focused on academic trajectories in the context of the student's life course. Crosnoe (2001) specifically called for research accounting for the time-varying effects of academic achievement at various times during a student's educational career. In addition to academic orientation, Crosnoe (2001) called for studies focusing on other academic trajectories (e.g., extracurricular activities), as these trajectories may interact with the student's psychological orientation towards school and parental orientations towards their child's education. Additionally, making note of the limited inferential ability of his own study due to its small sample size, Crosnoe (2001) recommended that scholars take advantage of nationally representative data sets (e.g., NELS), since they would provide less biased data from which to generalize findings.

Based upon Crosnoe's (2001) call for further studies focused on academic trajectories, along with past student college choice research findings, accounting for time-varying effects of parental involvement on college aspirations during the eighth and tenth grades provides a conceptual framework from which students' ability to maintain college

aspirations between these two critical periods can be better understood. Student college choice theory (e.g., Hossler & Gallagher, 1987; Kao & Tienda, 1998) also contends that students who form college aspirations early in their educational careers and subsequently maintain these aspirations through the tenth grade are more likely to enroll in college. Additionally, student college choice literature (Cabrara & LaNasa, 2000a) indicates that parental influences (e.g., parental involvement in educational planning) are among the strongest predictors of college aspirations. Thus, examining the relationship between students' college aspirations and parental involvement over the course of the secondary school experience is an area of research worthy of further exploration.

### **Chapter III: Research Design and Methodology**

A review of current literature illustrated the lack of research investigating differential effects of parental involvement on the likelihood of students having high college aspirations between the eighth and tenth grade periods. Although scholars have investigated the effects of parental involvement on students' college aspirations during the eighth and tenth grades, respectively, past research has not examined whether the relationship between students' college aspirations and parental involvement differs between the eighth and tenth grades. In an attempt to address this gap in the literature, this study used fixed-effects logistic regression models to examine the possible differential effects of parental involvement on students' college aspirations between the eighth and tenth grade school years. Specifically, this study used data from the restricted-use version of the National Educational Longitudinal Survey's base-year (1988) and first follow-up (1990) samples to answer the following research questions in sequential order:

- 1) What is the relationship between students' college aspirations and parental involvement during middle school (8<sup>th</sup> grade), while taking into account other variables?
- 2) What is the relationship between students' college aspirations and parental involvement during high school (10<sup>th</sup> grade), while taking into account other variables?
- 3) Does the relationship between students' college aspirations and parental involvement, while taking into account other variables, differ between middle school (8<sup>th</sup> grade) and high school (10<sup>th</sup> grade)?

This chapter outlines the research design and methodology used to address the above research questions. A discussion of the NELS sampling design and instrumentation provides an overview of how the National Center for Educational Statistics (NCES) collected the eighth and tenth grade NELS data. This chapter also provides a detailed description of the variables included in the analyses along with rationales for the selection and operationalization of variables. This chapter proceeds with an explanation of statistical techniques (missing values analysis and imputation, factor analysis, and multicollinearity analysis) used to prepare the NELS eighth and tenth grade data for the fixed-effects logistic regression analyses. Following the overview of data preparation techniques this chapter then discusses, in detail, how and why fixed-effects logistic regression and seemingly unrelated estimation statistical techniques were used to answer the three research questions. Finally, the chapter concludes with an acknowledgement of the statistical limitations of this study.

### *Research Design*

In order to answer this study's research questions, a causal-comparative research design was utilized. Causal-comparative methodology was utilized because it allows the researcher to explore possible causes for the phenomenon being studied by comparing subjects in whom a characteristic is present (e.g., high college aspirations) with similar subjects in whom the characteristic is absent or present to a lesser degree (e.g., low college aspirations). However, it must be noted that causal-comparative research designs are used to explore causal relationships, not confirm them (Borg & Gall, 1989).

In this study, secondary analysis of data collected by the National Educational Longitudinal Survey (NELS) was utilized. Sponsored by the National Center for Educational Statistics (NCES), the general purpose of NELS is to allow researchers the ability to examine

“change in young people’s lives and the role of schools in promoting growth and positive life outcomes” (Curtin et al., 2002, pp. 151). Secondary analysis of NELS data as a research methodology was employed because it provided an efficient and reliable means of obtaining data. Furthermore, the NELS data provides nationally representative samples of both eighth grade and tenth grade students.

### *NELS Sample Design*

*Eighth grade sample.* The NCES implemented a multistage, clustered sampling design in order to select a nationally representative sample of eighth grade schools and students. An initial target sample size of 1,032 schools was selected from a national frame of 38,866 schools. This initial sampling frame created groups of schools called strata. Within each stratum, schools were sorted into superstrata according to school type (public, private, Catholic) and geographic region (North, South, East, West). From the superstrata groups, substrata were formed based on school location (urban, suburban, or rural area) and according to the school’s minority classification (percentage minority).

In the base year NELS design, students were the second stage sampling unit. A random selection of 26,432 students from participating schools resulted in 24,599 eighth grade students. NCES augmented this random sample with an oversample of Asian/Pacific Islander and Hispanic students, resulting in an average of 23 eighth grade students from each school.

*Tenth grade sample.* For the first follow-up sample, base-year students attending school in 1990 were sub-sampled with probabilities of selection related to the number of other base-year students attending the same school. Base-year students who matriculated to high schools with at least ten other base-year students were selected with certainty.

Otherwise, base-year students were sampled into the first follow-up sample with probabilities of selection greater than zero, but less than 1. NCES found that approximately 75 percent of the students (19,568 of 25,988) had matriculated into approximately 23 percent of the same high schools (908 of 3,967). For convenience and economical reasons, NCES included all 19,568 of these tenth grade students in the first follow-up sample. The remaining 6,420 students were distributed among 3,059 schools with 10 or fewer members of the base-year sample. In order to maintain a representative sample of tenth grade students, NCES implemented a freshening process which added an additional 1,997 students who were not contained in the base-year sampling frame. Of these additional students, 855 were considered eligible. The final first follow-up sample consisted of 20,706 tenth grade students.

The analytic sample (9,707) utilized in this analysis was determined by the number of students participating in both the base-year and first follow-up surveys during their eighth and tenth grade school years. Additionally, only students providing complete and reliable responses to questions used to operationalize key variables (college aspirations, gender, and race/ethnicity) in the conceptual framework were utilized.

*Response bias.* NCES staff took several precautions to reduce the effects of non-response bias. For example, in order to reduce school-level non-response effects extra schools were selected from the same super-stratum and substratum. As a result, an additional 359 schools available from the replacement pool were selected, resulting in a total school sample size of 1,057. From these 1,057 cooperating schools, 1,052 (815 public schools and 237 private schools) contributed usable student data.

To further alleviate concerns of sampling bias problems, non-responding schools were asked to supply information about key school questionnaire variables. Based on the similar contextual characteristics between non-response schools and participating schools, the NCES concluded that the impact of non-responding schools on school-level estimates would be small.

In order to compensate for unequal probabilities of selection, sampling bias, and to adjust for the effects of non-response, sampling weights were applied to the usable data for both the 1988 and 1990 samples. In this study, NELS sample weight (F4F1PNWT) was utilized so that the analytic sample could be projected to the population of approximately 3,008,080 eligible tenth grade students in public, Catholic, and other private schools during the 1990 school year. The F4F1PNWT sample weight was obtained from the restricted-use NELS first follow-up survey dataset. The NCES formulated the F4F1PNWT sampling weight to account for the underrepresentation of certain undersampled student populations, to take into account the effects of the stratified and clustered sampling design, and to allow for inference of findings to the entire population of 10th grade students attending U.S. public and private schools in 1990 (Curtin et al., 2002).

#### *NELS Instrumentation*

In order to answer the research questions, data collected via NELS questionnaires administered to students during both the eighth grade year (base-year survey) and tenth grade year (first follow-up survey) were utilized. The student questionnaires collected pertinent information needed to conduct this study, including measures of student and parent characteristics and college aspirations.

*Validity and reliability of NELS student questionnaire items.* NCES administrators implemented both pre- and post-test strategies in order to gauge the quality of the student questionnaire items. For example, prior to the base-year student survey administration, the NCES field tested student questionnaire items on a 1987 eighth grade cohort. Based on feedback from this cohort, questionnaire items were either modified or deleted (Rock & Pollack, 1995).

Following the administration of the student questionnaire to the base-year eighth grade student sample in 1988 several studies were conducted in order to evaluate the student questionnaire's measurement quality. Kaufman and Rasinski (1991) gauged the validity and reliability of student background and school-related questions by comparing student and parent responses to similar questionnaire items. Utilizing parent responses as the standard upon which student response quality were based, Kaufman and Rasinski (1991) discovered that students were relatively reliable informants of race or ethnicity ( $r = 0.77$ , percentage matched = 91.6), number of siblings ( $r = 0.83$ , percentage matched = 82.2), and number of older siblings ( $r = 0.85$ , percentage matched = 86.4). Students and parents were less likely to agree on whether their parents were at home when the student came home from school (father,  $r = 0.61$ , percentage matched = 55.0; mother,  $r = 0.70$ , percentage matched = 64.9). Kaufman and Rasinski (1991) also reported that students were moderately reliable informants of their parent's occupations (father,  $r = 0.53$ , percentage matched = 51.8; mother,  $r = 0.42$ , percentage matched = 47.8) and parent's expectations for their student's education (father,  $r = 0.41$ , percentage matched = 47.5; mother,  $r = 0.434$ , percentage matched = 43.1).

Kaufman and Rasinski (1991) reported that the validity and reliability of student responses were stratified by student socioeconomic status (SES), academic ability, and race

or ethnic background. For example, Kaufman and Rasinski (1991) reported that low SES students and those with lower reading skills provided less valid and reliable responses regarding family characteristics. Furthermore, the validity coefficients and the percentage of cases matched for most items were also generally lower for African American and Hispanic respondents than for Asian and White respondents. The mean validity coefficient for White students was 0.64, 0.65 for Asian students, 0.53 for African American students, and 0.59 for Hispanic students. The mean percentage of cases matched for all items was 63.1 percent for Asian students, 59.8 percent for Hispanic students, 56.5 percent for African American students, and 65.5 percent for White students.

While Kaufman and Rasinski (1991) reported moderate to high validity coefficients for student and family background items, they reported generally lower validity coefficients for school-related items. For example, the mean validity coefficient for school-related items was 0.26. However, the percentage of cases matched was somewhat higher for school-related variables than for the family background variables (66 percent compared to 63 percent). In general, the effect of SES and reading ability on the validity of the school-related variables was similar to their effect on the validity of the family background variables. For example, while the mean validity coefficient for all school-related variables was 13.6 percent higher for high-SES students than for low-SES students, the mean validity coefficient for all family background variables was 13.2 percent higher for high-SES students. Furthermore, the validity coefficients and the percentage of cases matched between parent and student responses regarding the frequency of parent-student and parent-school interactions was slightly higher for students with higher SES levels and higher reading abilities (Kaufman & Rasinski, 1991).

Kaufman and Rasinski (1991) noted the validity measures of the school-level items should be interpreted with caution due to their subjective nature. For example, parent and student responses to questions related to school safety and parent-student discussions about school matters are items related to opinion as opposed to fact. Thus, it is unclear whether the parent or student is best informed about the student's school life.

Comparing base-year student responses with second follow-up student responses to similar questions, McLaughlin and Cohen (1997) found that students' educational expectations were moderately convergent, with a polychoric correlation of 0.57. They also found that this measure was relatively stable with an average slightly below the level of expecting to graduate from a four-year college. McLaughlin and Cohen (1997) also reported that due to the overall low rates of omitted student responses to questionnaire items for base year and second follow-up students, respectively (0.7 percent and 3.8 percent), item response omission bias should not be a concern. However, McLaughlin and Cohen (1997) reported that more than 12 percent of the responses were omitted regarding students' perceptions of parental educational aspirations for them. McLaughlin and Cohen (1997) further explained that students omitting the questions regarding parent's educational expectations generally had lower perceptions of their parent's aspirations for them compared to those students responding to the question.

### *Variables*

Utilizing restricted-use NELS base year and first follow-up survey data (NELS:88/90) key variables from the conceptual model (Figure 3.1) were operationalized in order to answer this study's research questions. In accordance with the conceptual model, the dependent variables for both students' eighth and tenth grade years were measures of college

aspirations. The independent variables were measures of students' gender, race or ethnicity, academic ability, and parental characteristics (SES, father's and mother's educational expectations for their child, and parent-student discussions regarding educational-related matters).

The following sections detail how each of the variables used in this study were operationalized. Additionally, Tables 3.1 and 3.2 include the dependent and independent variables of interest for both students' eighth and tenth grade school years. These tables include descriptions of the corresponding NELS survey questions used to collect the data during both the eighth and tenth grade years.

*College aspirations.* During both the base year and first follow-up surveys, students were asked to respond to the following question: "As things stand now, how far in school would you like to go?" In the base year questionnaire, students were given six response choices: "won't finish high school," "will finish high school," "will attend vocational, trade, or business school after high school," "will attend college," "will finish college," and "will attend a higher level of school after graduation from college," scored 1 to 6, respectively. In the first follow-up questionnaire, students were given nine response choices: "less than high school," "high school graduate only," "less than two years of trade school," "two-plus years of trade schools," "greater than two years of trade school," "two or more years of college," "finish college," "master's degree," or "Ph.D or M.D.," scored from 1 to 9, respectively. Past studies (e.g., Kao & Tienda, 1998) utilizing NELS data to study college aspirations have found relatively high aspiration levels among students during both the base-year (8<sup>th</sup> grade) and first follow-up year (10<sup>th</sup> grade), respectively. Like Kao and Tienda (1998), this study

**Table 3.1**

***Operational Definitions for the Variables used in the Eighth Grade Analyses.***

<b>Dependent Variable</b>	<b>NELS Source/ Questions</b>	<b>Operationalization</b>
College Aspirations	BYS45: “As things stand now how far in school do you think you will get?” (1) Won’t finish H.S. (2) Will finish H.S. (3) Vocational, trade school (4) Will attend college (5) Will finish college (6) Higher school after college	Recoded into a binary value; high college aspirations (5,6) was set equal to 1, low college aspirations (1, 2, 3, 4) was set equal to 0. Low college aspirations set equal to won’t finish H.S., will finish H.S., Vocational, trade school, or will attend college. High college aspirations equal will finish college or higher school after college.
<b>Independent Variables</b>		
Gender	BYS12: “What is your sex?” (1) male, (2) female	Recoded. Binary: Male set equal to 1, otherwise 0, Female is the reference group.
Race/Ethnicity	BYS31A: “What best describe you?” (1) Asian, Pacific Islander (2) Hispanic, (3) Black, Non-Hispanic (4) White, Non-Hispanic	Recoded. Binary: Asian (1) or non-Asian (0); Hispanic (1) or non-Hispanic (0); Black (1) or non-black (0). White is the reference group.
Academic Ability	BY2XCOMP: NELS standardized Test composite for reading and math	Recoded. Measured on an Interval Scale. Subsequently grand mean centered and standardized.
Parental SES	BYSSEQ: Constructed using father’s education, mother’s education father’s occupation, mother’s occupation, and family income: separated into quartiles, (1) low SES, to high SES (4)	Measured on an ordinal scale ranging from lowest SES(1), lower mid-25 percentile(2), upper mid-25 percentile (3), highest SES (4).
Father’s and Mother’s Educational Expectations	BYS48A & BYS48B: How far in school do you think your father and your mother want you to get? (1) Less than high school (2) Graduate from high school (3) Vocational, trade, or business school after high school (4) Attend college (5) Graduate from college (6) Higher school after college (7) Don’t know or don’t care	Recoded. Ordinal. Don’t know or don’t care (0) Less than high school (1) Graduation from high school (2) Vocational, trade, or business School (3) Attend college (4) Graduate from college (5) Higher school after college (6). Subsequently, grand mean centered and standardized.
Parental Involvement	BYS36A, BYS36B & BYS36C: “Since the beginning of school how often have you discussed any of the following with either of your parents or guardians?” A. selecting courses, or subjects at school, B. school activities or events of particular interest to you, C. things you’ve studied in class. Response choice include: (1) not at all, (2) once or twice, or (3) three or more times	Factor scores based on principal factor analysis of the three eighth grade parental involvement measures.

**Table 3.2**

***Operational Definitions for the Variables used in the Tenth Grade Analyses.***

<b>Dependent Variable</b>	<b>NELS Source/ Questions</b>	<b>Operationalization</b>
College Aspirations	F1S49: “As things stand now how far in school do you think you will get?” (1) Less than H.S. (2) H.S. graduate (3) Less than 2 years of trade school (4) 2-plus years of trade school (5) Less than 2 years of college (6) More than 2 years of college (7) Finish college (8) Master’s degree (9) PH.D, M.D.	Recoded into a binary value: high college aspirations (7,8, or 9) was set equal to 1, while low college aspirations (1,2,3,4,5, or 6) was set equal to 0. Low college aspirations equal less than H.S, H.S. graduate, less than 2 years of trade school, 2-plus years of trade school, less than 2 years of college, more than 2 years of college. High college aspirations equal finish college, master’s degree, or PH.D, M.D.
<b>Independent Variables</b>		
Gender	F1SEX: taken from BY composite variable, (1)male, (2)female	Recoded. Binary: Male (1) or Female (0). Female is the reference group
Race/Ethnicity	F1RACE: taken from BY composite Race “What best describe you?” (1) Asian, Pacific Islander (2) Hispanic (3) Black, Non-Hispanic (4) White, Non-Hispanic	Recoded. Binary: Asian (1) or non-Asian (0); Hispanic (1) or non-Hispanic (0); Black (1) or non-black (0). White is the reference group
Academic Ability	F12XCOMP: NELS standardized Test composite for reading and math	Recoded. Measured on an Interval Scale. Subsequently grand mean centered and standardized.
Parental SES	F1SESQ: Constructed using father’s education, mother’s education father’s occupation, mother’s occupation, and family income: separated into quartiles (1) low SES, to (4) high SES	Ordinal scale ranging from lowest SES(1), lower mid-25 percentile(2), upper mid-25 percentile (3), highest SES (4).
Father’s and Mother’s Educational Expectations	F1S48A & F1S48B: How far in school do you think your father and your mother want you to get? (1) less than high school (2) graduation from high school (3) vocational, trade, or business school (4) Attend 2-year college (5) Attend 4-year college (6) Graduate from college (7) Post graduate education (8) Don’t know, or don’t care	Recoded. Ordinal: don’t know, or doesn’t care (0), less than high school (1), graduation from high school (2), vocational, trade, or business school (3), attend two-year college (4), attend four-year college (5), graduate from college (6), post-graduate education (7). Subsequently, grand mean centered and standardized.
Parental Involvement	F1S105A, F1S105B, F1S105C: “Since the beginning of school how often have you discussed any of the following with either of your parents or guardians?” A. selecting courses, or subjects at school, B. school activities or events of particular interest to you C. things you’ve studied in class. (1) never, (2) sometimes, or (3) often	Factor scores based on principal factor analysis of the three eighth grade parental involvement measures.

dichotomized college aspirations in a manner discriminating students with higher aspirations (e.g., will finish college) from those with lower aspirations (e.g., less than college). For analysis purposes, college aspirations were dummy coded and set equal to 1 for students indicating high college aspirations and equal to 0 for students indicating low college aspirations. For the eighth grade responses, students responding that they planned to either finish college (5) or attain an advanced degree after college (6) were coded a 1, indicating high college aspirations. Students indicating they planned to either attend college (4), attend a vocational, or trade school (3), at least finish high school (2), or not finish high school (1) were coded a 0, indicating low college aspirations.

Similarly, for the tenth grade survey responses, students indicating that they would either finish college (7), attain a master's degree (8), or attain PH.D, M.D. (9) were coded a 1, indicating high college aspirations. Students indicating that they either planned to attain more than 2 years of college (6), less than 2 years of college (5), 2-plus years of trade school (4), less than 2 years of trade school (3), graduate from high school (2), or not graduate from high school (1) were coded a 0, indicating low college aspirations.

*Gender.* Recent studies (e.g., Chenowith & Galliher, 2004; Mau et al., 2000; Reynolds & Pemberton, 2003) indicate that the ability to form and maintain college aspirations differs by gender. Therefore, this study used the student's response to the question "What is your sex," to create a gender variable. Response choices included either male or female on both the base-year and first follow-up NELS questionnaires. Dummy coding was used to identify males (1) and females (0). In this analysis, females were treated as the reference group.

*Race/Ethnicity.* This analysis measured a student's race or ethnic background based on the student's response when asked "What best describes you?" Response choices on both the base-year and first follow-up NELS questionnaires included Asian-Pacific Islander, Hispanic, Black, non-Hispanic, White, non-Hispanic, and American Indian. This analysis was limited to those students describing themselves as Asian Pacific Islander, Hispanic, Black (non-Hispanic), or White (non-Hispanic). For analytical purposes, race/ethnicity design variables were used with the race/ethnicity of interest (African American, Asian, Hispanic, or White) being set equal to 1, while all others were set equal to zero.

*Academic ability.* Previous studies (e.g., McDonough, 1997; Kao & Tienda, 1998) have shown that academic ability is a reliable predictor of college aspirations. Studies have indicated that test scores show not only a student's academic ability, but also academic interest and preparation. Whereas, other measures of academic ability such as curricula track and grade point average often vary tremendously from school to school. Thus, this study utilized a measure of academic ability based on scores from standardized math and reading tests administered and collected by the NCES during the NELS base-year (1988) and first-follow-up years (1990), respectively. For this analysis, academic ability was operationalized as an ordinal variable and was subsequently grand mean centered and standardized.

Designed by a team of curricula experts from the Educational Testing Service (ETS), the NCES tests aimed to measure the NELS respondent's ability in reading comprehension, mathematics, science, and social studies. Though all students in the base year completed the same test, the difficulty level of the mathematics and reading questions differed on each of six follow-up forms. Each sample member's test form during the first follow-up study was

determined by his or her scores on the base-year and/or first follow-up mathematics and reading tests.

According to Rock and Pollack's (1995) Psychometric Report for the NELS:88 Base Year Test Battery, the reliability of theta estimates for reading, math, science and history for the eighth grade cohort were 0.80, 0.89, 0.73 and 0.84, respectively. During the first follow-up, tenth grade test administration, Rock and Pollack reported that each of these reliability measures increased to 0.86, 0.93, 0.81 and 0.85, respectively. In addition to measures of reliability, Rock and Pollack calculated the construct validity of the test's content areas using intercorrelation scores. The average intercorrelations among content areas were calculated to be 0.72, 0.75 and 0.76 for the eighth, tenth, and twelfth grade cohorts, respectively.

Correlations between adjacent administrations within the same content areas were found to be higher than those found between content areas within the same administration. Rock and Pollack reported that finding was consistent with the notion that the content areas should show some discriminant validity. Also correlations between eighth and tenth grade scores were reported to be lower than those found between tenth and twelfth grade scores within all the content areas. This finding of stronger correlations between students' tenth and twelfth grade test scores versus the correlations eighth and tenth grade scores was consistent with the fact that proportionately greater changes in achievement measured by these tests occurred between the eighth and tenth grades than between the tenth and twelfth grades.

*Parent socioeconomic status (SES).* In accordance with past research (e.g., Goyette & Xie, 1999), this study utilized a composite socioeconomic variable constructed using data collected from the students' parents during the eighth grade school year (NELS:88). The SES variable combined parent education attainment, occupations, and family income into

one composite score (BYSES). Reliability of this composite variable was calculated using Cronbach's alpha and was found to be 0.74 (Peng, 1995). For the tenth grade survey, BYSES information was utilized to create a similar F1SES variable. Based on the BYSES and F1SES scores, the NCES created a SES quartile measure for each student during his or her eighth and tenth grade school years. These variables, BYSESQ and F1SESQ, were coded from 1 to 4, 1 reflecting the lowest SES quartile and 4 being the highest SES quartile.

*Father's educational expectations and mother's educational expectations.* Scholars (e.g., Kao, 2002; Kim et al., 1998) have found parental expectations to be related to a student's college aspiration levels. In accordance with past studies (e.g., Cheng & Starks, 2002), parental expectations were measured utilizing responses to questions collected from the student questionnaires administered during both the base-year and first follow-up surveys. During both the eighth and tenth grade years, students responded to the question, "How far in school do you think your father and your mother want you to get?" Response choices for the base-year included, "less than high school," "graduate from high school," "vocational, trade or business school after high school," "attend college," "graduate from college," "higher school after college," or "don't know, doesn't care." Response choices for the first follow-up included "less than high school," "graduate from high school," "vocational, trade or business school after high school," "attend 2-year college," "attend 4-year college," "graduate from college," "attend post graduate education," or "don't know, doesn't care."

For analytical purposes, the eighth grade student responses regarding perceived father's and mother's educational expectations were coded on a continuum from "don't know, doesn't care" (0), "less than high school" (1), "graduate from high school" (2),

“vocational, trade, or “business school after high school” (3), “attend college” (4), “graduate from college” (5), or “higher school after college” (6). Likewise, the tenth grade student responses regarding perceived father’s and mother’s educational expectations for them were coded on a continuum ranging from “don’t know, doesn’t care“ (0), “less than high school” (1), “graduate from high school”(2), “vocational, trade, or business school after high school” (3), “attend a 2-year college” (4), “attend a 4-year college” (5), “graduate from college” (6), or “attend post-graduate education”(7).

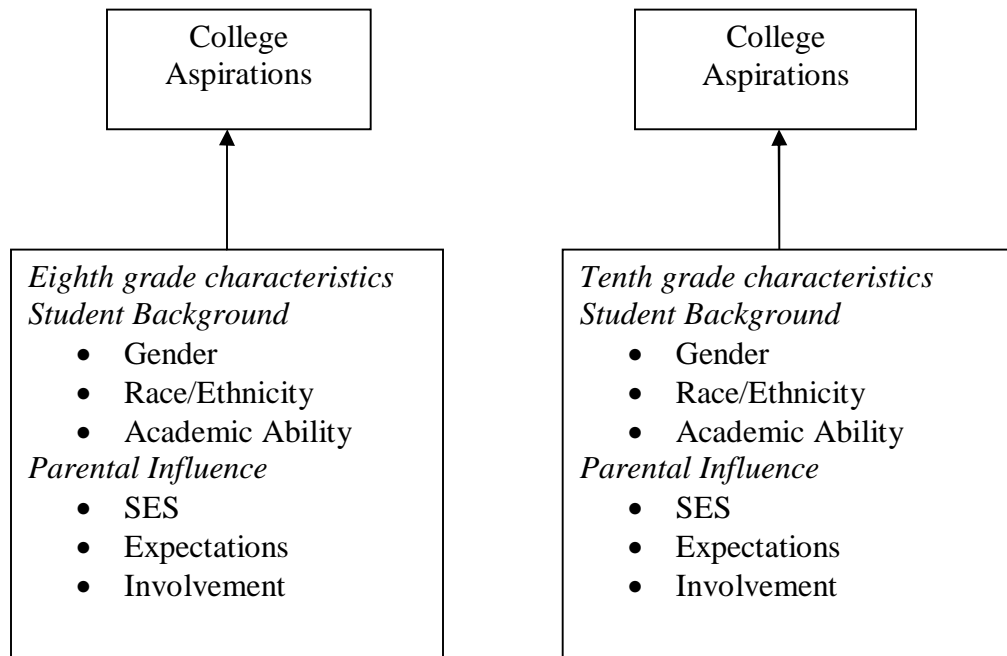
*Parental involvement.* Though multidimensional and qualitative measurements of parental involvement are desirable, most scholars (e.g., Perna & Titus, 2005) have been limited to quantitative measures of parental involvement. Typically, scholars (e.g., Conkin & Dailey, 1981) have measured parental involvement based on the frequency of parent-child discussions regarding educational issues or the parent’s participation in school activities. Parental involvement in the form of parent-student discussions regarding educational issues has been found to be a strong predictor of academic achievement and college plans (e.g., Farmer, 2001; Sui-Chu & Willms, 1996). Therefore, this study utilized a measure of parental involvement based on the frequency of discussions between the student and their parents regarding education-related activities. During both the base-year and first follow-up years, students were asked to recall the frequency of discussions with parents about the following topics: “selecting courses or programs at school,” “school activities or events of particular interest to you,” and “things studied in class.” The student response options for the base-year questionnaire included, “not at all,” “once or twice,” or “three or more times.” The student response options during the first follow-up were “never,” “sometimes,” or “often.”

For analytical purposes, factor scores computed from a factor analysis of the frequency of parent-student discussions regarding educational matters were utilized. According to Comrey (1992), factor analysis is performed by examining the pattern of correlations between observed measures. Measures that are highly correlated (either positively or negatively) are likely influenced by the same factors, while those that are relatively uncorrelated are likely influenced by different factors. In this analysis, principal factor analysis (PFA) was used to extract the factor scores. According to Comrey (1992), PFA is a form of factor analysis which seeks the least number of factors which can account for the common variance (correlation) of a set of variables. PFA is generally used when the research purpose is to identify latent variables which contribute to the common variance of the set of measured variables, excluding variable-specific (unique) variance (Comrey, 1992). PFA was appropriate in this study since it was used to reduce multiple intercorrelated variables (frequency of parent-student discussions regarding selecting courses, school activities, and things studied in class) into an underlying dimension (Parental Involvement) (Agresti & Finley, 1997).

### *Conceptual Framework*

Based on scholarly recommendations (e.g., Crosnoe, 2001; Perna & Titus, 2005; St-Hilaire, 2002), the purpose of this study was to examine whether the relationship between students' college aspirations and parental involvement differs between the eighth grade and tenth grade years, two critical time periods during which students initially form and subsequently reassess college aspirations. In this study, Figure 3.1 reflects the independent and control variables of interest. The outcome variable, college aspirations, reflects the amount of education students aspire to attain in the future (e.g., high school diploma, finish

college, etc.). The predictor variable of interest, parent involvement, refers to the frequency of conversations between the student and his or her parents regarding educational planning and preparation.



**Figure 3.1. A Conceptual Model used to Examine Differences between College Aspirations and Parental Involvement during Students' Eighth and Tenth Grades.**

The remaining independent variables included in the model are control variables. Studies have shown that concepts such as student background characteristics and parental influences either positively or negatively effect students’ college aspirations. In the model, student background characteristics refer to gender, race or ethnicity, and academic ability. Parental influence control variables refer to parental socioeconomic status and maternal and paternal educational expectations for their child.

### *Statistical Analyses*

Using data from the restricted-use version of the National Educational Longitudinal Survey's base-year (1988) and first follow-up year (1990), this study addressed three research questions in sequential order:

- 1) What is the relationship between students' college aspirations and parental involvement during middle school (8<sup>th</sup> grade), while taking into account other variables?
- 2) What is the relationship between students' college aspirations and parental involvement during high school (10<sup>th</sup> grade), while taking into account other variables?
- 3) Does the relationship between students' college aspirations and parental involvement, while taking into account other variables, differ between middle school (8<sup>th</sup> grade) and high school (10<sup>th</sup> grade)?

Fixed-effects multiple regression analyses, seemingly unrelated estimation (suest), and post-suest cross-model hypotheses tests were the statistical procedures utilized to address the research questions. Prior to conducting the fixed-effects multiple logistic regression, seemingly unrelated estimation analyses, and subsequent cross-model hypotheses tests needed to address the research questions, several statistical procedures were needed to prepare the NELS:88/90 data. Thus, this chapter begins with a discussion of the data preparation steps (missing values analysis and imputation, factor analysis, and multicollinearity analysis). Following the data preparation analyses overview, this chapter discusses the fixed-effects multiple regression, seemingly unrelated estimation, and

subsequent cross-model hypotheses statistical tests used to address this study's research questions.

The analytic sample used in this study contained 9,707 cases from the 12,144 cases available from the restricted-use NELS:88/90 dataset. The 9,707 cases were obtained after excluding cases for students who did not participate in both the eighth and tenth grade NELS during the 1988 and 1990 school years, respectively. Additionally, only cases in which the student reliably responded to questions regarding race or ethnicity, gender, and college aspirations were included in this analysis. This study did not utilize cases collected from students identified as Native American, since the number of cases ( $n = 413$ ) was too small to produce generalizable results. After cases not matching these criteria were deleted, 9,707 cases remained.

*Missing values analysis.* Although 9,707 cases represented a sufficient analytic sample size for this study, many cases were incomplete due to missing data on key independent variables. List-wise deletion of incomplete cases was not a viable option to handle the missing data because this method would have resulted in an insufficient sample size ( $N = 7,649$ ). Appendix A includes information regarding the number of cases missing for each variable as well as the means and standard deviations for cases with data present.

Of the variables used in the eighth and tenth grade models, the variables used to measure college aspirations (BYS45, F1S49), gender (Female, Male), race or ethnicity (Asian, Hispanic, African American, or White), and parental socioeconomic status (BYSESQ, F1SESQ) had complete data. The variables measuring eighth and tenth grade academic ability (BY12XCOMP, F12XCOMP) had missing data on 3.1 and 3.5 percent of the cases, respectively. The variables with most of the missing data related to the student's

perception of his or her parent's educational expectations and parental involvement. The eighth grade variables measuring the father's and mother's educational expectations (BYS48A, BYS48B) had missing data on 6.5 and 5.4 percent of the cases, respectively. Similarly, the tenth grade variables measuring father's and mother's educational expectations (F1S48A, F1S48B) had missing data on 2.0 and 2.3 percent of the cases. The eighth grade variables measuring parental involvement (BYS36A, BYS36B, and BYS36C) had missing data on 0.9, 0.8, and 0.9 percent of the cases, respectively. The tenth grade variables measuring parental involvement (F1S105A, F1S105B, and F1S105C) had missing data on 7.6, 7.7, and 7.7 percent of the cases, respectively.

In order to alleviate the problem with missing values, maximum likelihood estimation (MLE) as implemented by the EM-Algorithm in the SPSS *Missing Values Analysis*<sup>TM</sup> option was utilized to impute missing values. This method of missing data imputation was selected for various reasons. First, MLE makes fewer demands of the data in terms of statistical assumptions and is generally considered superior to imputation by mean imputation or multiple regression techniques. Through the use of MLE, EM-Algorithm provided better estimates and standard errors than other methods of imputation. Second, EM-Algorithm avoids one of the difficulties with conventional regression imputation, deciding which variables to use as predictors and coping with the fact that different missing data patterns have different sets of available predictors. Because EM-Algorithm always starts with the full covariance matrix it is possible to get regression estimates for any set of predictors, no matter how few cases there may be in a particular missing data pattern. Hence, EM-Algorithm always uses all of the available variables as predictors for imputing the missing data (Allison, 2000).

Appendix B provides the means and standard deviations for the imputed data sample (N = 9,707). Comparison of the variable means in Appendix B with those in Appendix A indicates that the biggest differences were found among the variables with the most missing data in both the eighth and tenth grade models: father's educational expectations (BYS48A, F1S48A), mother's educational expectations (BYS48B, F1S48B), and parental involvement (BYS36A-C, and F1S105A-C). However, even for these variables, none of the differences between the means of the list-wise deletion values and the imputed values exceeded one percent.

*Factor analysis.* Following the imputation of missing data for some of the key independent variables utilized in this study, factor analysis was conducted on three questionnaire items from both the eighth and tenth grade surveys (NELS:88/90) that were assumed measures of parental involvement (e.g., discussions about school activities, discussions about coursework, and discussions about extracurricular activities). According to Agresti and Finley (1997), factor analysis is performed by examining the pattern of correlations between observed measures. Measures that are highly correlated are likely influenced by the same factors, while those that are relatively uncorrelated are likely influenced by different factors (Agresti & Finley, 1997).

The form of factor analysis used in this study was principal factor analysis (PFA). According to Comrey (1992) principal factor analysis seeks the least number of factors which can account for the correlation of a set of variables. PFA is generally used when the research purpose is to identify latent variables which contribute to the common variance of the set of measured variables, excluding variable-specific (unique) variance. Therefore, PFA was appropriate in this study since it was used to reduce correlated variables (frequency of

parent-student discussions regarding selecting courses, school activities, and things studied in class) into an underlying dimension (parental involvement) (Comrey, 1992).

Prior to conducting the principal factor analysis using the assumed measures of parental involvement, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, Bartlett test of sphericity, and Cronbach alpha coefficients tests were calculated to determine the suitability (intercorrelation) of the eighth grade and tenth grade parental involvement measures for factor analysis. Results indicated that the measures of parental involvement met criteria for factor analysis based on the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, the Bartlett test of sphericity, and Cronbach alpha coefficients. Generally, KMO scores of 0.50 or higher are considered satisfactory to proceed with the factor analysis. For the three eighth grade parental involvement measures (BYS36A, BYS36B, and BYS36C), the KMO measure of sampling adequacy score was 0.69. Similarly, the KMO measure of sampling adequacy for the three tenth grade parental involvement variables (F1S105A, F1S105B, and F1S105C) was 0.63. Additionally, it was revealed that the Bartlett test of sphericity and the determinate of the correlation matrix scores provided further evidence that the measures were adequately correlated for factor analysis to proceed. For example, the eighth grade parental involvement measures for the Bartlett test of sphericity (chi-square = 2660.248,  $p < 0.001$ ) and the determinate of the correlation scores (0.473) provided strong evidence against the null hypothesis that none of the variables measuring eighth grade parental involvement were not correlated. Likewise, for the tenth grade parental involvement measures, the Bartlett test of sphericity (chi-square = 7265.64,  $p < 0.001$ ) and the determinate of the correlation scores (0.473) provided strong evidence against the null

hypothesis that none of the variables measuring tenth grade parental involvement were not correlated.

Cronbach alpha reliability coefficients were also calculated for both the eighth and tenth grade measures of parental involvement. For the eighth grade parental involvement measures (BYS36A-BYS36C), the Cronbach's alpha reliability coefficient was equal to 0.60, below the generally acceptable correlation threshold value of 0.70. Because scholars (e.g., Nunnally, 1978) have generally set an acceptable reliability coefficient standard of 0.70, the eighth grade parental involvement composite factor should be interpreted with caution. For the tenth grade parental involvement measures (F1S105A-F1S105C), the Cronbach's alpha reliability coefficient was 0.78, exceeding the generally acceptable reliability coefficient standard of 0.70. Based on the collective evidence of appropriate levels of intercorrelation, the variables used to measure both eighth and tenth grade parental involvement were deemed suitable for the factor analysis procedures.

Once the parental involvement measures were deemed suitable for factor analysis, student responses were subjected to the principal factor method in order to extract the factors. After the principal factor analysis was conducted, eigenvalues were examined to determine which factors to extract. According to Comrey (1992), the eigenvalue for a given factor measures the variance in all the variables which were accounted for by that factor. In this study, if a factor had a low eigenvalue, then it was viewed as contributing little to the explanation of variances in the variables and may be ignored as redundant with more important factors.

Based on the factor analysis results, only the first factors were necessary for both the eighth and tenth grade measures of parental involvement. Subsequent results of scree tests

for both the eighth and tenth grade parental involvement measures also suggested that only the first factors were meaningful. For the eighth grade sample, the extracted factor had an eigenvalue of 0.79 and accounted for 1.71 of the proportion of variation in the total sample accounted for by each factor. Similarly, the extracted factor for the tenth grade correlation had an eigenvalue of 1.39 and accounted for 1.30 proportion of the variation in the total sample accounted for by each factor. Questionnaire items from the eighth and tenth grade parental involvement measures and corresponding factor loadings are presented in Appendix C and Appendix D.

In interpreting the factor pattern, an item was said to load on the factor if the factor loading score was 0.30 or greater for that factor (Comrey, 1992). Utilizing this criterion, all three items from both the eighth and tenth grade parental involvement questionnaire items were found to load on the retained factor and were subsequently labeled the parental involvement factor for both the eighth and tenth grade models, respectively.

*Multicollinearity.* As noted by Agresti and Finley (1997), multicollinearity is often a concern when conducting logistic regression analyses. To alleviate multicollinearity of the variables used in both the eighth and tenth grade models, several variables (academic ability and mother's educational expectations and father's educational expectations) were grand mean centered and standardized, as indicated by their means of 0 and standard deviations of 1. According to Hamilton (2006), a variable is grand mean centered when the mean value for the variable is subtracted across all observations in the sample. Grand mean centering and standardizing variables alleviates possible issues of collinearity among variables resulting in more accurate coefficient estimates with lower standard errors (Hamilton, 2006). Grand mean centering was justified in this study for several reasons. First, the research questions in

this study focused on student-level variables, as opposed to school-level variables. Second, the hierarchical structure of the NELS data and potential presence of school-level effects on student-level outcomes were accounted for in this study through the use of school dummy variables (Umbach & Porter, 2002).

Following the mean centering and standardizing procedures, variance inflation factors (VIF) and tolerances were calculated. According to Acock (2006), if the VIF for any of the variables is greater than 10 or if the mean VIF is substantially greater than 0, then multicollinearity among the predictor variables may be a problem. Additionally, if the reciprocal of the VIF,  $1/VIF$ , is less than 0.10, then there may be multicollinearity problems. Appendix E and Appendix F include the VIF's and tolerances for the variables included in the final eighth and tenth grade logistic regression models. According to the criteria explained above, all of the variables included in both the eighth and tenth grade models had acceptable VIF's and tolerances. Thus, multicollinearity among those variables was not a concern in this analysis.

*Fixed-effects multiple logistic regression.* Multiple logistic regression analysis was utilized to address the first two research questions. Multiple logistic regression analysis was an appropriate statistic technique for several reasons. First, the criterion variable, college aspirations, was operationalized in a binary fashion (high college aspirations = 1 or low college aspirations = 0) and violated the assumption of linearity and homogeneity typical in ordinary least squares regression. Second, if ordinary linear regression analysis was used, the predicted values would become greater than one and less than zero. According to Hosmer and Lemeshow (2000), logistic regression assumes that the outcome variable has a probability that varies as a function of the values for each independent subject, yielding an S-

shaped distribution with values ranging from zero to one as the slope ranges from  $-\infty$  to  $+\infty$ . Third, the significance testing of the coefficients rests upon the assumption that prediction errors are normally distributed. Therefore, the tests of the regression weights would be suspect if ordinary linear regression was used with a binary dependent variable (Hosmer & Lemeshow, 2000).

A general logistic regression model for binary responses can be described by the following formula:

$$\log\left[\frac{P(Y)}{1-P(Y)}\right] = b_0 + b_1X_1 + b_2X_2 \dots + \dots b_iX_i \quad (\text{Equation 1})$$

where  $P(Y)$  represents the probability of observing the condition for success (e.g., high college aspirations), given a particular value of  $X$  (e.g., parental involvement), and  $[1-P(Y)]$  represents the probability of not observing the condition for success (e.g., low college aspirations).

In an effort to test the conceptual framework and the underlying explanatory patterns among variables in this study, the following multiple logistic regression equation was used to fit both the eighth and tenth grade NELS88/90 data. In the equation,  $P_i$  represents the probability of observing a condition for success (e.g., high college aspirations) and  $1 - P_i$  represents the probability of not observing the condition for success (low college aspirations).

$$\begin{aligned}
\log \left[ \frac{P_i}{1 - P_i} \right] = & \beta_{0i} + \beta_{1i} \text{Gender}_i + \beta_{2i} \text{Race/Ethnicity}_i + \beta_{3i} \text{Academic Ability}_i \\
& + \beta_{4i} \text{Parent SES}_i + \beta_{5i} \text{Father's Education Expectations}_i \quad (\text{Equation 2}) \\
& + \beta_{6i} \text{Mother's Education Expectations}_i \\
& + \beta_{7i} \text{Parental Involvement}_i + \text{School dummy variables}
\end{aligned}$$

Due to the complex sampling procedure utilized by the NCES to collect NELS data, controlling for school-level effects was necessary. Because sampling of the NELS was first conducted at the school level (groups) and then at the student level within schools, the presence of school (group) effects (e.g., quality, SES, type, location, etc.) on student educational outcomes (e.g., college aspirations) was inherent in both the eighth and tenth grade samples. Because this study focused only on student-level characteristics, the regression models in this research project did not consider school-level characteristics. Thus, the use of dummy coded school-level variables was necessary in order to avoid biased model estimates resulting from unobserved school-level effects inherent in the NELS data. Through the inclusion of school-level dummy variables, unobserved school effects were accounted for in each regression model, resulting in more reliable, unbiased beta coefficient estimates. In essence, through the use of school dummy variables, this study employed what statisticians (e.g., Allison, 1999) refer to as fixed-effects logistic regression analysis. Fixed-effects logistic regression takes into account unobserved institutional effects in the regression model, resulting in more consistent and reliable coefficient estimates (Allison, 1999).

Additionally, because of the complex sampling design used to collect NELS data, sampling weights were utilized by the NCES to ensure that the eighth and tenth grade samples were representative of all eighth and tenth grade students attending U.S. middle and

high schools in 1988 and 1990, respectively. To account for the effects of the design weights on the model estimates, this study utilized a design-based approach recommended by Hosmer and Lemeshow (2000) to fit the NELS base-year and first-year follow-up data to both the eighth and tenth grade models. According to Hosmer and Lemeshow (2000), when complex sampling design features such as those used in the NELS are ignored and data are handled as if it were obtained using a simple random sampling design, an underestimate of the sampling variance associated with an estimate may result. In order to compensate for unequal probabilities of selection, sampling bias, and to adjust for the effects of non-response, sampling weights were applied to the usable data for both the 1988 and 1990 NELS samples. For both the eighth and tenth grade samples, NELS sample weight (F4F1PNWT) was utilized so that the findings from statistical analyses could be projected to the population of approximately 3,008,080 eligible eighth and tenth grade students in public, Catholic, and other private schools during the 1988 and 1990 school years (Curtin et al., 2002).

After appropriately fitting the NELS data to both the eighth and tenth grade models, each model was assessed to determine its overall goodness-of-fit and statistical significance in predicting the outcome variable of interest, college aspirations. In this study, the likelihood ratio test for overall significance of the  $p$  coefficients for the independent variables in the model was utilized along with other measures. Based on the  $G^2$  statistic, derived from the equation  $G^2 = -2\ln\left[\frac{\text{likelihood without the variable}}{\text{likelihood with the variable}}\right]$ , the likelihood ratios test tested the null hypothesis that all population logistic regression coefficients except the constant were zero (Hosmer & Lemeshow, 2000). Additionally, the approximation of the chi-squared test statistic, along with its corresponding  $p$ -value, was used to determine the significance of each of the predictor variables. In this study, a well fitting model was considered at the  $p \leq .05$

level (Hosmer & Lemeshow, 2000). In addition to the likelihood-ratios test, other diagnostic procedures were used to determine how well the full eighth and tenth grade logistic models fit this study's analytic sample data. These procedures included analysis using a cross-tabulation of the model-generated probabilities against actual data (count- $R^2$ ), and a receiver operating characteristic (ROC) curve (Agresti, 2002).

In this study, the count- $R^2$  was used to assess model fit because it is indicative of the overall correctly predicted observations and is determined by adding the overall shares in the main diagonal of the cross-tabulation table. In this study, a well-fitting model was considered if its count- $R^2$  equaled 0.80 (Agresti, 2002). In order to generate the count- $R^2$  value, a classification table was created in which every observation was assigned one of the two outcomes of the dependent variable (high college aspirations = 1 or low college aspirations = 0). The positive outcome (high college aspirations = 1) was assigned when the fixed-effects logistic model predicted a probability of over 0.5. Whereas an observation was assigned a negative outcome (low college aspirations = 0) when a probability of under 0.5 was predicted.

In addition to the count-  $R^2$  values, a ROC curve was used to assess model fit because it is more informative than the classification table since it summarizes predictive power for all possible  $\pi^0$ . Agresti (2002) explained that a ROC curve is a plot of sensitivity as a function of (1-specificity) for possible cutoffs  $\pi^0$ . Agresti (2002) explained further that the area under a ROC curve is identical to the concordance index (c) and that a value c equal to or less than 0.5 means predictions are no better than random guessing.

In order to determine the statistical significance of the parental involvement variable in predicting students' eighth and tenth grade college aspirations, respectively, the full model

(including the parental involvement variable) and nested model (excluding parental involvement variable) were compared using log-likelihood ratios, pseudo- $R^2$ , Akaike information criterion (AIC), Bayesian information criterion (BIC), and Count- $R^2$  values. In general, these statistics were used because they are good indicators of the overall strength of each model or how close the model's fitted values tend to be to the true values (Kohler & Kreuter, 2005). In this study, evidence of a significant parental involvement effect was acknowledged if the resultant chi-squared statistic's  $p$ -value was at the  $< 0.001$  threshold. Additionally, the best fitting model was considered to be the one resulting in higher Count- $R^2$  and pseudo- $R^2$  values and lower AIC and BIC values (Agresti, 2002). Thus, if the full model had higher Count- $R^2$  and pseudo- $R^2$  values and lower AIC and BIC values, then the parental involvement variable was viewed as having a statistically significant effect on the model's ability to predict the likelihood of students having high college aspirations.

In this study, the results of the fixed-effects multiple logistic regression analyses were presented using odds ratios. Hosmer and Lemeshow (2000) described the odds ratio as a measure of association that approximates how much more likely (or unlikely) it is for the outcome to be present among those with  $x = 1$  than among those with  $x = 0$ . According to Hosmer and Lemeshow (2000), "the odds of the outcome being present among individuals with  $x = 1$  is defined as  $\pi(1)/[1-\pi(1)]$ . Similarly, the odds of the outcome being present among individuals with  $x = 0$  is defined as  $\pi(0)/[1-\pi(0)]$ . The odds ratio, denoted as OR, is defined as the ratio of the odds for  $x = 1$  to the odds for  $x = 0$ , and is given by the equation

$$OR = \frac{p(1)/[1-p(1)]}{p(0)/[1-p(0)]}, \text{ (Hosmer \& Lemeshow, 2000, p.49).}$$

In this equation, the symbol  $\pi$  represents the probability that  $Y = 1$ . In this study, the odds ratios were denoted as  $OR = e^\beta$ . Odds ratios above 1.0 indicated that a one-unit change in the

independent variable predicted a greater likelihood of students having high college aspirations while odds ratios below 1.0 indicated that a one-unit change in the independent variable predicted a lesser likelihood of students having high college aspirations. Because this study did not consider school-effects, the odds ratios generated from the school dummy variables were not reported.

*Seemingly unrelated estimation and cross-model hypotheses testing.* In order to examine the third research question, “Does the relationship between students' college aspirations and parental involvement, while taking into account other variables, differ between middle school (8<sup>th</sup> grade) and high school (10<sup>th</sup> grade)?” the stabilities of the regression relationships between college aspirations and the predictor variables across both the eighth and tenth grade prediction models were analyzed. More specifically, the question of whether the coefficient describing the relationship between college aspirations and parental involvement in the eighth grade model differed from the coefficient describing the relationship between college aspirations and parental involvement in the tenth grade prediction model was addressed.

Statistically, this question could not be properly answered with conventional methods used for the assessment of incremental changes in coefficients across prediction models. For example, examining whether one or more of the regression coefficients associated with x was significantly different from zero or differed between the models, or whether the apparent size of the coefficients differed between the two models were not adequate for several reasons. First, comparisons of this kind are invalid because they ignore the fact the coefficients in the first model are not independent of the coefficients in the second model. Second, attempts to compare the effect of coefficients across groups make the assumption that each group has the

same residual variation. If this assumption were false, comparisons of coefficients could reveal differences when none existed or conceal differences when, in fact, they existed (Clogg et al., 1995).

In order to alleviate these concerns, a statistical technique referred to as seemingly unrelated estimation (suest) was conducted using *Stata*<sup>®</sup> statistical software. The *Stata*<sup>®</sup> suest command combines the parameter estimates and associated variance matrices from multiple models into a single parameter vector and simultaneous variance matrix. Hence, the regression estimates are improved by accounting for correlations between the errors in the two equations. Based on the combined parameter estimates, reliable hypotheses test results regarding differences of the effects of the predictor variables on the dependent variables across groups are obtainable.

In this study, the *Stata*<sup>®</sup> suest command was utilized to combine the estimation results from the eighth and tenth grade models into a single integrated estimation result comprising the simultaneous (co)variance matrix of all coefficients in the models. Following this suest procedure, 9,324 coinciding cases from both the eighth and tenth grade surveys were preserved. Subsequent cross-model hypotheses tests were conducted to detect if differences existed between each model's coinciding coefficients and students' college aspirations. In this analysis, the following null hypothesis was tested for each independent variable:

$$H_0: \text{independent variable [eighth grade model]} - \text{independent variable [tenth grade model]} = 0.$$

Wald tests resulting in chi-squared statistics along with the associated degrees of freedom and *p*-values were assessed to determine whether the hypothesis of no cross-model difference was accepted or rejected.

### *Limitations*

The statistical analyses used in this study were limited in several ways. First, the availability of measures within the NELS base-year and first follow-up questionnaires limited both the flexibility of variable selection and the manner in which the variables were operationalized. Second, some of the NELS eighth and tenth grade student responses were incomplete, which resulted in missing data. Although this study used multiple imputation via an EM-Algorithm technique to impute the missing data, complete data would have provided more reliable and less biased statistical inferences. Third, this study's analytic sample was limited to NELS participants who successfully transitioned from the eighth grade in 1988 to the tenth grade in 1990. NELS students who did not make this successful transition were not included in the analytic sample for this study. Fourth, due to limitations in *Stata*<sup>®</sup> statistical software's *suest* command, NELS sample weight F4F1PNWT was used for both the eighth and tenth grade fixed effects logistic regression analyses. The NELS sample weight F4F1PNWT was calculated based on the tenth grade NELS sample in order to compensate for the under sampling of students from underrepresented student populations. Utilization of the F4F1PNWT sample weight for the eighth grade fixed-effects logistic regression may have resulted in biased estimates regarding the significance of students' race or ethnicity. Thus, inferences from this study's findings regarding the effects of race or ethnicity should be interpreted with caution. Fifth, while this study used school-level dummy variables to account for unobserved school effects on student outcomes, this study did not include various school-level variables as part of the analyses. Sixth, because no variance in the dependent variable existed within some of the schools attended by the students in this study, using fixed-effects logistic regression resulted in a less efficient model with a slight decrease in the

number of cases for the eighth grade model ( $N = 9135$ ) and tenth grade model ( $N = 8,312$ ), respectively.

## Chapter IV: Results and Findings

Following scholarly calls (e.g., Crosnoe, 2001; Perna & Titus, 2005) for studies related to students' academic trajectories, the purpose of this study was to examine whether the relationship between students' college aspirations and parental involvement differed between the eighth grade and tenth grade years. The outcome variable in this study was college aspirations, defined as students' desire (or lack thereof) to finish college. Independent variables included measures of students' gender, race or ethnicity, academic ability, parental SES, maternal educational expectations, paternal educational expectations, and parental involvement.

Using data from the restricted-use version of the National Educational Longitudinal Survey's base-year and first follow-up year (NELS: 88/90), this study answered three research questions in sequential order:

- 1) What is the relationship between students' college aspirations and parental involvement during middle school (8<sup>th</sup> grade), while taking into account other variables?
- 2) What is the relationship between students' college aspirations and parental involvement during high school (10<sup>th</sup> grade), while taking into account other variables?
- 3) Does the relationship between students' college aspirations and parental involvement, while taking into account other variables, differ between middle school (8<sup>th</sup> grade) and high school (10<sup>th</sup> grade)?

This chapter presents the results from the analyses as described in chapter three.

This chapter begins with an overview of this study's descriptive statistics followed by presentation of the results from the fixed-effects multiple logistic regression and the cross-model hypotheses tests, respectively. This chapter concludes with a summary of the results.

### *Descriptive Statistics*

The analytic sample used in this study contained 9,707 cases. Table 4.1 contains summary statistics for the variables utilized in this study's analyses. As noted in Table 4.1, 8.7% of the students self-identified as African American, 7.4% identified as Asian, 12.3% identified as Hispanic, and 71.6% identified as White. Of the students in the analytic sample, 46.7% identified as being male and 53.3% of the students identified as being female. Additionally, 71.6% of the students in the analytic sample aspired to finish college or attain higher levels of education after college (high college aspirations) during the eighth grade, while 64.7% of the students in the analytic sample aspired to finish college or attain higher levels of education after college (high college aspirations) during the tenth grade. The continuous variables, academic ability, father's educational expectations, mother's educational expectations, and parental involvement were grand mean centered and standardized.

### *Effects of Parental Involvement on College Aspirations in the Eighth Grade*

In order to address the first research question, fixed-effects multiple logistic regression was utilized. In this study, fixed-effects multiple logistic regression analysis examined the prediction of eighth grade students' college aspirations by parental involvement, controlling for the effects of gender, race or ethnicity, academic ability, parental socioeconomic status (SES), father's educational expectations, and mother's educational expectations. Two fixed-effects logistic regression models were fit using the

eighth grade NELS data (NELS: 88) and were subsequently analyzed. The first model (Model 1) contained measures of gender, race or ethnicity, academic ability, parental SES, father’s educational expectations, and mother’s educational expectations. The second model (Model 2) contained the key predictor variable of interest in this study, parental involvement, in addition to the variables in the first model. Odds ratios and beta coefficients were reported for the variables in each of the models. The results from the eighth grade fixed-effects multiple logistic regression analyses for both models are presented later in this section.

**Table 4.1**

*Descriptive Statistics of Variables from the NELS: 88/90 Survey Data*

Variable	Observations	Mean	S.D.	Min.	Max.
<i>Eighth-Grade Model</i>					
College Aspirations	9707	0.716	0.451	0.000	1.000
Male	9707	0.467	0.499	0.000	1.000
Female (reference)	9707	0.533	0.499	0.000	1.000
White (reference)	9707	0.716	0.451	0.000	1.000
Asian	9707	0.074	0.261	0.000	1.000
Hispanic	9707	0.123	0.328	0.000	1.000
African American	9707	0.087	0.283	0.000	1.000
Academic Ability	9707	0.000	1.000	-1.648	1.133
Parent SES-quartile	9707	2.616	1.119	1.000	4.000
Father’s Expectations	9707	0.000	1.000	-2.732	0.904
Mother’s Expectations	9707	0.000	1.000	-3.093	0.901
Parental Involvement	9707	0.000	0.694	-2.070	0.826
<i>Tenth-Grade Model</i>					
College Aspirations	9707	0.647	0.478	0.000	1.000
Male	9707	0.467	0.499	0.000	1.000
Female (reference)	9707	0.533	0.499	0.000	1.000
White (reference)	9707	0.716	0.499	0.000	1.000
Asian	9707	0.074	0.261	0.000	1.000
Hispanic	9707	0.123	0.328	0.000	1.000
African American	9707	0.087	0.283	0.000	1.000
Academic Ability	9707	0.000	1.000	-1.603	1.166
Parent SES-quartile	9707	2.606	1.120	1.000	4.000
Father’s Expectations	9707	0.000	1.000	-2.055	0.941
Mother’s Expectations	9707	0.000	1.000	-2.591	0.916
Parental Involvement	9707	0.000	0.826	-1.714	1.583

Source: Analysis of NELS:88/90 data

*Goodness-of-fit measures for eighth grade model.* Prior to interpreting the odds ratios obtained from the two fixed-effects multiple logistic regression models, results from diagnostic procedures used to measure the overall goodness-of-fit for both the full model (Model 2) and nested model (Model 1) were examined to make sure each model adequately fit the analytic sample data. Additionally, differences between the full model (Model 2-with parental involvement) and the nested model (Model 1-without parental involvement) were analyzed to determine the statistical significance of the parental involvement variable in predicting college aspirations for the eighth grade students.

In order to diagnose how well the full eighth grade model fit this study's analytic sample data, several statistical procedures were conducted. These procedures included a likelihood ratio test for overall significance ( $G^2$ ), a cross-tabulation comparison of the model-generated probabilities against actual data (count- $R^2$ ), and a receiver operating characteristic (ROC) curve. In general, these diagnostic procedures were used to gauge how closely the model-generated estimates matched the actual observed values in the analytic sample.

According to Hosmer and Lemeshow (2000), the likelihood ratios test tests the null hypothesis that all population logistic regression coefficients except the constant are zero. In this study, an adequate model was considered at the  $p \leq .05$  level (Hosmer & Lemeshow, 2000). For the full model, including the parental involvement variable, the chi-squared ( $\chi^2$ ) statistic equaled 1952.92 with 586 degrees of freedom. The coinciding  $p$ -value of 0.000 provided very strong evidence that at least one of the beta coefficients was not equal to zero.

As noted above, a classification table assigning one of the two outcomes of the dependent variable, high college aspirations or low college aspirations, was created. A positive outcome (e.g., high college aspirations = 1) was assigned when the model predicted

a probability of over 0.5. Whereas, a negative outcome (e.g., low college aspirations = 0) was assigned when the model predicated a probability of under 0.5. According to Agresti (2002), the count- $R^2$  is indicative of the overall correctly predicted observations and is determined by adding the overall shares in the main diagonal of the table (Agresti, 2002). Table 4.2 presents a cross-classified table containing the model-generated values and the original values. The eighth grade classification table indicated that 2,285 model-generated values were classified as 0. For 1,604 observations, this number corresponded to the true value, but for 681 it did not. Similarly, the classification table indicated that 6,962 model-generated values were classified as 1, which was correct for 5,817 of the observations. In total, the count- $R^2$  equaled 80.25 or  $(1,604 + 5,817) / 9247$ , indicating that the eighth grade model was a sufficient predictor of eighth grade students' college aspirations.

**Table 4.2**

***Predicted Probabilities versus Actual Observations for Eighth Grade Students' College Aspirations***

College Aspirations (Predicted)	College Aspirations (Observed)		Total
	0	1	
0	1,604	681	2,285
	58.35	10.48	24.71
	17.35	7.36	24.71
1	1,145	5,817	6,962
	41.65	86.72	75.29
	12.38	53.06	75.29
Total	2,749	6,498	9,247
	100.00	100.00	100.00
	29.73	70.27	100.00

Another diagnostic test used to measure the overall model fit for the full eighth grade model was the receiver operating characteristic (ROC) curve. For the eighth grade model,

the area under ROC curve and corresponding  $c$  equaled 0.8840, indicating that the eighth grade model adequately predicted the responses to the NELS-generated college aspirations variable. Based on collective evidence gained from the likelihood ratios test ( $G^2$ ), the cross-tabulations (count- $R^2 = 80.25\%$ ), and the ROC curve ( $c = 0.88$ ), the overall model appeared to be an efficient predictor of students' eighth grade college aspirations.

*Significance of parental involvement in the eighth grade.* To determine whether the addition of the parental involvement variable achieved a significant increase in the explanatory power for the eighth grade model, log-likelihood ratios ( $G^2$ ), pseudo- $R^2$ , Akaike information criterion (AIC), Bayesian information criterion (BIC), and Count- $R^2$  values for both the full (Model 2-with the parental involvement variable) and nested (Model 1-without the parental involvement variable) models were compared. Table 4.3 displays the values of the measures obtained from both models as well as the differences between the two models. In order to compare the nested and full models using the aforementioned techniques, *Stata*<sup>®</sup> software required the use of *iweights*, instead of the usual *pweights*, in order to introduce the appropriate NELS sampling weight (F4F1PNWT). *Stata*<sup>®</sup> software generally allows programmers to use the *pweight* command so that a model can include appropriate sampling weights. In *Stata*<sup>®</sup>, a model's *pweight* denotes the inverse of the probability that the observation is included because of the sampling design. According to Long & Freese (2006), *iweights*, also known as importance weights, have no formal statistical definition. *Iweights* are typically used by programmers to facilitate certain types of computations under specific circumstances (e.g., log-likelihood ratio tests, *suest* procedures, etc.) (Long & Freese, 2006). In this study, the *Stata*<sup>®</sup> command for conducting model comparisons demanded that the NELS sampling weight (F4F1PNWT) be set equal to the *iweight*, instead of the usual

pweight. It must be noted that the results for both the full and nested model estimates and odds ratios, prior to conducting the comparison tests, were identical regardless of whether iweight or pweight designations were used when running the models.

Utilizing the log-likelihood values from the full and nested models, a test was conducted to compare the maximum log-likelihood for the full model,  $L_1$  (Model 2, with parental involvement) to the maximum log-likelihood for the simpler model,  $L_0$  (Model 1, without parental involvement). The test statistic  $G^2 = -2(L_0 - L_1)$  equaled 32387.57 with 1 degree of freedom, the difference between the numbers of parameters in the two models. The corresponding chi-squared  $p$ -value of 0.001 provided strong evidence of a significant parental involvement effect.

**Table 4.3**

***Measures-of-Fit for the Eighth Grade Logistic Regression Model, including Parental Involvement***

	Model 1 (without parental involvement)	Model 2 (with parental involvement)	Difference Model 2-Model 1
N	9135	9135	0.000
Log-Lik. Intercept	-1.256e+06	-1.256e+06	0.000
Log-Lik. Full	-818584.408	-802390.624	-16193.784
Deviance	1637168.816(2052022)	1604781.249(2052021)	32387.567(1)
LR	874330.387(585)	906717.954(586)	32387.567(1)
Prob > LR	0.000	0.000	0.000
McFadden's R2	0.348	0.361	-0.013
AIC	0.798	0.782	0.016
BIC	1645686.104	1613313.072	32373.032
Count- $R^2$	.8025	.8035	0.010

Note: Results were generated using iweights instead of pweights as required by *Stata*<sup>®</sup>. Equivalent beta estimates and odds ratios were generated using either iweights or pweights.

It must be noted that the pseudo- $R^2$  used for this analysis was analogous to McFadden's  $R^2$ . Thus, the pseudo- $R^2$  value from the resultant model was interpreted as an indicator of the overall strength of the model (Kohler & Kreuter, 2005). In this analysis, the

pseudo- $R^2$  increased from 0.348 for Model 1 to 0.360 for Model 2. This increase in the pseudo- $R^2$  was an indicator that the parental involvement variable increased the explanatory power of the eighth grade model.

Other criteria used to gauge the statistical significance of parental involvement were comparison of the AIC, BIC, and cross-tabulations of the predicted versus observed dependent variable values (Count- $R^2$ ) generated for Model's 1 and 2. The AIC judged the model by how close its fitted values were to the true values. In this study, the best model was the one which resulted in the lower AIC value. Based on the AIC scores, Model 2 was deemed superior due to its lower AIC value of 0.782 versus the AIC value of 0.798 for Model 1. Additionally, a difference of 32373.032 in the BIC values between Models 1 and 2 provided very strong support for the model including the parental involvement variable. Also, the count- $R^2$  value increased from 80.25 for the nested model to 80.35 for the full model. This increase in the count- $R^2$  value provided evidence of a slightly more accurate prediction for the full model (Model 2) than that of the limited model (Model 1). These collective results provided evidence that the addition of the parental involvement variable significantly increased the eighth grade model's prediction power.

*Interpretation of the eighth grade model's odds ratios.* In this study, the odds ratio represented the change in odds of students having high college aspirations relative to students having low college aspirations for each one-unit change in a specific independent variable, while accounting for the other independent variables. An odds ratio greater than 1 represented an increase in the likelihood of students having high college aspirations relative to not having high college aspirations; whereas, an odds ratio less than 1 represented a decrease in the likelihood of students having high college aspirations relative to not having

high college aspirations. The approximation of the Wald test generated chi-square statistic was used to determine the significance of each model's individual predictor variables.

Results from Model 1 (see Table 4.4) indicated that being male, being African American, being Hispanic, academic ability, parental SES, mother's educational expectations, and father's educational expectations all significantly predicted the likelihood of students having high college aspirations during the eighth grade. According to the results of the fixed-effects logistic regression analysis, males (odds ratio = 0.757,  $p < 0.001$ ) were less likely to have high college aspirations than females. Additionally, the fixed-effects logistic regression analysis indicated that African American students (odds ratio = 2.090,  $p < 0.001$ ) and Hispanic students (odds ratio = 1.327,  $p < 0.05$ ) were both more likely to have high college aspirations than White students. The eighth grade fixed-effects logistic analysis also indicated that for each one-unit increase in academic ability (odds ratio = 2.43,  $p < 0.001$ ), the likelihood of students having high college aspiration increased.

The results of the eighth grade fixed-effects logistic regression analysis also indicated that certain parental influences had significant positive effects on the likelihood of students having high college aspirations during the eighth grade. Results indicated that for each one-unit increase in parental-SES (odds ratio = 1.72,  $p < 0.001$ ), the likelihood of students having high college aspirations increased. Additionally, the findings indicated the likelihood of eighth grade students having high college aspirations increased for each one-unit increase in father's educational expectation (odds ratio = 1.625,  $p < 0.001$ ). The results also indicated that for each one-unit increase in mother's educational expectations (odds ratio = 1.709,  $p < 0.001$ ), the likelihood of students having high college aspirations during the eighth grade increased.

Results from Model 2 (see Table 4.4 below) indicated that that the same variables in Model 1 were statistically significant, even after adding the parental involvement variable to the model. Parental involvement, the primary predictor variable of interest in this study, was found to be statistically significant in the analysis. According to the results of the fixed-effects multiple logistic regression analysis, for each one-unit increase in parental involvement (odds ratio = 1.787,  $p < 0.001$ ), the likelihood of students having high college aspirations during the eighth grade increased.

**Table 4.4*****Results of the Eighth Grade Fixed-Effects Multiple Logistic Regression Analyses using NELS: 88 Data***

Variables	Model 1 Without Parental Involvement				Model 2 With Parental Involvement Included			
	Coef.	Odds Ratio	Std. Err.	P> z	Coef.	Odds Ratio	Std. Err.	P> z
Male <i>Female(reference)</i>	-0.278	0.757 ***	0.055	0.000	-0.172	0.842*	0.062	0.019
Asian	0.243	1.275	0.305	0.310	0.354	1.425	0.351	0.150
Hispanic	0.283	1.327*	0.187	0.045	0.329	1.390*	0.201	0.023
African American <i>White(reference)</i>	0.737	2.090***	0.298	0.000	0.762	2.143***	0.310	0.000
Academic Ability	0.888	2.430***	0.110	0.000	0.828	2.289***	0.105	0.000
Parental SES	0.542	1.720***	0.671	0.000	0.508	1.662***	0.065	0.000
Father's Educational Expectations	0.486	1.625***	0.079	0.000	0.481	1.618***	0.079	0.000
Mother's Educational Expectations	0.536	1.709***	0.090	0.000	0.509	1.664***	0.088	0.000
Parental Involvement					0.580	1.787***	0.102	0.000
$\chi^2$		$\chi^2(585) = 1908.92$	Prob > chi2 = 0.000			$\chi^2(586) = 1952.92$	Prob > chi2 = 0.000	
Pseudo-R <sup>2</sup>		Pseudo-R <sup>2</sup> = 0.3481				Pseudo-R <sup>2</sup> = 0.3610		
School fixed-effects	Yes				Yes			

Note: Variables were weighted with the panel weight F4F1PNWT and were clustered by school (PSU). \*p<0.05 \*\* p<0.01 \*\*\*p<0.001

### *Effects of Parental Involvement on College Aspirations in the Tenth Grade*

In order to address the second research question, fixed-effects multiple logistic regression analyses were conducted. Similar to the eighth grade analyses, two fixed-effects multiple logistic regression models were fit using the tenth grade NELS sample data. The first model (Model 1) contained measures of gender, race or ethnicity, academic achievement, parental SES, and both father's and mother's educational expectations. The second model (Model 2) incorporated the key predictor variable of interest in this study, parental involvement. The resulting odds ratios and beta coefficients are reported and discussed later in this section.

*Goodness-of-fit measures for tenth grade model.* Prior to interpretation of the odds ratios for the tenth grade models, an assessment of the full model's overall fit and significance of the parental involvement variable was conducted. The results of this assessment indicated that the full model (Model 2), including the parental involvement variable, adequately fit this study's analytic sample. Results from the likelihood ratios test resulted in a chi-square statistic equal to 2259.92 with 865 degrees of freedom. The corresponding  $p$ -value of 0.000 provided very strong evidence that at least one of the beta coefficients in the model was not equal to zero. Additionally, both the count- $R^2$  and ROC curve generated  $c$  scores indicated that the tenth grade model appropriately fit the NELS data. The count- $R^2$  was determined by generating a cross-classified table comparing the tenth grade model-generated college aspiration values to the original college aspiration values from the analytic sample. Results indicated that 3,015 of the model-generated college aspirations values were classified as 0, indicating low college aspirations. For 2,331 of the responses, this value corresponded to the analytic sample value, but for 684 of the responses,

it did not. Results also indicated that 5,400 model-generated values were classified as 1, indicating high college aspirations. For 4,465 of the responses, this value corresponded to the analytic sample value, but for 935 of the responses, it did not. In total, the count- $R^2$  equaled 80.79 or  $(2,331 + 4,465) / 8415$ , indicating that the tenth grade model was an efficient predictor of students' college aspirations.

**Table 4.5**

***Predicted Probabilities versus Actual Observations for Tenth Grade Students' College Aspirations***

College Aspirations (Predicted)	College Aspirations (Observed)		Total
	0	1	
0	2331	684	3015
	71.37	13.28	35.83
	27.70	8.13	35.83
1	935	4465	5400
	28.63	86.72	64.17
	11.11	53.06	64.17
Total	3266	5149	8415
	100.00	100.00	100.00
	38.81	61.19	100.00

For the tenth grade model, the area under the ROC curve or the concordance index (c) was equal to 0.900, indicating that the tenth grade model predicted the actual responses to the dependent variable in an efficient manner. Based on collective evidence gained from the likelihood ratios test ( $\chi^2 = 2259.92, p < 0.001$ ), the cross-tabulations (count- $R^2 = 80.76\%$  correct prediction), and the ROC curve (c = 0.90), the overall model appeared to be an efficient predictor of tenth grade college aspirations.

*Significance of parental involvement in the tenth grade.* To determine whether the addition of the parental involvement variable achieved a significant increase in the

explanatory strength of the tenth grade model, differences between the full model (Model 2, with parental involvement) and the nested model (Model 1, without parental involvement) were analyzed using a likelihood ratios test ( $G^2$ ). Additionally, differences between each model's count- $R^2$ , pseudo- $R^2$ , AIC and BIC values were examined. Table 4.6 includes the results of the likelihood ratios test as well as the differences in the count- $R^2$ , pseudo- $R^2$ , AIC and BIC values between Model's 1 and 2. With the exception of the count- $R^2$  values, an evaluation of these values generated from each model indicated that the addition of parental involvement had a significant effect on the ability to predict students' college aspirations.

**Table 4.6**

***Measures-of-Fit for Tenth Grade Logistic Regression Model, including Parental Involvement***

	Model 1(without Parental Involvement)	Model 2(with Parental Involvement)	Difference Model 2 – Model 1
N	8312	8312	0.000
Log-Likelihood Intercept	-1.170e+06	-1.170e+06	0.000
Log-Lik. Full	-690029.716	-681168.576	-8861.140
Deviance	1380059.432(1743118)	1362337.151(1743117)	17722.280(1)
LR	960756.232(864)	978478.512(865)	17722.280(1)
Prob > LR	0.000	0.000	0.000
McFadden's- $R^2$	0.410	0.418	-0.008
AIC	0.792	0.782	0.010
BIC	-948339.098	-966047.007	17707.909
Count- $R^2$	.8082	.8079	-0.0003

Note: Results were generated using iweights instead of pweights as required by Stata. Equivalent beta estimates and odds ratios obtained using either iweights or pweights

The test to compare the maximum log-likelihood for the full model,  $L_1$  (Model 2, with parental involvement) to the log-likelihood for the simpler model,  $L_0$  (Model 1, without parental involvement) resulted in a test statistic  $G^2 = -2(L_0-L_1)$  equal to 17722.280 with one

degree of freedom. The corresponding  $p$ -value of 0.000 provided strong evidence of a significant parental involvement effect. The pseudo- $R^2$  value increase from 0.41 for Model 1 to 0.42 for Model 2 was also an indicator that the parental involvement variable increased the explanatory strength of the tenth grade model. Additionally, the smaller AIC and BIC values for Model 2 (AIC = 0.782, BIC = -966047.007) versus Model 1 (AIC = 0.792, BIC = -948339.098) provided strong support for the inclusion of the parental involvement variable in the full model.

As mentioned above, the only measure that did not indicate a significant parental involvement effect was the count- $R^2$  value. The count- $R^2$  for Model 2, including the parental involvement variable, was .8079, indicating that the full model predicted 80.79 percent of the actual tenth grade college aspiration responses correctly. The count- $R$  value for Model 1, without parental involvement variable, was 0.8082, indicating that the limited model, without the parental involvement variable, predicted the actual tenth grade college aspirations responses 80.82 percent correctly, a slightly higher percentage than for the full model. Based on this evidence, the parental involvement variable could be viewed as providing little or no predictive power to the tenth grade model.

*Interpretation of the tenth grade model's odds ratios.* Results from the fixed-effects logistic regression analysis for Model 1 indicated that being male, being African American, being Asian, academic ability, parental SES, mother's educational expectations, and father's educational expectations all significantly predicted students' likelihood of having high college aspirations during the tenth grade. According to the results of the fixed-effects logistic regression analysis, males (odds ratio = 0.744,  $p < 0.001$ ) were less likely to have high college aspirations than females. Additionally, when controlling for the other

independent variables in the model, Asian (odds ratio = 2.205,  $p < 0.001$ ) and African American (odds ratio = 2.828,  $p < 0.001$ ) students were significantly more likely than their White counterparts to have high college aspirations. The fixed-effects multiple logistic regression analysis also indicated that the likelihood of students having high college aspirations increased significantly for each one-unit increase in academic ability (odds ratio = 2.718,  $p < 0.001$ ).

The analysis also indicated statistically significant effects of the parental influence variables on the likelihood of students having high college aspirations. The results of the fixed-effects multiple logistic regression analysis indicated that for each one-unit increase in parental-SES (odds ratio = 1.471,  $p < 0.001$ ), the likelihood that students would have high college aspirations increased. Additionally, the results indicated that both father's educational expectations and mother's educational expectations had statistically significant effects on the likelihood of students having high college aspirations. According to the results, the likelihood of students having high college aspirations increased for each one-unit increase in both father's educational expectations (odds ratio = 1.567,  $p < 0.001$ ) mother's educational expectations (odds ratio = 2.462,  $p < 0.001$ ).

The fixed-effects logistic analysis utilizing the full model (Model 2 in Table 4.7) indicated that the same predictor variables included in Model 1, in addition to the parental involvement variable, were significant. The results of the full fixed-effects logistic regression analysis indicated that the likelihood of students having high college aspirations increased significantly for each one-unit increase in parental involvement (odds ratio = 1.494,  $p < 0.001$ ).

**Table 4.7**

***Results of the Tenth Grade Fixed-effects Multiple Logistic Models Analyses using NELs:90 data***

Variables	Model 1				Model 2			
	Coef.	Odds Ratio	Std. Err.	P> z	Coef.	Odds Ratio	Std. Err.	P> z
Male <i>Female(reference)</i>	-0.295	0.744***	0.727	0.000	-0.237	0.789**	0.005	0.002
Asian	0.801	2.205***	0.474	0.000	0.886	2.426***	0.527	0.000
Hispanic	0.070	1.073	0.183	0.678	0.097	1.101	0.185	0.565
African American <i>White (reference)</i>	1.040	2.828***	0.524	0.000	1.024	2.783***	0.514	0.000
Academic Ability	1.000	2.718***	0.161	0.000	0.992	2.696***	0.162	0.000
Parental SES	0.368	1.471***	0.064	0.000	0.355	1.425***	0.062	0.000
Father's Educational Expectations	0.450	1.567***	0.079	0.000	0.428	1.535***	0.078	0.000
Mother's Educational Expectations	0.901	2.462***	0.143	0.000	0.873	2.393***	0.140	0.000
Parental Involvement					0.402	1.494***	0.076	0.000
$\chi^2$		$\chi^2$ (864 ) = 2313.47	Prob >chi2 = 0.000			$\chi^2$ (865) = 2259.92	Prob > chi2 = 0.000	
Pseudo-R <sup>2</sup>		Pseudo-R <sup>2</sup> = 0.410				Pseudo-R <sup>2</sup> = 0.420		
School Fixed Effects	Yes				Yes			

Note: Variables are weighted with the panel weight F4F1PNWT and are clustered by school (F1SCH\_ID). \*p<0.05 \*\* p<0.01 \*\*\*p<0.001

### *Differences between the Eighth and Tenth Grade Models*

Results from the seemingly unrelated estimation (suest) and subsequent cross model hypotheses tests (see Table 4.8) indicated that no statistically significant eighth grade and tenth grade cross-model differences existed for the coefficients describing the relationships between college aspirations and being male, being Asian, being Hispanic, being African American, or father's educational expectations. However, the results did indicate the presence of eighth grade and tenth grade cross-model differences between the coefficients describing the relationships between students' college aspirations and academic ability, parental SES, mother's educational expectations, and parental involvement.

The hypothesis test indicated that the importance of academic ability ( $\chi^2 = 5.19, p < 0.05$ ) in predicting the likelihood of students having high college aspirations differed significantly between the eighth and tenth grade models. The positive difference of 0.1644 between the tenth grade and eighth grade academic ability coefficients indicated that academic ability was more important in the tenth grade model than in the eighth grade model. Results also indicated a significant cross-model difference between the parent-SES coefficients ( $\chi^2 = 8.00, p < 0.01$ ). The chi-square value of 8.00 with 1 degree of freedom and corresponding  $p$ -value of 0.01 provided significant evidence of a difference in the importance of parent-SES in predicting college aspirations between the eighth and tenth grades. The negative difference of -0.1536 between the tenth and eighth grade parent-SES coefficients indicated that the parent-SES variable was a more important predictor of college aspirations for the eighth grade model than for the tenth grade model.

**Table 4.8**

*Results of the post-Suest Hypotheses Tests for Differences between Eighth and Tenth Grade Model Coefficients.*

Variables	Coef. Eighth Grade Model	z- statistic Eighth Grade Model	Coef. Tenth Grade Model	z- statistic Tenth Grade Model	Difference	$\chi^2$	$P > \chi^2$
Male	-0.1721	-2.35	-0.2372	-3.09	-0.0651	0.45	0.5035
Asian	0.3544	1.44	0.8862	4.08	0.5318	3.35	0.0673
Hispanic	0.3293	2.28	0.0967	0.58	-0.2326	1.12	0.2691
African American	0.7623	5.26	1.0240	5.54	0.2617	1.35	0.2455
Academic Ability	0.8276	18.11	0.9920	16.48	0.1644*	5.19	0.0227*
Parental SES	0.5082	12.90	0.3546	8.16	-0.1536**	8.00	0.0047**
Father's Educational Expectations	0.4812	9.90	0.4284	8.47	-0.0528	0.57	0.4516
Mother's Educational Expectations	0.5089	9.63	0.8730	14.87	0.3641***	21.99	0.0000***
Parental Involvement	0.5803	10.08	0.4020	7.84	-0.1783*	5.61	0.0178*

Source: Analysis of NELS 88:90 survey data

\* $p < 0.05$  \*\*  $p < 0.01$  \*\*\* $p < 0.001$

A post-suest hypothesis test also indicated that the effect of mother's educational expectations on students' likelihood of having high college aspirations differed significantly ( $\chi^2 = 21.99, p < 0.001$ ) between the eighth and tenth grades. The positive difference of 0.3641 between the tenth grade and eighth grade mother's educational expectations

coefficients indicated that the mother's educational expectation variable was more important in the tenth grade model than in the eighth grade model.

For the predictor variable of interest in this study, parental involvement, the chi-square value of 5.61 with 1 degree of freedom and corresponding  $p$ -value of less than 0.05 provided significant evidence of a differential parental involvement effect on students' college aspirations between the eighth and tenth grades. The negative difference between the tenth grade parental involvement and eighth grade parental involvement coefficients of -0.1783 indicated that the effect of the parental involvement variable on the likelihood of students having high college aspirations was more important for the eighth grade model than for the tenth grade model.

#### *Summary of Results and Findings*

Results from the fixed-effects logistic regression models indicated that being male had significant negative effects on the likelihood of students having high college aspirations during both the eighth and tenth grade school years, respectively. The analyses also found that being African American had significant positive effects on the likelihood of students having high college aspirations during both the eighth and tenth grade years. Although being Hispanic was found to be a significant positive predictor of the likelihood of having high college aspirations during the eighth grade, being Hispanic was not significant in the tenth grade. Conversely, while being Asian was not found to be a significant predictor of the likelihood of students having high college aspirations in the eighth grade, it was found to be a significant positive predictor in the tenth grade.

Academic ability proved to be a significant positive predictor of the likelihood of

students having high college aspirations in both the eighth and tenth grade models. Students with high academic ability, compared to those with low academic ability, were significantly more likely to have high college aspirations. Parent socioeconomic status (SES) was also found to be a significant positive predictor of the likelihood of students having high college aspirations in both the eighth and tenth grade models. For each one-unit increase in parent SES, the likelihood of students having high college aspirations increased significantly for both the eighth and tenth grade models.

As for the parental influence variables, both mother's educational expectations and father's educational expectations had significant positive effects on the likelihood of students having high college aspirations for both the eighth and tenth grade models. Parental involvement, the predictor variable of interest in this study, was also found to be a significant positive predictor of the likelihood of students having high college aspirations for both the eighth and tenth grade models. However, comparison of the models for both the eighth and tenth grade samples indicated that the importance of parental involvement on the likelihood of having high college aspirations may be more important in the prediction of eighth grade college aspirations than tenth grade college aspirations.

Results from the cross model hypotheses tests indicated that no statistically significant differences existed between the eighth and tenth grade model coefficients reflecting the relationships between students' college aspirations and being male, being Asian, being Hispanic, being African American, or father's educational expectations. The cross model hypotheses tests did indicate that statistically significant differences existed between the eighth and tenth grade model coefficients reflecting the relationships between

students' college aspirations and academic ability, parental SES, mother's educational expectations, and parental involvement.

The positive cross model difference between the academic ability coefficients indicated that academic ability was more important in predicting the likelihood of having high college aspirations during the tenth grade than the eighth grade year. Similarly, the positive cross model difference between the mother's educational expectations coefficients indicated that mother's educational expectations were more important in predicting the likelihood of students having high college aspirations during the tenth grade than the eighth grade year.

Conversely, the negative difference between the eighth and tenth grade parental-SES coefficients indicated that parental-SES was more important in predicting the likelihood of students having high college aspirations during the eighth grade than during the tenth grade year. Similarly, the negative difference between the eighth and tenth grade parental involvement coefficients indicated that parental involvement was more important in predicting the likelihood of students having high college aspirations during the eighth grade than during the tenth grade year.

## **Chapter V: Conclusions, Implications, and Recommendations for Future Research**

The purpose of this study was to examine whether the relationship between students' college aspirations and parental involvement differed between the eighth and tenth grade school years. This study was guided by the following research questions: 1) What is the relationship between students' college aspirations and parental involvement during middle school (8<sup>th</sup> grade), while taking into account other variables?, 2) What is the relationship between students' college aspirations and parental involvement during high school (10<sup>th</sup> grade), while taking into account other variables?, and 3) Does the relationship between students' college aspirations and parental involvement, while taking into account other variables, differ between middle school (8<sup>th</sup> grade) and high school (10<sup>th</sup> grade)? Based on the results from the quantitative statistical analyses, this chapter discusses conclusions, implications for theory and practice, and recommendations for future research.

### *Conclusions*

In order to address the first two research questions, results from the eighth and tenth grade fixed-effects logistic regression analyses were utilized. Results from the eighth grade analysis indicated that being male was a significant negative predictor of the likelihood of students having high college aspirations. Additionally, results from the eighth grade analysis indicated that being Hispanic, being African American, academic ability, parental SES, father's educational expectations, mother's educational expectations, and parental involvement were all significant positive predictors of the likelihood of students having high college aspirations. Results from the tenth grade analysis indicated that being male also had a significant negative effect on the likelihood of students having high college aspirations.

The tenth grade analysis indicated that being Asian, being African American, academic ability, parental SES, father's educational expectations, mother's educational expectations, and parental involvement all had statistically significant and positive effects on the likelihood of students having high college aspirations.

As mentioned above, this study found that parental involvement had a statistically significant and positive effect on the likelihood of students having high college aspirations during both the eighth grade (odds ratio = 1.787,  $p < 0.001$ ) and tenth grade (odds ratio = 1.440,  $p < 0.001$ ). These findings statistically support Perna and Titus' (2004) speculation that some of the effects of parental involvement on twelfth grade students' likelihood of enrolling in a four-year institution actually take place during earlier secondary school years. These findings also further validate parents as important definers and role models of expected educational attainment for their children as well as previous findings indicating strong correlations between college aspirations and various operational forms of parental involvement. For example, Kao (2002) and Kao and Tienda (1998) found positive relationships between college aspirations and the frequency of student-parent discussions regarding educational plans and preparation. Researchers have also found consistent positive relationships between students' college aspirations and the frequency of parental involvement in school activities (McGrath et al., 2002; Perna, 2000) and the propensity of parents to save money for college expenses (Hossler & Vesper, 1992). Other studies (e.g., Flowers et al., 2003; Kao, 2002; Kim et al., 1998; Levine & Nidiffer, 1997; Mau et al., 1995) have reported positive relationships between college aspirations and parents who provide positive educational encouragement to their children.

This study also included measures of both mother's (maternal) educational expectations and father's (paternal) educational expectations in the eighth and tenth grade models. Consistent with prior scholarly findings (Flower et al., 2003; Kao, 2002; Kim et al., 1998; Mau et al., 1998), the results from this study indicated that both father's educational expectations and mother's educational expectation were significant and positive predictors of the likelihood of students having high college aspirations, with maternal educational expectations having a greater effect than that of paternal educational expectations for both the eighth and tenth grade years. These results are consistent with previous research findings. For example, utilizing NELS data, Mau and associates (1998) reported that the effect of maternal educational expectations and encouragement on tenth and twelfth grade students' college aspirations was much stronger than that of paternal educational expectations and encouragement. Similarly, Flowers and associates (2003) reported that maternal educational expectations were much stronger in predicting students' college aspirations than were paternal educational expectations.

Scholars have speculated as to why maternal educational expectations provide more strength in predicting college aspirations than paternal educational expectations. Most often, scholars (e.g., Cheng & Starks, 2002; Hamrick & Stage, 2004) have concluded that, for a variety of reasons, mothers express more interest and are more involved and informed regarding their child's educational process than are fathers. Scholars (e.g., Flower et al., 2003) have also speculated that students may perceive their mother's general demeanor towards their educational advancement as more supportive when compared to their father's general demeanor. Recognizing this maternal interest and the mother's role as nurturer, the student naturally seeks advice from their mother regarding educational matters more

frequently than they do from their father. Scholars (e.g., Mau et al., 1998) have also argued that for similar reasons students generally view maternal advice as more credible and reliable information regarding school matters than paternal advice. Other reasons for differential maternal and paternal effects on students' college aspirations may be due to general societal norms and expectations which typically view the mother as educational nurturer of the children and the father as the financial provider for the family.

Consistent with most previous findings, results from the fixed-effects logistic regression analyses indicated that parental SES had a significant and positive effect on students' likelihood of having high college aspirations in both the eighth (odds ratio = 1.662,  $p < 0.001$ ) and tenth (odds ratio = 1.425,  $p < 0.001$ ) grades. Prior studies (e.g., Hossler & Stage, 1992; Hossler et al., 1989; Paulsen, 1990; St-Hilaire, 2002) have found that parents from high income and highly educated backgrounds have higher educational expectations for their children and are generally more involved throughout their child's college choice process. McDonough (1997) argued that parents who had attended college themselves were more proactive in preparing their daughters for college. Similarly, Reynolds and Pemberton (2001) argued that higher levels of parental education and income had positive effects on students' college aspirations due to first-hand knowledge of the college choice process. McGrath and colleagues (2001) found that high college aspirations were positively associated with the students having high socioeconomic status parents. McGrath and colleagues (2001) explained that high SES parents were able to be more actively involved in their child's schooling due to more flexible work schedules than their lower SES parent counterparts.

Despite the generally positive effects of high parental SES on students' likelihood of having high college aspirations found in most studies, some studies have indicated that parental SES has little effect on students' college aspirations. For example, McGrath and associate's (2001) study indicated that some students formed high levels of college aspirations despite the fact that their parents were from middle-to-low SES backgrounds and were not involved with their child's school activities. Likewise, the poor Columbian immigrant mother who never finished primary school in Levine and Nidiffer's (1997) study made up for her deficiency by cultivating her daughter's teachers through one-on-one meetings.

Results from the fixed-effects logistic regression analyses also indicated that academic ability had a statistically significant and positive effect on students' likelihood of having high college aspirations during both the eighth (odds ratio = 2.43,  $p < 0.001$ ) and tenth (odds ratio = 2.718,  $p < 0.001$ ) grades. Although studies have shown mixed results when examining the relationship between college aspirations and academic background, most (e.g., Chenoweth & Gallagher, 2004; Hossler et al., 1989; Hossler & Stage, 1992; Hossler et al., 1999; Kao & Tienda, 1998; Kim et al., 1998; McDonough, 1997) have found that students who take more academically rigorous courses and earn higher grade point averages and test scores report higher college aspirations when compared to those students tracked in non college-preparatory curricula and earn lower grade point averages and test scores.

The research findings in this study are also consistent with some of the recent research findings regarding the negative effect that being male has on the likelihood of students having high college aspirations (eighth grade model's odds ratio = 0.842,  $p < 0.05$ ,

tenth grade model's odds ratio = 0.789,  $p < 0.05$ ). Although past studies have reported male students as generally having higher educational aspirations than females, most recent studies (e.g., Chenowith & Galliher, 2004; Mau et al., 2000; Reynolds & Pemberton, 2003) have consistently found that males are less likely to have high educational aspirations than females. There may be several plausible explanations for this gradual gender shift over the past several decades. For example, the negative association between the likelihood of having high college aspirations and being male could reflect the varied career choices (e.g., technical careers, military) available to males outside of attaining an advanced college degree. Conversely, increased importance placed on both education and workplace equity has perhaps provided more opportunities and motivation for females to acquire the necessary desire for higher levels of education attainment needed to access previously male dominated professions.

This study's findings indicating a significant positive relationship between the likelihood of students having high college aspirations and being African American (eighth grade model's odds ratio = 2.143,  $p < 0.001$ , tenth grade model's odds ratio = 2.783,  $p < 0.001$ ) both support (e.g., Farmer, 2001; Mau, 1995; Solorzano, 1992) and contradict (e.g., Hurtado et al., 1997; Mau et al., 1998; Perna, 2000) prior research findings. Some scholars (e.g., Ogbu, 1990; Solorzano, 1992) have hypothesized that because African Americans place less value on education and upward mobility, African American students inherently have lower college aspirations than Whites. Contrary to Solorzano's (1990) hypothesis that involuntary minorities such as African Americans sometimes lack a cultural frame of reference that encourages educational success, the results from this study suggest that, all

else being equal, African American students have higher college aspirations than White students. Thus, this study's findings further debunk the myth that African Americans place little emphasis on college attainment.

The findings from this study also indicated that although being Hispanic (odds ratio = 1.390,  $p < 0.05$ ) had a significant and positive effect on the likelihood of students having high college aspirations in the eighth grade, being Hispanic (odds ratio = 1.101,  $p = 0.565$ ) was not a significant factor in the tenth grade. Findings from this study also indicated that although being Asian (odds ratio = 1.425,  $p = 0.150$ ) was insignificant in predicting students' likelihood of having high college aspirations in the eighth grade, being Asian (odds ratio = 2.426,  $p < 0.001$ ) was a significant positive effect on the likelihood of students having high college aspirations in the tenth grade. There may be several explanations accounting for these time-varying race or ethnicity effects on students' college aspirations. Scholars (e.g., Kao & Tienda, 1998) have argued that college aspirations may be stratified due to social and structural barriers (e.g., racism, sexism, discriminatory policies and practices, and cultural beliefs) faced by students from minority backgrounds. For example, Hispanic students may experience blocked opportunities or cultural barriers hindering their ability to form or maintain high college aspirations as they transition through the educational pipeline (middle school to high school). Although the findings from this study do not necessarily support the suggestion that social and structural barriers have a negative impact on Hispanic students' ability to maintain college aspirations over time, the findings do suggest that the effect of being Hispanic on the likelihood of having high college aspirations becomes insignificant over time (between the 8<sup>th</sup> and 10<sup>th</sup> grades). Conversely, as Asian students progress through the educational pipeline, Asian cultural norms and societal expectations may place greater

emphasis on education and college attendance, thus increasing the likelihood of having high college aspirations during later secondary school years (10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup> grades). Furthermore, recognizing the importance of educational attainment among the Asian culture, perhaps the peers, teachers, and counselors of Asian students are conditioned to have high educational expectations for the Asian student as they transition through the educational pipeline. In support of these explanations, Cheng and Starks (2002) compared teacher encouragement and expectations by race or ethnicity and found that Asian tenth grade students reported perceiving the highest amount of educational encouragement and expectations from teachers and counselors, while Hispanic tenth grade students reported perceiving the lowest amount of educational encouragement and expectations from teachers and counselors.

In order to address this study's third research question, "Does the relationship between students' college aspirations and parental involvement, while taking into account other variables, differ between middle school (8<sup>th</sup> grade) and high school (10<sup>th</sup> grade)?," the results from the cross model hypotheses tests were analyzed. On one hand, results from the cross model hypotheses tests indicated that no significant differences existed between the eighth and tenth grade models for the male, Asian, Hispanic, African American, and father's educational expectations coefficients. On the other hand, results from the cross model hypotheses test indicated that statistically significant differences did exist for parental involvement, parental SES, mother's educational expectations, and academic ability. The hypotheses tests indicated that significant negative differences existed between the eighth and tenth grade models for the parental involvement ( $\chi^2 = 5.61, p < 0.05, \text{Diff.} = -0.1783$ ) and parental SES ( $\chi^2 = 8.00, p < 0.01, \text{Diff.} = -0.1536$ ) coefficients, and significant positive

differences existed for the mother's educational expectations ( $\chi^2 = 21.99, p < 0.001, \text{Diff.} = 0.3641$ ) and the academic ability ( $\chi^2 = 5.19, p < 0.05, \text{Diff.} = 0.1644$ ) coefficients.

Based on the results of the cross-model hypotheses tests, this study's third research question was answered in the affirmative. The significant negative difference of -0.1783 between the parental involvement coefficients indicated that parental involvement had less of an effect on students' likelihood of having high college aspirations during the tenth grade year than for the eighth grade year. In support of this finding, comparison of pseudo- $R^2$ , AIC, BIC, and count- $R^2$  values for the full model (including parental involvement) and nested model (excluding parental involvement) indicated that the parental involvement variable added more predictive strength for the eighth grade model than for the tenth grade model. The decrease in the parental involvement variable's explanatory strength over time was especially evident when examining the count- $R^2$  values for the tenth grade nested model (count- $R^2 = 0.8082$ ) versus that of the tenth grade full model (count- $R^2 = 0.8079$ ). The lower count- $R^2$  value for the full tenth grade model was an indication that including the parental involvement variable actually lowered the tenth grade model's ability to accurately predict tenth grade students' likelihood of having high college aspirations. These findings indicating differences in the relationship between college aspirations and parental involvement between the eighth and tenth grade models support previous research (e.g., Hossler et al., 1999; Paulsen, 1990) suggesting that the effect of parental involvement on educational outcomes wanes as students ascend through the educational pipeline.

Scholars have posited several rationales as to why the effect of parental involvement may become less important in predicting educational outcomes as students progress from middle school grades (7<sup>th</sup>, 8<sup>th</sup> grades) into high school grades (9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>). For

example, researchers (e.g., Hossler et al., 1999; Lareau, 1987; Paulsen, 1990) have suggested that students are more reliant on parents for educational encouragement and support during elementary and middle school years than during high school years. Scholars (e.g., Muller, 1998) have attributed the decline in parental involvement in educational matters during later secondary school years to the students' desire for more autonomy as they grow older. Due to this increased sense of autonomy, students may rely more on school personnel and peers, rather than their parents, for educational advice during high school years. Additionally, some parents, particularly those with low educational attainment, may feel less knowledgeable about more complex educational issues as their child progresses through the secondary school system. Hence, the parents choose to be less involved in their child's complex educational process. Mickelson (1990) argued that parents may feel more and more powerless as their student fails to respond academically to their involvement in school matters over time. Additionally, Zimbhoff (2005) noted that parents often hope or expect that high school teachers and counselors are assisting their student through the complex college choice process. In reality, however, many teachers may be focused on the subject matter at hand and do not feel obligated to discuss future college plan with their students. Similarly, guidance counselors are often unable to advise students regarding college choice matters due to other responsibilities and lack of time and resources. Moreover, Crosnoe (2001) speculated that high school teachers and administrators may be less receptive to school involvement from parents when compared to elementary and middle school teachers and administrators. For example, high schools may offer fewer formal parental involvement opportunities than elementary and middle schools. Thus, parents have no choice but to be

less involved in their child's educational experience as they transition from middle school to high school.

Although the focus of this study was on examining differential effects of parental involvement across the students' eighth and tenth grades, results also indicated additional significant differences between the eighth and tenth grade models for both the mother's educational expectations and parental SES coefficients. In fact, results indicated that the largest differential effect across the eighth and tenth grade models was that of maternal educational expectations ( $\chi^2 = 21.99, p < 0.001, \text{Diff.} = 0.3641$ ). The positive difference of 0.3641 between the eighth and tenth grade coefficients indicated that the effect of maternal educational expectations on students' likelihood of having high college aspirations was more important during the tenth grade year as opposed to the eighth grade year. Past research findings offer several rationales explaining why the effect of maternal educational expectations on students' college aspirations may become more important over time. For example, both Cheng and Starks (2002) and Hamrick and Stage (2004) found that mothers expressed more interest and were more involved and informed regarding their child's educational process than the student's fathers. Based on these findings, one could speculate that mothers may be inclined to exert more influence during their child's tenth grade year due to the fact that it coincides with important decisions related to college preparatory course selection and the college search stage. One could also argue that students' reliance on mothers for guidance regarding these crucial decisions impacting their educational futures may increase during the tenth grade year. Additionally, the mother may recognize the importance of exerting influence via expressed educational expectations during high school

due to actual or perceived school discriminatory practices such as academic tracking and lack of counselor or teacher encouragement or guidance regarding college access and choice.

Results also indicated a significant cross-model difference for the parental SES coefficients ( $\chi^2 = 8.00$   $p < 0.01$ , Diff. = -0.1536). Like the parental involvement coefficients, the negative difference between eighth and tenth grade parental SES coefficients indicated that the effect of parental SES on the likelihood of students having high college aspirations was more important in the eighth grade than the tenth grade. There may be several explanations as to why parent SES becomes less important as the student progresses from the eighth to tenth grade. For example, Crosnoe (2001) noted that parental involvement is context specific. Thus, students who are doing well academically and content on making their own decisions regarding future college plans during high school may not require the academic and social support afforded from high SES parents. Additionally, due to the complex high school environment, many low SES parents may feel inadequate due to their own lack of education and familiarity with how to best advise their student regarding educational matters.

A cross-model hypothesis test also indicated differences in the magnitude of the academic ability variable's ( $\chi^2 = 5.19$ ,  $p < 0.05$ , Diff. = 0.1644) importance in predicting students' likelihood of having high college aspirations across the eighth and tenth grade models. The positive difference of 0.1644 between the eighth and tenth grade academic ability coefficients indicated that academic ability was a more important factor in students' ability to have high college aspiration during the tenth grade than the eighth grade. There may be several rationales as to why this difference in significance may exist between the eighth and tenth grade years. Mickelson (1999) explained that the placement of students by

academic ability into college preparatory or vocational tracks as they enter high school may predispose the student to reassess future college plans. For example, placement of low academic ability students with previously high college aspirations into vocational or workplace readiness programs may cause students to lower their previously high college aspirations levels. Studies (e.g., Bonous-Hammarth & Allen, 2005) have also suggested that students' ability to form and maintain high college aspirations may be limited by discriminatory academic placement in non-college bound tracks. For example, Mau and associates (1998) found that greater percentages of female, Asian American, and White students were enrolled in college preparatory programs compared to the percentages of male, African American, Hispanic, and Native American students, who were overrepresented in vocational programs. Similarly, Gonzalez and colleagues (2003) found that Hispanic students were often underrepresented in Advanced Placement and Honors courses when compared to other race and ethnic groups. As a result of this differential tracking, both Mau and associates (1998) and Gonzalez and colleagues (2003) reported that the students in the lower academic tracks reported lower college aspirations than students enrolled in the college preparatory tracks. Similarly, in a study utilizing NELS data, the results from Smith-Maddox's (1999) multiple regression analysis showed that African American eighth grade students placed in low academic ability groups reported lower college aspirations than those placed in higher ability groups. Smith-Maddox (1999) speculated that placement into low-ability groups heightened or perpetuated the educational inequalities between race and ethnic lines by institutionalizing the unequal distribution of academic resources.

### *Implications*

This research study focused on two streams of literature; primarily, the student college choice literature (Perna & Titus, 2004) and secondarily, the fledgling line of academic trajectories literature (Crosnoe, 2002; Dauber et al., 1996; Ratelle et al., 2004). The main goal of this study was to contribute to a line of research exploring the complex relationship between students' college aspirations and parental involvement. More specifically, this study focused on exploring whether or not the strength of the relationship between students' college aspirations and parental involvement differed as students ascended from the eighth to tenth grade years.

Based on the findings from this study, several important implications for student college choice and academic trajectories theory are evident. This study's findings also provide important insights with regards to federal, state, and local-level parental involvement policies within secondary schools. The following sections summarize this study's important theoretical contributions to the student college choice and academic trajectories literature as gleaned from this study's findings. Also, implications for policy related to parental involvement programs are discussed.

*Implications for theory.* The findings from this study suggest some important contributions to both the student college choice literature (e.g., Perna & Titus, 2005) and the fledgling line of academic trajectories literature (e.g., Crosnoe, 2001; Dauber et al., 1996 ). The student college choice literature (e.g., Cabrera & LaNasa, 2000a; Perna & Titus, 2005; Tierney, 2005) conveys the importance of the relationship between students' college aspirations and parental involvement. The findings from this study indicating strong positive

relationships between students' likelihood of having high college aspirations and frequency of parental involvement during both the eighth and tenth grades substantiate these past findings. This study's findings also provide support for Perna and Titus' (2005) speculation that the positive effects of parental involvement on students' likelihood of enrolling in a four-year college could be explained by the strong, positive relationship between college aspirations and parental involvement during earlier grades (e.g., 8<sup>th</sup> and 10<sup>th</sup> grades).

The student college choice literature also indicates that scholars (e.g., Hamrick & Stage, 1998; Hamrick & Stage 2004; Kao, 2002) have explored the relationships between college aspirations and various forms of parental involvement during specific grade levels (e.g., 8<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, and 12<sup>th</sup>). However, the existing literature also indicates that no known study has explored whether differential effects of parental involvement on college aspirations exist between the middle school (e.g., 7<sup>th</sup>, 8<sup>th</sup>) and high school (e.g., 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>) grade levels. Although a few scholars (e.g., Hossler et al., 1999; Paulsen, 1990) have found evidence suggesting students may rely more on parents for educational encouragement and support during middle school and more on school personnel and peers during high school, no known study has found explicit evidence indicating that the effect of parental involvement on college aspirations declines over this time period. Responding to this noticeable gap in the literature and to scholarly calls for longitudinal, time-varying college aspirations studies (e.g., St. Hilaire, 2002), the results of this study add to the student college choice literature.

This study found a significant difference in the magnitude of the relationship between students' college aspirations and parental involvement between the eighth and tenth grades. The findings indicate that the effect of parental involvement on students' likelihood of having high college aspirations becomes less important as students ascend from the eighth to

tenth year. This finding provides statistical support for previous speculation that the relationship between college aspirations and parental involvement wanes as the student progresses through the educational pipeline.

Based on the aforementioned findings from this study, several important implications can be argued for both student college choice theory and academic trajectory theory. First, although this study recognizes the importance of students' ability to maintain high levels of college aspirations throughout the student college choice process (e.g., predisposition, search, and choice stages), this study's conceptual framework also views students' college aspirations as dynamic in nature. The student college choice theory (e.g., Hossler & Gallagher, 1987; Hossler et al, 1999), on the other hand, has generally placed emphasis on students' college aspirations during the initial predisposition stage (7<sup>th</sup> through 9<sup>th</sup> grades) and assumes that initial levels of college aspirations remain static throughout the search and choice stages (10<sup>th</sup> through 12<sup>th</sup> grades). This study's findings imply that scholars should instead view college aspirations as dynamic over time and should treat the student college choice stages as an interconnected and synergistic process, rather than a static and disconnected process.

Second, student college choice theory (e.g., Hamrick & Stage, 2004; Hossler & Gallagher, 1987) has viewed parental involvement as the expressed attitudes of the parents towards their child's current and future educational prospects (e.g., Lareau, 1987). Although this study's conceptual model acknowledges the importance of both father's educational expectations and mother's educational expectations in predicting students' college aspirations, a more concrete, proactive form of parental involvement is also included. In this study, parental involvement is measured via the frequency of student-parent discussions

regarding things studied in class, course selection, and school activities. Based on this study's findings indicating a significant positive effect of this form of parental involvement on students' likelihood of having high college aspirations, scholars should view parental involvement in more concrete forms of active participation versus the traditional expressed educational expectations.

Third, most student college choice scholars view parental involvement as the collective participation of both the student's mother and father in educational matters, disregarding potential differential impacts of involvement by the student's father and mother, independently. Findings from this study imply that the impact of parental influences differ according to whether it is received or imparted by the student's mother or father. Although this study found both paternal and maternal educational expectations to be significant predictors of students' likelihood of having high college aspirations, mother's educational expectations proved to be more important during both the eighth and tenth grades. Additionally, this study found that the effect of maternal educational expectations on students' college aspirations differs significantly between the eighth and tenth grades, with maternal educational expectations becoming significantly more important over time. These findings imply that students perceive and react differently towards their mother's active involvement in educational matters than they do their father's active involvement in educational matters. Based on these findings, scholars should acknowledge that students react differently towards maternal involvement than they do towards paternal involvement. Additionally, scholars should view the relationship between student educational outcomes and maternal and paternal involvement as dynamic over time, versus being static. As

Crosnoe suggests, “Parental involvement represents the interdependent lives of young people and their parents. Both may fluctuate with time and changing conditions, and both are best viewed as trajectories” (2001, p 213).

Coincidentally, the findings from this study contribute to and have important implications for the academic trajectories literature (e.g., Crosnoe, 2001; Crosnoe, 2002; Dauber et al., 1996; Ratelle et al., 2004). In response to Crosnoe’s (2001) call for research on the time-varying effects of different types of academic trajectories (e.g., participation in extracurricular activities) on students’ psychological orientation towards school, this study focuses on parental involvement (e.g., frequency of discussions between student and parent regarding school matters) and its relationship with students’ psychological orientation towards future college plans (high or low college aspirations) between the eighth and tenth grade years. Additionally, making note of the limited inferential ability of Crosnoe’s (2001) study due to its small sample size, findings from this study are based on data collected in 1988 and 1990 from the National Educational Longitudinal Survey (NELS 88/90), a large nationally representative dataset. Thus, this study’s findings provide representation of all eighth and tenth grade students attending U.S. public schools in 1988 and 1990.

With regards to implications for academic trajectories theory, this study’s findings present at least one consideration scholars should take into account when conducting future studies. The academic trajectories literature has focused primarily on time-varying elementary and secondary education outcomes (e.g., variance of academic orientation throughout high school) and has not explicitly explored postsecondary educational outcomes (e.g., college aspirations). In his 2001 study, Crosnoe speculated that part of the reason for the decline in parental involvement among academically-gifted students was due to the fact

that both the student and parent had shifted their focus from secondary school outcomes towards postsecondary school outcomes as the student transitioned from the 9th to 12th grades. Although findings from this study suggest that parental involvement has significant positive effects on the likelihood of students having high college aspirations during both the eighth and tenth grade years, results also indicate that the strength of the relationship weakens between the students eighth and the tenth grade years. Coincidentally, the tenth grade is the year when many students and parents begin the college search process. Perhaps the weakening relationship between college aspirations and parental involvement found in this study is a signal that some students and parents do shift their energy from secondary school involvement (e.g., discussions regarding course selection, things studied in class, and school activities) towards postsecondary involvement (e.g., discussions regarding college search process) between the eighth and tenth grade years. Based on this argument and results from this study, scholars should use caution when viewing the effect of parental involvement as becoming less important for certain educational outcomes over time, as both students' and parents' energy, focus, and involvement may simply shift towards other educational outcomes. In other words, students and parents focus on other educational matters (e.g., college search and choice), away from the educational outcome of interest (e.g., course selection, school activities), may detract from an otherwise significant relationship between the specific educational outcome of interest and parental involvement.

*Implications for policy, practice, and programming.* The findings from this study also provide implications for federal, state, and school-level policy makers and practitioners interested in college access. The underlying purpose of most college access policies and programs are to identify and encourage avenues to improve the likelihood of students gaining

access to college. Based on the results of this study, policy makers and practitioners should consider policies, practices, and programs encouraging proactive forms of parental involvement opportunities (e.g., PTA, conferences, volunteering, parent-student collaborations/discussions regarding educational matters, and college visits) as students transition through the educational pipeline (e.g., 6<sup>th</sup>-12<sup>th</sup> grades), and coincidentally, the student college choice process (e.g., 8<sup>th</sup>-12<sup>th</sup> grades). Most specifically, this study's findings imply that policies and programming efforts need to focus on educating parents, school administrators, and teachers about the importance of effectively engaging parents in appropriate discourse with their adolescent and their adolescent's teachers regarding educational matters.

The understanding that parents are necessary ingredients for student and school improvement is both supported by research (see Perna, 2002) and explicitly reinforced through federal policy and programming efforts. For example, Section 1118 of the No Child Left Behind Act of 2001 (NCLB) states that:

each school under this part shall jointly develop with parents for all children served under this part a school-parent compact that outlines how parents, the entire school staff, and students will share the responsibility for improved student academic achievement and the means by which the school and parents will build and develop a partnership to help children achieve the State's high standards. (U.S. Department of Education, 2003)

Furthermore, in her extensive review of pre-college programming efforts in 2001, Perna identified parental involvement as one of the five critical components needed for pre-college

programs to successfully facilitate educational advancement and college access for low-income students.

Despite these explicit policy compacts and research findings, some educational agencies and practitioners continue to either completely neglect or fail to appropriately engage parents consistently throughout the educational pipeline. In fact, Perna (2002) found that a majority of pre-college outreach programs failed to acknowledge the importance of parental involvement. Based on this study's findings indicating a strong relationship between the likelihood of students having high college aspirations and parental involvement, pre-college programming efforts should employ strategies aiming to involving parents throughout the educational pipeline, with specific focus on encouraging a high frequency of parent-student discourse related to things studied in class, course selection, and school activities.

This study's findings also imply that policy makers should make parental involvement in students' college planning and preparation during middle school and high school an explicit part of new policy provisions. Although section 1118 of NCLB acknowledges the importance of parental involvement in general educational matters, there is no reference to the importance of college access and attainment and its relationship with a student's formation and maintenance of high college aspirations during the high school years. In fact, one of the major contentions with the No Child Left Behind law is that although its provisions supposedly apply to all public schools, including high schools, the NCLB law focuses primarily on the K-8 grades. Thus, the NCLB provisions often neglect the needs of high school students (Alliance for Excellent Education, 2007). In support of this contention, findings from this study imply that future NCLB revisions should explicitly emphasize the

importance of students forming and maintaining high college aspirations and frequent, proactive forms of parental involvement throughout the secondary school grades.

Additionally, future revisions of federal policy should recognize the nexus between the student college choice process, which typically takes place during the middle and high school grades (e.g., 8<sup>th</sup>-12<sup>th</sup> grades), and eventual postsecondary access and attainment.

Acknowledging the importance of the student college choice process and its' relationship with college preparation and eventual college access in policy is especially important given the continued lack of college attainment among low-income and minority groups in the United States. (U.S. Department of Education, 2006).

#### *Recommendations for Further Research*

The primary purpose of academic trajectories and college aspirations research is to find ways of helping students maintain adequate academic outcomes and high college aspirations throughout the educational pipeline in a manner that increases the likelihood of college access and eventual attainment. Therefore, based on this study's findings regarding the significant positive effect of parental involvement on the likelihood of students having high college aspirations during the eighth and tenth grade school years, future research in these areas is warranted.

Findings from this study suggest that students who have more frequent discussions with their parents regarding things studied in class, course selection, and school activities are more likely to have high college aspirations than students who have less frequent discussions with their parents. Also, findings from this study suggest that students whose fathers and mothers have high educational expectations for them have a higher likelihood of having high college aspirations than those students whose fathers and mothers have lower educational

expectations. Results from this study also indicate that the relationships between students' college aspirations and parental involvement and students' college aspirations and maternal educational expectations differ between the eighth and tenth grades. Although findings from this study suggest that the relationship between students' college aspirations and parental involvement is stronger during the eighth grade than the tenth grade, the findings suggest that the relationship between students' college aspirations and maternal educational expectations is stronger during the tenth grade than during the eighth grade.

Based on these results, there are several recommendations for future research. First, based on the significant positive effect of parental involvement (frequency of student-parent discussions regarding things studied in class, course selection, and school activities) on students' college aspirations found in this study, future studies should examine the effects of other proactive forms of parental involvement on college aspirations. For example, Dornbusch and Ritter (1988) found that high school students whose parents attended school events and had frequent contact with their teachers had higher achievement than those students whose parents were minimally involved or uninvolved. Future studies could examine the relationship between other proactive forms of parental involvement such as frequency of participation in school activities (PTA, parent-teacher conferences, attendance at school events, and college visits) and college aspirations, particularly during high school grades.

Second, in the future, longitudinal studies should disaggregate parental involvement to examine respective differences between maternal and paternal involvement and students' college aspirations. Although it has been well established that fathers are less involved in their child's educational process than are mothers, the question remains as to whether

students whose fathers are more frequently involved in educational matters have significantly higher educational outcomes (e.g., high college aspirations) compared to those students with fathers who are not as involved. Additionally, findings from this study indicate that the relationship between maternal educational expectations and college aspirations is stronger during the tenth grade than during the eighth grade. Based on this evidence, future inquiries examining time-varying differences of the impact of maternal and paternal involvement on college aspirations could shed light on why some students are more successful at maintaining high college aspirations throughout the educational pipeline than other students.

Third, this study focused on parental involvement and was largely based on the assumption that students had both a father and a mother available to discuss school-related matters. However, studies (e.g., Cheng & Starks, 2002) indicate that some students, for a variety of reasons, rely more heavily on extended family members (grandparents, aunts, uncles, foster parents, and stepparents) or school peers and personnel for guidance regarding educational matters. Thus, future studies should consider the effects of family involvement or school peers and personnel on students' college aspirations and whether these relationships change as the student ascends through the educational pipeline.

Fourth, future studies should examine the relationship between students' college aspirations and academic tracking. Although findings from this study indicate a significant positive relationship between the likelihood of students having high college aspirations and academic ability during both the eighth and tenth grades, respectively, the findings from this study also indicate that the magnitude of the relationship between the likelihood of students having high college aspirations and academic ability is stronger during the tenth grade year. These findings are contrary to prior findings regarding the time-varying relationship between

academic tracking and academic orientation. In his 2001 study, Crosnoe suggested that although students placed within college-preparatory academic tracks began high school with high levels of academic orientation and parental involvement, they also experienced sharp declines in both over time. Crosnoe's (2001) findings further suggested that the sharpest declines in parental involvement during high school grades were among the highest achieving students and minority students. Additionally, based on Crosnoe's (2001) study, one could argue that parental involvement promotes academic orientation, but only among students who are enrolled in non-college preparatory tracks. Based on these contradictory findings, further inquiries examining the complex relationships between college aspirations, academic tracking, and parental involvement and how these relationships may differ over time are warranted.

Scholarly findings (e.g., Bonous-Hammarth & Allen, 2005) also indicate that students' ability to form and maintain college aspirations could be limited by discriminatory academic placement in non-college bound tracks. For example, Mau and associate's 1998 study indicated that greater percentages of female, Asian American, and White students were enrolled in college preparatory programs compared to the percentages of male, African American, Hispanics, and Native American students, who were over-represented in vocational programs. Similarly, Gonzalez and colleagues (2002) found that Hispanic students were often underrepresented in Advanced Placement and Honors courses when compared to other race and ethnic groups. As a result of this differential tracking, both Mau and associates (1998) and Gonzalez and colleagues (2002) reported that the students in the lower tracks had lower college aspirations than those students enrolled in the college preparatory tracks. Similarly, in a study utilizing NELS data, the results from Smith-

Maddox's (1999) multiple regression analysis showed that African American eighth grade students placed in low academic ability groups reported lower college aspirations than those placed in higher ability groups. Smith-Maddox (1999) speculated that placement into low academic ability groups heightened or perpetuated the educational inequalities between race and ethnic lines by institutionalizing the unequal distribution of academic resources. Based on these past findings, future studies should examine school academic tracking policies and practices and the effect these policies have on the relationships between students' academic track and college aspirations over time.

Fifth, this study focuses on the effects of parent involvement on college aspirations for students, in general. More studies are needed specifically examining how the relationship between college aspirations and parental influence differs by race and ethnic backgrounds. Research has found that, for a variety of reasons (e.g., work commitments, feeling of inadequacy due to lack of educational attainment, linguistic barriers, perceived lack of welcome from teachers and administrators, assumed lack of parental interest from teachers and administrators, lack of understanding or information about the structure of the school and accepted communication channels), minority and low-income parents are often underrepresented among those parents involved with schools. Contrary to the popularly held deficit viewpoint that minority parents lack the capacity to positively impact students' educational outcomes, research (e.g., Levine and Nidiffer, 1998) indicates that low socioeconomic and minority parents can have a positive impact on students' college aspirations and eventual college degree attainment. Thus, scholars have called for new theoretical lenses in order to further understand cultural barriers and differences among underrepresented minorities and low income groups. For example, Hamrick and Stage

(1998) called for new conceptual models accounting for the school experiences of African American students in order to identify the influences and processes impacting their ability to form and maintain college aspirations. Similarly, Farmer (2001) indicated that studies were limited by their inability to assess minority students' experiences with discriminatory school practices and whether or not these experiences were related to students' ability to form and sustain college aspirations. Based on these scholarly calls, evidence that involvement from minority or low-income parents can have positive impacts on students' college aspirations, and evidence of school discriminatory practices, more research is needed to identify, understand, and eventually increase the positive discourse between minority or low-income students, their parents, and school administrators and teachers.

Sixth, future studies should examine whether the effects of parental involvement policies and policy-informed programming efforts indirectly impact the relationship between students' college aspirations and parental involvement. For example, studies could examine the relationship between the extent to which state and local school agencies comply with Section 1118 of the No Child Left Behind Act of 2001 and actual school-wide parental involvement rates. In a similar vein, research could address the effectiveness of various types of parental involvement programs and opportunities (school governance, parent advisory committees, classroom volunteering, effective parental guidance classes, PTA's, school, family and community outreach programs) used to engage students, school staff, and parents in discourse regarding school and student matters. Once successful programming efforts are identified, assessment of these programs could be conducted to identify best practices, which could then be implemented by other schools.

Seventh, although this study chose to control for school contextual effects on students' college aspirations for students attending both the eighth (middle school) and tenth grades (high school), future studies need to explore the effects that school contextual factors (e.g., student and faculty race or ethnic composition, school SES, parent involvement rates, and parental involvement opportunities) might have on the relationship between students' college aspirations and parental involvement. Although studies (e.g., Hamrick & Stage, 1998; Hamrick & Stage, 2004) have examined college aspirations of at-risk students attending predominately low-income or high-minority schools, only a few studies (e.g., Goldsmith, 2004; Yun & Kurleander, 2004) have studied the college aspirations among students attending multi-racial schools.

Eighth, this study was limited by several weaknesses inherent in the NELS data. First, the NELS was administered to eighth grade students in 1988 and again during their tenth grade year in 1990. Due to changing student demographics since this time period, future studies are needed based on more recent nationally representative data such as the NCES-sponsored Education Longitudinal Study of 2002 (ELS: 2002). Utilizing more recent data would provide research results reflective of current student and school demographic trends, as well as current policies impacting parental involvement. Second, parental influence measures used in this study (e.g., parental involvement, mother's educational expectations, and father's educational expectations) were collected from student perspectives and not directly from parents. Future studies are needed utilizing nationally representative datasets which have surveyed parents in order to get a true reflection of parental perceptions of involvement in their child's educational activities as well as the parent's educational expectations for their child, instead of relying totally on students' perception of parental

influence. Although current NCES databases (e.g. NELS: 88/00, and ELS: 2002) collected data from parents, these parent surveys were only administered during one of the student's school grades (e.g., NELS: 90), and not over a period of several grade levels. Third, future studies are also needed based on survey data collected utilizing more consistent measures of students' college aspirations over time. Although the NELS base-year and first follow-up questionnaires posed the same question to the students: "As things stand now how far in school do you think you will get," the response choices differed for each survey. For example, the base-year or eighth grade NELS response options included "won't finish high school," "will finish high school," "will attend vocational, trade, or business school after high school," "will attend a four-year college," "will finish college," and "will attend a higher level of school after graduation from college", respectively. Whereas, the first follow-up or tenth grade NELS questionnaire response choices included "less than high school," "high school graduate only," "less than two years of trade school," "two-plus years of trade schools," "greater than two years of trade school," "two or more years of college," "finish college," "master's degree," or "Ph.D or M.D." Perhaps future questionnaires should be more definitive in the choice ranges to include the attainment of a four-year baccalaureate degree. Lastly, although this study employed a single composite parental involvement variable, future studies are needed utilizing multiple measures of parental involvement. For example, based on their perusal of parental involvement research, Sui-Chu and Willms (1996) suggested that parental involvement is a multidimensional construct consisting of both school involvement and home involvement. Based on Sui-Chu and Willms' (1996) suggestions, future studies should explore the relationship between students' college aspirations and parental involvement at school (e.g., frequency of contact with teachers,

counselors, and other school personnel, volunteering in schools, attendance at open house) and parental involvement at home (e.g., discussion of school activities and monitoring out-of-school activities).

Ninth, although this study successfully compared the relationship between college aspirations and parental involvement during the eighth and tenth grades, more longitudinal, time-varying studies exploring whether or not the student-parent relationship changes across other critical secondary and post-secondary years are needed. Additionally, this study focused on the relationship between college aspirations and parental involvement during the college predisposition stage (Hossler & Gallagher, 1987). Future studies should focus on time-varying relationships between both the college search stage (11<sup>th</sup> & 12<sup>th</sup> grades) and parental involvement, and the college choice stage (12<sup>th</sup> grade & 1<sup>st</sup> year of college) and parental involvement, respectively.

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## Appendices

## Appendix A.

### *Descriptive Statistics of Analysis Variables using NELS:88/90 before Imputation*

Variable	Cases (%missing)	Mean	S.D.	Min.	Max.
<i>Eighth-Grade Model</i>					
College Aspirations	9707 (0.0)	0.716	0.451	0.000	1.000
Male	9707 (0.0)	0.466	0.499	0.000	1.000
Female (reference)	9707 (0.0)	0.533	0.499	0.000	1.000
White (reference)	9707 (0.0)	0.716	0.451	0.000	1.000
Asian	9707 (0.0)	0.074	0.261	0.000	1.000
Hispanic	9707 (0.0)	0.123	0.328	0.000	1.000
Black	9707 (0.0)	0.087	0.283	0.000	1.000
Academic Ability	9407 (3.1)	5261.96	1000.474	3240	7580
Parent SES-quartile	9707 (0.0)	2.617	1.119	1.000	4.000
Father's Educational Expectations	9080 (6.5)	4.530	1.677	0.000	6.000
Mother's Educational Expectations	9179 (5.4)	4.658	1.528	0.000	6.000
Parental Involvement					
BYS36a	9616 (0.9)	2.300	0.665	1.000	3.000
BYS36b	9634 (0.8)	2.534	0.626	1.000	3.000
BYS36c	9622 (0.9)	2.450	0.663	1.000	3.000
<i>Tenth-Grade Model</i>					
College Aspirations	9707 (0.0)	0.647	0.478	0.000	1.000
Male	9707 (0.0)	0.467	0.499	0.000	1.000
Female (reference)	9707 (0.0)	0.533	0.499	0.000	1.000
White (reference)	9707 (0.0)	0.716	0.451	0.000	1.000
Asian	9707 (0.0)	0.074	0.261	0.000	1.000
Hispanic	9707 (0.0)	0.123	0.328	0.000	1.000
Black	9707 (0.0)	0.087	0.283	0.000	1.000
Academic Ability	9370 (3.5)	5235.79	974.0	3031	7182.0
Parent SES-quartile	9707 (0.0)	2.605	1.120	1.000	4.000
Father's Educational Expectations	9510 (2.0)	4.818	2.347	0.000	7.000
Mother's Educational Expectations	9482 (2.3)	5.184	2.005	0.000	7.000
Parental Involvement					
F1s105a	8968 (7.6)	2.044	0.601	1.000	3.000
F1s105b	8962 (7.7)	2.072	0.663	1.000	3.000
F1s105c	8960 (7.7)	2.020	0.624	1.000	3.000

Source: Analysis of NELS: 88/90 survey data

## Appendix B.

### *Descriptive Statistics of Analysis Variables using NELS:88/90 after EM-Algorithm Imputation.*

Variable	Observations	Mean	S.D.	Min.	Max.
<i>Eighth-Grade Model</i>					
College Aspirations	9707	0.716	0.451	0.000	1.000
Male	9707	0.466	0.499	0.000	1.000
Female (reference)	9707	0.533	0.499	0.000	1.000
White (reference)	9707	0.716	0.451	0.000	1.000
Asian	9707	0.074	0.261	0.000	1.000
Hispanic	9707	0.123	0.328	0.000	1.000
Black	9707	0.087	0.283	0.000	1.000
Academic Ability	9707	5254.3	996.81	3240	7581.0
Parent SES-quartile	9707	2.617	1.119	1.000	4.000
Father's Educational Expectations	9707	4.507	1.650	0.000	6.000
Mother's Educational Expectations	9707	4.646	1.502	0.000	6.000
Parental Involvement					
BYS36a	9707	2.297	0.663	1.000	3.000
BYS36b	9707	2.532	0.625	1.000	3.000
BYS36c	9707	2.448	0.662	1.000	3.000
<i>Tenth-Grade Model</i>					
College Aspirations	9707	0.647	0.478	0.000	1.000
Male	9707	0.467	0.499	0.000	1.000
Female (reference)	9707	0.533	0.499	0.000	1.000
White (reference)	9707	0.716	0.451	0.000	1.000
Asian	9707	0.074	0.261	0.000	1.000
Hispanic	9707	0.123	0.328	0.000	1.000
Black	9707	0.087	0.283	0.000	1.000
Academic Ability	9707	5228.62	972.73	3031	7182
Parent SES-quartile	9707	2.605	1.120	1.000	4.000
Father's Educational Expectations	9707	4.800	2.336	0.000	7.000
Mother's Educational Expectations	9707	5.172	1.996	0.000	7.000
Parental Involvement					
F1S105a	9707	2.039	0.579	1.000	3.000
F1S105b	9707	2.062	0.642	1.000	3.000
F1S105c	9707	2.016	0.602	1.000	3.000

Source: Analysis of NELS: 88/90 survey data

## Appendix C.

### *Results from Factor Analysis of Eighth Grade Parental Involvement Measures*

<b>Factor</b>	<b>Eigenvalue</b>	<b>Difference</b>	<b>Proportion</b>
Factor1	0.78907	0.92693	1.7056
Factor2	-0.13787	0.05069	-0.2980
Factor3	-0.18856	-0.4076	1.0000

<b>Variable</b>	<b>Factor Loadings</b>	<b>Uniqueness</b>
BYS36A (Selecting courses or subjects at school)	0.5166	0.7331
BYS36B (School activities or events)	0.5376	0.7109
BYS36C (Things studied in class)	0.4828	0.7669

Source: Analysis of NELS: 88/90 survey data

\*Alpha reliability coefficient = 0.600

## Appendix D.

### *Results from Factor Analysis of Tenth Grade Parental Involvement Measures*

<b>Factor</b>	<b>Eigenvalue</b>	<b>Difference</b>	<b>Proportion</b>
Factor1	1.38599	1.52152	1.302
Factor2	-0.13787	0.05222	-0.1275
Factor3	-0.18775		-0.1767

<b>Variable Name</b>	<b>Factor Loadings</b>	<b>Uniqueness</b>
F1S105A (Selecting courses or subjects at school)	0.6825	0.5432
F1S105B (School activities or events)	0.7125	0.4923
F1S105C (Things studied in class)	0.6422	0.5876

Source: Analysis of NELS: 88/90 survey data

\*Alpha reliability coefficient = 0.760

## Appendix E.

### *Variance Inflation Factors (VIF) for Eighth Grade Variables.*

Variable	VIF	1/VIF
Mother's Educational Expectation	2.23	0.449
Father's Educational Expectations	2.20	0.455
Parental SES	2.06	0.484
Male	1.88	0.533
Academic Ability	1.27	0.786
Black	1.15	0.866
Parent Involvement	1.15	0.872
Hispanic	1.11	0.899
Asian	1.05	0.952
Mean VIF	1.57	

**Appendix F.**

*Variance Inflation Factors (VIF) for Tenth Grade Variables.*

Variable	VIF	1/VIF
Parental Involvement	2.03	0.492
Male	1.85	0.541
Father's Education Expectations	1.78	0.574
Mother's Education Expectations	1.74	0.575
Black	1.18	0.849
Hispanic	1.11	0.898
Parent Involvement	1.05	0.952
Mean VIF	1.46	