

## ABSTRACT

GONZALEZ, LAURA MCLAUGHLIN. College Choice of Latino High School Students: Influence of Demographics, Academic Preparation, and Academic Self-efficacy Beliefs on Intended Level of Post-secondary Institution. (Under the direction of Stanley B. Baker and Siu-Man R. Ting.)

National data has shown that Latino students entering college have selected two-year institutions at a greater rate than any other group. Some reasons for this tendency have been suggested (e.g., financial or academic difficulties), but they have not explained the phenomenon satisfactorily. The current study addressed this issue with logistic regression analysis, utilizing data from the National Center for Education Statistics. The outcome variable was level of college intended by Latino and White high school students in their senior spring. Predictor variables were related to demographic factors, academic preparation factors, and academic self-efficacy beliefs (the primary focus of exploration). Several main effects predictors were significant for all students (e.g., percent of free and reduced lunches at the high school, highest level of high school math, student expectations for future education). Only one predictor was significant ( $p < .05$ ) when interacting with race/ethnicity – student expectations for future education, one of the academic self-efficacy variables. An alternate evaluation of interaction terms (using a cross derivative) found some areas of significance for the interaction effects of race/ethnicity with teacher expectations and math and reading test scores, in addition to student expectations. For Latino students, all three of these interactions had a negative effect (as compared to Whites) on the predicted probability of selecting a four-year college. Socioeconomic status was held constant in the analysis of interaction terms, so the Latino students were similar in economic terms to the White students. However, even with high aspirations, high expectations from teachers, and good math and reading test scores, Latinos had a lower predicted probability of the reference outcome. Therefore, that subgroup

of Latinos could have been choosing two-year colleges for other reasons, such as family ties, social networks, or other dynamics common to collectivistic cultures. Findings are discussed in terms of Bandura's social cognitive theory. Academic self-efficacy and social influences are promising areas for future research.

College Choice of Latino High School Students: Influence of Demographics,  
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by

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## DEDICATION

Completing a doctoral degree is a community endeavor, and I consider myself extremely fortunate to be surrounded by such a supportive and resourceful community. The Counselor Education program has gone through some changes in my time here, but there has been a network of students reaching out to help each other and a bedrock of committed faculty who have stabilized the terrain. Many thanks to my peers who have shared so willingly their emotional and mental resources as we all climbed the ladder together.

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## BIOGRAPHY

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## Chapter One

### INTRODUCTION

#### Latinos in the United States

Recent events have caused more national attention to be focused on the Latino or Hispanic community living in the U.S. Census estimates for 2005 indicate that the Latino population residing in the U.S. has grown to 14.4%, not including citizens on the island of Puerto Rico (U.S. Census Bureau, 2005b). For the purpose of the present dissertation, Latinos will be defined as citizens or descendents from the following countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Uruguay, and Venezuela. Citizens of the U.S. who maintain cultural pride or traditions from those groups, no matter how many generations have been born in this country, claim Latino heritage or ethnic identity. Latinos are more accurately described as an ethnic group than a racial group, because their physical features may reflect heritage from Africa, Asia, Europe, an indigenous tribe from the Americas, or a combination thereof.

Unlike prior Latino émigrés, who tended to concentrate in a few geographic areas of the country (e.g., California, Florida, New York, Texas), the newest Latino immigrants have located in areas unaccustomed to such influx, such as the rural Southeast (Kochhar *et al.*, 2005). The result of this wave of newcomers and other national trends (e.g., political, economic) has been an expanded and sometimes contentious dialogue about immigration in all parts of the country, mostly focusing on the individuals arriving from Mexico and Central America.

It is worthwhile to elaborate on the various identities and experiences that are included under the umbrella terms Latino or Hispanic. Mexican Americans are the largest subgroup, making up approximately 7.3% of the total U.S. population (U.S. Census U.S. Census Bureau, 2000). The native-born U.S. Latino population (62% of total) outnumbered the foreign-born population (Llagas & Snyder, 2003). Latinos are younger on average than the other racial/ethnic groups present in the U.S., with a median age of 26.6 years. Latinos are over-represented among individuals living below the poverty line at 21% of the total. This is combined with the fact that immigrant households tend to have more financial challenges than households of U.S.-born Latinos (Fry, 2002).

Both age and poverty in the Latino community have implications for the primary, secondary and postsecondary educational systems, as a portion of the group will be seeking the tools to lift themselves into a better circumstance, but also facing significant challenges in the process. To broaden the picture, the declining numbers of Whites in the workplace due to baby boomer retirement and the projected increases to the working age Latino population have great importance for the future of the United States (Fry, 2002). It is good for the Latino community, but also good for the entire country, to focus on the postsecondary educational progress of this group. The present chapter will examine portions of the pathway that can lead to college to describe how Latinos are faring.

To provide a condensed example, if 100 Latino elementary students were followed through the U.S. educational system, only 52 would graduate from high school. Of those 52 students, 20 would go to community college and 11 would go to a baccalaureate college. Two students would successfully transfer from community college to the four-year

university, and a total of 10 students would graduate with a bachelor's degree (Solorzano *et al.*, 2005). These numbers do not compare favorably with other racial and ethnic groups in the U.S.

### Educational Progress of Latinos at the Secondary Level

Swail, Cabrera, and Lee (2004) indicate that of all 8<sup>th</sup> graders initially surveyed by the National Center for Education Statistics (NCES) in the 1988 National Education Longitudinal Study (NELS:88) database, Latinos had the lowest rate of receiving a high school credential (86%). History will show us that the current concerns about rates of high school completion or postsecondary enrollment of Latinos are not new. Duran (1983) and Aguirre and Martinez (1993) were among the first to gather and review the available information, and present it in a coherent framework. Duran synthesized the scholarship of the 1970's and identified some important factors for understanding and promoting educational success among all Latinos, including language background, income, educational attainment of the parents, and sociocultural experiences in the classroom. Aguirre and Martinez authored a report that examined the educational pathway of Chicanos (Latinos with Mexican heritage) in the 1980's through 1990. These three scholars documented that 55.5% of Latinos between the ages of 18 to 34 years had finished high school in 1977, and that 44.1% of Chicanos, 55.5% of Puerto Ricans, and 63.5% of Cubans had completed four or more years of high school in 1990. By 2002, 50.6% of Mexican Americans, 66.8% of Puerto Ricans, and 70.8% of Cubans age 25 and older had completed a high school education (U.S. Census U.S. Census Bureau, 2003). This certainly represents progress, but

the year 2000 graduation rate (64%) for Latinos ages 18 to 24 still lags behind the rates for Whites (92%) and African Americans (84%) (Llagas & Snyder, 2003).

Duran (1983) reminds readers that generation of immigration can have an impact on educational attainment. It should be noted that educational attainment rates may be difficult to compare when they are drawn from different age groups, including children who have moved through the U.S. primary and secondary system and adults who came here to work, perhaps with less educational background in their home countries (e.g., Llagas & Snyder, 2003). Fry (2002) writes, “U.S.-born Latinos 16 to 19 years old are four times more likely to be in school and not working at all than their immigrant peers who came to the United States as adolescents” (p. 5). It can be difficult for adolescents to make the choice to continue with education as opposed to providing immediate financial support to their families, given the challenging economic circumstances which characterize the lives of most new Latino immigrants. Their experiences are qualitatively different from adolescents who are third or fourth generation U.S. citizens and are supported by educational tradition and social structure.

In addition to completing high school, there are other steps that are necessary to become eligible for enrollment in four-year colleges. Many colleges require standardized test scores (either SAT or ACT) and a specific pattern of academic course taking in high school. Latinos made up nine percent of SAT-takers in 2001, up from seven percent in 1991 (Llagas & Snyder, 2003). Scores are still below the national averages for verbal and math, however. Llagas and Snyder indicate that in 2001, the verbal average for all students was 506, while Mexican Americans scored 451, Puerto Ricans averaged 457, and those

categorized as “other Latino” posted a 460 average. The mathematics portion of the 2001 SAT exam shows similar results (514 national average, 458 for Mexican Americans, 451 for Puerto Ricans, 465 for other Latinos). Students who only intend to work or apply to community college may opt out of standardized testing entirely.

National data for 1998 shows that Latinos had increased the number of academic credits earned in high school, to the point where differences between African Americans (17.2 credits), Latinos (17.7 credits) and European Americans (18.1 credits) were negligible (Llagas & Snyder, 2003). There are still gaps in terms of the highest levels of math and science being completed by Latinos, however, which can have an important influence on college preparedness and selection of majors. Only 26.2% of Latino high school graduates in 1998 had taken precalculus, trigonometry, or calculus, as compared to 30.4% of Black graduates and 45.1% of White graduates. The number of Latinos who took Advanced Placement exams in 2000 had increased from earlier years to 9% of the student total (Llagas & Snyder, 2003).

These patterns could be interpreted as evidence of educational motivation and willingness to strive for improvement. Of course, the availability of college preparatory courses and the economic resources of high schools also have an influence on which students can achieve these standards (Contreras, 2005). Goldsmith (2004) indicates that both Latinos and African Americans are more likely than European American students to live in families and neighborhoods that are characterized as low socioeconomic status (SES) and to attend “inferior schools” (p. 121). Students who are leaning toward work or community college attendance after high school may elect not to sign up for challenging

math classes, but in doing so, they have put premature limits on their educational possibilities.

### Postsecondary Progress of Latinos

Data confirm that there is a gap in achievement of bachelor's degrees between Hispanic or Latino students and a reference group of White students (Fry, 2004). Looking at a traditional path through college, differences could start with initial enrollment level or timing, continue with attendance patterns, and terminate in final attainment rates. In the NELS:88 study of 8<sup>th</sup> graders, 73% of the entire group had entered some form of postsecondary education within 8 years of high school graduation – for Latinos, the percentage was 66% (Swail et al., 2004). This is particularly notable when compared to data from 1977, when 21.2% of Latino high school graduates and 19.8% of the population at large enrolled in college (Duran, 1983). Duran notes that fewer Latinos succeeded in graduating from high school at that time, however, which artificially changes the pool of those considering college. Still, a trend for more high school students to attend college is visible in the data, as is the suggestion that Latinos are losing ground in comparison to other students.

Turning to attendance patterns, over half of the Latinos in the NELS:88 study who did enroll in college were part time students, and almost a quarter had delayed their entry into postsecondary education after high school graduation (Swail et al., 2004). Only 43% maintained continuous enrollment, compared to 67% of White students. Although there are reasons for making such decisions, these differences in enrollment and attendance are considered to reduce chances of degree attainment (Fry, 2002).

Another concern that has been raised about Latinos and postsecondary education is their tendency to start their trajectory at a relatively low level. Only 22% of Latinos in NELS:88 had their initial enrollment at a four-year college, compared to 37% for the whole sample (Swail et al., 2004). Using data from NCES, Fry (2005) showed that whereas 60% of all first-time full-time students (regardless of age) began their postsecondary educations in four-year institutions, only 42% of Latinos did so. Latinos were more likely to start in community colleges (38%) or non-degree granting programs (19%). Fry (2004) also showed that beyond the question of two-year and four-year institutions, Latinos tend to select different types of colleges. For example, “well prepared Latinos attend post secondary institutions that are less selective and have lower BA completion rates than similarly prepared whites” (Fry, 2004, p. v). Swail et al. (2004) demonstrated that Latinos were more likely to enroll at public universities (83%) with lower tuition costs (\$3978 compared to \$5646 on average). Very few attended a selective or highly selective school (7.7%). These statistics show a trend of selecting the path of least resistance, although the reasons cannot be clearly inferred. A potential consequence, however, is that Latinos are present in greater numbers in the institutions that have lower rates of bachelor’s degree completion (Fry, 2004; 2005).

The U.S. Department of Education constructed an educational predictor (e.g., standard test scores, high school grades, high school course work), and found that approximately 41.4% of the Latino students who graduated from high school were qualified to succeed with courses at a university (Swail et al., 2004). However, Fry (2004) found that “less than one-quarter of young Latino entrants finish a bachelor’s degree and nearly two-

thirds end up with no post-secondary credential at all” (p. 2). Similarly, in terms of completing four or more years of college, only 5.4% of Chicanos, 9.7% of Puerto Ricans, and 20.2% of Cubans had done so in 1990 (Aguirre & Martinez, 1993). The 2002 data is not disaggregated by national origin, but it shows an 11.1% bachelor’s completion rate for all Latinos, compared to a 29.4% rate for European Americans (U.S. Census Bureau, 2003). Only 23% of those young Latinos in the NELS:88 sample who entered postsecondary education received a bachelor’s degree, 13% received an associate’s or certificate, and 64% had not received any degree within eight years from high school graduation (Swail et al., 2004). Timeline data suggest that Latinos take more time to earn a degree – 23% of those completing a bachelor’s did it within four years, but 42.5% finished past the five-year mark. This may contribute to the differences in some of the estimates presented from different studies; the timing of measuring degree completion has significant influence.

#### Potential Consequences

The educational choices just outlined can be very important. The tendency of Latinos to choose community colleges versus baccalaureate colleges as their initial enrollment location will be a major focus of the present paper. Some students who enter associate’s degree programs are not interested in further degrees and are appropriately placed. However, figures from national studies show that between 74% (Suarez, 2003) and 86% (Community College Research Center, 2006) of students in associate’s programs express interest in a higher degree. Bailey, Jenkins, and Leinbach (2005a, 2005b) calculated that Latinos who entered two-year programs had a very low percentage of transfer and bachelor’s degree attainment within six years (13% transfer and 5% bachelor’s degree for

public community colleges, 9% and 6% for private). When starting directly in four-year colleges, Latinos had much higher rates of degree attainment after six years (45% public, 57% private). Of considerable concern are the 23% of Latinos who completed their associate's and transferred to four-year colleges, then were not able to complete a bachelor's degree after eight years. The comparable figures for African Americans (9.6%) and European Americans (9.9%) are less alarming (Bailey et al., 2005b).

Some scholars have started to describe possible barriers to transfer for Latinos in two-year colleges, including significant and time-consuming responsibilities for family and work, relatively weak academic backgrounds, incomplete understanding of the requirements and mechanisms of transfer, limited financial aid information, distance of four-year colleges from home, lack of commitment by the community colleges to promoting transfer, and weak articulation agreements between institutions (Ornelas & Solorzano, 2004; Suarez, 2003). Therefore, for Latino students with the goal of completing a four-year degree, the choice to begin in a community college may not be optimal (Fry, 2002).

Reviewing the pathway to postsecondary education for Latinos as it has been described to this point, the difficulties fall into several broad categories. Some problems with educational attainment may be due to demographic factors like SES, generation of immigration, educational legacy in the family, or language proficiency (Duran, 1983). Other problems may be related to academic progress, such as high school course taking patterns and graduation rates, completion of standardized college entrance exams, and scores/grades (Llagas & Snyder, 2003). Finally, there are a set of issues that can be described as psychosocial in nature, such as cultural adjustment to U.S. educational systems,

individual choices regarding level and intensity of enrollment, and presence of family responsibilities (Suarez, 2003). Inquiry into these three categories will be an important part of the present study.

Education has become an increasingly valuable commodity in our information-driven global economy. Individuals with bachelor's degrees can expect to earn 75% more income over their lifetimes than those with high school diplomas or less (Suarez, 2003). Education can also bring fulfillment in other ways, such as social and cognitive development. Whether the limits in Latino educational attainment can be traced to demographic, academic, or psychosocial issues, more attention to the problems may help uncover workable solutions.

Educators and policy makers would have several choices about where to intervene along this pathway to postsecondary completion, if there was a goal to improve outcomes for Latino students. A good argument can be made for working with students who have shown their interest in higher education by applying and enrolling (Fry, 2002). Latino students whose goal is a bachelor's degree, but who initially enroll in community colleges for a variety of reasons, might benefit from some well-informed and structured intervention. However, if challenges can be traced to a variety of sources (demographic, academic, psychosocial), it may be unclear what focus an intervention should have in order to achieve maximum benefit. A multi-pronged approach is probably wise, but with limited budgets, educators may desire guidance as to where efforts can potentially be most fruitful. Research may be able to shed some light on the most influential factors to address in order to improve postsecondary outcomes for Latinos.

### Theoretical Perspective

In chapter two, a detailed description of the existing literature on Latinos will help to elaborate on some of the contributing factors to this observed educational lag. The major theoretical perspective through which this problem will be viewed is Bandura's (1999) Social Cognitive Theory (SCT). This choice was made because Bandura's theory includes both demographic factors (or social and environmental influences) and human factors such as motivation, striving, and development. One of the key concepts of SCT is reciprocal triadic determinism, as diagrammed by a triangle with behavioral factors, cognitive and biological person factors, and environmental factors at its apexes. Bandura (1999) conceived of SCT in a holistic way, incorporating areas of study from cognitive psychology (the connection between behavior and person factors), behavioral psychology (environment and behavior), and social psychology (environment and person factors). The interaction of these three segments holds explanatory power for human functioning, rather than a single dimension by itself. As Muuss (1996) summarizes, "Social learning theory's effort in combining such diverse points of view has been described as the merging of the clinically rich psychoanalytic concepts with the scientifically rigorous behavioristic constructs" (p. 281).

A second central concept in SCT is the agentic nature of human beings. Bandura (1999) believed that people are "self-organizing, proactive, self-reflecting and self-regulating" (p. 2). This led him to focus intensive research efforts on understanding the role of self-efficacy beliefs in a person's functioning. He defined self-efficacy as a person's belief in his or her abilities to perform a given action in a way that provides some agency or

control in life events. Consistent with the idea of scientific rigor, Bandura (1977) formulated four areas from which self-efficacy beliefs spring, and are therefore amenable to intervention. These include (a) step by step efforts toward mastery experiences, (b) vicarious learning by observing role models, (c) social persuasion by influential others, and (d) the reduction of negative emotional states that could be misinterpreted as signs of inability. After being absorbed, these sources of interpersonal data must be processed by an individual; they are viewed through lenses specific to the person, the situation, and the social influences.

Thus, the reciprocal triadic dimensions influence how a person integrates the feedback he or she receives, and that is the final step to transforming raw data into self-efficacy beliefs. This logical and specific articulation of self-efficacy beliefs as part of the pathway to social learning is part of the strength of SCT. As Bandura (1999) wrote, “Because social cognitive theory articulates the ways in which a strong sense of efficacy can be instilled and delineates the operative mechanisms, this knowledge has been extensively applied to enhance human functioning in diverse spheres of life” (p. 52). I believe this important motivational construct could have important bearing on the choice to attend community college versus the choice to attend a baccalaureate institution.

College choice will be defined in the present study from a planning point of view, comparing high school seniors who responded to an NCES survey as intending to enroll in community college versus four-year college. The college choice literature usually discusses the process of selecting a college as comprised of three steps – predisposition to higher education, search for relevant information, and selection of preferred institution (Pope &

Fermin, 2003). The predisposition stage takes into account factors like student background and attitudes toward college, which is compatible with the areas under consideration in the current study. The theoretical lens of SCT is broad enough to include environmental factors (including student demographics and background) and attitudes (academic self-efficacy beliefs). Therefore, while these steps in the choice process will not be examined specifically, the study does not contradict current knowledge about how choice may occur.

Social Cognitive Theory and self-efficacy beliefs are applicable to a student population entering or contemplating college. For all students, but most specifically new students, there are challenges associated with functioning more independently (behavior), being in a new environment (environment), and facing more difficult academic tasks (person). Those who do well with the transition are not always those with the highest entrance examination scores or most privileged family background, and those who struggle are not always those with discernable disadvantages. As Bandura (1999) wrote, “People who have a high sense of coping efficacy lower their stress and anxiety by acting in ways that transform threatening environments into benign ones” (p. 50). Educational outcomes may very well be influenced by self-efficacy beliefs or the ability to learn more adaptive social cognitive responses.

SCT is also appropriate to apply to various ethnic groups, although Bandura’s early investigations were not likely to have included a diversified sample. Because the theory includes social interaction and environmental factors as key elements of analysis, it makes room for the distinctive cultural aspects that each individual may bring. A construct like self-efficacy is set in the person’s framework, as they are choosing their goals or listing their

perceived barriers. In this way, it is not likely to be coercive or to advocate one particular solution. Studies investigating self-efficacy beliefs in Latino college students have been attempted (e.g., (Solberg et al., 1993b; Solberg & Villarreal, 1997) so this is a viable area.

In addition to this major theoretical lens, several other perspectives contribute to the philosophical underpinning of the present study. As a counselor education student, the primary researcher has read and processed information regarding cognitive development and educational applications (including authors such as Kohlberg and Perry). The developmental issues of college students, the impact of multiculturalism on self and society, and the interactions between individuals and their social environments also have been studied. This background contributed to an interest in the self-actualization of human beings from a psychosocial and developmental viewpoint, not a deficit perspective (e.g., Bensimon, 2005). That is, rather than proceeding with the stereotypical view that Latinos are intrinsically less capable in educational endeavors, the present study seeks to promote a fuller understanding of all factors that impact educational attainment and potential paths to achievement and empowerment.

#### Purpose of the Study

To state the problem succinctly, there is a documented lag in the progress of Latinos in obtaining bachelor's degrees. This problem is timely and important on individual, community, and national levels. One significant contributor to this lag is the noted tendency for many Latinos to choose community colleges as an entry point, while intending to move forward into a baccalaureate institution. The overall purpose of the present study will be to investigate the differences between Latinos who have planned to attend community college

as their initial postsecondary location versus those who have planned to attend baccalaureate institutions. A comparison group of White students will also be investigated. The potential differences between and within groups will be examined through predictor variables related to demographic, academic preparation, and academic self-efficacy issues. These three clusters will serve as guides in the inquiry.

The present study is different from other studies in that it includes psychosocial factors (academic self-efficacy), while simultaneously admitting the presence of other types of factors. If results prove to be significant or meaningful in any particular direction, the investigator would like to provide recommendations for counselors, educators, policy makers, and other concerned parties who wish to address the problem. Bandura (1999) reminded his readers that “It is partly on the basis of efficacy beliefs that people choose which goal challenges to undertake, how much effort to invest and how long to persevere in the face of difficulties” (p. 49).

The specific research questions guiding the present study, therefore, are:

1. Which factors contribute significantly to the intention to either enroll in a four-year college or a two-year college for all members of the research sample (Latino students and a comparison group of White students)?
2. How do demographic factors, academic preparation factors, and psychosocial factors (primarily academic self-efficacy) function differently as predictors in the two racial/ethnic groups?
3. Are there interactions among selected demographic, academic preparation, and academic self-efficacy related factors?

## Chapter Two:

### LITERATURE REVIEW

#### Latino Students in Postsecondary Settings

In some respects, Latinos at two-year and four-year institutions are similar to other undergraduate students. The percentage of Latinos who are traditional college age, dependent on their parents, and work part time while taking classes was not significantly different from other groups, based on data from the National Postsecondary Student Aid Study (Santiago & Cunningham, 2005). However, Latinos in higher education were different in that they were more likely than other students to be first generation college students from families with relatively low incomes, enrolled part time, living with their parents instead of on-campus, attending institutions with low costs, and matriculating initially into community colleges. These differences are not automatic markers of deficit, but can represent obstacles if the student's ultimate goal is to earn a four-year degree. While some gains have been made in the path toward and through postsecondary education for Latinos, representation in higher education is still less than optimal.

Data regarding the presence and advancement of Latinos along various portions of the U.S. educational pathway were discussed in the first chapter. The current chapter addresses some of the frameworks that have been proposed in order to explain the noted differential achievement. Following the first research question proposed in chapter one (e.g., "What are the factors that contribute to the choice of Latinos to either enroll in a two-year college or a four-year college?"), a thorough list of possible explanations was generated. These frameworks, which were drawn from a review of the research literature,

fell into three general categories: demographic, academic, and psychosocial. Demographic frameworks focus on external descriptors of a person or group. Although these demographic categories can also impact a person's internal sense of self, the psychosocial frameworks capture the categories that relate to a person's psychological and social make-up. Academic frameworks refer to some of the traditional definitions of readiness when a student leaves high school and enters higher education. Figure 1 provides a visual model of the variables that constitute those frameworks, grouped according to Bandura's (1977) social cognitive theory.

Although the research questions of this study related specifically to initial college choice, the list of frameworks drawn from the literature was more inclusive. It contained factors that related to persistence and educational experiences at college, because these things can influence initial choice. If a Latino student thinks that no one from his or her neighborhood has entered a predominantly White four-year university and successfully graduated, that perception could cause him or her to make a different selection. Some of the frameworks were shown to have limitations, but all were presented in order to provide a true picture of the state of the research literature on this question. After all three categories (demographic, academic, and psychosocial) were evaluated, connections were made between the frameworks and Bandura's (1977, 1999) work in perceived self-efficacy. The chapter concludes with a review of the literature linking the Latino student population with the concept of academic self-efficacy.

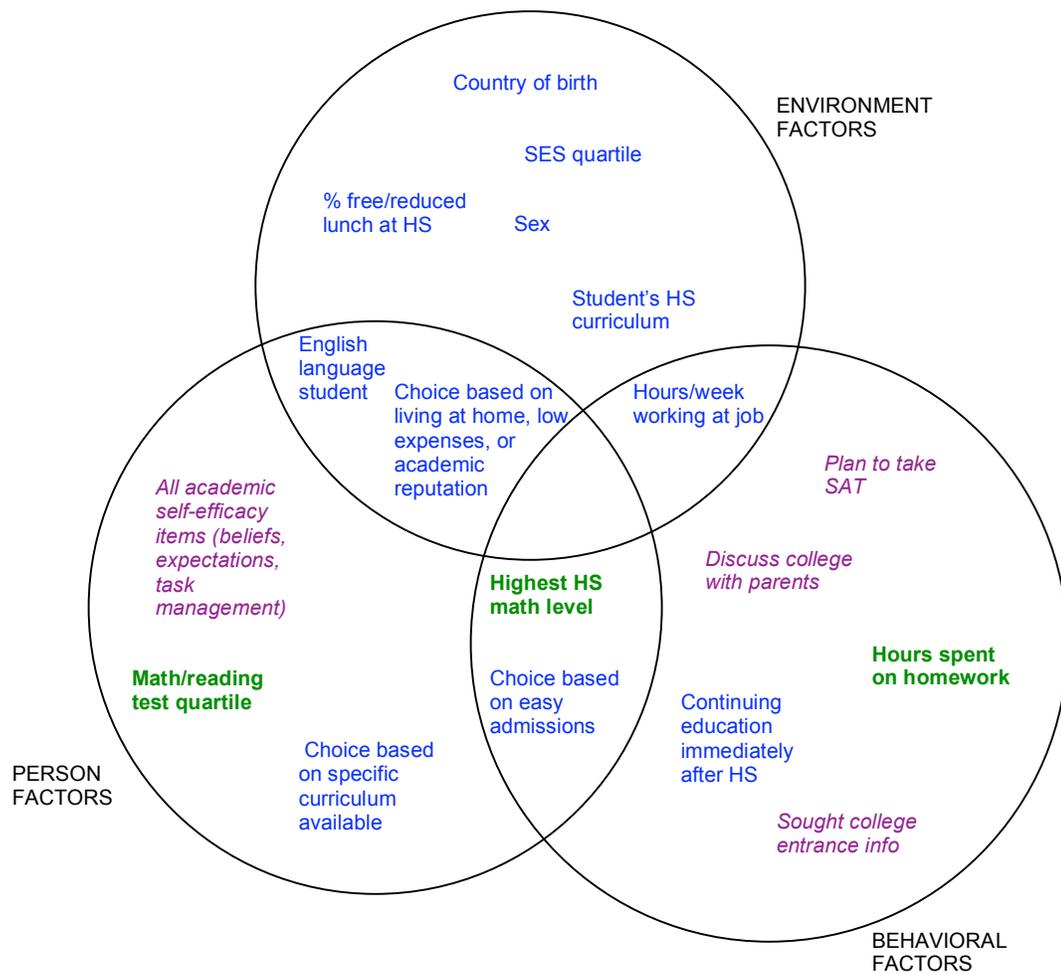


Figure 1. Predictors for the current study as categorized by Social Cognitive Theory's triadic factors (demographic in blue text, academic in green bolded text, psychosocial in purple italic text)

It is important to bear one caveat in mind before delving into the literature review. As is true with any large group, there is diversity within the Latino community (Torres, 2004). For example, generation of immigration and degree of acculturation to the United States can differ widely. In addition, Latinos come from every socioeconomic bracket, from every racial group and from a wide variety of geographic backgrounds, and have differing educational legacies in their families. The categories or frameworks discussed in the current study do not apply in every situation, but represent many of the pieces that may contribute to the full picture. While Latinos with relatively less social privilege may have more challenges to overcome on the path to higher education, it is important not to over-attribute these qualities to every member of the ethnic community.

#### Demographic Frameworks Related to Latinos in Higher Education

##### *Immigrant Experiences*

In this discussion, first generation was used to refer to a person who was born in a country other than the U.S. and arrived subsequently. Documentation was not addressed, as immigration was discussed in the current paper as a social and cultural experience, not a legal or political one. Second generation individuals were born in this country, but at least one parent was not. It is important to bear in mind that not all Latinos are first generation immigrants; 62% are U.S. born (Hernandez & Lopez, 2004). Of all undergraduates in the U.S. who are Latinos, 86.1% are U.S. citizens (Santiago & Cunningham, 2005). Clearly, not all first generation immigrants have the same situations. Some immigrants have had more opportunity for education prior to arriving in the United States, may be quite fluent in English, or may have left professional positions in their home countries. Some may be very

young children with almost no memory of their birth country. In discussions of immigrants and educational attainment, however, attention is most frequently drawn to those who have not fully acquired English as a second language, or who have less than a high school level of education.

However, there were disagreements in the literature as to the exact effect that first generation immigrant status had on educational choices and attainment. Hagy and Staniec (2002) executed a logistic regression study with data from the National Education Longitudinal Study of 1988 (NELS:88), seeking to understand the college enrollment choices of immigrants from various racial/ethnic backgrounds ( $N=10,222$ ). The outcome variable had five levels – non-enrollment, less than four-year private school enrollment, less than four-year public school enrollment, four-year private enrollment, and four-year public enrollment. The predictor variables spanned student characteristics (e.g., immigration generation, race/ethnicity, academic ability), family characteristics (e.g., income, parental education and occupation, number of siblings), and school characteristics (e.g., private or public high school, percent of students in college preparatory curricula, rural or urban). The researchers were particularly interested in the interaction between immigrant generation and race/ethnicity and the specific level of college enrollment chosen by the student. When looking only at the outcome by race/ethnicity and immigration, the results indicated that Asians in almost every generation of immigration were the least likely to choose non-enrollment as an option. The trend for Latinos was that almost 40% of the students in every immigration category (first, second, or third generation) chose non-enrollment, thus making

native students and recent arrivals statistically similar in this regard. This mirrored some of the commonly held perceptions about higher education and racial/ethnic group participation.

The Hagy and Staniec (2002) study showed a more interesting effect when the other variables were entered into the equation. There was a positive enrollment effect for first generation immigrants of all races and ethnicities when factors like SES, academic ability, or parental education were controlled. In other words, the probability of attempting some type of postsecondary education (public two-year or four-year college) versus non-enrollment was higher for these individuals than for native-born persons from the same groups. They wrote, “All else constant, Asians are no more likely (nor Hispanics less likely) to choose any enrollment alternative relative to non-enrollment than are Whites” (p. 386). The final analysis in this study related to level of college enrollment. The investigators indicated that first generation immigrant Latinos were more likely than native-born Latinos to select two-year public institutions, but the effect diminished with second-generation immigrants. One explanation they proposed is the existence of affirmative admissions programs at four-year universities, which target students of color born in the U.S. If this is indeed a factor, the recent lawsuits against such programs may have a decidedly negative impact on Latino baccalaureate enrollment.

Fry (2002) also used national databases to study trends related to Latinos, immigration, and education. Unlike the Hagy and Staniec (2002) study, this data brief was purely descriptive and produced as a report for the Pew Hispanic Center. Although it had limitations, it raised some important dynamics for consideration. He found that Latino first generation immigrants attended college at a lower rate (25%) than subsequent generations

(second generation attendance ranges from 43% - 55%, depending on the nationality). He contrasted this with the experience of Asian immigrants, who have high rates of college attendance (58%) across both first and second generations. Fry suggested that some of the observed differences may be due to the educational background of Asian and Latino immigrants upon arrival, with individuals who already have some education being more likely to seek additional classroom experiences. Another difference between these groups could be socioeconomic, with migration to the U.S. typically costing more for Asian and less for Latino immigrants, due to proximity (Qian & Blair, 1999). Also, Fry indicated that more Latino immigrants were motivated to come to the U.S. by work, not primarily to pursue postsecondary education. For example, international student visas were given more often to Asian students (more than 50% of the visas distributed in 1999) than to Latino students (approximately 15% in the same year). Various immigrant groups clearly have different experiences in the U.S. educational system.

Like the Hagy and Staniec (2002) study, Fry (2002) showed the distribution between two-year and four-year colleges by immigrant generation. Between 1997 and 2000, 39.7% of first generation (or foreign born) Latino college students of any age were enrolled in community colleges, while 45.9% were at baccalaureate universities. The remaining 14.5% were enrolled in graduate studies. In contrast, 18.8% of Asian/Pacific Island first generation immigrants who were college students were at two-year institutions, 46.5% were at four-year institutions, and 34.7% were engaged in graduate school. Therefore, Latino immigrants who were first generation may have been more likely to utilize the community college than Asian immigrants, but a similar percentage were accessing baccalaureate colleges.

Padilla (1996) also reviewed various predictors of educational attainment for Latinos. Her study took a longer range perspective, following approximately 400 Latino males in the National Longitudinal Survey of Labor Market Experience from 1978 to 1988. Thus, the data started with adolescence (14-17 year olds) and continued through young adulthood. In an incremental regression study, the researcher examined the following predictor sets - family background, community environment, immigration generation, and psychosocial variables such as occupational aspirations, educational expectations, and cognitive ability. In all, there were 35 individual predictor variables entered into the analyses, which could have the effect of overburdening the sample numbers. The outcome being examined was highest level of educational attainment (grade 0 – 20) by 1988. Descriptively, the researcher reported that Latinos born in the U.S. attended college at a slightly greater (but not statistically significant) rate than did Latinos born elsewhere (28.6% compared to 24.6%). She did claim to find significant differences among generations of immigrants and their educational attainment, but utilized a  $p < .10$  significance level in a design with other possible weaknesses.

In the regression analyses, Padilla (1996) considered four models. The first entered only predictors related to family background and resources, the second added variables describing the economic structure of the local community, the third added psychosocial and cognitive variables, and the final model included all prior variables and the immigration history indicators. The third model explained had an  $R^2$  of .414 and an adjusted  $R^2$  of .380, and the full model only improved that slightly ( $R^2 = .440$ , adjusted  $R^2 = .401$ ). The greatest rise in explanatory power came between the second and third model, with the addition of

psychosocial variables, and not with the subsequent addition of immigration history. Still, the immigration related variables were all significant in the full model at a  $p < .05$  level. The researcher suggested that “educational achievement cannot be compared across different Latino groups without also taking into account their individual and generational tenure in the United States” (Padilla, 1996, p. 41).

Acculturation of new immigrants is a gradual process, but one that can be augmented through support and communication. Auerbach (2004) described a successful bilingual program in California that helped Spanish-speaking parents become more informed about the college planning process, so that they could provide better support to their children. Both students and parents need to be proactive in seeking out such opportunities, but this study showed that barriers could be overcome with effort. The college application process could be more challenging in such a context, but proactive guidance counselors or mentors could help fill this gap in the best case scenario (Behnke *et al.*, 2004; Harrell & Forney, 2003).

Two studies (Bohon *et al.*, 2005; St-Hilaire, 2002) used the term segmented assimilation to describe new Latino immigrants who have no ethnically similar community with which to integrate or are rejected by other groups, and so end up forming a separate society with very little connection to the majority groups. St-Hilaire did research with students of Mexican descent in southern California ( $N=728$ ) and found that this segregation can have long-term effects. In a regression analysis, the investigator found that the longer a Mexican-origin student had been in the U.S., the lower their educational expectations. Conversely, the more bilingual the students became (adding English fluency to their native

Spanish), the higher their educational expectations. Bohon et al. conducted interviews with recent Latino arrivals and community support persons in Georgia ( $N=68$ ) in order to describe some barriers they were facing in their educational trajectory. Most of the barriers had to do with lack of infrastructure to assist monolingual immigrants, and historical biases against low-income persons of color or ethnic social stratification. They acknowledged that Georgia had the highest Latino high school dropout rate in the country (approximately 66%), and suggested that “The educational outcome for the South’s new Latinos, therefore, depends on the extent to which the social structural conditions that perpetuate low educational attainment for minorities also affect Latino immigrants” (Bohon et al., 2005, p. 44).

National policies like the DREAM (Development, Relief, and Education for Alien Minors) Act have been debated as part of current immigration reform legislation, but only nine states have passed their own versions and thus provided access to higher education at in-state costs to immigrant children graduating from their high schools (Siley, 2005). Seventeen other states had introduced legislation as of 2005, but some of those were being vigorously contested. Almost half the states in the nation have taken no action regarding immigrant secondary students who want to attend college at in-state tuition rates. Although states like California have had many more years of experience with Latino immigration, the result includes both exemplary support programs like the Puente Project (see Oliva & Nora, 2004) and anti-immigrant backlash like Proposition 187 (see Alvarez & Butterfield, 2000).

To summarize, immigration status is a variable that may be confounded with other influential factors like SES, and assumptions about the educational pathways of immigrants

should be carefully examined. They are similar in that they have left their home countries and come to the U.S., but immigrant experiences diverge along many other variables. The literature provided different and sometimes conflicting perspectives on how immigrants were progressing, and may also have been using different comparison groups (e.g., new immigrants contrasted with native-born individuals of any generation as in Hagy and Staniec's study, or contrasted with second generation individuals as in Fry's article). In general, the literature indicated that differences in higher education participation could be due to the specific reasons for emigrating, the past educational experiences and financial status of the immigrant, aspirations and cognitive ability, experiences of bias or systemic racism, or perhaps the rate of acculturation to U.S. structures and norms. For first generation Latinos, especially those with relatively low incomes, community colleges seemed to be the higher education institution of choice. This may be logical for adult immigrants who were seeking short-term ESL training or work skills, but may be more limiting for traditional age college students. Caution should be used in interpreting the meaning of this complex demographic variable or assigning it causal importance.

#### *Income Level*

Continuing the theme of diversity within the Latino community, it is inaccurate to assume that all Latinos are from low socioeconomic brackets. Data extracted from the National Center for Education Statistics (National Postsecondary Student Aid Survey, NPSAS:96) showed that 38% of Mexican origin college students who were dependent on their families were drawing from a total income of \$20,000 or less (retrieved from an NCES data tool by the investigator in July, 2006). However, 31% came from families with

incomes between \$20,000 - \$40,000, and another 31% had family incomes above \$40,000. Cuban Americans, admittedly a smaller percentage of the Latino population, had a higher average income (52% of those dependent college students were from families with incomes above \$40,000). Public attention is more likely to be focused on Latinos who face financial difficulties. In terms of educational choices and progress, individuals from low SES backgrounds may be the most vulnerable. Qualitative research (Hernandez, 2000) has made it clear that Latino students see finances (whether present or absent) as important to their ability to begin or continue their postsecondary educations.

Much of what has been written about Latinos' income and higher education comes in the form of reporting on data and statistics. Hernandez and Lopez (2004) reported that "in the mid 1990's, 30% of all Latinos were considered poor, earning less than \$15,569 for a family of four" (p. 41). Swail, Cabrera, and Lee (2004) also examined financial stability with the 8<sup>th</sup> grade students of the NELS:88 cohort. More than 50% of the Latinos in the dataset came from families with incomes below \$25,000, as compared to 23% of Whites in the study. This background information can build a context for understanding choices made by Latino students and their families and institutional responses to the unmet need.

These facts take on additional weight when seen in the context of rising tuition costs across the country and decreasing amounts of financial aid (Hernandez & Lopez, 2004). For some, the educational cost versus income gap was prohibitive, or was one concern that may have led to community college enrollment rather than four-year college. For those who did move forward and enroll in more expensive colleges, financial problems caused more worry and stress, and perhaps led to having to study part-time or work while in school. Hernandez

and Lopez reported on several studies that showed Latinos working longer hours while enrolled or leaving school for financial reasons at higher rates than other racial/ethnic groups.

Although students may not be aware of it, it has been shown that the net price (that which students must pay, factoring in costs/debits and aid/credits) was not statistically greater at a four year public college (\$4487) than a two year public college (\$4598) (Choy, 2000). Total financial aid packages were usually higher at four-year colleges, which may have included accepting more loans. However, some students and families may be discouraged from applying simply based on tuition comparisons or concerns about legal eligibility for aid. Finances may have contributed to the decision to attend community college for some students and their families, but additional factors may also be at work.

National census data showed that the African American and Latino communities are similar in terms of income – African American households had a median income slightly over \$30,000 in 2004, and Latino households had a median income slightly over \$34,000 (U.S. Census U.S. Census Bureau, 2005a). Poverty rates in 2004 were also similar for Latinos (21.9 percent) and Blacks (24.7 percent). Yet, students from those backgrounds have chosen to attend community colleges at very different rates. Depending on the age range of the students being counted, estimates are that 25% to 38% of both White and Black undergraduate students chose to enroll initially in community colleges, while 40% to 55% of Latinos did so (Bailey et al., 2005b; Fry, 2002). Thus, income level may have been influential in college choice, but it did not appear to be the sole factor of importance.

Nora (1990) conducted a structural equation modeling study to examine the links between financial aid and student retention for Latinos at a community college in Texas. Although this study was older, it had served as an important reference point for other studies on financial aid and had not been updated or duplicated. Some of the trends reported in Nora's work still exist today, such as financial difficulties for some portions of the Latino community, cutbacks in government sponsored aid programs, rising tuition costs, and reliance on two-year colleges. Nora examined several variables that could have an impact on retention (e.g., high school and college grades, financial need, both campus-based and non-campus based aid resources). Data were collected for 170 first-time Latino students, and LISREL was used to model the relationships between the variables. Some of the notable findings were that high school grades held more explanatory power for college academic performance than did financial need, and that students with more financial need usually enrolled in fewer credits for fewer semesters than students without as much need. Most importantly, students who received financial aid resources (non-campus based, usually Pell grants) to meet their need tended to enroll in more semesters and complete more credits. Campus-based financial aid did not have as large an effect as Pell grants did, but still helped improve retention to a degree. These aid sources were found to mediate the relationship between retention and financial need, such that needy students who might have left school before had a better chance of remaining and earning credits with the presence of campus-based aid. These findings suggested that even needy students with good academic records could succeed in higher education, especially if the appropriate financial aid resources were

available to them. Persistence, in terms of credits and credentials earned, could be positively affected by the provision of financial resources.

In a study that examined data from the National Postsecondary Student Aid Survey (NPSAS:2003), Santiago and Cunningham (2005) reported on how Latino undergraduates participated in financial aid programs (e.g., applying, receiving aid, types and amounts of aid, institutional fees). This non-empirical study was done for the nonprofit organizations Excelencia in Education and The Institute for Higher Education Policy. The scholars calculated that close to 80% of Latinos who were already enrolled in some level of higher education had applied for financial aid. This percentage was higher than that of White and Asian American students, but lower than that of African Americans and Native Americans. Importantly, only 63% of those who applied received some sort of aid package (whether grants, loans, or other forms). Some of the factors that distinguished those who did not receive aid from those who did included part time enrollment, and attending a school with lower costs (community colleges or inexpensive four year colleges). Some forms of aid included citizenship as an eligibility requirement. The study did note that it could not address the role financial aid might play in a student's initial choice of an institution, as all students in the dataset had already enrolled. However, it seemed clear that at least a segment of the Latino community was aware of financial aid resources and the mechanisms to access them.

Kurlaender (2006) published a study with some similarities to the present research project. She conducted a logistic regression analysis examining the outcome variables of college choice (two-year or four-year) for Latino students, including predictors related to

SES, academic preparation, degree intention, and state location. One important difference was the inclusion of psychosocial factors, specifically academic self-efficacy beliefs, and more varied demographic indicators in the present study. However, the need for such investigation was apparent. As of the publication date, Kurlaender indicated that “less is known about how different groups of students make decisions about which type of college to attend” (2006, p. 8). She utilized NELS:88, which is the predecessor of the national dataset used in the present study (ELS:2002). Her findings on income status were clear – whereas low SES students (Latino, White, and African American) were similar in their tendency to select community college over baccalaureate college, higher SES Latinos were very different from both White and African American peers in their relatively high probability of attending community colleges (approximately 40% chance for high SES Latinos versus 10% for the others).

In terms of intentions or interest, Qian and Blair (1999) found that presence or absence of financial capital had no effect on Latino’s aspirations for higher education, as compared to having a significant effect on White students’ aspirations. The researchers utilized an ordered-logit regression design, including 22 predictors related to student characteristics (e.g., native language, sex, test scores), family characteristics (e.g., parental education, income, number of siblings and parents present in the household), and school characteristics (e.g., private or public, rural or urban). The outcome was educational aspirations of high school seniors, as captured through the NELS:88 survey in a question with levels such as intention to finish high school, complete some college, obtain a college degree, finish a Master’s, etc. In terms of descriptive statistics, Latino students in the study

had the highest percentage of parents with only a high school education, and they scored below White and Asian peers in terms of family income and standardized test scores. However, family income, parental education, and native language did not reach the level of significance in terms of coefficients in the regression analysis. For Latino students, standardized test scores, school location, and parental involvement were the significant predictors. Parental involvement in school-related activities was used in the study as a proxy for social capital, and it did have a significant effect on Latino students' interest in higher education. The scholars hypothesize that Latinos and African Americans may have experienced a different "mobility system" than Whites did, where "parents who encourage their children to move ahead give enough attention to their children despite the deficiency of human and financial capital. It is one of the cultural strategies that minorities design to increase their children's school success" (p. 622). The models with the best overall predictive power for Latinos were those that included social capital variables. While aspirations do not automatically equate with actual enrollments, they demonstrated that the intention can be there even without the financial means. One limitation of the Qian and Blair study for the purpose of the present study was the lack of specificity in the NELS:88 data regarding intention to enter community college or baccalaureate college.

While financial constraints are a reality for many Latinos who may be seeking more education, there are sufficient counter-examples to suggest that it is not an insurmountable barrier or the only factor in play. In the studies reviewed, Latinos did not seem to aspire to lesser education because of their families' income level, or make their selection solely based on financial criteria. Kurlaender's (2006) study suggested that "even affluent Latinos are

disproportionately choosing community colleges over four-year institutions” (p. 12). Those who were familiar with the financial aid system, eligible, and receiving resource assistance may have been able to persist in education longer, despite the difficulties. The suggestion that choosing to enroll in less expensive colleges or as part-time students reduces the probability of a needy Latino student’s receiving aid was troubling, as many students do precisely that. The question of what percentage of Latinos opt out of higher education entirely or choose a shorter path for financial reasons was not fully answered here, however. Family finances may be designated for other purposes, or may not be the most relevant factor in the choice of college level. In terms of research, economic status is a variable that continues to merit attention, but it may not function in the traditional or stereotypical manner.

### *Enrollment Patterns*

The tendency of Latinos to enroll at community colleges in greater percentages than baccalaureate colleges has been established. Research documents that there were also more Latino students than average enrolling in postsecondary education as part-time students, taking breaks in their enrollment, or delaying initial matriculation after high school (Fry, 2002; Swail *et al.*, 2005). These phenomena can be discussed as a demographic trend because they are externally observable behaviors that are linked to membership in a group, and because the root causes may be connected to SES or other demographic realities. For example, Fry (2002) drew parallels between SES and enrollment patterns among various groups of Latinos. Cuban Americans have average family incomes over \$40,000, and they also have the highest educational profile of all Latino groups (e.g., 32.9% of Cuban

Americans in the 18 to 24 age range are attending college, 89% of them are enrolled full time). As a comparison, the average income for a Mexican American family is lower, and the parallel educational statistics are also slightly depressed (e.g., 17.6% in the 18 to 24 age range attend college, 71.8% are full time students).

Fry (2002) also showed that among Latino college students age 18 to 24, three quarters attended full-time. The comparable figure for European-American and African-American students was 85%. Swail et al (2004) indicate that 51.8% of the Latino students attending college from the NELS:88 cohort were part-time students, compared to 38.6% of the total. They also calculated that Latinos had the lowest rate of continuous semester-by-semester enrollment while in higher education (43%), almost 20 percentage points below the group average. Finally, 23.3% of Latinos waited several months before entering college, which is a slightly higher percentage than the group average (19.3%). Only African Americans delayed entry more frequently (29%).

Latino students with good academic records have been shown to enroll more frequently than students of other ethnic groups in open door colleges or less selective institutions. Fry (2004) indicated that “Among the best prepared young college students, nearly 60 percent of Latinos attend non-selective colleges and universities, in comparison to 52 percent of White students. Among students who are less well prepared, nearly 66 percent of Latinos initially enroll in ‘open door’ institutions” (p. vi). More selective colleges traditionally have higher rates of student completion, whether due to academic climate or available resources, so this choice can also impact educational outcomes.

Although the explanations for these alterations from the traditional enrollment path were not always clear or consistent, reasons were likely to relate to pressure to work or family commitments. Hernandez and Lopez (2004) discussed the pressures of increasing tuition, decreasing financial aid, and the need of some Latinos to have a part time job or reduced tuition hours in order to make ends meet. They also referred to Astin's (1984) findings that working and living off campus takes energy and commitment away from the student's roles at the college. In terms of family commitments, the traditional Latino value system would prioritize responding to family needs above other issues, such as the pattern of being enrolled full time, attending consecutive semesters, or entering college directly after high school (Duran, 1983; Fry, 2002; Marín & Marín, 1991). Statistically, Latino undergraduates were more likely to have dependents (whether children or elderly) than White students, which increased the amount of responsibility awaiting them at home (Fry, 2004). They were also more prone to maintaining a residence with their parents. Even without considering two-year college students who were commuters, nearly 50% of Latinos at four-year colleges lived at home while in school. This could provide mental and emotional support to the student, but could also involve distractions and responsibilities apart from academic work, contributing to the inconsistent attendance patterns noted.

Although Fry (2002, 2004) was writing informative reports based on government data collections, as opposed to articles for publication in scholarly journals, he has addressed enrollment patterns and underlying reasons more thoroughly than other cited works. Fry related the choices Latino students have made in these matters (part-time enrollment, delayed or non-sequential enrollment, two-year colleges, etc.) to commitment to family, and

thus often to paid work that helped to support low-income families, and to the desire to remain at home or within the community. Community colleges are often structured with just such exigencies in mind, and thus are attractive for Latino students, particularly those with low high school grades or test scores.

Fry (2002) acknowledged that other low-income students do not rely on community colleges as heavily as Latinos do, and that the cultural habit of choosing a community college could “adversely affect Latinos’ chances of sticking with their studies and finishing with a degree” (p. 7). The same report documented that, after three years, nearly 50% of the part-time students had no degree and had dropped out. Particularly for students who were the first in their families to attend college, the support structures to facilitate success may not be in place. This tradeoff between accessing postsecondary opportunities and maintaining responsibilities to family and finance is a difficult one. Adelman (2006) projected that the two most significant things Latinos could do to improve their postsecondary degree completion rate would be to start college immediately after high school and to take a more rigorous high school curriculum. Similarly, Swail et al. (2005) advised that delaying enrollment “reduced the probability of completion for Latinos by 20 percent,” while being continuously enrolled improved Latino students’ chances of graduation from college by 60%.

#### Academic Frameworks Related to Latinos in Higher Education

##### *Level of Academic Preparation*

In terms of initial choice of postsecondary institution, one of the most prevalent arguments is that Latinos go to community colleges because they are not sufficiently

prepared for baccalaureate colleges or universities. Academic preparedness for baccalaureate institutions has traditionally been measured by a combination of standardized tests, grade point average (GPA) or class rank, and high school course taking patterns. Certainly, the lower numbers of Latinos graduating from high school mean the available applicant pool is smaller (Llagas & Snyder, 2003). The failure of a few others to take some preparatory steps (register for the SAT, apply for financial aid) may also impact their ability to exercise the four-year college option (Choy, 2000; Contreras, 2005). According to the National Center for Education Statistics (NCES), there are four sequential steps a student should take in order to ready him or herself for entry to a four-year college. Those steps are to state an aspiration toward a bachelor's degree by 10<sup>th</sup> grade, to become academically qualified in terms of courses and grades, to take a standardized entrance exam, and to complete an application to a four-year college. A simple query in the NELS:88 database showed that only 22.5% of Latino students had completed all four steps by 1992 (the senior year of high school), as compared to 37.7% of all students in the sample (NCES data tool accessed by the investigator on 7/1/2006).

When Latinos do take the steps necessary to become college eligible, how do they fare? Swail et al. (2004) wrote a report for the Pew Hispanic Center in which they utilized an index prepared by NCES that separated students into three categories – not qualified for college, minimally qualified, and qualified. It is not clear if “qualified for college” included all postsecondary institutions, or only four-year institutions. The index combined a brief aptitude test with traditional measures like SAT scores and high school grades. As a caution, it is not known whether the NCES index has been evaluated for racial/ethnic bias or

validity. Using this index, 58.6% of Latinos in the NELS:88 cohort were designated as unqualified, 16.1% were minimally qualified, and 25.3% were fully qualified for higher education (a total of 41.4% qualified). In contrast, the portion of qualified students in the entire cohort was 55.7%, and the unqualified portion was 44.3%. It is not clear if Latino students who did not take the SAT would be excluded from the index, or if they would be given a score of zero and found to be unqualified.

Of interest, 46% of the Latinos found to be unqualified did enroll in a postsecondary institution, many in community colleges (Swail et al., 2004). Also, 32% of the unqualified Latino students who started at 4-year colleges did obtain a bachelor's degree. Among minimally qualified students, 91% of Latinos attended a postsecondary institution, compared to 85% of minimally qualified Whites. Of the qualified Latinos, 97% attended a postsecondary institution. The mixed outcome is that only 62% of those individuals selected four-year colleges. Emphasized even more vigorously by the report's authors, "almost 40 percent of Latino students considered worthy academically for four-year studies failed to enroll at a four-year institution" (Swail et al., 2004, p. 18). These statistics speak of motivation on behalf of unqualified or minimally qualified Latino students, who entered higher education at rates higher than similar White students. However, many students were selecting a route with fewer challenges and fewer rewards by attending associate's granting colleges, even those who may have had the academic background for a bachelor's degree.

Other tests that are often used as indices of academic readiness are the SAT or ACT. Contreras (2005) stated that, of all SAT takers in 2003, 3.6% described themselves as of Mexican descent and an additional 4% said they belonged to another Latino category. Swail

et al. (2004) indicated that 44% of the Latino students in the NELS:88 database took the SAT, as compared to 59% of White students. As stated in chapter one, Latino students tended to have below average scores on those standardized tests (Llagas & Snyder, 2003). However, the appropriate interpretation of that fact was not clear. The argument has been made that standardized tests like the SAT or ACT do not fairly reflect the abilities of some students of color. Hernandez and Lopez (2004) summarized some of the research regarding standardized tests and their inability to accurately predict college GPA or time to degree for Latinos. For example, SAT scores have been emphasized more in University of California admissions after Proposition 209 barred the use of any affirmative action procedures (Garcia *et al.*, 1999). Latino students who may have been eligible by GPA could have their eligibility revoked due to SAT scores; the scholars estimated that the number of Latinos who were UC eligible would double without the SAT requirement.

Contreras (2005) also suggested several reasons why this gap in standardized test scores may exist, drawing her conclusions from data available through the College Board. Although Contreras did not state a direct relationship between these factors and achievement on the SAT, she suggested they can play a role in preparation. She found that Latinos have less of a parental educational legacy, the potential disadvantage of English not being the primary language spoken in some homes, and the probability that low SES Latino families live in districts served by under-funded high schools. High level academic courses can serve as SAT preparation, but many Latinos (approximately 55%) live in areas where calculus courses were not offered at the secondary level (Adelman, 2006). This environmental barrier could limit options for some students.

Beyond the problems of low test scores or under-resourced secondary schools, Kurlaender (2006) was able to demonstrate that high school academic achievement did not fully predict the college choices of the Latinos in the NELS:88 sample. For White and African American students, higher math achievement scores correlated with a diminished probability of attending community college. For Latinos, however, “academic achievement does not seem to affect the type of postsecondary institution attended” (p. 12). Low scoring Latinos were more similar to African Americans and Whites in their tendency to go to community colleges. However, Latinos scoring close to 100% on the math achievement test still had a 40-50% probability of choosing a community college over a four-year college, compared to less than 10% rate for the other two groups.

Some researchers hypothesized that the student’s home environment may have influenced his or her academic preparedness. The ability to take the appropriate planning steps in the application process to a four-year college is facilitated by an understanding of the structure and requirements of the U.S. postsecondary system (Ceja, 2004; Padilla, 1996). The educational level of the parental generation has been suggested as a possible influential factor. Whereas 72% of the NELS:88 participants had at least one parent who attended college, only 49% of Latinos had that educational legacy (Swail et al., 2004). Fry (2004) acknowledged that some Latino parents have low levels of knowledge about post-secondary educational systems or limited means of communicating with the schools, with older immigrants being an obvious example. However, Fry also stated that young Latinos, whether children of immigrants or children of U.S. born parents, tended to pursue

postsecondary education in equivalent numbers. Therefore, he doubted that parental familiarity with the U.S. collegiate system had significant impact on the outcome.

Talbot and Kuehn (2002) supported that hypothesis by demonstrating that high schools in a particular California region which were producing high proportions of college eligible Latino students also had low levels of parent educational attainment, on average. They examined sources of cultural and social capital that students may derive from their schools, if they are not able to draw from family or cultural networks. School level variables like teacher expertise, number of college preparatory classes, and overall school achievement levels were studied at 109 high schools over an eight county area in Central California. Extant data in the California Department of Education were utilized, and schools were grouped as having a high or low percentage of Latino students who were eligible for entrance to the University of California (UC) system. The analysis consisted of *t*-tests to compare the social capital variables across the two groups of schools. The findings included several surprises. High schools that produced a high proportion of UC eligible Latinos often had “high Hispanic and English language learner enrollment, limited parent resources, and inexperienced teachers ...[in] small and/or rural high schools” (Talbot & Kuehn, 2002, p. 117). Latino students who were able to take higher percentages of math and science in high school had better rates of college eligibility, even if the high schools they attended were relatively unprivileged. The social climate of these small or rural high schools with large percentages of Latino students was able to partially compensate for the demographic limitations of the students, and to encourage them to set and meet high standards for academic achievement.

Overall, academic explanations for the distribution of Latinos in higher education are not without flaws. A further pair of examples may illustrate the point. An experimental study by Nyberg, McMillin, O'Neill-Rood, and Florence (1997) showed that high school students between the 25<sup>th</sup> and 65<sup>th</sup> percentile on an achievement test could be successfully retracked from a standard curriculum into a college-preparatory curriculum. The goal of the research was to evaluate a California reform project that retracked students for four years at one particular high school, comparing control and experimental groups in a pre and post-test design. The students in the longitudinal treatment group reflected the same racial distribution as the control group and the school as a whole (approximately 40% each White and Latino students, 10% African American students). Despite being in more challenging classes than their test scores would have typically recommended, the treatment group completed more rigorous academic courses than the control group each semester, regardless of racial/ethnic group membership. The treatment group also persisted to graduation and achieved comparable GPA's when compared to the students in the less rigorous control group. The only discouraging finding was that treatment group students had more attendance problems in their senior year and were more likely to accept early admissions offers at two-year colleges rather than persist in their baccalaureate preparation track. The encouraging portion of the results highlighted the idea that students can raise their academic profiles if given the opportunity and support, regardless of prior expectations or performance. The college choice outcome requires more data and contemplation.

In another study, Ortiz and Gonzales (2000) reminded their readers that high schools are institutions created by society, and can be either assets or liabilities to their residents. If

Latinos are over-represented in schools that have few resources and function poorly, the problem may be described as social rather than academic. Ortiz and Gonzales collected case study data on a high school in California that was 75% Latino and had an extremely low rate of University of California eligible students graduating. Data included interviews with the high school principal, guidance counselors, teachers, parents, high school and university students, university admissions officers, financial aid representatives, affirmative action officers, the vice president, classroom and meeting observations, and document analysis at both the high school and university level. The study was framed in terms of resistance theory, rather than attributing the low UC eligibility to cultural characteristics of the Latino students, or institutional characteristics of a poorly resourced high school. The investigators described the efforts of the principal to “transform the social conditions in which they find themselves and to do this in conscious, intentional ways” (Ortiz & Gonzales, 2000, p. 72). He worked to create structures within his school and relationships with nearby universities to help reverse the negative college eligibility trend, with laudable success. Therefore, the dedication and human agency of one individual was able to address some of the academic roadblocks (e.g., less rigorous course selection, lack of appropriate information, guidance, and teaching, lesser levels of parental involvement, etc.), resulting in more students becoming academically eligible by objective criteria. These examples showed the malleability of markers like GPA, college eligibility, and test scores.

The literature bore out that Latinos on average have lower academic profiles than other groups, but also showed that the traditional definitions of qualified and unqualified may not actually predict which students attend university, attend community college, or

succeed with educational goals. Strategies to help students improve their college eligibility were important, but the literature revealed that some Latino students may opt for community colleges regardless. Lower GPA's or test scores did not tell whole story, because even Latinos and Whites with similar academic credentials were not finishing degrees at the same rates (Fry, 2004). Factors like student motivation or environmental supports may also have played an important role in postsecondary activity. Lack of participation in college preparatory activities (e.g., taking the SAT, enrolling in appropriate courses) was a problem in terms of future access to four-year colleges, but one that could potentially be remedied. Communication to the students and their families, encouragement from guidance personnel, and planning timetables may address some of the information disconnect. High school course availability is a broader issue than can be addressed here. Latinos are completing more academic high school credits and taking more AP courses than in the past, which may be an indication of more interest in higher education, or may be related to the increased numbers of Latinos in some secondary schools (Llagas & Snyder, 2003). The translation of these gains into improved four-year college enrollments has not been consistent to date.

#### *Transitional Adjustment and Coping*

Beyond factors related to initial college choice, student persistence or institutional retention rates also factor into how many Latinos eventually obtain bachelor's degrees. The early transition to the chosen campus is a critical time which influences further decisions. Students who begin at majority White four-year campuses but have negative transition experiences may decide to transfer to other locations (e.g., community college, locations closer to home, Hispanic serving institutions). Alternatively, students who begin at two-year

colleges with the motivation to continue through a bachelor's degree, adjust well to the academic setting, and receive sufficient support learning about transfer requirements may be more likely to succeed (Suarez, 2003).

Much of the literature used Tinto's (1987) framework of social and academic integration to discuss the important transition tasks that face new college students. Although this section of the literature review was specifically focused on academic frameworks, it was difficult to separate the academic and social aspects of a student's transition to campus. Hurtado and Carter (1997) discussed the potential difficulties of minority groups attempting to integrate themselves on a predominantly White campus, and tried to clarify what a sense of belonging would look like for those students. Given that the Latino community is diverse and student persistence decisions are complex, solutions are not likely to be "one size fits all." Kraemer (1997) examined academic and social integration with Latino students at a two-year college and determined that the constructs were reasonable to utilize with that particular population, although the behaviors which reflected or measured social and academic integration may look slightly different.

Good quality faculty-student interaction was important for academic integration, whether the faculty member was ethnically similar or different from the student (Hernandez & Lopez, 2004). At residential campuses, this type of communication may have been easier to encounter than at commuter campuses where students and staff alike may not spend much time in the same space (Kraemer, 1997). Mentors, whether peers or adults, can be important sources of information and support as well. First generation students in particular may be in need of the concrete information about college that their families could not provide

(Hernandez & Lopez, 2004). Suarez (2003) indicated that the students she interviewed emphasized the importance of role models (faculty, students, counselors, administrators) in helping them complete the transfer from community college to the university. These role models were especially meaningful if they were Latinos or had similar backgrounds to the students and had succeeded.

Other research indicated that students engaged in positive and productive relationships with faculty who made themselves available, regardless of race or ethnicity (Weissman *et al.*, 1998). This study compared transition experiences of White, Latino, and African American community college students. All three groups listed faculty members as important resources, but Latinos and Blacks qualified that by adding that they had experienced uncomfortable moments in the classroom when they had been asked to represent the opinions of a much larger ethnic or racial group. This experience of finding a helpful resource but simultaneously having concerns about accessing it may be more common for students of color.

Programs or student organizations specific to Latino culture may be useful social integration resources for some students, but research demonstrated that not all students chose to involve themselves in those activities (Hernandez and Lopez, 2004). Involvement in other activities (e.g., academic, athletic, values-based organizations) where students find support and become socially integrated can be just as important. For students of color, which many Latinos consider themselves to be, becoming comfortable with the social environment in college was tied to the racial and ethnic climate on campus and the presence of other students of color. This is addressed further under psychosocial issues.

Apart from the framework of academic and social integration, Hernandez published several qualitative studies seeking to learn about the transitional tasks facing Latino first year college students (Hernandez, 2000; Hernandez, 2002; Hernandez & Lopez, 2004). Some of the themes to emerge were (a) differences in the level of collegiate academic tasks, (b) various challenges in constructing and balancing a social system, (c) learning to access support systems on campus, (d) the importance of support from family and friends, (e) racial climate and cultural adjustments, (f) financial concerns, and (g) the importance of motivation and belief in self. In many ways, those were the tasks that faced all beginning postsecondary students. Some of the adjustments that may have been more important for Latinos than for a typical White student were the maintenance of the relationship with the family, the translation into a new cultural environment (depending on the previous experiences of the student and the nature of the school environment), and the emphasis on motivation as a key to success.

Zurita (2005) conducted in-depth interviews with 10 Latino students at one college, covering financial, academic, personal, institutional, and cultural issues related to transition and persistence. The target institution was highly selective and considered to be “its state’s flagship public university” (p. 304). The university had a 2% Latino enrollment at the time of the study, and had put in place a special need-based scholarship program to attract students of color. Five of the study participants had stopped out of their postsecondary path, and five had continued at the university. Zurita’s participants did not have some of the typical adjustment stressors (finances, academics) as they were all recipients of four-year scholarships and had proved themselves with strong academic credentials from high school.

However, all 10 felt less prepared than their majority classmates to face the challenges of the campus, and all felt a sense of social isolation due to class and ethnic differences. Of those who stopped out, they also were more likely to be first generation students who had attended racially segregated high schools. For them, the transition was quite stark. Those who persisted had slightly more advantage in that they attended racially mixed high schools, had siblings who had attended college, or had a middle class background. Although all struggled initially, the students who persisted found a way to establish their coping mechanisms and had good GPA's in college, while those who stopped out were on academic probation at some point. Although they all entered with similar academic credentials and personal profiles, the persisters had more specific career goals from the outset. Those who stopped out had entered with only a general sense that they wanted to finish a degree in four or five years. These types of adjustment issues would pertain in particular to students at majority White campuses. In addition, the students who stopped out and went home could potentially influence many others' decisions with their accounts of isolation and difficulty.

Solberg and Villarreal (1997) described both social and cognitive contributors to stress in Latino undergraduates, which could impact adjustment to college and desire to persist. The research design was a hierarchical regression which examined the effects of self-efficacy, social support, stress, and their interactions on the outcome (symptoms of distress). Several inventories containing the relevant constructs were given to 164 Latino students in their second or third year at a four-year university. For students who were experiencing higher numbers of distressing events, the perception of social support did decrease the impact the stress caused on the students. Alternatively, for students with lower

levels of event-related stress, having social support caused higher ratings of distress. The researchers hypothesized that social support in a collective culture also carried with it the obligation to be a support provider. It is possible that Latino students with lower amounts of event-related stress felt more responsibility to provide for those in their social system, while those who were under high levels of stress could call upon the support structure. This might be particularly salient for students still living with family or maintaining connections with peers in the home neighborhood. Of note, self-efficacy was found to reduce stress in the regression equation, although the mechanism for this relationship was not direct and could not be clarified.

For commuting students who attended college but still lived at home, a different set of adjustment factors was pertinent. Salinas and Llanes (2003) described a four-year university in Texas where 99% of the students were commuters, over 90% were Latino, 72% were from low income families, and 85% were the first to attend college. In an ex post facto study, they divided the entering freshmen class of 1992 into five groups. The groups included students who did not receive any college degree within the state of Texas, those who received a degree from a community college, those who received a degree from the target institution, those who received bachelors degrees from other colleges in Texas, and those who had persisted in their studies at the target institution, but still did not have degrees within six years. The purpose of the study was to identify pre-existing factors that differentiated these groups from each other. Although they were most interested in persistence, they also identified factors related to adjustment and coping.

The groups were not strikingly dissimilar on factors like academic indicators or financial aid. However, attendance patterns showed a distinct difference among the groups. Those who eventually graduated from the target university had the highest rates of continual attendance, while those who transferred to two-year or four-year institutions or left higher education completely had lowered attendance rates following their first semester of enrollment. This could reflect problematic adjustment (not due to observable financial or academic problems). The investigators did some follow-up interviews and hypothesized that these students had not made a clear separation from their old lives, including from friends who may not be at college, family obligations, jobs, etc. They had not transitioned into a new set of academic expectations and norms, and thus did not fully integrate with the institution. Since almost every participant was also a commuter, the definition of integration with the campus was not clear.

In a qualitative dissertation study, Jalomo (1995) described the transition between home culture and college culture for 30 Latino students attending community college. Of importance was the concept of bicultural socialization, or being able to bridge the areas of incongruence among subcultures. For example, many students had families who encouraged them to continue with their education, and yet did not have the experience themselves and could not provide strategic advice. Therefore, the students had little help in interpreting the educational norms, cultural norms, structures, and expectations present at their colleges. Students also mentioned work as a subculture that often conflicted with the requirements of school, and old neighborhood friends as an influence that often disparaged their educational plans. In order for students to transition well to campus, they needed support in negotiating

these differences. Jalomo described it as the ability to bridge new and old environments, which includes cultural, physical, and internal environments.

Whether or not campuses have special initiatives related to the perceived needs of Latino students varies considerably. Little has been published about the most essential resources for retaining Latino undergraduates and supporting their efforts to reach their goals. Many colleges may provide resources and then wonder why certain students are not fully utilizing them. Saunders and Serna (2004) provided an interesting perspective, which is that some Latino students in their study were quick to establish new support networks when they arrived on campus, to supplement the support from family and friends at home, whereas other students (particularly those close to home) continued to rely solely on old networks for support or information. One student on academic probation who had not sought any help told the researchers, “They do [have tutoring]. I just haven’t researched it, but I know they do” (Saunders & Serna, 2004, p. 156). A variety of barriers could be preventing resource utilization, including office climate, office hours or location, developmental readiness to reach out, low levels of acculturation to the U.S., time conflicts with work and home life, and lack of awareness or motivation.

At the postsecondary level, there is no perfect formula for colleges providing the needed resources and students taking initiative to find what they need. Some students have an easier time with campus integration (e.g., second or third generation immigrants, those without language or financial barriers, students who are successful in finding a like peer group or adult mentors). Other students may need more direct outreach (e.g., first generation college students, first generation immigrants, those in the distinct racial/ethnic

minority, those in under-resourced colleges or communities). Some campuses may have larger resource pools, some may have fewer obvious advantages. The transition to campus depends on the quality of the academic and social bridge that can be built between school and student. For the college or university, that means continually renewing its awareness of its own characteristics, the needs of the students attending, and the appropriate resources that allow the two parties to work together. The students are shaped by their prior academic experiences, the types of relationships they may be continuing (supportive or non-supportive), the amount of difference or similarity from self they encounter on campus, and their individual coping skills. They may need to learn new forms of self-advocacy, however, in order to meet the college in the bridging process. These transition experiences are important for the success of current students, and may also have ripple effects on other Latino students' willingness to extend beyond their initial comfort zones and select challenging colleges for themselves.

### Psychosocial Frameworks Related to Latinos in Higher Education

#### *Family Orientation*

One of the values that has been associated with traditional Latino culture is the importance of family (Casas & Pytluk, 1995). In practice, factors like acculturation to the United States may influence the degree to which an individual expresses or adheres to this value. Family orientation has many positive aspects, including loyalty and support for members of the system. It has also been hypothesized that this value may make it difficult for some Latino students to leave home to attend college (Ortiz, 2004). Whereas children from individualistic cultures may be prepared to make a decision in order to promote their

own independence and success, children from collective cultures may see decision-making as a group activity and are more likely to abide by the family's wishes (Marín & Marín, 1991).

Dynamics related to income and socioeconomic status in the Latino community were explored in more detail in the previous section on demographic frameworks. It is worth mentioning briefly that these financial constraints also may have a psychosocial component. Some students, especially in families with financial challenges, may feel pressure to generate income in order to contribute to the well-being of the household and take college classes part-time or not at all. Their loyalty dictates that they help the rest of the family first, and consider their educational goals second. Fry (2002) stated that “the results of this economic necessity are vividly evident in the high proportion of immigrant youth who end their education before high school graduation and work full-time instead” (p. 5).

The social networks that are relied upon by people from collective cultures may have positive and negative aspects. Person and Rosenbaum (2006) conducted a mixed methods study on the enrollment decisions of Latinos, Whites, African Americans, and Asian Americans at 14 community colleges, with an analytic focus on the Latino portion of the sample. Latinos were intentionally oversampled in both the qualitative portion (17 of the 33 interviews) and the quantitative portion (approximately 28% of the 4,365 students who completed surveys) of the study. The surveys included items related to family demographics, high school academics, current college experiences, future expectations, and the extent to which students had enough information about their college's academic requirements (the dependent variable). As compared to the other racial/ethnic groups in the

study, Latinos had the least amount of information regarding college requirements. This statistic did not change when age, family income, high school preparedness, or type of degree enrollment were also taken into account.

Person and Rosebaum (2006) also conducted a regression analysis to test the effects of encouragement by teachers, staff members and other students on the amount of college requirement data gathered by the student, and Latinos continued to be the least informed group. The scholars turned to the qualitative data for possible explanations for this phenomenon, and found that Latinos who relied on family or friends to help with college decisions rarely even explored other postsecondary options or researched the programs of interest at their intended campus. They trusted their significant others implicitly, and did not seek more information to discern whether this college was a good fit for their goals, needs, or learning styles. Such students also spent less time creating networks with faculty or staff who could help them, as they relied upon their existing social network to provide for all of their needs (even when those in the network were not fully knowledgeable). Person and Rosenbaum hypothesized that there was a link between the tendency to rely on family networks for information (expressed in the interviews) and a trend in the survey data regarding percentage of Latino students on a campus. For schools with less than 15% of the total student body as Latinos, the differences in amount of information obtained by the various racial/ethnic groups was the greatest, while in schools with higher percentages of Latinos present, the among-group differences diminished to insignificant levels. Thus, the possibility of working within a familiar cultural network to gather information versus a

greater level of cultural isolation could make a big difference in the educational decision-making process for Latinos.

Suarez (2003) conducted a qualitative study which described barriers to Latino community college students' transferring to four-year colleges. Even though the size of the sample was small (10 students, six administrators, and two counselors), her findings reflected some of the trends previously identified in her literature review. Several of the participants expressed themes related to family (e.g., having important financial and personal responsibilities in the family, not wanting to leave home or the community, and having less educational legacy in the family, and thus less understanding of the requirements of the process). Some students stated "that they had very traditional families who did not support them traveling outside of the city limits to attend a university" (p. 113). However, family support for nearby educational options was stronger, which left community-based two-year colleges as the leading candidates for higher education. Students had the overall impression that their parents "supported their children's aspirations to pursue a higher education despite cultural traditions" (Suarez, 2003, p. 114).

An innovative study by Gonzalez and Hilmer (2006) tried to determine the effect of location and cost of postsecondary options on Latino students' decisions about attending two-year or four-year colleges. The data were drawn from an NCES dataset which contained 1,963 Latinos out of 8,785 participants (High School and Beyond, HSB:80). Rather than selecting an ordinary least squares estimation technique, the investigators chose to use an instrumental variables approach (which compensated for any correlation between the independent variables and the error term). After a complex regression analysis, they

concluded that “for Hispanics, each additional 10 miles from a 2-year college decreases the likelihood of 2-year attendance by 2.4% and increases the likelihood of 4-year attendance by 2% while the distance from the nearest 4-year college does not significantly affect the likelihood of choosing either attendance option. At the same time, for Hispanics each additional \$1000 increase of 2-year fees decreases the likelihood of 2-year attendance by 7.2% and increases the likelihood of 4-year attendance by 8.3%” (Gonzalez & Hilmer, 2006, p. 253). Although this effect was statistically significant, both accessibility variables (distance and cost) exerted less influence over college choice than individual educational expectations. Therefore, decision-making may include family influences (financial means and proximity) as well as personal goals in some proportion.

As part of the strong emphasis on family connection, Latino students in several studies indicated that their motivation and encouragement to pursue postsecondary education came mainly from the family. This was true whether or not the parents spoke English or had been to college themselves (Ceja, 2004; Ornelas & Solorzano, 2004; Plunkett & Bamaca-Gomez, 2003). Whereas parents who had more experience in the educational system may have been able to help with specific steps in the planning and preparation for higher education, a strong theme in the literature was that Latino children of less educated parents felt strong emotional support from their families to strive for their goals. The children also indicated that the struggles of their parents to survive economically inspired them to take advantage of opportunity when it presented itself and to be in a position to help their families later. Once in college, many students relied on family for the motivation to succeed (Phinney *et al.*, 2005). In this way, first generation Latino parents did contribute to

the aspirations of their children, but not in the same way as more acculturated European American parents (Suarez, 2003).

In summary, support within the family was clearly a key to success for Latino college students (Hernandez & Lopez, 2004). Family or friends with experience at a particular college could ease the transition for others in their network, or provide concrete instructions on how to navigate the system successfully. They could even make the difference for someone deciding between enrollment or no postsecondary education at all. Encouragement was a key motivator, and Latinos seemed to place enormous faith in their collective system to help them through. Even in the case of new immigrants, the struggles of the parent generation seemed to increase the resolve and determination to succeed of the children in many cases. One possible limitation was in the implementation phase (gathering and sorting information, taking tests, applying, selecting a college). Non-college educated or very traditional parents may have had less guidance to offer, or students may have relied too much upon the family network and neglected other viable support systems. As one study stated, “Social capital has mixed effects: it provides information, but it may also limit the breadth of a student’s information and activities” (Person & Rosenbaum, 2006, p. 58). Desire to be near family was a strong value for many Latinos, which may have limited the possible matriculation sites. The balance between honoring cultural and personal values and educational goals is a delicate one, if they are not initially synchronized.

### *Social Capital*

As was discussed with respect to parental educational legacy, not all students have access to the same quantity of social capital. Social capital can be defined as non-material

resources that benefit a person, such as attitudes, skills, and knowledge passed down in one's social networks (Valadez, 2002). In terms of educational decision-making, for example, social networking may broaden an individual's perspective on the advantages of persisting to earn a bachelor's degree. Social capital for young Latino students can be gained by networking with similar students or important mentors in their schools, or possibly from family members who have experience with higher education (Talbot & Kuehn, 2002). If one source is missing, the other becomes even more important. Students with little parental educational legacy and biased or unhelpful school staff are left with fewer sources of social capital to assist them.

Valadez (2002) described the way ethnicity and socioeconomic status (SES) may interact with the functioning of social capital (defined mainly as level of parental involvement) to influence high school math selection in White and Latino students. High school math level is an important variable in many bachelor's degree completion studies (Adelman, 2006). Drawing from the NELS:88 database, Valadez carried out a descriptive analysis of the pertinent variables as well as a logistic regression analysis on the outcome (selection of algebra or advanced math). Initially, the two student groups differed on economic and academic indicators, as well as measures of parental involvement. In terms of the regression results that addressed social capital, there was support for the hypothesis that it functions differently for White and Latino students. Being from a family with many siblings reduced the chance that White students would enroll in either level of math, but had no effect on the odds for Latinos. Rather than reducing social capital by reducing the amount of time parents could spend with each child, a large family network did not dampen

social capital transmission for Latinos. Also, parental discussion was highly significant for Latino students in the choice of either math class, but had a mixed effect for White students (not significant for algebra, significant for advanced math). Participation in a parent-teacher organization had a positive affect in math selection for White students, but no significant effect for Latinos. Similarly, parent involvement in class visitation or meetings with the teachers were helpful for White students' math decisions, whereas they had a neutral to negative impact for Latinos. Finally, parental monitoring of academic progress was not significant for Latinos, and had a positive effect on White students' selection of algebra. The scholars mention that it is not clear whether biased reception of Latino parents by school personnel could be playing a part in some of those findings. It is clear that social capital functions differently for Latinos and Whites.

A slightly more complicated finding in the Valadez (2002) study was that SES interacted with the social capital variables in a way that influenced the outcome more significantly for upper SES Latino students than lower SES Latino students. None of the interactions of SES and social capital were significant for White students. That is to say, the efforts of upper SES Latino parents to monitor their children's progress, interacting with both school officials and the student, had a greater effect on the outcome of math course selection than did the efforts of lower SES Latino parents. For White parents, there was no difference by SES. Overall, the "study shows consistently that parental involvement proves advantageous for making informed curricular decisions, but under conditions that favor White and upper SES students" (Valadez, 2002, p. 336). The Latino family network seems

strong, but the educational impact may vary based on familiarity and comfort with majority White U.S. institutions.

Qian and Blair (1999) investigated the effects of social, financial, and human capital on educational aspirations of students from various racial/ethnic groups. By social capital, they meant “the strength of the relationship between parents and children” (p. 606). This study was reviewed in the demographic section focused on income and socioeconomic issues and is only referenced briefly here in support of the importance of social capital in the educational aspirations of Latinos. As they were using an existing national data set (NELS:88), Qian and Blair defined social capital with items like parental involvement in the child’s studies, study resources present in the home, and dual parent versus single parent households. These factors proved to be even more significant for Latinos than financial or human resources (e.g. educational attainment of the parents). For White students, educational aspirations had closer relationships to parental status items (e.g., family finances, educational legacy), but for Latinos and African Americans, factors like parental involvement have a much greater impact.

Goldsmith (2004) investigated the importance of social capital, not in terms of building resources or power, but in terms of self-beliefs. His study involved multi-level regressions, where he examined student level variables and school level variables simultaneously. The main research questions being addressed revolved around the educational and occupational aspirations of Black and Latino students (as compared to White students), how the racial/ethnic mix of schools and teachers influenced those aspirations, and whether achievement gaps were impacted by high aspirations or beliefs.

Social capital in this study was related to the positive presence of like peers or teachers, not just the resources found in the home. Goldsmith reviewed past literature that suggested that optimism and social capital can be increased in a majority Black or majority Latino school, as unfavorable comparisons with White students were not as prevalent. Other research has suggested that segregating low-achieving students in a school caused them to feel a false sense of progress or unrealistic expectations based on a restricted comparison group.

Goldsmith (2004) found (using NELS:88 data) that mixed race and majority Black or Latino middle schools with more teachers of color generated more optimism and higher aspirations in Black and Latino students than did majority White schools. The role model effect was important, as students had positive attitudes in mixed school settings with many like peers, but had even higher beliefs in schools where the teaching staff also reflected their race and ethnicity. Not only did students of color in the majority Black and Latino schools aspire to professional occupations, but the gaps between their reading and math achievement scores and those of similar White students in majority White schools were reduced. This is important to eventual college choice because pro-education attitudes and optimism regarding future options are important motivators along the path to higher education. Even without the economic advantages that some White students have, social capital can provide positive influences to students of color, most specifically to Latinos and African Americans.

### *Identity*

There are many aspects that contribute to a person's sense of identity, some of which have already been discussed (generation of immigration, SES, family relationships). Some other aspects which influence a person's psychosocial functioning may include race,

community of origin, ethnic identity or degree of acculturation, and gender. The concept of psychosocial identity draws our attention to the development of a person's set of core beliefs about him or herself, and to the simultaneous social influences that support or impinge upon those core beliefs. These may have an impact on how an individual evaluates his or her capabilities and future educational options, or how others provide feedback (positive or negative) about his or her choices. It is also essential to remember that these identities and beliefs are intersecting and self-defined at all times (Robinson, 1999). One human being contains many identity characteristics, some of which may be brought into increased salience by a particular circumstance, but all of which are a part of the persons' makeup. It is for the individual him or herself to determine if he or she is experiencing marginalization on the basis of an identity characteristic, not for an onlooker. That is to say, simply being Latino is not automatically a social hindrance – it requires the individual's interpretation of his or her experience as a Latino to make that determination.

Ethnic identity is a concept that has been studied from several different points of view (Phinney, 1990). As Latino is an ethnic category, this dynamic was important to explore in detail. Social psychologists have investigated ethnic identity development (EID) from the point of view of social identity theory and group identification. They have examined the social dynamics that may lead some groups to have a disparaged social identity and others to have a preferred social identity. Sociologists or anthropologists have been interested in acculturation as a marker of EID, or questions of how cultural attitudes may change as a result of two groups being in proximity. Finally, developmental or counseling psychologists have been interested in EID through the lens of identity

development. This is the framework that was utilized in the current study - how the individual has chosen to construct his or her sense of self as an ethnic (and simultaneously racial) being.

Due to the wide variety of cultural backgrounds, skin tones, and physical features that may be present in Latinos, students may have complex racial and ethnic identities (Hernandez & Lopez, 2004). Ethnicity implies shared cultural experience, or consciously identifying oneself on the basis of homeland or ancestry (Cornell & Hartman, 1998). Race was discussed here as a social construct rather than a biological one (Helms & Talleyrand, 1997). There are many more similarities than differences between racial groups in genetic terms, but the perceptions and attitudes that society carries toward different groups can have powerful impact. Many Latinos, but not all, are mestizos of Spanish and Indian heritage. A person may self-identify in one racial/ethnic category (e.g., Puerto Rican, Zapotec Indian) or in several (e.g., African and Cuban). At first glance, college staff and peers may form a race-based impression of a Latino individual (e.g., dark-skinned, and therefore Black) that is similar or different than the person's ethnic self-identification. Thus, to refer back to Robinson (1999), it is important to allow a person to define themselves in terms of identity characteristics and to respect how they allocate meaning to that identity.

Ethnic identity was described as a person's conscious choice to identify themselves with an ethnic group, and the thoughts, feelings, and experiences that come along with that identification (Phinney, 1996). Phinney (1993) developed a general model to describe the process of ethnic identity development, based on existing racial identity development models and experimental data. Her model started with the assumption that ethnic identity

follows a developmental process, with later stages being more adaptive and healthy than earlier stages. Phinney also assumed that active exploration is necessary in order to move forward, not a simple aging process. Finally, she included contextual factors (e.g., SES, gender, family, environment) as important influences in identity development.

As was true with other forms of identity development, late adolescence and early adulthood were important times for exploration and formation of ethnic identity (Phinney, 1990). The environment may have played an important part in causing early dissonance in a person's ethnic identity, especially for individuals who had physical characteristics that distinguished them from the racial and cultural majority. They may have received feedback which prompted them to reflect on the meaning in their lives of their ethnic or cultural background. Individuals who were not perceived as significantly different from the U.S. Anglo norms were less likely to go through a period of dissonance (Phinney, 1993). Therefore, many European Americans do not expend considerable effort to clarify their ethnic identity, although they have one. It is also possible to imagine a third or fourth generation Mexican American who felt pride in his or her ancestry, but did not maintain many distinctly Mexican cultural practices (e.g., speaking Spanish, celebrating holidays, preferring traditional music or food). Ethnic identity may be more complex for bicultural individuals such as this.

Choosing a college could be an important time for reflecting upon prior family experiences, making choices in a new environment, and consolidating ethnicity as part of one's sense of self. For students intending to go to a campus where their group was not in the numerical majority, understanding ethnic identity would be closely aligned with

understanding how they related to the majority group and how the majority group viewed them. For Latino students whose families have been living in the U.S. for several generations and have experienced diversity while growing up, this ability to see themselves in context of the majority U.S. culture may not be difficult (Hurtado *et al.*, 1996). Indeed, depending on the student's family upbringing, they may have defined themselves as bicultural and be comfortable in various settings (Torres & Phelps, 1997). The concept of ethnic flexibility refers to students who belong to more than one group (e.g., Mexican heritage, but born in the U.S., or both Chinese and Panamanian), and who may emphasize different portions of their identity depending on context (Teranishi, 2002). However, for students who have experienced only the U.S. majority culture, or only their specific Latino national culture, planning to attend a multicultural campus may present a challenge of acculturation (Berry, 1994; Torres, 2003).

Hernandez and Lopez (2004) touched briefly on gender roles in the Latino community, reporting on prior studies that provided some mixed results. The traditional view was that there were distinct and appropriate activities for men and women, and that education may not have been encouraged or valued as much for females. However, Latinas are represented in higher numbers than their male counterparts in college at the current time, so traditional views may be shifting due to accommodation of U.S. ways or other factors. In a qualitative study with 13 Latina students, the choice to attend college was depicted as an opportunity for self-improvement and contribution to the family (Butler *et al.*, 2001). However, there was also an element of conflict present. The young women struggled between their interest in further education and their sense of what it meant to be a good

daughter. In this particular study, support for college seemed to come from the parent generation, but criticism for the choice came from extended family members. Hernandez and Lopez indicated that more investigation is needed to clarify gender differences in the Latino community and their impact on college experiences.

The qualitative study by Jalomo (1995) was mentioned in a previous section on transition to campus. He focused on bicultural socialization, or being able to make a bridge between the norms from the community of origin and the new campus culture. This also had implications for ethnic identity, as students tried to integrate the feedback they were receiving in both places into a coherent understanding of self. Jalomo described some of the students in his sample as more interpersonally resilient, and thus better able to construct a flexible identity that could include both halves of their experiences. Another potential resource was a “cultural mediator,” or a person who could help Latino students learn the new roles and expectations of college in a way that was simultaneously accepting of their existing culture or lifestyle.

Identity, whether it is ethnic identity, gender identity, or cultural identity, can have a strong influence on a student’s educational choices. Students who feel culturally congruent with their intended campus surroundings were more likely to enter and/or persist than students who felt culturally isolated or marginalized (Gloria & Castellanos, 2003). Identity continues to develop over time, based upon some biological givens and some psychological and social choices made by the individual in response to those givens. For adolescents who were leaving high school and home for college, identity was often still in the process of crystallizing (Phinney, 1990). However, even adults who experienced a change of

circumstance or environment could have received new prompts which caused them to consider their identities in ways they formerly had not. Context and social feedback can shape our identities in subtle or overt ways, and it is important for helping professionals to maintain awareness of that dynamic. There are, unfortunately, social consequences to the feedback or external labeling that occurs around race and ethnicity. The racial climate of a campus can vary along a continuum from welcoming and supportive through indifferent to hostile and marginalizing, as will be discussed in the next section. An individual may not be able to control how he or she is perceived by this social system. How this affects a student's interest in applying, matriculating, or persisting on that campus will be a function of many things (e.g., support from family or peers, determination, resilience, appearance, salience of identity).

#### *Racial Climate/Ethnic Community on Campus*

Assessment of racial climate depended on several factors, including the traits and perspectives of the individual student, and the atmosphere (including attitudes and behaviors) at his or her chosen campus (Ancis *et al.*, 2000). Campuses concerned about climate can examine their "historical legacy of inclusion or exclusion of groups, structural diversity or numerical representation of diverse people, the nature of interactions among diverse groups, and individual perceptions of the environment" (Hurtado & Ponjuan, 2005, p. 236). Individual perceptions can vary greatly within a cultural community. Physical appearance may be less of an issue for a Latino student at a majority Latino campus than at a college that has been majority White for generations. Similarly, a dark-skinned Latino may face more discrimination than one with light skin and hair color, or a less U.S.-acculturated

Latino may struggle to understand or connect with those native-born students around him or her. Latinos in areas that have been affected by immigration patterns may also have to contend with political opinion or historical context. Community colleges, being more local and committed to access and not exclusion, often have a higher percentage of students of color than do baccalaureate colleges. However, representation is only part of the puzzle, and community college should not take climate issues for granted either. Adverse climate issues can affect both the academic and social lives of students on campus and their emotional attachment to the college (Hurtado et al., 1996).

Hurtado and various colleagues have done several studies related to campus climate for Latinos (Hurtado & Carter, 1997; Hurtado et al., 1996; Hurtado & Ponjuan, 2005). For example, in a study featuring regression analysis, Latinos who spoke Spanish at home were more likely than those who did not to perceive an ethnically hostile campus environment (Hurtado & Ponjuan, 2005). This illustrated how individual characteristics could influence perception of climate. Another study (which included factor analysis, correlation, and regression analysis) utilized the Student Adaptation to College Questionnaire (SACQ) (Hurtado et al., 1996) to highlight the fact that the perception of a negative climate for diversity at their schools led Latino students to have negative adjustment scores across all scales (personal-emotional, academic, social, and campus attachment). This result was a reminder of the far-reaching impact that climate could have on students, and thus the importance of attending to institutional factors.

Hurtado and Carter (1997) focused on Latino students' sense of belonging, which incorporated both campus environment and student interactions with it. This study (done

with structural equation modeling) was an effort to clarify what “academic and social integration” would look like for a student of color on a predominantly White campus. For example, working with a faculty member on a research project or being a guest in a faculty member’s home were not significantly associated with a sense of belonging for Latinos, although those were typically mentioned as important to academic integration with other groups. For the Latinos in the study, activities like discussing course material with other students outside of class or getting to know smaller segments or niches of the campus were more important for a sense of belonging. The researchers developed the idea that student integration can be with selected portions of a campus, and not necessarily attachment to the whole institution, particularly if racial, ethnic, or cultural differences might make that challenging in places.

In the Ancis et al. (2000) study, 587 undergraduates from a variety of racial/ethnic backgrounds completed the Cultural Attitudes and Climate Questionnaire, a survey regarding perceptions and experience of campus racial climate. The overall survey return rate was 60%, and the percentage of Latinos on the target campus was 6%. The 77 Latino participants had significantly different responses (as verified by MANOVA tests) with regards to cross-cultural comfort (similar to African Americans, more than Whites), experience of racial pressures (more than Whites, but less than African Americans and Asian Americans), and experience of faculty racism (less than African Americans). They also expressed the most comfort (highest survey mean) with their own culture, but that difference was not statistically significant. It was not clear which specific factors led to those responses – the investigators hypothesized that Latinos had not yet reached a critical

mass on the campus to become a politicized group, that the Latinos in attendance were more acculturated and accepting of majority White U.S. culture, or that their physical appearance (as an ethnic but not racial group) drew less racist attention to them. These dynamics were reflective of the particular campus where the survey was distributed. In general, however, the maintenance of positive intercultural attitudes such as those expressed by the Latinos in this study was likely to result in less conflict and stress. The scholars note, “These students’ acceptance of self and others may buffer the negative effects of discrimination” (Ancis et al., 2000, p. 183).

In the best-case scenario, campus climate can be constructed in such a way as to welcome all students. This requires conscious attention and continual input, however, and not all campuses allot the needed time and resources to the project. For campuses to take responsibility for constructing a positive climate for Latino students, they first must understand the characteristics of the students they have present. Many universities have histories that are discriminatory and exclusive, and the leadership (White people in many cases) must come to understand the centrality of race in the lives of many students of color (Solorzano et al., 2005). Solorzano and his colleagues used critical race theory to help illustrate how the noted gaps in educational attainment of students of color could be attributed to institutional characteristics (e.g., structures, policies, and practices), not always to student traits and characteristics. Their study reviewed data from California educational systems, ranging throughout the K-16 pipeline. Although they were reframing the data from a critical race perspective and not performing any statistical analysis, the article was

valuable in its challenge to racist viewpoints and in its recommendations for improved practices on campuses.

After the college had done its part to address campus climate and equity issues, the presence of an identifiable community of like students could greatly contribute to a sense of belonging. With such diversity present among Latinos, defining “like students” may be a somewhat complicated endeavor (Torres, 2004). For example, international students from Latin America may have more in common with international students from Europe than third generation U.S. Latinos, or Afro-Latinos may experience similar social dynamics as Black American students. Many individuals identified first through their nationalities, such as Cuban Americans or citizens of Colombia, and secondarily or not at all with the pan-ethnic term “Latino” (Jones-Correa & Leal, 1996). For some students who placed strong salience in their ethnic identities, the presence of support services for minority students and the possibility of connecting with other students of color could make a positive difference, even if the Latino population itself was not large (Hernandez & Lopez, 2004). More U.S.-acculturated Latino students may have been accustomed to integrating themselves into majority White climates, and may therefore have perceived few barriers or difficulties. However, individuals with more easily identifiable cultural characteristics or needs may have a harder time finding support or becoming comfortable in the campus environment (Hernandez & Lopez, 2004). For example, Hurtado et al. (1996) found that of all Latino students included in a national survey, Mexican American students had the lowest levels of social comfort on campus. Other studies have focused on the unique needs of first generation immigrant students (Saunders & Serna, 2004; St-Hilaire, 2002).

Latinos students can find a suitable niche on campus in several ways, including participation in student organizations. While studies indicated no strong trends for Latinos to become involved in ethnically-centered student groups, a broad set of opportunities for participation should include that option among others (Hernandez & Lopez, 2004).

Commuter campuses have traditionally had more difficulty in involving students in out of class activities, due to the multiple obligations of their population. Suarez (2003) reported on a community college study by Nora and Rendon, in which they discovered that strong social and academic integration with the college helped predispose students to successfully transfer to baccalaureate institutions. Thus, attempts to create welcoming campus climate and an involved community are still worthwhile. Support services are best tailored to the specific campus population, not offered in a one-size-fits-all fashion. The literature on Latino student experiences on a variety of campuses is growing and should be consulted for suggestions on best practices (Hernandez, 2000; Hurtado & Ponjuan, 2005; Kraemer, 1997; Ortiz, 2004).

Hispanic-serving institutions (HSI's, federally defined as campuses with at least 25% full-time equivalents that are Latino students) provided an interesting counterpoint to the discussion (Laden, 2001). At the time of Laden's article, there were 203 HSI's in the U.S., including two-year and four-year institutions. As they were defined by population density, it was not surprising that 43% of all Latinos in higher education were attending HSI's. However, Laden posited that the completion rates for Latino students were much better than at non-HSI's, probably due to the constructive effects of the environment. She stated that Latinos in general earned 5.3% of all of the bachelor's degrees distributed in 1997, but those

students in HSI's earned 23%. Hagedorn (in press) studied the community college system in Los Angeles, which includes several HSI's. The campuses varied from 22% to 75% Latino student population, and the investigator indicated that the campuses with the higher density also had better outcomes (e.g., Latinos at those sites took more courses which would transfer to a four-year college) for those students. Thus, the positive effect of critical mass on the educational progress of Latinos has begun to be explored.

In terms of student experiences and reactions, there was no simple way to summarize the literature on campus racial climate issues for Latinos. The responses were likely to be as varied as the group itself. In terms of institutions, a few basic guidelines may be pertinent (e.g., know thy students and know thyself, do not proceed under assumptions or one-size-fits-all responses). Some studies portrayed Latinos as cross-culturally adaptive and able to find their niche in any given college environment. Other studies pointed to specific conditions in which that may be true, and other conditions which might cause more problematic perceptions of campus racial/ethnic climate. The concept of "sense of belonging" put forward by Hurtado and Carter (1997) was important to consider in that it allowed for the complexity of bringing together person and environmental factors in new and changing ways.

### *Motivation*

Motivation was described in many different ways, but often included both cognitive and affective components. It was an internal state that may influence the behaviors that a person enacted. It was considered a psychosocial framework because it included both thoughts/feelings about the self and interaction with the external social environment. One

theory described it as “a combination of goals, personal agency beliefs (self-concept), and emotions” (Gordon-Rouse & Austin, 2002). It has a clear connection to self-efficacy theory (Bandura, 1977), which will be discussed subsequently.

Hernandez and Lopez (2004) summarized some of the literature on Latinos and academic motivation, including its relationship to GPA, persistence, and retention. The “belief in and the realization that they possessed the potential to succeed in college” was found to be very important for all students, but perhaps especially for students of color. A qualitative study related to retention of Latino students (Hernandez, 2000) also found the theme “I want to do it” as the most prominent influence in the participants’ desire to stay in college. Hernandez indicated that this theme included statements of motivation or attitude, and also statements of capability or self-efficacy.

Motivation can affect a variety of processes and outcomes. Kao and Tienda (1998) interviewed 12<sup>th</sup> grade Latinos who indicated that having “*ganas*,” or the desire to do something, was the most important part of succeeding. Although a positive and motivated attitude did not ensure the desired outcome, it led to determination and resilience that helped to overcome difficulties and barriers along the way. Suarez (2003) found that, among individual factors that improved the likelihood that Latino community college students would transfer to a four-year college, an “internal drive to succeed, born out of personal experiences” was the most important (p. 107). This drive could level the playing field even for students with weaker academic backgrounds or financial hardships.

Phinney et al (2005) studied low income Latinos who were enrolled at a four-year college. These students described their motivation for being at college, which fell into three

basic clusters. Some of the students were determined to complete a degree just to show that they could, or because they had set a goal to do so. Others expressed motivation that related to their families and the desire to make them proud and be able to provide support to them. The final group was in college because it seemed like the thing to do after high school, but not because they were highly motivated by any particular cause. The researchers indicate that the final group, which they labeled as “default oriented,” had very low levels of commitment to college, and below average levels of career motivation. Although their GPA’s were not notably different from the other students in the study, they had less confidence in reaching their goals in college and somewhat lower self-efficacy scores. This suggests that short-term outcomes (like semester grades) might not suffer when motivation is low, but persistence to graduation and long-term outcomes could be impacted.

Goldsmith (2004) discussed the connection between high aspirations (the goals portion of motivation) and actual achievement. While his analysis was somewhat mixed, it was clear that “Latinos with high beliefs achieve more than do Latinos without them” (p. 140). He related this to a status attainment social model, in which mental states like goals and aspirations affect motivation and thus potentially performance. There may be an important distinction between abstract attitudes, such as “anything is possible,” and more concrete attitudes, which are grounded in past performance and may have more predictive power for future actions and achievements. Goldsmith included both kinds of belief statements in his research, and the concrete attitudes, especially having a positive outlook toward English class, typically had higher regression coefficients for Latinos than did the abstract aspirations.

Following the theme of abstract and concrete aspirations, St. Hilaire (2002) reviewed survey data from 728 Mexican-American 8<sup>th</sup> and 9<sup>th</sup> grade students in the San Diego school system and found incongruence between their statements about highest level of education they abstractly wanted to achieve (48% said graduate school) and the highest level they realistically thought they could attain (32% said finish college, 29% said graduate school). In a regression analysis the strongest predictive factor in these aspirations was parental SES – children from higher SES families had both higher abstract aspirations and realistic expectations for education. The other important predictor of abstract aspirations was length of residency in the U.S., but the overall model was considered to be relatively weak, with an adjusted  $R^2$  of only 0.071. The model related to realistic expectations for education had a higher adjusted  $R^2$  (0.541), but only when educational aspirations were also entered into the regression as a control variable. The researcher concluded, “Students tend to conceive as realistic what they profess as their aspired educational goals” (St-Hilaire, 2002, p. 1039). This could be influenced by the relative youth (14 years) of the participants in the sample. However, at this point in their lives, the experiences of discrimination by teachers or attending under-resourced inner city schools (non-significant variables in the regression) had not decreased the motivation of these students to attain high levels of education

At least two studies have examined expectations or aspirations for education in Latinos, including student and parent contributions. They ranged in scope and design from a qualitative interview study to a local survey study. However, the common factor was the focus on the importance of motivational profiles in the educational process.

Behnke, Piercy, and Diversi (2004) conducted in-depth interviews with 10 Latino families who were recent immigrants to a rural area of the U.S. The majority of the families were from Mexico, and had an average length of eight to nine years living in the U.S. Most of the parents had not completed high school and were working in factories in the local community. The 10 children who were interviewed for the study were between the ages of 11 and 16, and seven of them were enrolled in an English as Second Language class. The study intended to describe the educational and occupational aspirations of the students, of the parents, and any relationship between those two sets. Findings revealed that half of the students aspired to graduate from high school, and those students had at least one parent with only an elementary level education. The parents of those five students also had minimal educational aspirations for themselves, such as learning English. The students who had slightly higher educational aspirations (some college or a bachelor's degree) also had parents with slightly higher educational levels (at least some high school) or with higher educational aspirations (attend technical school, earn a degree themselves). A couple of the participants had a difficult time answering the questions beyond "I don't know," which may point to a lack of information about options. More importantly, there was a connection between parental role modeling and the children's motivation for future education. Given the importance of family in decision making for many Latinos, any efforts to raise the educational aspirations of Latino youth should not exclude other members of the family. The financial status of the families in this study was not directly discussed, but a relatively low SES can be inferred from the job descriptions of the parents. Parents also mentioned lack of time as a barrier to their aspirations, with long hours at the factory and many

responsibilities at home. Aspirations must therefore be viewed in context of other daily realities and constraints for newly emigrated families.

Plunkett and Bámaca-Gomez (2003) examined self-report survey data from 273 students in 9<sup>th</sup> through 12<sup>th</sup> grade in Los Angeles who had both parents born in Mexico. Two regression analyses were conducted – one with academic motivation as the outcome, and one with educational aspiration as the outcome. Significant predictor variables included parental monitoring behaviors, parental help with academics, parental educational attainment, language spoken at home, and student’s gender. Of interest, different variables predicted the amount of effort and importance students’ placed on high school (academic motivation) as compared to their future plans for educational attainment. The ability of parents to provide help with homework and academic tasks improved a student’s academic motivation, while such assistance had little impact on how far they planned to go in higher education. Educational aspirations were higher when English was spoken at home and where the parents had attained comparatively more education themselves. Thus, the role model effect seen in the Behnke et al. (2004) study was also apparent here. Based on correlations between parental monitoring and the two outcome variables, Plunkett and Bámaca-Gomez added that “adolescents who perceive parents as monitoring, encouraging, and supporting them may have higher self-esteem and self-efficacy” (2003, p. 235).

In sum, the attitudes, beliefs, and feelings that underlay motivation and educational aspirations did appear to play a part in postsecondary progress of Latino (and other) students. The effects on effort, direction, and process are perhaps easier to document. The mechanism through which motivation may be translated into action, or aspirations into

outcomes, was not entirely clear. Some of the contextual variables which may have influenced motivation and aspirations in Latino students were parental involvement and role modeling, the degree of acculturation to U.S. norms, and demographic variables like SES.

### Summary of Frameworks

Upon review of the three main frameworks presented (demographic, academic, and psychosocial), some general conclusions can be reached. Socioeconomic status (SES) emerged as an important demographic factor, one that needed to be tracked in order to gain a clear sense of its impact on other phenomena, but it did not explain educational choices, progress, or attainment in all cases. Many of the demographic variables that were discussed in the literature have a nested quality – it can be hard to separate immigration status from economic status, or delayed and part time enrollment from need to work. This was perhaps part of the reason why firm conclusions about the effects of demographic variables have been difficult to achieve. Some of the published work in these areas were summary reports of extant databases, but some did make empirical contributions to the research base. The literature did not yet seem to be exhaustive in its coverage of demographic variables that were relevant to Latinos and their movement from secondary into postsecondary education. Several articles highlighted exemplary programs in which motivated school leaders or supportive structures helped overcome the educational liabilities of some Latino students, including low SES backgrounds, limited family educational legacy, low academic profiles, and under-resourced high schools (Auerbach, 2004; Nyberg et al., 1997; Ortiz & Gonzales, 2000; Talbot & Kuehn, 2002). Therefore, person factors can overcome demographic factors in some situations.

Academic factors could be seen broadly as individual (e.g., ability, desire, performance) or institutional (e.g., school resources, unequal distribution). Problems with college choice or educational attainment could be attributed to either category, and both areas could be modified. Therefore, this was not an intractable barrier. The literature describing academic frameworks for evaluating Latino progress in higher education was more advanced than other portions of the literature. In addition to descriptive reports and case studies, some experiments and interventions have been attempted. One weakness may have been the reliance on traditional performance related variables. These markers had been used to evaluate students for generations, and perhaps were not as helpful in predicting success as once thought. If other ways of matching student needs with institutional capabilities could be implemented, or if more attention was paid to providing the things that students need to make a good transition to higher education, some additional problems could be solved. These are bridges that *can* be built.

The psychosocial factors also pointed to the interaction between an individual (e.g., identity, motivation) and his or her surroundings (e.g., racial climate, social network). Indeed, the lens of social cognitive theory would show us that the individual cannot be analytically separated from his or her social and interpersonal setting, and that behavior, person, and environment were reciprocally linked. The literature examined in this section was more widely dispersed, and perhaps not often examined as part of a set. However, together these five areas (identity, motivation, family orientation, social capital, racial climate) helped identify what is happening inside the individual, inside the family, inside the community, and among communities. It not only set up concentric rings of context, but

served as a reminder that the environment can be a powerful actor relative to educational choices. Although not as visible as the numbers on a monthly paycheck or an SAT score, the psychosocial frameworks provided valuable information about individuals in relationship with their worlds. The studies reviewed were both qualitative and quantitative – a limitation was that few could deal in cause and effect statements, given the complexity of human beings.

In an ecological view, the three frameworks presented here were not competing explanations, but parts of the macro-level system that encompasses all we are and all we do. In a research project that sought to understand a tendency towards community college over baccalaureate college, it was appropriate to cast the net broadly.

#### Academic Self-efficacy and Latino College Students

##### *Self-efficacy*

Perceived self-efficacy was but one of many concepts described by Bandura (1999) in his Social Cognitive Theory (SCT). As defined in chapter one, self-efficacy beliefs were internal statements of how a person evaluated his or her ability to complete a given task with a degree of success. They reflected the whole SCT because self-efficacy beliefs were constructed from social or environmental input, behavioral attempts with appropriate feedback, and person factors such as motivation, ability, interest and belief (Bandura, 1977). This was also known as reciprocal triadic determinism, which combined environment, behavior, and person factors in an effort to describe human psychological phenomena.

As a subcomponent of SCT, self-efficacy has been rigorously researched, defined, and evaluated. Bandura and other researchers have spent many years describing the ways in

which self-efficacy beliefs may influence a person. Bandura (1980) wrote a review of a microanalytic study that intended to establish a link between strength of self-efficacy beliefs for specific behavioral tasks and the eventual performance of those tasks. The analysis showed that participants were more likely to complete those actions for which they expressed complete certainty of their abilities, and their anticipatory fears were lower. The congruence levels between beliefs and actions were in the range of 84% ( $p < .001$ ).

Several studies have addressed the role of self-efficacy beliefs in setting goals and efforts to reach those goals (Bandura & Cervone, 1983; Mone, 1994; Wood & Locke, 1987; Zimmerman *et al.*, 1992). In one of the earliest studies, Bandura and Cervone utilized 90 research participants from a college psychology class and randomly assigned them to various treatment conditions. The experiment involved riding a stationary bicycle with adjustable air resistance – some participants selected a goal of improving their performance while others had no performance goals specified. In addition, some participants received feedback on how they had performed with respect to the goal. The researchers selected the goal of 40% improvement as one that would be sufficiently motivating, but not unattainable and discouraging. All participants completed a survey that included perceived self-efficacy statements about performing the tasks. The students who had both goals to aspire to and feedback on how close they were coming to those goals had the largest increase in their performance (almost 60%), while the control group and the groups with goals but no feedback and feedback but no goals all achieved approximately a 25% increase in performance. A combination of high self-efficacy related to the task and dissatisfaction with the level of progress toward the goal was also found to be predictive of future task

performance. Bandura and Cervone discussed this as part of a cycle of raised aspirations for individuals who believe in their efficacy for a task, display high levels of accomplishment and receive accurate feedback, and then expect more of themselves in future performances.

Similar to general self-efficacy beliefs, academic self-efficacy can be simply defined as a person's level of confidence in his or her ability to perform a given academic task successfully (Gore, 2006). As cited by Solberg, O'Brien, Villarreal, Kennel and Davis (1993a), Multon, Brown and Lent conducted a meta-analysis on 36 studies relating self-efficacy and academic performance or persistence. Their calculations showed that efficacy beliefs and performance were related, with a moderate effect size of .35. It was useful to be able to characterize the level of a person's academic self-efficacy, therefore, because it could have some bearing on their educational outcomes. If the pathways through which academic self-efficacy beliefs develop were understood, then they might also be amenable to intervention (Schunk & Pajares, 2002). This tool is very constructive and useful.

Both Wood and Locke (1987) and Zimmerman et al. (1992) addressed attainment, goals, and self-efficacy beliefs in academic settings. A set of mental tasks (e.g., memorization, understanding, explaining concepts, discriminating concepts) were identified and college student participants were asked to give a yes/no response to performing items in the task area, and a rating of strength of self-efficacy for that item (on a scale of 0 to 100). When this instrument was utilized in a pilot study, all but one of the self-efficacy strength ratings were significantly ( $p < .05$ ) correlated with student grades. After modifications to the scales, follow-up studies were completed in which participants also received performance feedback (took their first course exam but did not yet have grades) and indicated their goals

for grades on the exam. Even controlling for prior academic performance and ability, significant (although moderate,  $r = .27$ ) correlations were found between self-efficacy strength ratings and subsequent academic performance. The investigators did note that the feedback provided in the form of experiencing a test and setting goals for test grades were perhaps not as specific as feedback that can be provided for a single task. That limitation, along with the lapse of time between the self-efficacy survey and the final performance measure (2 months) and the fact that college student subjects were pre-selected in terms of academic ability, may have accounted for the mid-level statistical results. The researchers also indicated that self-efficacy functioned in both a direct (performance) and a mediating (goals for grades) role. In their opinion, self-efficacy for academic tasks was still a viable and important concept to explore in field settings.

Zimmerman et al (1992) undertook a path analysis study to examine how self-efficacy beliefs related to prior grades and academic goal setting to influence 102 urban high school students' final grades in a required social science course. The students were from low to middle SES neighborhoods and evenly distributed across several racial/ethnic groups, and thus demographically dissimilar to the college students in the prior study. Self-efficacy beliefs related both to ability for subject-specific learning and ability to be a self-regulated learner (e.g., finish homework on time, plan and organize academic tasks, provide own motivation and focus on studies). Correlations done prior to the path analysis showed that students' prior social science grades were significantly (although moderately, with  $r$ 's ranging from 0.22 – 0.26) related to their self-efficacy ratings, their current grade goals, and their final grade in the course ( $p < .05$  throughout the study). Stronger relationships were

found among perceived self-efficacy, grade goals ( $r=0.41$ ) and final grades ( $r=0.39$ ). A significant causal path from self-efficacy for self-regulated learning to self-efficacy for general academic achievement (coefficient = 0.51) and then to final grades (coefficient = 0.21) was found. Self-efficacy for academic achievement also had a direct and significant effect on student grade goals (coefficient = 0.36), which then made a significant contribution to final grade outcome (0.43). Two factors (academic achievement efficacy and student goals) accounted for 31% of the variance in the outcome. When the two forms of self-efficacy beliefs were combined, they produced an effect of 0.37 on final academic attainment. Thus, although the path did not explain the majority of the variance in final grades, it did demonstrate that self-efficacy plays an important part through both direct and indirect influences.

Several studies investigated the role of academic self-efficacy in student adjustment and performance (Bandura *et al.*, 1996; Chemers *et al.*, 2001; Gore, 2006). The Bandura *et al.* (1996) study utilized subjects in a middle school in Rome, Italy, with an average age of 12. It has slightly less bearing on the U.S. college-age participants in the current study, but is helpful in terms of early influences on a child's academic beliefs, aspirations, and achievements. The role of parental beliefs is also explored in that study. More relevant to the current topic, Chemers *et al.* (2001) did a longitudinal study with first year students at a state university in California. They had 373 survey respondents in the first wave of data collection (after completing the first academic quarter, but before receiving evaluations), and follow-up data (at the end of the first full academic year) from 256 of the original group. Several measures were taken in the initial collection, including academic self-efficacy,

optimism, evaluation of challenges-threats, self-ratings of academic performance in the first quarter, future performance expectations, stress/health, and university satisfaction/adjustment. A portion of those measures was repeated at the second data collection point. The researchers diagrammed a complicated path of expected direct and indirect relationships, but summarized their hypotheses in the following statement. “We predicted that the effects of dispositional characteristics, academic self-efficacy, and optimism on perceived stress, health, and adjustment would be moderated by challenge-threat evaluations. We also expected academic self-efficacy to affect performance through its impact on academic expectations” (Chemers et al., 2001, p. 57). The findings included significant direct effects of self-efficacy on challenge-threat evaluations (standardized coefficient = 0.27,  $p < .001$ ), academic expectations (standardized coefficient = 0.28,  $p < .001$ ), and academic performance (standardized coefficient = .34,  $p < .001$ ). Self-efficacy also had significant indirect or mediated effects on academic expectations (.08,  $p < .001$ ), academic performance (.08,  $p < .01$ ), stress (-.16,  $p < .001$ ), health (-.15,  $p < .001$ ), and adjustment (.11,  $p < .001$ ). The mediating relationship of self-efficacy often functioned by allowing students to interpret difficult academic situations they faced as motivating challenges instead of overly demanding threats. The scholars concluded that positive student attitudes (such as high academic self-efficacy) were important factors in personal transition to campus and subsequent academic success.

More recently, Gore (2006) investigated the usefulness of academic self-efficacy as a predictor of college GPA outcomes in a two phase study. Phase one participants ( $N=629$ ) were first year students at a public Midwestern university who completed the College Self-

Efficacy Instrument (CSEI). Academic variables were reflected through ACT scores, college GPA's, and enrollment status. A regression analysis was performed with the outcome being college GPA. ACT scores were entered as a first step in the analysis, to see if the self-efficacy measures could add further predictive power beyond standardized tests. The ACT did predict GPA across three semesters of college work, while the CSEI scores taken after the completion of the first semester (but not at the beginning of the first semester) made a small additional contribution to predicting grade outcomes. In the second phase with almost 8,000 students from several universities, the effectiveness of the ACT as a predictor of college GPA was compared to the academic self-confidence scale of the Student Readiness Inventory (SRI). Again, the ACT predicted a significant amount of the variance in GPA, and the SRI scale (administered at the beginning of the academic semester) provided a small increase in predictive power. The likely explanation was that a new college student's ability to form accurate academic self-efficacy beliefs improved with experience in college courses, so that early data collections were less telling.

Bandura had a strong belief in human agency, or the ability of people to create and direct their own life paths. People are "self-organizing, proactive, self-reflecting and self-regulating," he wrote (1999, p. 2). This applies to educational pathways as well. In concert with Bandura's ideas of human agency, Qian and Blair (1999) noted "The aspirations of youth are part of a set of social psychological processes that play a crucial part in helping to determine eventual educational attainment. The extent to which an adolescent believes that he or she should attain a higher level of education will directly affect the drive, motivation, and effort that they put toward the achievement of that goal" (p. 617). Thus, self-efficacy

beliefs, motivation and educational aspiration may be expressed in academic goal-directed behavior.

Some other researchers have posited that self-efficacy beliefs are useful as predictors of whether or not behavior might follow, but do not have a causal role in the behavior (Hawkins, 1995). This point of view charges that self-efficacy does not fully facilitate an understanding of how and why human behavior occurs, but only offers a partial description. Bandura (1999) responded that “It is partly on the basis of efficacy beliefs that people choose which goal challenges to undertake, how much effort to invest and how long to persevere in the face of difficulties” (p. 49). Human behavior is complex and multi-determined, so the debate of how our belief systems impact our behaviors is not likely to be resolved in a neat fashion. Sometimes self-efficacy beliefs played a mediating role as opposed to a direct role, by empowering the individual to participate more consistently, expend more effort, or persist in spite of setbacks (Schunk & Pajares, 2002). In other words, belief systems could function like a filter to help a person make interpretations about his or her experiences and prepare for future actions. As summarized by Pajares (2002), “the beliefs that individuals create and develop and hold to be true about themselves form the very foundation of human agency and are vital forces in their success or failure in all endeavors” (p. 1).

The studies reviewed have shown the continued interest in self-efficacy as a construct over the past 25 years. Self-efficacy in academic settings has been linked to goal setting, task performance, grade outcomes, future expectations, adjustment, and ability to deal with stress. Self-efficacy beliefs were utilized in the present study as part of a

predictive set that influenced level of college choice, but was not being identified as the only source for such decisions or actions. The environment in which students were preparing to make college choices could play an important shaping role in self-efficacy beliefs, as Bandura's (1999) Social Cognitive Theory would attest.

### *Self-efficacy and Latino Students*

Many of the early studies on self-efficacy were done with homogeneous populations (e.g., White, middle class). As a concept, however, self-efficacy seemed appropriate for assessment with more heterogeneous groups. Due to the environment and person-based factors that were part of the definition, self-efficacy beliefs operated in the context of the subject him or herself. A person decided what goals were of interest, and acted in accordance with his or her beliefs about how successfully he or she could achieve them. Certainly, deleterious beliefs that flow from prejudiced cultural sources could have a downward effect on a person's self-efficacy beliefs (Pajares, 2002). If students found themselves in a social structure that constrained them, such as a school with few resources, or an internship where students of color were not respected no matter what their contributions, their self-efficacy beliefs may be stymied. Internal motivation or task-oriented skill may not be sufficient to bring about the results that the student hoped for. Beliefs may have been diminished, or if they stayed at high levels, the incentive to act on the beliefs within the constraints of a biased system may have suffered. Pajares indicated that more research about self-efficacy and race, ethnicity, or cultural contexts would be useful.

In terms of published articles, self-efficacy has been applied to Latino students in several studies. Solberg et al (1993a) validated the College Self-Efficacy Instrument (CSEI)

with Latino students in a large West-coast university. The participants (52% of 311, or  $N=164$ ) responded to a mailed packet of surveys. The items in the instrument were written to be etic, or universal to all college students, as opposed to emic, or specific to Latino culture. The researchers reasoned that many adjustment challenges that might cause a student to draw upon their self-efficacy beliefs were common ones, such as talking with professors or meeting a new roommate. They read college self-help manuals to develop a pool of items that represented important and broadly representative concerns for students. Of the 40 items initially drafted, 20 received high consensus among the six expert raters who read them. The wording of the items was parallel to many self-efficacy instruments, which often begin with the question, “how confident are you that you could successfully complete the following tasks.” The test subjects’ responses were entered on a 10-point Likert scale from extremely confident to not at all confident. Construct validation was done with a factor analysis of the 20 items selected by the raters, and 19 of the items (with loadings higher than .50) clustered into three factor pools. The factors were named course self-efficacy, social self-efficacy, and roommate self-efficacy. The factors had good internal reliability, with alpha values ranging from .88 to .93. As a final check, convergent and discriminant validity were established by comparing the self-efficacy instrument with scales measuring psychological distress, academic stressors, and social support. The self-efficacy scales “were related to other indexes of adjustment and discriminated from nonadjustment constructs” (Solberg et al., 1993, p. 89).

In a study described previously, Solberg and Villarreal (1997) used regression analysis to examine the role of self-efficacy beliefs in adjustment for 164 Latino college

students, and found positive self-efficacy and the availability of social support to be useful predictors of stress levels. Hernandez (2000) focused on retention-related outcomes, but his small qualitative study of 10 Latino college students also identified a theme (“I want to do it”) related to motivation and self-efficacy. Phinney and Haas (2003) explored coping among 30 first year students of color, most of whom were first generation college students and 19 of whom were Latino. In addition to a qualitative exploration of coping styles via journals, the students completed a survey that included self-efficacy items. Self-efficacy was significantly correlated with students’ ratings of how well they were coping with stressors ( $r=.46, p<.01$ ). Although the total number of participants in this study was somewhat small, the positive survey results regarding self-efficacy were also repeated in the qualitative journal entries of those students, who tended to write about self-reliance, commitment to education, and confidence in themselves.

Some earlier studies with Latino participants contained similar concepts, but did not use the term academic self-efficacy. These can be considered related studies that converge to provide more support for examining self-efficacy in a Latino student population. For example, Alva (1991) based her research with 10<sup>th</sup> grade Mexican-American students in Los Angeles ( $N=384$ ) on previous work describing protective resources that promote academic success and invulnerability to stressful conditions. The participants completed a survey that dealt with risk factors, personal resources such as academic self-esteem, environmental resources such as support from teachers and family, and appraisal of stress in their lives. A regression analysis tested how these predictors would explain the students’ academic outcomes, such as results of a comprehensive basic skills test or grades for the academic

year. The theoretical foundation being explored was that successful students would have a combination of “positive self-evaluation of their academic status at school and a sense of control over their academic success and failure” (p. 19). This belief system was parallel to self-efficacy in that it included self-assessment of capability and a visualization of a level of success. Alva found that several variables were able to discriminate ( $p < .001$ ) between students with low basic skills test scores and those with high test scores. The highest regression coefficient (.83) was for a student’s appraisal of how English/Spanish language issues were dealt with in school, but the second highest (.73) was for the personal resource variable labeled “self-concept of intellectual and social status” (Alva, 1991, p. 28). The researcher recommended that schools with high percentages of Latinos or other students of color pay attention to the protective resources and adaptive attitudes that could promote success and buffer students against some of their stressors and challenges.

Arellano and Padilla (1996) also investigated academic invulnerability and academic success through interviews with 30 Latinos of Mexican heritage who were enrolled at a selective university. Unlike the students in Alva’s (1991) study (34% born in another country, 41% born in the U.S. to Mexican parents), the majority of these students were born in the U.S. (83%). However, they were not highly privileged students in that two thirds were from low SES backgrounds, only 25% of their parents were college graduates, and most of them (approximately 80%) had attended majority Latino or African American high schools. In addition to the interview regarding school experiences, the students completed an educational resiliency scale. Unfortunately, this scale was not named or described in the article, as its main purpose was to deal with the interview data. However, pertinent themes

emerged from the qualitative analysis as well. Among the themes that were identified as important to success were attitudes of persistence and motivation, parental encouragement, and “a belief that success was possible no matter what the challenge” (Arellano & Padilla, 1996, p. 489). The scholars used the term self-efficacy later in the article to discuss this belief system, but without defining its parameters specifically. Of interest, 22 of the 30 participants had been identified early in their schooling as gifted students, and thus had received special encouragement, attention, and reinforcement from their teachers. This positive mental orientation to learning was often cited by the students as a reason for their confidence that they could succeed academically.

Rodriguez (1996) completed a regression analysis with Mexican American students ( $N=225$ ) at a large university in Texas and found that academic self-concept was one of three predictor variables that were related to the outcome of first year college GPA. The other two significant predictors of GPA were being an education major or a social sciences major. Academic self-concept was represented through four items (e.g., I am as skilled academically as the average applicant to this university) and measured on a five-point Likert scale. The investigator did stipulate that the internal reliability (.44) was only moderate for these items. “Nevertheless,” she wrote, “Mexican American students with the same academic background were more likely to achieve higher grades if they had greater confidence in their academic abilities” (Rodriguez, 1996, p. 336).

Finally, Strage (2000) wrote about college adjustment and success in Latino ( $N=37$ ), White ( $N=73$ ), and Asian American ( $N=40$ ) students at a California university. Participants completed a survey of their perceptions about family experiences and their attitudes related

to confidence in ability to succeed at college, persistence in difficult tasks, and ability to focus on academic tasks. She performed MANOVA's to compare the survey means for the three groups of students, and described Latino college students as having a mastery orientation, based on comparatively high scores in areas of task involvement, confidence, and persistence. This was true in spite of the fact that Latinos were also the most likely to be first generation college students. Correlations revealed that although having a family member who had already experienced college coursework did provide a boost in GPA, it did not make a difference in attitudinal variables such as confidence, focus on task, or willingness to persist. Strage wrote of the Latino portion of the sample, "They are remarkably persistent and confident despite their relatively low grades. The high levels of emotional support and autonomy they report [from family experiences] coupled with the emphasis placed on moral and religious education may well have helped them to achieve this motivational profile" (2000, p. 739). Self-efficacy beliefs functioned in a similar way, to engender confidence for academic tasks and energy to focus and persist through difficulty.

#### *Summary of Self-efficacy Literature*

Social Cognitive Theory and self-efficacy (Bandura, 1977, 1999) have been selected as the analytical lenses for the present research because of their inclusive scope. As described earlier, person-centered phenomena (cognitions, feelings, motivation), environmental phenomena (family structure, economic circumstance, cultural milieu), and behavioral phenomena (academic preparation, enrollment patterns, adjustment and coping skills) can all be included and connected in this framework.

Although it has some limitations in terms of accuracy of measurement and proposed role in causing behavior, self-efficacy has shown to be an influential variable in a variety of educational research settings and with a variety of populations. Qualitative explorations with Latino students have highlighted in their own words how important this belief structure can be, especially when other advantages are not present. The quantitative research presented here has explored how self-efficacy relates (in correlations or regressions) to a variety of academic outcomes, either as a direct influence or as a mediator on other attitudes. Path analyses have sought to describe how this influence plays out, and have typically found self-efficacy beliefs to be significant components in the matrix of academic inputs and outputs. None of the studies described have focused on the effects of self-efficacy beliefs on the college choice process, as students assess their abilities, experiences, and resources from high school and make goals for themselves related to level of higher education. Few studies have included Latino community college students, to date. Therefore, the present study built upon the base of existing research on academic self-efficacy, but addressed how it interacted with demographic, academic, and other psychosocial variables to influence Latino students' choice of a two-year or four-year college.

## Chapter Three:

### METHOD

#### Introduction

As stated in chapter one, the purpose of the present study was to investigate the predictors (demographics, academic preparation, and academic self-efficacy beliefs) that might influence a Latino student's plan to enter a two-year or four-year college. The theoretical perspective for the study came from Social Cognitive Theory (Bandura, 1999). Thus, the predictor variables were also related to his reciprocal triadic causal factors (environment, behavior, and person). The literature review in chapter two helped to identify the foundation for the present work and also how this dissertation contributes to filling a gap in current understanding. This chapter describes the participants, the instruments or survey used, the procedure for data collection, and the plan for data analysis. Steps for dealing with missing data are also detailed.

Extant public data that was collected by the National Center for Education Statistics (NCES) was used in the present study. The particular database used was the Education Longitudinal Study (ELS:2002) survey (Ingels *et al.*, 2004). ELS is a longitudinal study that begins with a complex sample of 10<sup>th</sup> grade students in 2002 and follows them through 2004, 2006, and beyond. Participants and survey procedures are described in a subsequent section. Two sample groups were selected from the ELS:2002 – Latino students and White students. Although there was a larger number of White students, the weighted sample design reflected the populations in a proportional manner (A. D'Amico, NCES statistician, personal communication, June 16, 2006).

## Participants

Since ELS:2002 data collection has already taken place, this section begins by describing the procedures used by the NCES in identifying participants for the survey (Ingels et al., 2004). NCES used complex research designs, which differ from simple random samples in that each individual does not have the same probability of selection. The NCES designs are weighted probability samples that utilize both stratification and clustering. Stratification refers to grouping similar units in a population. Each strata is relatively homogeneous internally, and allows for sampling that includes critical subpopulations that may not be targeted otherwise. For example, in ELS:2002 schools were stratified by classification (public, private, Catholic) and by location (rural, suburban, urban). Sampling rates between the strata could vary. Clusters, in contrast, are internally heterogeneous and often are grouped by geographic proximity. In ELS:2002, nine geographical divisions based on the U.S. Census were utilized, such as New England/Middle Atlantic, South Atlantic, and Mountain (Ingels et al, 2004). The primary sampling unit, the school, also functioned as a cluster. This helped to reduce data collection cost but also meant that the data could not be considered representative at a local or state level. In the public release data, NCES also took steps to protect confidentiality of individuals, such as slightly editing a data file.

Variables must be weighted along all of these dimensions so that the individuals selected for and responding to the survey accurately represent the universe or population from which they were chosen. For example, in ELS:2002 “the general purpose of the weighting scheme was to compensate for unequal probabilities of selection of schools and

students into the base year sample and to adjust for the fact that not all schools and students selected into the sample actually participated” (Ingels et al., 2004, p.36).

To target the participant population, NCES engaged in a two-stage sampling process (Ingels et al., 2004). First, schools with a 10<sup>th</sup> grade student population in the 50 states and the District of Columbia were identified. Of approximately 27,000 such schools, 1221 were sampled. Of these eligible public, private, Catholic, and charter schools, 752 agreed to participate in the survey and were utilized. In the spring of the 2002 school year, these schools were asked to provide enrollment lists and approximately 26 students per school were selected as participants. Thus, the student sampling constituted the second stage. Students were eligible if English was their first language and they did not have prohibitive disabilities, or if school personnel indicated that the remediation necessary for participation was available (e.g., that limited English speakers had sufficient grasp of vocabulary or that testing accommodations could be provided to students with disabilities).

Although parents, teachers, and other school personnel provided information in ELS:2002, the unit of analysis in this survey was still the student. As described in the ELS User’s Manual, “Of 17,591 eligible selected sophomores, 15,362 completed a base year questionnaire, as did 13,488 parents, 7,135 teachers, 743 principals, and 718 librarians” (Ingels et al., 2004, p. 12). Latino students were intentionally over-sampled in ELS:2002, resulting in 2227 students who self-identified as Hispanic/Latino (almost 14% of the total sample). A total of 8735 students (close to 54% of the sample) self-identified as non-Hispanic Whites. Male and female students were present in equal proportions in the sample, and the age range was narrow as the participants were all in 10<sup>th</sup> grade in 2002. In terms of

SES quartile, the overall sample was fairly evenly distributed, with 22-26% of students in each of the four categories. Forty-eight percent of the students were attending schools in suburban environments, with an additional 34% at urban schools and 18% at rural schools (Ingels et al).

The first follow-up dataset (from spring 2004) has been released to the public, with over 14,000 participating students (Ingels et al., 2005). This was a refreshed sample that included both eligible students who had participated in the 10<sup>th</sup> grade data collection and some new students who had entered the school after the initial data collection (e.g., transfers or immigrants). The follow-up survey also included students who had participated in the base year data collection but subsequently dropped out of school, graduated early, moved to a new district, or entered home schooling. Thus, the majority of students were in their senior year of high school during the first follow-up, but not all. The number of Latinos present in the 2004 ELS sample was 2440, and the number of White students was 9073. The total weighted response rate was between 87-89% for these two surveys.

#### Instrumentation

In the ELS:2002 database, individual surveys included a student questionnaire, a questionnaire from a parent and a teacher regarding the student, a questionnaire from the principal and a librarian regarding the school, and a facilities checklist. The student questionnaire was the source for the majority of the variables in the present study. It included “background, school experiences and activities, plans and goals for the future, employment and out-of-school experiences, language background, and psychological

orientation toward learning” (Ingels et al., 2004, p. 12). Students at most participating schools were also given academic achievement tests in math and reading.

All of the questionnaires and achievement tests were created by NCES after identifying constructs of interest and drawing relevant material from existing surveys (e.g., National Assessment of Educational Progress [NAEP], National Education Longitudinal Study of 1988 [NELS:88], and the Program for International Student Assessment [PISA]) (Ingels et al., 2004). The questionnaires went through several stages of revision, including technical review by panels of experts, field testing, and psychometric analyses. In order to describe the psychometric properties of the math and reading achievement tests and the self-efficacy items selected for the current research, the investigator consulted technical manuals for ELS:2002, NELS:88, and PISA:2000, all of which were available on-line (Adams & Wu, 2002; Ingels et al., 2004; Ingels *et al.*, 1994).

### *Math and Reading Items*

The math and reading questions came from the base year ELS data collection cycle. To allow for longitudinal comparisons, the academic achievement items paralleled those used in the NELS:88 study. The math items ranged from arithmetic through geometry to some more advanced topics, including skills and comprehension problems (Ingels et al., 2004). The reading test utilized topical paragraphs with a series of questions to examine understanding and evaluation of the material. Almost 2000 high school students participated in a field test of the math and reading items in 2001, which allowed NCES to assess length of test, completion rate, correct responses, item difficulty, and item discrimination before

collecting the base year data in 2002 (Burns *et al.*, 2003). One of the documentation reports stated,

For the achievement tests in mathematics and reading, item parameters were estimated for both 10th and 12th grade in the base-year field test. Both classical and Item Response Theory (IRT) techniques were employed to determine the most appropriate items for inclusion in the final (base-year main study) forms of the two tests. Psychometric analyses included various measures of item difficulty and discrimination, investigation of reliability and factor structure, and analysis of differential item functioning (Ingels *et al.*, 2005, p. 18).

In terms of the classical item analysis techniques, the correlation of each item score to the total test score (labeled R-biserials) showed how well individual questions served as measures for the whole construct being tested (Ingels *et al.*, 2005). The lowest average R-biserial for either math or reading was .58, which was interpreted as an acceptable level of content validity. Also, the average number of correct responses was lower for the 10<sup>th</sup> grade field test students than for the 12<sup>th</sup> grade students, which is appropriate given more time for content instruction and mental development in high school seniors. This bolstered the validity of the academic content of the achievement tests.

With the item response theory (IRT) analysis of items, the goal was to evaluate how well items discriminated between levels in a chart of step-wise math or reading proficiencies (Burns *et al.*, 2003). An example of a hierarchical math proficiency level would be moving from simple arithmetic with whole numbers to operations including fractions, decimals, powers, or roots (Ingels *et al.*, 2004). IRT is therefore pointing to an external reference

point or criterion (construct validity), rather than an internal correlation with the total test score. For the math tests, the average index of parameter discrimination was between 1.02 and 1.27, while for reading it was between .98 and 1.14. Burns et al (2003) indicated that any item above a 1.0 discrimination index is functioning well in terms of distinguishing between levels of ability. The IRT analysis also considered difficulty of the items, which takes into account both the percent of students at each grade level who answered correctly and the possibility of random guesses resulting in a correct response. This helped the field testers make recommendations about which items to drop from the final achievement test form.

Internal consistency reliability of the items, or the amount of variance between performance on one particular item and performance on the test as a whole, was in the range of .89 - .91 for both math and reading. These values are high and reflect good reliability. A factor analysis was also carried out, which lent support to the idea that the achievement tests in math and reading had strong central themes. Items clustered around difficulty levels, but the researchers stated that eigenvalues indicated a primary factor (math or reading) for each test (Burns et al., 2003). Numeric eigenvalues were not printed in the document for verification.

Of interest for the current study were the differential item function checks that were carried out in the field test (Burns et al., 2003). Researchers examined students who were matched in terms of ability but different in terms of gender or race/ethnicity. The statistical check (similar to a chi-square analysis) allowed researchers to see which items gave advantage to a student based on his or her identity group, and which items were gender or

race neutral. Any biased items were not recommended for the final test form. Overall, the math and reading tests went through several stages of evaluation for psychometric soundness and were built on the strengths of similar surveys from the past.

### *Self-efficacy Items*

The psychological orientation questions used in ELS:2002 (and subsequently in the current study) were adapted from PISA:2000 (see Table 1). This survey was created by the Organisation for Economic Co-operation and Development (OECD), which was founded by 20 countries in Europe, Scandinavia, and North America (Adams & Wu, 2002). In addition to academic proficiency scales, PISA included scales related to motivation, interest in math and English, self concept, learning styles and strategies, expectations regarding task completion, and learning confidence (including academic self-efficacy beliefs) (Ingels et al., 2004). Because academic self-efficacy is an important construct in the current research, attention was paid to the psychometric properties of these items in PISA, how particular items were selected for inclusion in the current study, and how well they reflect Bandura's (1977) original definition of self-efficacy.

As shown in Table 1, the academic self-efficacy items used in the current study can be traced back to PISA:2000 items in the perceived self-efficacy, effort and perseverance, and control expectations subscales (Adams & Wu, 2002). In terms of relevant psychometric characteristics, the PISA learning confidence scale is addressed first. Of the five academic self-efficacy beliefs items used in the current study, four came from the learning confidence scale. The scale includes two subscales, perceived self-efficacy and control expectation.

The average reliability scores listed for these two subscales were .70 - .75 for the entire sample, and .77 - .79 for the United States participants (Adams & Wu, 2002).

In PISA documentation, each average item parameter was listed, along with the thresholds between points on the Likert response scale. For example, for the item derived from the effort and perseverance scale, the mean was .33, and there were differences in the parameter estimates between the categories “almost never” and “sometimes” (-2.54), between “sometimes” and “often” (0.22), and between “often” and “almost always” (2.32) (Adams & Wu, 2002). For each scale, reliability or internal consistency estimates are also given; for effort and perseverance, the mean reliability for all countries was .78 and for the United States was .83.

The confirmatory factor analysis (which was done by OECD researchers in order to validate the items and indices) was then reconfirmed with structural equation modeling. The factor analysis for the two-dimensional learning confidence scale (including perceived self-efficacy and control expectation) showed an acceptable model fit for the sample. Several statistical measures were used to compare the fit between the expected versus observed model (Adjusted Goodness of Fit Index, *AGFI* = 0.96, Non-normed Fit Index, *NNFI* = 0.95 and Comparative Fit Index, *CFI* = 0.97). Indices close to 1.0 show a good model fit. The PISA documentation states that “correlation between the latent factors was as high as 0.93 but for conceptual reasons it was decided to keep two separate scales” (Adams & Wu, 2002, p. 241).

The PISA items utilized in the current study were selected after reviewing some publications regarding construction and validation of academic self-efficacy scales

Table 1

*Comparison of Self-efficacy Items From PISA 2000 to Current Study*

PISA item #	PISA item content	PISA subscale	Current item content
CC01Q04	When I sit myself down to learn something really difficult, I can learn it.	Control expectations	Identical wording
CC01Q24	If I want to learn something well, I can.	Control expectations	Identical wording
CC01Q12	When studying, I keep working even if the material is difficult.	Effort and perseverance	Identical wording
CC01Q18	I'm confident I can do an excellent job on assignments and tests.	Perceived self-efficacy	I'm confident I can do an excellent job on my English assignments.
CC01Q02	I'm certain I can understand the most difficult material presented in texts.	Perceived self-efficacy	I'm certain I can understand the most difficult material presented in math texts.

Note: PISA is Program for International Student Assessment of the Organisation for Economic Co-operation and Development (OECD)

(Bandura, 2006; Miller *et al.*, 1999; Mone, 1994). Although it was not published, Bandura (as cited in Miller *et al.*, 1999) did create a scale related to academic self-efficacy, the Multidimensional Scales of Perceived Self-Efficacy (MSPSE). Miller *et al.* tested the MSPSE for psychometric properties, and the empirical factor analysis ( $N=500$  participants) reflected a nine-factor solution (explaining almost 92% of the variance). Some of those factors were named Self-efficacy in Basic Study Skills (BSS), Self-efficacy for Academic Achievement (AAE), and Self-efficacy in Seeking Help (SHE). The BSS factor explained the highest single percentage of the total variance (18%). Correlations among these first order factors suggested that some second order factors might be present, and so a second analysis was undertaken. Miller *et al.* reported three meaningful second order factors, including Social Self-efficacy, Academic Efficacy, and Task Management Efficacy. These turned out to be similar to three higher order themes identified by Bandura, Barbaranelli, Caprara, and Pastorelli (1996) in earlier research – Social Efficacy, Academic Efficacy, and Self-Regulatory Efficacy. Academic Efficacy was comprised of the AAE factor, combined with a factor related to math achievement. Task Management efficacy included SHE, BSS, and a factor related to resisting peer pressure. Of interest, AAE loaded (with a lesser coefficient) on Task Management and BSS loaded (with a lesser coefficient) on Academic Efficacy. The two second-order factors mentioned had a correlation of 0.65, confirming a relationship between them.

In the current study, academic self-efficacy items reflected two of the categories present in the MSPSE (as cited in Miller *et al.*, 1999). They were the higher order factors Task Management and Academic Efficacy. Task Management was approximated by

variables related to the Basic Study Skills and Seeking Help subscales. Examples included planning to take the SAT or ACT exam and seeking college information from various sources. Academic Efficacy was approximated with statements of future academic aspirations and Academic Achievement items (e.g., mastering skills, efforts in studying). These items include both general academic confidence and subject specific efficacy beliefs, such as understanding math texts or doing well on English assignments.

### Data Collection

#### *Procedure*

As stated under instrumentation, several surveys were used to gather information for the ELS:2002 database. The student questionnaire was described in most detail, as the majority of the variables in the present study were drawn from that source. However, all surveys can be accessed through the NCES website (<http://www.nces.ed.gov/surveys/els2002/index.asp>). The items in the self-report student questionnaire included information relevant to the present study's demographic, academic, and self-efficacy variables. The items in the academic achievement tests were largely in multiple-choice format. All students completed a routing test first, which consisted of 15 basic math and 14 basic reading questions and then were given a second test of varying difficulty in each subject, depending on the scores from the routing test. Scores were compiled by NCES in quartiles and in standardized T scores (Ingels et al., 2004). The student questionnaire and achievement tests were administered in the school setting. In general, 45 minutes were allotted for completion, which means that some items at the end of the questionnaire had a lower response rate.

In addition to the procedural steps just described for survey administration, NCES has typical procedures for dealing with missing data after the surveys have been returned. Missing information in the ELS:2002 was dealt with through logical imputation, defined as “a process that tries to determine whether the missing answer can be either deduced or guessed from answers to other questions” (Ingels et al., 2004, p. 80). For example, if a student did not complete the item for sex, but the parent indicated the child was female or the student had a typically female name, that information was then filled in from the secondary source. If logical imputation was not possible, statistical imputation was utilized in some situations to avoid missing data bias. A weighted hot-deck procedure was used for statistical imputation; interested readers are referred to the Ingels et al (2004) document for more details. In the judgment of the investigator, the high survey response rates, the national scope of data collection, and the large number of ELS:2002 participants were indicators that the Latino portion of the participant pool was likely to be sufficiently varied.

The principal investigator also had to take procedural steps to access the data, even though it had already been collected. The variables present in ELS:2002 can be accessed through the public-use Electronic Code Book (ECB), which can be requested from NCES without a restricted data license. The fact that the data are public-use and that individually identifying information had been eliminated meant that the university Institutional Review Board granted the present study an exemption from human subjects review (D. Paxton, Compliance Administrator, personal communication, July 27, 2006).

The ECB allows researchers to review variable names, original questionnaire item phrasing, sampling weights, value ranges, and response rates. The ECB also allows

researchers to select variable weights and to format them appropriately for the study. The principal investigator attended a week-long institute co-sponsored by the Association for Institutional Research (AIR), NCES, and the National Science Foundation. There she received instructions on how to prepare the ECB data for entry into SAS and then import them into a statistical program called AM. This software is available from AIR and has the advantage of dealing with the NCES complex sampling design appropriately (e.g., stratified or clustered data with weights that requires a Taylor series or balanced repeated replications to correctly estimate the variance).

### *Sample*

The ELS:2002 participants were described previously. The respondent pool from the entire dataset includes diversity in terms of gender, racial/ethnic origin, generation of immigration, socioeconomic status, and type of high school attended. The students were similar in terms of age. In the present study, race/ethnicity was used as a filtering variable, excluding all those except self-identified Latino respondents and a comparison group of White (non-Hispanic) respondents. The final sample utilized in the current study (after missing data procedures, described presently) was 4748 students, with the Latino portion making up approximately 13.5%. In the final data set there were 2218 males and 2530 females, 640 Latinos and 4108 White students. The vast majority of the students sampled were born in the United States ( $N=4515$ ). Some students ( $N=359$ ) spoke a language other than English as their first language, and 4389 were native speakers of English. In the parent generation, 2.6% had not completed high school, 14.5% had only a high school diploma or GED, and 9.7% had attended a two-year college but left without a degree. Most parents had

graduated with a two-year degree (10.6%), attended a four-year college but left without a degree (12.2%), completed a bachelor's degree (26.5%), or completed a graduate school program (23.7%). In terms of SES quartiles, 13% of the families were in the lowest quartile, 20% were in the second lowest quartile, 28% were in the third quartile, and 39% were in the highest quartile. Similarly, the majority of the respondents attended schools with low percentages of students enrolled in free and reduced lunch programs – 52.9% were in schools with 0-10% of students receiving such aid, and 17.9% were in schools where 31% or more of students received free and reduced lunches.

The public use data did not contain information regarding the national origin of those students identifying themselves as Latino, however, the restricted data did contain those details. For descriptive purposes only, a demographic overview of the Latino/Hispanic subgroup was provided by NCES personnel (J. Wirt, personal communication, 9/12/2006). In the 2004 ELS data collection cycle, 65% of those self-identifying as Latino or Hispanic stated they were of Mexican, Mexican American, or Chicano origin. Another four percent each were of Cuban origin and Dominican origin. Thirteen percent stated they were Puerto Rican, seven percent were from Central American countries, and eight percent were from South American countries.

## Data Analysis

### *Introduction*

In the present study, the outcome (or dependent) variable was the level of institution at which students in the sample intended to matriculate as of the spring of 2004. All students responded to a survey question asking if they planned to continue to higher

education in the future, and those who responded yes were then routed to an item asking them to select which level they were likely to attend. The outcome was thus drawn from a circumscribed group of students who did intend to go to college, and it was measured at a point where most participants in the survey would soon be graduating from high school. The second ELS follow-up (collected in 2006) will show where students actually matriculated, but those data were not available currently.

The predictors represented demographic, academic, and self-efficacy constructs. The analysis was a multiple logistic regression, due to the categorical nature of the outcome variable (Theilbar *et al.*, 2005). Logistic regression is a quantitative descriptive design that serves to model the probabilities that various predictor variables will have an influence on the outcome variable. Unlike linear regression, these relationships are not assumed to be linear, the dependent variable and the error term are not assumed to have a normal distribution, and homogeneity of variance is not assumed (Garson, n.d.). Another contrast between logistic regression and linear regression is the use of the maximum likelihood method to estimate the regression coefficients rather than ordinary least squares (Cizek & Fitzgerald, 1999).

Other important statistical assumptions included that error terms should be independent, samples should be large enough to support the number of variables being included in the analysis, and that there was only limited multicollinearity (or correlation) among the independent variables (Garson, n.d.). The sample dataset requested from NCES combined data from 2002 and 2004 surveys so that each respondent was represented as one observation with multiple variables. Thus, Garson's warning that "subjects cannot provide

multiple observations at different time points” (¶ 99) was not violated and the error terms were still assumed to be independent. Sample size and multicollinearity were addressed and more details will be provided, but these aspects were not seen as threats in the current research.

Interactions must be specifically entered into the equation if the research questions specify group comparisons. The most important limitation of this design (and all other regression designs) was the inability to assign cause and effect relationships. Researchers were also cautioned to examine data points and residuals for extreme outliers, as they can significantly shift a regression line and thus bias the results (Hosmer & Lemeshow, 1989). Data analysis was carried out with two software programs – SAS version 9.1.3 (copyright 2002-2003, SAS Institute, Inc.) and AM version 6.03 (copyright 2003, American Institutes for Research and Jon Cohen).

When the most influential predictor variables and interaction terms have been identified, the proposed model can be evaluated for significance, to see which variables contribute to the most accurate or statistically viable final model (Hosmer & Lemeshow, 1989). Logistic regression results have been converted through the use of the natural log, so the coefficients can be interpreted either as log odds, odds, or probabilities that the outcome will change with alterations in a given predictor variable (Garson, 2006; Pampel, 2000). In the current research, the main effects were presented in terms of probabilities evaluated at the minimum, maximum, and modal values of the significant predictor variables (to be discussed in more detail in chapter four). As a general strategy, the calculations “involve the partial derivatives for continuous variables and differences in predicted probabilities for

dummy variables computed at the mean probability for the sample. For more detail, using [...] predicted probability effects at a variety of points on the curve” (Pampel, 2000, p. 30). Interaction terms will be evaluated in two different ways (Ai & Norton, 2003; Jaccard, 2001)

A test such as the Wald statistic or the likelihood ratio can be used to evaluate the significance of individual variables to the outcome, or the overall fit of the model to the data (Garson, n.d.). The adjusted Wald statistic generated by the AM software package is an overall Wald test, which evaluates the fit of the variables in the logistic regression model compared to a model with only a constant term. Goodness-of-fit statistics such as the likelihood ratio show how effective the fitted model is in describing the research data. The researcher can then make decisions about dropping variables from the full model to achieve a more parsimonious fit.

Unlike linear regression, there is no widely accepted  $R^2$  statistic to measure the effect size in logistic regression. This is because “an  $R^2$  measure seeks to make a statement about the ‘percent of variance explained,’ but the variance of a dichotomous or categorical dependent variable depends on the frequency distribution of that variable” (Garson, n.d., ¶ 55). Instead, the investigator evaluated the percent of correct predictions of the outcome by the model, as compared to how the outcome is distributed in the observed data. More details on this statistic and other data checks (e.g., multicollinearity analysis) are presented in chapter four.

*Independent/Dependent Variables*

Variables were selected by consulting the literature to determine what factors may be relevant to the college choice process for Latino students, and also by reviewing what variables were present in the database. For example, although specific type of Latino background (e.g., Mexican, Cuban, Puerto Rican, or other Latino heritage) may be influential, this information could not be accessed in the public level dataset that was selected. However, academic self-efficacy beliefs, which are of focal interest in this study, were present in the database. Academic preparation was approximated in much the same way that high schools and colleges do, reviewing test scores and course work. Demographic items were selected to describe some aspects of the student's individual characteristics, family characteristics, home environment, school environment, and mindset towards higher education (e.g., reasons for selecting a college).

A chart of all variables used in this study, along with the range of values they could assume, is provided in Table 2 (pp. 116 - 123). Dummy coding was used to create a reference level and comparison levels for three of the categorical variables (the third and thirteenth demographic variables listed in Table 2, as well as the second task management variable). Ordinal variables (e.g., Likert scale items) were treated as continuous and did not need dummy coding. Interval variables (e.g., SES quartiles) were also treated as continuous. Thirty five variables (including dummy levels) were entered into the logistic regression analysis as predictors with the single outcome variable (intended level of college enrollment).

It is important that the sample size be large when the researcher is interested in entering many independent (or predictor) variables into the equation. As a rule of thumb, “the smaller of the classes of the dependent variable have at least 10 events per parameter in the model (Garson, n.d., ¶ 109). The observed values of the dependent variable were 1254 for the base level outcome (planning for two year college) and 3494 for the comparison level outcome (planning for four year college). In the present research, the sample size was 4748 and the Latino portion included 640 participants.

Nine demographic items were included in the logistic regression analysis, with subcategories of the variables adding up to fifteen separate entries in the equation. These are listed in Table 2 (pp. 116 - 123). For academic performance variables, three items were utilized. The investigator was mindful that highest math completed may be correlated with highest math offered at a high school, but without access to restricted data sets, that information cannot be obtained. Academic self-efficacy was reflected by nine belief statements (including educational expectations) and three task management items with subcategories, totaling 16 separate variables in the regression equation. The belief items were in the traditional format of self-efficacy ratings, where respondents chose how confident they were in performing specific skills. One example is, “When I try to learn something that is really hard, I can do it,” and the options include “almost always, often, sometimes, and almost never.” In Table 2, three of these items reflect general academic self-efficacy, and two focus on confidence for specific topics or tasks. The final four academic self-efficacy items measure expectations for future education. Two of

Table 2

Variable List for current research, derived from the NCES survey ELS:2002

Variable List	Variable Name	Code/Values	ELS variable abbreviation
Filter	Race/ethnicity	0 = White (non-Hispanic) 1 = Hispanic/Latino	F1RACE
Outcome	Which will you most likely attend? (spring 2004 survey)	0 = 2-yr college, voc/tech 1 = 4-yr college	F1S49
Demographic			
1	Country of birth	0 = student born in 50 states 1 = student not born in US	BYP23
2	English is student's native language?	0 = No 1 = Yes	F1STLANG
3	Plans to continue studies immediately after HS	0 = Yes 1 = No 2 = Don't know	F1S45
4	Sex	0 = male 1 = female	F1SEX
5	SES by quartiles (based on income, parents' occupation, and parents' education level)	1 = lowest quartile 2 = 2nd quartile 3 = 3 <sup>rd</sup> quartile 4 = highest quartile	F1SES1QU

Table 2, continued

Variable List	Variable Name	Code/Values	ELS variable abbreviation
6	% students with free/reduced program at high school	1 = 0-5 % 2 = 6-10 % 3 = 11-20 % 4 = 21-30% 5 = 31-50% 6 = 51-75% 7 = 76-100%	BY10FLP
7	Hours/week working in 2004	1 = not working 2 = 1-5 hours 3 = 6-10 hours 4 = 11-15 hrs 5 = 16-20 hrs 6 = 21-25 hrs 7 = 26-30 hrs 8 = 31-35 hrs 9 = 36-40 hrs 10 = over 40 hrs	F1S60

Table 2, continued

Variable List	Variable Name	Code/Values	ELS variable abbreviation
8-12	How important was this factor in choosing a college?	1 = not important	F1S52 (a-r)
	a. low expenses	2 = somewhat important	
	c. specific curriculum available	3 = very important	
	f. living at home while in college		
	k. academic reputation of college		
	l. easy admissions standards		
13	Type of HS program being taken by the student	0 = general 1 = college prep 2 = vocational	BYSCHPRG
Academic Performance	Highest math completed (by 2004 school year)	1 = no math or other math 2 = pre-algebra, general math 3 = algebra 1 4 = geometry	F1HIMATH
1			

Table 2, continued

Variable List	Variable Name	Code/Values	ELS variable abbreviation
	Highest math, continued	5 = algebra 2 6 = trigonometry, pre-calc, calculus	
2	ELS test quartile score (math and reading combined)	1 = lowest 2 = second quartile 3 = third quartile 4 = highest	BYTXCQU
3	Time on homework per week	1 = none 2 = less than 1 hour 3 = 1-3 hours 4 = 4-6 hours 5 = 7-9 hours 6 = 10-12 hours 7 = 13-15 hours 8 = 16-20 hours 9 = over 20 hours	F1S31

Table 2, continued

Variable List	Variable Name	Code/Values	ELS variable abbreviation
<b>Academic</b>			
Self-Efficacy	When I try to learn something really hard,	1 = almost never	BYS89(e)
1	I can do it.	2 = sometimes 3 = often 4 = almost always	
2	I can learn something well if I want	(same Likert scale)	BYS89(t)
3	When studying, I keep working even if material is difficult	(same Likert scale)	BYS89(o)
4	I'm confident I can do an excellent job on my English assignment	(same Likert scale)	BYS89(i)
5	I'm certain I can understand the most difficult material presented in math texts.	(same Likert scale)	BYS89(b)
6	Teacher expectations (2002)	1 = Less than HS grad 2 = HS grad or GED	BYTE20

Table 2, continued

Variable List	Variable Name	Code/Values	ELS variable abbreviation
	Teacher expectations, continued	3 = Attend/complete 2 year program 4 = Attend but not complete 4 yr 5 = Complete 4 yr degree 6 =Master's degree 7 =Doctoral, other adv degrees	
7	Student expectations (2002)	1 = Less than HS grad 2 = HS grad or GED 3 = Attend/complete 2 yr 4 = Attend but not complete 4 yr 5 = Complete 4 yr degree 6 =Master's 7 =Doctoral, other adv degrees	BYSTEXP

Table 2, continued

Variable List	Variable Name	Code/Values	ELS variable abbreviation
8	Student expectations (2004)	1 = Less than HS grad  2 = GED  3 = HS grad  4 = Attend/complete 2 yr  5 = Attend but not complete  4 yr  6 = Complete 4 yr degree  7 =Master's  8 =Doctoral, other adv  degrees	F1STEXP
9	Parent aspirations for student	1 = Less than HS grad  2 = HS grad or GED  3 = Attend/complete 2 yr  4 = Attend but not complete  4 yr  5 =Complete 4 yr degree  6 =Master's  7 =Doctoral, other adv  degree	BYP79

Table 2, continued

Variable List	Variable Name	Code/Values	ELS variable abbreviation
Task			
Management		1 = never	BYS86(g)
1	How often discuss going to college with parents?	2 = sometimes 3 = often	
2	Did you take or plan to take SAT/ACT?	0 =Haven't thought about it 1 =No, won't take it 2 =Yes, plan to or have taken it	F1S21(c)
3-6	Went to these sources for info on college entrance: a. guidance counselor b. teacher h. college website/publication i. college representatives	0 = No 1 = Yes	BYS59(a-k)

Note: BY indicates base year (2002) survey items and F1 indicates first follow-up year (2004)

these belief items came from sources other than the student, but addressed the student's chances of moving forward in higher education (e.g., teacher expectations and parental aspirations). The task management items were included as behavioral evidence of a student's belief in his or her academic self-efficacy. For example, if a student believed he or she could complete a university degree, it would be necessary to take a standardized entrance exam and seek information about available college options.

These task management items are not incongruent with self-efficacy as conceived of by Bandura. Bandura, Barbaranelli, Caprara, and Pastorelli (1996) identified three higher order themes in the unpublished "Multidimensional Scales of Perceived Self-Efficacy – Social Efficacy, Academic Efficacy, and Self-Regulatory Efficacy." Task management or self-regulation is consistent with beliefs being translated into action. Bandura wrote, "It is partly on the basis of efficacy beliefs that people choose which goal challenges to undertake, how much effort to invest and how long to persevere in the face of difficulties" (1999, p. 49).

### *Missing Data*

A preliminary inspection of the dataset containing the requested variables showed a high percentage (over 15%) of missing data for some items. It was important to address missing data before proceeding with analysis, as results could otherwise be distorted. Data that are missing could differ along some key dimensions as compared to data that are present, and thus dropping those cases could impact the findings (Allison, 2002). Some of the missing information was coded by NCES as item or survey component "legitimate skip," which meant that students had been directed by survey instructions to skip the item because

it did not relate to them. Such cases were logically dismissed from the analysis. There were also categories of missing data due to the participants refusing to answer, only participating in a partial interview, stating that they did not know, giving a response that was out of the range of the item, or giving multiple responses where only one was expected. Some missing data was due to the lapse of time and the presence or absence of a particular respondent in the base year or follow-up survey. However, other items were simply coded as “missing,” which meant that a response was expected but was not received. The investigator chose to dismiss “don’t know” and out of range missing data but used statistical techniques to reconstruct missing data due to item refusal, partial interviews, multiple responses, some of the items with only one collection year present, and the truly missing data.

Some assumptions must be made about the missing data with respect to the pattern or distribution of the missing values (Allison, 2002; Garson, n.d.). Values that are missing completely at random (MCAR) have no relationship between missingness and characteristics of the given respondent. This is a high standard to meet and may be difficult to verify. The less rigorous assumption is missing at random (MAR), in which the pattern of missingness could depend on the values of some (but not all) of the other variables. Most research using missing data procedures relies on this assumption.

In particular, the academic self-efficacy items in the ELS survey had high percentages of missing responses. The user’s manual commented that these items were located at the end of the survey, and due to the timed nature of administration, some students were not able to finish all items (Ingels et al., 2004). Even among the academic self-efficacy items, the percentage of missing responses rose the closer the item was to the end of the

survey. However, due to the possibility that survey non-completion was not a random event, the missing data needed to be reconstructed. For example, if all students who spoke English as a second language were slower in completing the survey, or if many students with low academic profiles had spent more time on the questionnaire, then eliminating those respondents would cause bias in the remaining data.

After researching many methods for dealing with missing data, the investigator determined that a multiple imputation approach would be appropriate (Allison, 2002). This is a technique using statistical regression to predict likely values for those that are absent, based on the other data that are present. Rather than randomly simulating the missing values, multiple imputation “draws a random sample of the missing values from its distribution” (SAS Institute, Inc., 2002-2004). As described in a recent journal article, multiple imputation (MI) is currently seen as one of the best methods for handling missing data in studies with multivariate statistics (Allison, 2000). The steps that Allison outlines are to (a) impute missing values using a regression model that includes random variation, (b) repeat the process five times, producing five similar data sets, (c) repeat the proposed data analysis on each set using standard procedures, (d) average the parameter estimates across the five samples to produce one estimate, and (e) calculate the standard errors. Multiple imputation was accomplished with a combination of two procedures in SAS (Proc MI and Proc MI Analyze). The researcher entered “donor” variables that had small percentages of missing values and those served as independent variables for generating the regression equation and the imputed data values. MI has the benefit of allowing an appropriate amount of random error to be generated by the repetitions, therefore permitting the researcher to

understand and quantify the additional standard error of the imputed values. Multiple imputation may be used when data are missing at random (MAR), which is the assumption that was utilized in the present study.

Data must have a monotone missing pattern in order to utilize the MI procedure in SAS. The data in the current study had an arbitrary missing pattern, so this was corrected first. “For data sets with arbitrary missing patterns, a Markov Chain Monte Carlo (MCMC) method (Schafer 1997) that assumes multivariate normality is used to impute [...] just enough missing values to make the imputed data sets have monotone missing patterns” (SAS Institute, Inc, 2002-2004). Initially, some variables had large numbers of missing records (over 10%). Variables with smaller numbers of missing observations were entered first in the MCMC procedure, and some of those were fully imputed by the MCMC step. This provided some complete “donor variables” from which to impute the variables with higher percentages of missing values. After implementing the MCMC step, PROC MI in SAS imputed the remaining missing values to make a complete data set. Following those steps, a greater portion of the participant records in the survey could be entered into the logistic regression for analysis. Appendix A displays the changes in the data due to MI implementation, which should have affected the number of missing observations but not have changed the means to a great extent. After the multiple imputation of each of the five data sets, each had zero missing observations. After MI, the total number of observations available for analysis was 4748 out of almost 11,000 initial participants.

*Planned Analysis*

The research questions guiding this study were stated in chapter one. Several steps were taken in preparation to respond to each hypothesis; these common procedures were as follows. The logistic regression analysis began with selecting predictor and outcome variables and design variables such as strata, cluster, and weights from ELS:2002 through the public level access electronic codebook. The data were prepared for analysis using SAS procedures (including multiple imputation to address missing values), and the resultant five data sets were entered into AM for logistic regression output. Regression coefficients and standard errors for each data set were returned to SAS for unification with PROC MI Analyze. Therefore, data presented in chapter four were output from SAS, but were presented with Wald statistics that were generated for each of the five datasets during the logistic regression in AM. The adjusted Wald evaluates the overall fit of the variables in the logistic regression equation compared to a model with just the constant. Tables that provide information relevant to each hypothesis show logistic regression coefficients, standard errors, and 95% confidence intervals, and some also display the predicted probabilities that were calculated from the relevant coefficient.

Unlike standard linear regressions, the coefficients in logistic regression do not have an immediately apparent interpretation. One way to depict the mathematical model of logistic regression is  $\ln(o) = a + b_1(X_1) + b_2(X_2) + \dots + b_n(X_n)$ . The expression to the right of the equals sign is called the logit. This presents the outcome in terms of log odds [ $\ln(o)$ ], but the effects ( $b_1$ - $b_n$ ) of the predictor variables ( $X_1$ - $X_n$ ) on the outcome can also be discussed in terms of probabilities or regular odds (Pampel, 2000). Given that odds are

equal to probability divided by one minus the probability [ $o=p/(1-p)$ ], one can substitute probabilities for odds in the model. Taking the antilog (or exponent) of both sides of the logistic regression equation and rearranging terms, it is possible to construct a mathematical expression that translates the outcome of the logistic regression model in terms of probabilities. This is the expression that was used to evaluate and discuss the findings in the present study.

$$p = \frac{e^{a+b_1X_1+b_2X_2+\dots+b_nX_n}}{1 + e^{a+b_1X_1+b_2X_2+\dots+b_nX_n}}$$

As Pampel (2000) indicates in his text on logistic regression, “the relationship between the independent variables and the probabilities are nonlinear and nonadditive, [so] they cannot be fully represented by a single coefficient. The effect on the probabilities has to be identified at a particular value” (p. 23). In the current investigation, the modal values of the independent variables were used so that the predicted probabilities reflected (as much as possible) the typical student in the participant pool. The possibility of separate modes for White students and Latino students was explored, but there were only three variables on which the modes differed. The final decision was to proceed with the analysis using population modal values, as the separate modes made very little difference in the outcomes.

The hypotheses for this study required both main effects and interaction terms, as they sought to compare the influential predictors in two different racial/ethnic groups. The main effects demonstrated which predictors were influential for all students in the sample, regardless of race/ethnicity or any other demographic influence. This formed a baseline from which to examine the interaction terms that were used to show the differences in how

Latino students and White students were influenced in planning to attend four year or two year colleges.

The research literature reflected two different perspectives on the interpretation of interaction terms in logistic regressions. The most recent citation came from Ai and Norton (2003), who began with the observation that logistic regressions are not linear, and therefore cannot be summarized by a single regression coefficient of an interaction term. When plotted on a graph, the effect of the interaction between two independent variables takes a curving shape, and therefore the magnitude, sign (positive or negative) and significance can all vary depending on which observation is selected for inspection. Their recommendation is to calculate a cross derivative to estimate the interaction effect, which takes all other covariates into account rather than using the coefficient of the interaction term alone.

A traditional interpretation was offered by Jaccard (2001), who defined interactions as the relationship between a focal independent variable and a moderator independent variable. He then stated that the logistic regression coefficients for single predictor variables and product terms could be interpreted after transforming them with the antilog. As shown previously, the antilog of the coefficient can be expressed as odds or probabilities. A graph of the results would display the predicted probability of the outcome along the y axis and the range of the focal independent variable along the x axis with several data lines in the chart area depicting each category of the moderator variable. This understanding of logistic regression interaction terms is more prevalent in the literature, and thus this approach was used for a first pass through the data. The Ai and Norton (2003) approach was used in a subsequent section as a comparison method.

Once the logistic regression program was executed, several initial data checks occurred. Results of these preliminary analyses are provided in chapter four. Details regarding the research questions, specific hypotheses, and planned statistical analysis are now provided.

1. Which factors or variables contribute significantly to the intention to either enroll in a four-year college or a two-year college for both Latino students and a comparison group of White students?

**Hypothesis 1:** The effect of the predictor variables in the model on the probability of a student going to a four year versus two year college is not significantly different from zero. This hypothesis (stated in the null form) concerns the main effects of the variables on the outcome for the entire group of participants.

**Analysis 1:** Variables (as listed in Table 2, pp. 116-123) were entered simultaneously into a logistic regression equation with the outcome variable. Analytical comparisons were made controlling for a particular variable (e.g., holding SES constant) because all of the variables were present in the equation and their influences accounted for. Regression coefficients (or parameter estimates), standard errors, and *p*-values to confirm significance were displayed as output.

2. How do demographic factors, academic preparation factors, and academic self-efficacy/task management factors influence the intended college enrollment level of Latinos as compared to the reference group of White students?

**Hypothesis 2:** There are no significant differences in the outcome (intended level of college choice) for Latinos as compared to Whites with respect to any of the demographic, academic preparation, or academic self-efficacy/task management variables. This hypothesis (stated in the null form) concerns the interaction of race/ethnicity with other predictors.

**Analysis 2:** The main effects equation was modified by adding each of the relevant variables (demographic, academic preparation, and academic self-efficacy/task management, as listed in Table 2 on pages 116 - 123) as they interacted with race/ethnicity. All interaction terms were entered simultaneously into the logistic regression equation along with the predictors from the first hypothesis and the outcome. The most influential predictors/interactions were noted and examined further.

3. Are there interactions among SES (a demographic factor) and test scores (an academic preparation factor) or student expectations (an academic self-efficacy factor)?

**Hypothesis 3:** There are no significant interactions among the variables selected. This hypothesis (stated in the null form) concerns the influence of SES as it interacts with test scores or student expectations for all participants.

**Analysis 3:** Based partly on suggestions from the literature and partly on results from earlier analyses, SES was paired with test scores and then with student expectations and the terms were entered into a regression equation to see if their interactions were significant.

## Chapter Four

### FINDINGS

#### Preliminary Data Checks

Findings resulting from the preliminary data checks and multiple logistic regression analyses are presented in this chapter. Regression findings are presented in terms of predicted probability that the outcome is affected by the variable of interest. The baseline outcome (planning to attend a two year college) is also referred to as the given outcome category, and the comparison group (planning to attend a four year college) may also be described as the reference outcome category. Similarly, White students are the baseline group of participants and Latino students are the comparison.

The observed counts of the outcome in the ELS dataset selected for the current research were analyzed to verify that there was indeed a difference between Latinos and Whites choosing to attend two year college and four year college, and that the difference was not due solely to chance. After dealing with missing data, a chi-square test was done with the weighted data (which proportionally increased the sample size to 5,419,752). It demonstrated that there was a significant difference between the groups ( $\chi^2 = 112117$ ,  $df = 1$ ,  $p < .0001$ ). In the current study, 43% of Latinos who were headed for post-secondary education said they were likely to enroll in a two-year college and 57% reported the intention to enroll at a four year college. White students also reported their intentions in the current study in a manner that favored four year colleges (76% were observed to make that choice as opposed to 24% planning to go to two year colleges).

One of the statistical assumptions underlying a logistic regression analysis is that there is limited or no correlation between the predictor variables (Hosmer & Lemeshow, 1989). Therefore, an analysis of multicollinearity was performed using SAS. The output (provided in Appendix B) provided both tolerance levels and variance inflation factors, which indicated areas of potential multicollinearity for the researcher to review (Allison, 1999). In the current study, there were two areas of potential concern (defined as a tolerance level is below .40 or a variance inflation factor above 10). Tolerance levels were .367 for parents' highest level of education and .343 for the SES quartile composite variable. This overlap was foreseeable, as the SES composite included family income, parents' occupation, and parents' educational level. To eliminate the multicollinearity, the parental education variable was dropped from the logistic regression analysis. Two other variables with borderline tolerance levels were English as the student's native language (TOL = .489) and English as the parents' native language (TOL = .510). Because the student was the focus of the present research, the parent language variable was dropped from the regression. All other variables had tolerance levels above 0.52. Other than the four variables previously mentioned, the highest variance inflation factor was 1.92. No further problems were observed after dropping those two predictors.

Although linear regression research designs typically report an  $R^2$  statistic that describes the amount of variation in the outcome that has been explained by the predictors, such statistics are not available for the binary outcome in a logistic regression (Hagle & Mitchell, 1992). One way to reflect similar information is a goodness of fit statistic, such as the percent correctly predicted or PCP (Wooldridge, 2003). This statistic compares the

number of times the predictors in the logistic regression model would generate a given outcome (two-year or four-year college) versus how many times those outcomes actually occurred in the dataset. As this statistic is comparing the probabilities of two discrete categories that are contained in the outcome, any mid-range values must be rounded to fit into one of those groups. The calculations were performed using the mean value of the outcome variable (0.736) as the cut-off point at which to evaluate percent correctly predicted. Any predicted probability which was below the cut-off point was rounded down to zero (e.g., two year college planning) and any predicted probability which was above the cut-off point was rounded up to one (e.g., four year college planning).

Table 3 reports standardized proportions rather than raw data for the PCP statistic. This is because all five imputed datasets and the weights associated with the ELS data were included in the calculations, and the resultant counts were very large and hard to contextualize. As demonstrated in the table, 26% of the observed outcomes in the ELS dataset were pointing toward two year college, and the model predicted that outcome 21% of the time. That ratio generated an 81% rate or percent correctly predicted. Five percent of the time, the model incorrectly predicted the four year college outcome when the observed data showed a two year college outcome. Overall, the model had a PCP of 83%.

When the percent correctly predicted (PCP) is compared with the percent in the modal category (PMC) of the outcome variable, it is possible to generate a goodness of fit statistic known as percent reduction in error or PRE (Hagle & Mitchell, 1992). PRE is mathematically defined as  $[(PCP-PMC)/(100-PMC)] \times 100$ . A model that makes no improvement in prediction over the selected baseline (PMC) would have a PRE of 0, and a

Table 3

*Standardized proportions of percent correctly predicted in main logistic regression model*

*(N scaled to 100)*

		Observed Outcome		
		Two year college	Four year college	Overall Percentage
Predicted Outcome	Two year college	21/100	12/100	
	Four year college	5/100	62/100	
	Percentage Correct	81%	84%	83%

Note: cut-off value is 73.6%

model that predicts with complete accuracy would have a PRE of 100. A negative PRE value is theoretically possible as well, indicating that the model has a lower prediction rate than the PMC. The PRE for the overall model was 35.6% in the current study, using the mean of the outcome variable (73.6%) as the selected baseline or PMC value.

Some scholars would argue that the classification table presented in Table 3 is not an accurate representation because it transformed a range of predicted probabilities into two categories, rounding up to one or down to zero. As Garson (n.d.) mentions, “the classification table does not reveal how close to 1.0 the correct predictions were nor how close to 0.0 the errors were” (¶ 63). For example, a dataset with the majority of predicted probabilities clustered around the midpoints could not be described as having a model with good fit, yet that trend would be obscured by using a classification table. Garson recommends a histogram of the predicted probabilities as a way to visualize the distribution between zero and one, which would ideally take a U-shape clustered around the endpoints.

A histogram for the data in the current study is presented in Figure 2. The baseline outcomes (planning to attend two year college, shown in red) should not be numerous in the right-hand side of the figure, just as the comparison outcomes (planning to attend four year college, shown in green) should not be numerous in the left-hand side. Those represent classification errors by the model – false positives to the left, false negatives to the right (Garson, n.d.). Conceptually, this is similar to residual points around a linear regression line – they are data that do not fit the regression model.

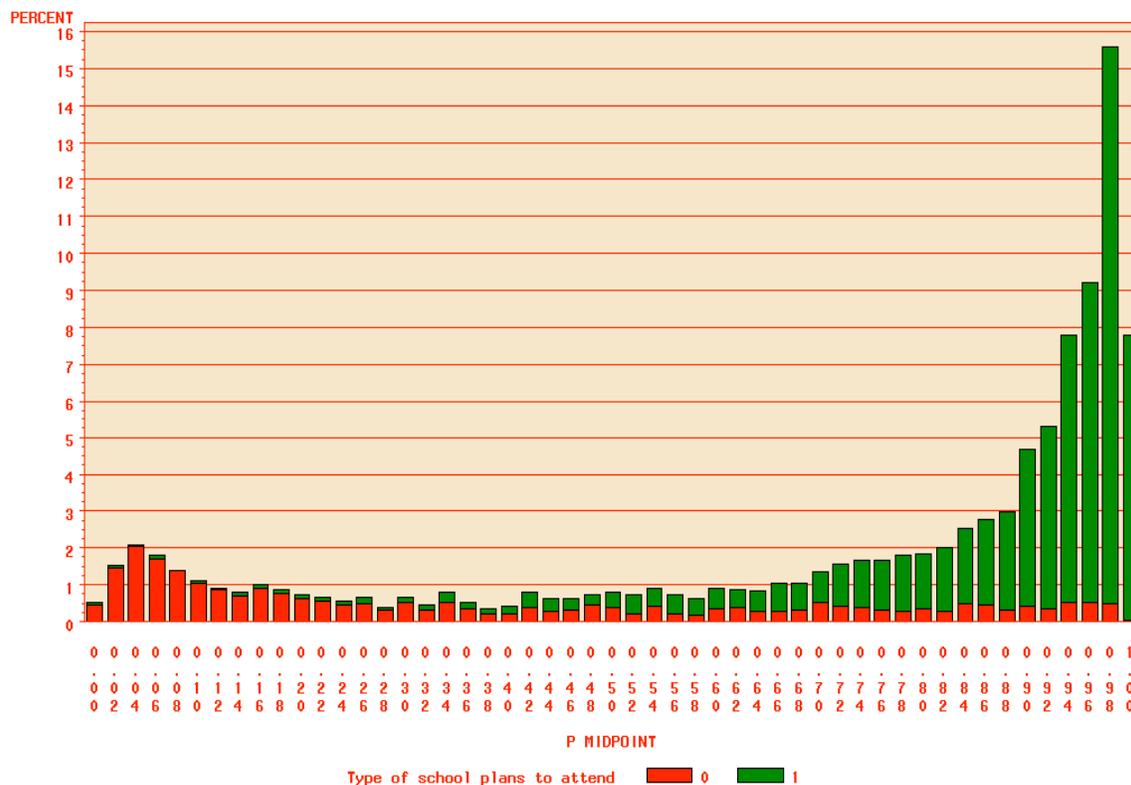


Figure 2. Histogram of percent of respondents observed in each outcome category by predicted probability of outcome (0 = planning for two year college, 1 = planning for four year college). Baseline outcome is shown in red and comparison outcome is shown in green.

### Hypothesis One – Main Effects

The first hypothesis stated that the predictor variables in the model have no significant effect on the intent of a student going to a two year (baseline outcome) versus four year (comparison outcome) college. This hypothesis concerned the main effect of each variable on the entire group of participants, while the other predictors were held constant. The main effects from the logistic regression model that included thirty-five predictor variables and the constant are presented in Table 4. Findings can be understood as estimating the effect of the predictor variable on the probability of the comparison outcome occurring. Those coefficients or estimates that reached the level of significance ( $p < .05$ ) are presented first, and then those whose p-statistic was larger than 0.05. The standard error of the coefficient is presented in the second column, followed by the 95% confidence limits. Significant results are presented with further details in a subsequent section, illustrating how the predictor would affect a typical student (modal values) in the population. For a table of modal values of the predictors, see Appendix C.

Of the significant predictors, there was representation from each category - demographic factors (four), academic preparation factors (two), and academic self-efficacy or task management factors (five). Although the constant was statistically significant, it did not provide any useful or interpretable information. It was included because analysis of how well the model predicts the outcome compared the researcher's model with a null model containing the constant and no other predictors (Garson, n.d.). Adjusted Wald statistics computed by AM for each of the five logistic regression models are shown below Table 4. According to the F distribution, all of the models were significantly different from the null

Table 4

*Summary of Main Logistic Regression Analysis: Predictors of Latino and White Students' Intentions to Attend Four Year Versus Two Year College (N = 4748)*

Variable	Estimate	Standard Error	95% Confidence Limits
Constant	-6.1268**	0.7749	(-7.646, -4.607)
Percent free and reduced lunch at HS	-0.0748*	0.0353	(-0.144, -0.006)
Low expenses important choice factor	-0.305**	0.0953	(-0.492, -0.118)
Living at home important choice factor	-0.6002**	0.0803	(-0.758, -0.443)
Academic reputation important factor	0.381**	0.0955	(0.194, 0.568)
Highest math taken in HS by 2004	0.215**	0.0826	(0.053, 0.377)
ELS math/reading test quartile score	0.1442*	0.0685	(0.010, 0.279)
I keep studying even when material is difficult	0.275**	0.0986	(0.081, 0.469)
Teacher expectations for student	0.175**	0.0616	(0.054, 0.296)
Student expectations in 2004	1.051**	0.0819	(0.890, 1.211)
No to taking SAT/ACT	-1.687**	0.2999	(-2.275, -1.099)
College representative as source of info	-0.4054*	0.1832	(-0.765, -0.046)
Race/ethnicity	-0.0846	0.2358	(-0.547, 0.378)
Country of birth	0.1068	0.2978	(-0.477, 0.691)
English is student's native language	0.2002	0.2590	(-0.308, 0.708)
Not continuing education immediately	-0.0462	0.2008	(-0.440, 0.348)

Table 4, continued

Variable	Estimate	Standard Error	95% Confidence Limits
Not sure about continuing education	-0.6266 <sup>^</sup>	0.3257	(-1.265, 0.012)
Sex	-0.033	0.1196	(-0.267, 0.201)
SES quartile (composite)	-0.0068	0.0600	(-0.124, 0.111)
Hours/week working at a job	-0.0516 <sup>^</sup>	0.0264	(-0.103, 0.0001)
University curriculum important choice factor	0.0658	0.0967	(-0.124, 0.255)
Easy admissions important choice factor	-0.2032 <sup>^</sup>	0.1070	(-0.413, 0.007)
College prep HS curriculum	0.1544	0.1271	(-0.095, 0.404)
Vocational HS curriculum	1.0228	0.6804	(-0.311, 2.357)
Hours/week spent on homework	0.0056	0.0428	(-0.078, 0.090)
When I try to learn something hard, I can do it	0.1078	0.1063	(-0.109, 0.324)
I can learn something well if I want	-0.0112	0.1005	(-0.214, 0.191)
I can do a good job with English homework	-0.1662 <sup>^</sup>	0.0878	(-0.339, 0.007)
I can read a difficult math text	-0.0964	0.0864	(-0.267, 0.074)
Student expectations in 2002	-0.0752	0.0665	(-0.206, 0.055)
Parent aspirations for student	0.0172	0.0571	(-0.095, 0.129)

Table 4, continued

Variable	Estimate	Standard Error	95% Confidence Limits
Discuss plans for college with parents	-0.0108	0.1002	(-0.208, 0.186)
Yes to taking SAT/ACT	-1.2974	0.7112	(-2.692, 0.097)
Guidance counselor as source of info	0.1236	0.1319	(-0.135, 0.382)
Teacher as source of info	-0.0394	0.1201	(-0.275, 0.196)
College website as source of info	0.1234	0.1367	(-0.145, 0.392)

Note: \* $p < .05$ , \*\* $p < .01$ , ^ =  $.05 < p < .06$ , Walds  $F(35, 336)$  from 24.62 to 26.08, all  $p(F > f) = 0$

model ( $p(F>f)=0$ ). Each significant predictor was discussed in a subsequent section. Non-significant predictors also add perspective.

The significant main effects variables are presented in the following paragraphs along with a table of how they affect the predicted probability of the students being in the comparison outcome group. When presenting logistic regression results, Pampel (2000) recommends “a researcher might compute a predicted probability for a range of values on the independent variables and present the marginal effects for the extremes as well as the middle of the sample” (p. 25). For those predictors which reached statistical significance, the predicted probabilities of the outcome were evaluated at three points in the range (minimum, maximum and mode) while holding the other variables constant to see if those points on the logistic curve were similar or different (see Table 5). Of note, the predicted probability when any significant predictor takes its modal value was always 80.73%. This is because all other predictors were being held at their modal values as well, so 80.73% reflects the predicted probability of the outcome for the typical student. This is different from the mean value of the outcome variable (73.6%) because that is a count - the average observed outcome in the dataset without any statistical manipulation.

#### *Demographics: Students Receiving Free and Reduced Lunch Program at High School*

In the ELS survey, the schools reported the percentage of their student populations that were receiving the free and reduced lunch program (0-100%). The responses were grouped by NCES into seven categories (see Table 2 in chapter three). For example, the first level of response was equivalent to zero to five percent receiving aid, and the final level of response was equivalent to 76 to 100 percent receiving aid. The direction of the logistic regression

estimate was negative, indicating that for every step up in percent of students receiving free and reduced lunches, the probability of a student from that school planning to attend a four year college was decreased (holding all other variables constant). As shown in Table 5, the predicted probability did not stay the same across the entire range of the predictor. The full effect of the variable can be seen by subtracting the predicted probability at the minimum value from the predicted probability at the maximum value. This was a 7.95% decrease in probability in the outcome with all other variables held constant. In comparison with the other demographic variables that reached statistical significance, this was not the most important.

*Demographics: Factors Deemed Important in College Selection*

The ELS survey asked students to review several factors which could influence their choice of a college and indicate which were not important, which were somewhat important, and which were very important to them personally. Five of these factors were entered in the logistic regression, and three reached the level of significance. The full effect for those students who indicated that low expenses were an important factor in choosing a college was a 9.5% reduction in the probability of the reference outcome (holding all other variables constant). Similarly, for students who selected living at home as an important factor in college selection, the probability of planning to attend a four year college was reduced by 24.96%. The probability of the reference outcome was improved for students who found the academic reputation of their college to be an important factor in choosing (+14.57%). The predicted probabilities for each of these variables are in Tables 5.

Table 5

*Predicted probability of the reference outcome with varying values of significant predictor, calculated at the minimum, mode, and maximum*

Variable Name	Variable Value	Logit	Predicted Probability
Free/reduced lunch	Maximum = 7	0.9836	72.78%
	Minimum* = 1	1.4324	80.73%
Low expenses important	Maximum = 3	1.1274	75.54%
	Minimum = 1	1.7374	85.04%
	Mode = 2	1.4324	80.73%
Living at home important	Maximum = 3	0.232	55.77%
	Minimum* = 1	1.4324	80.73%
School's academic reputation important	Maximum* = 3	1.4324	80.73%
	Minimum = 1	0.6704	66.16%
Highest math completed	Maximum* = 6	1.4324	80.73%
	Minimum = 1	0.3574	58.84%
ELS test score quartile	Maximum* = 4	1.4324	80.73%
	Minimum = 1	0.9998	73.10%
Self-efficacy for studying difficult material	Maximum = 4	1.7074	84.65%
	Minimum = 1	0.8824	70.73%
	Mode = 3	1.4324	80.73%

Table 5, continued

Variable Name	Variable Value	Logit	Predicted Probability
Teacher's expectations (2002)	Maximum = 7	1.7824	85.60%
	Minimum = 1	0.7324	67.53%
	Mode = 5	1.4324	80.73%
Student's expectations (2004)	Maximum = 8	3.5344	97.17%
	Minimum = 1	-3.8226	2.14%
	Mode = 6	1.4324	80.73%
Not taking the SAT/ACT	Maximum = 1	-0.2546	43.67%
	Minimum* = 0	1.4324	80.73%
Seeking info from college rep	Maximum = 1	1.027	73.63%
	Minimum* = 0	1.4324	80.73%

Note: \*Mode

*Academics: High School Math Level*

The ELS survey included six possible responses for the highest level of math completed by the student in the 2004 academic year, which was the senior year for most participants. The baseline response was no math or a math other than the options listed, and the other responses ranged from pre-algebra through geometry to calculus (see Table 2 in chapter three). Comparing students completing the highest levels of math (trigonometry, pre-calculus, or calculus) and the lowest levels of math, there was a 21.89% increase in the probability of the reference outcome (holding other variables constant). This was the most influential of the academic indicators. Table 5 shows the predicted probabilities associated with the maximum, minimum, and mode for highest math level.

*Academics: Quartile Scores on Math and Reading Tests*

One score represents the combined results of the ELS math and reading abilities tests, with the first quartile as the low end of the scale and the fourth quartile as the highest. The probability of planning to attend a four year college was 7.63% higher when comparing the lowest to the highest test quartiles, with all other variables held constant. The predicted probabilities are listed in Table 5. Thus, although significant, this effect was of a lower magnitude than the high school math effect.

*Self-efficacy: "I Keep Studying Even When the Material is Difficult"*

Students rated themselves on a Likert scale that ranged from one (almost never) to four (almost always) with respect to academic self-efficacy beliefs. While other academic self-efficacy items regarding expectations did reach significance, this was the only statement about the students' skills and actions that significantly influenced the probability of the

reference outcome. From the lowest to the highest step on the Likert scale, the probability that the student would plan to attend a four year college went up by 13.92% (holding other variables constant). Table 5 displays the predicted probabilities.

*Self-efficacy: Teacher Expectations for Students' Future Education*

This variable was collected from English teachers during 2002, the base year of the survey. They were asked to provide input on students with whom they were familiar. With a seven point scale ranging from less than a high school diploma to doctoral or other advanced degrees, the difference between highest and lowest teacher expectations translated to a 18.07% higher probability for students of the reference outcome. As before, all other variables were held constant. The predicted probabilities are presented in Table 5.

*Self-efficacy: Students' Expectations During 2004 School Year*

This survey item was phrased as “how far in school do you think you will get” in the ELS first follow-up (administered during the 2004 year). Thus, even students who planned to begin in a two-year college (as suggested in the outcome variable) may also have expected to transfer and obtain higher degrees in the future. There were eight response categories, ranging from less than a high school diploma through attending and/or completing a two-year degree, a four-year degree, or a graduate degree. That is to say, the difference between those who expected they would get less than a high school diploma and those who expected to earn a doctoral degree someday was a 95.03% increase in the predicted probability of also planning to begin their studies in a four year college (see Table 5). This was the academic self-efficacy variable with the largest magnitude of effect.

*Task Management: Standardized Entrance Tests*

The probability of planning to enter a four-year college was 37.06% lower for those who said they had not taken the SAT or ACT exams, or who were not planning to do so, as compared to the group of students who hadn't thought about taking them by the 2004 survey date. All other variables were held constant. The predicted probabilities are displayed in Table 5. On a related note, there was no significant difference between those who had not yet thought about taking the standardized tests, and those who stated that they were going to take the tests or already had done so (the other dummy category of this predictor).

*Task Management: Sources for Information on College Entrance*

The ELS survey asked students during the base year (2002) to mark all sources from which they had sought information on college entrance. The researcher selected four sources to investigate for this project, and only one was significant. The probability of planning to attend four-year college was 7.1% lower for students who say they went to college representatives for entrance information in 2002 (as shown in Table 5). In addition to being small in magnitude, this finding had limits to its interpretation, which will be discussed in chapter five.

*Non-Significant Results*

In light of the themes that emerged in the literature review, it was interesting to note which variables were not significant predictors of the reference outcome in the main logistic regression model. Those included hotly debated topics such as race/ethnicity, country of birth (which can be linked to immigration status), English as a first or second language, sex, SES quartile, hours per school week working at a job, type of high school curriculum, hours

per week spent on homework, and parent aspirations for the students. Many of the academic self-efficacy belief items also did not meet the criterion of statistical significance.

The standard errors of the regression estimates were part of the calculation of the t-statistics and 95% confidence intervals, so some of the non-significant results may reflect a larger error term. In general, some of the reasons for college choice which were attributed to Latinos in every day discourse (e.g., immigration status, English as a second language, propensity to work many hours or be in a low SES category) have not been proven to influence any member of this participant group, whether Latino or White.

#### Hypotheses Two and Three – Interaction Terms

The remaining hypotheses relied on interaction terms. The second hypothesis concerned the interaction of race/ethnicity with the demographic, academic preparation, and academic self-efficacy/task management variables. The third hypothesis investigated interactions of SES with one academic preparation and one academic self-efficacy variable. The comparison was between choosing two year or four year college, as all participants were planning to pursue some kind of post-secondary education.

#### *Traditional Interpretation of Interactions*

Twenty-five interaction terms were created, based on suggestions from the literature. Twenty-three of the terms took the form of “race/ethnicity times predictor,” and the final two examined SES interacting with test quartiles or with student aspirations. The importance to the model of each of the 25 interaction terms was evaluated with a likelihood ratio test, which compared the log likelihood value from the main logistic regression model and the log likelihood value from a model that added one interaction term to the main effects model

(Choudhary, 2006). Log likelihood was automatically calculated by AM as part of the logistic regression output. Mathematically, it is the log of the “probability that the observed values of the dependent may be predicted by the observed values of the independents. Log likelihood is the basis for test of a logistic model” (Garson, n.d., ¶13). Based on the ratios of individual likelihood values, four interaction terms were not significantly contributing to the model and were discarded. The remaining 21 interactions were included in a final logistic regression model (processed by both AM and SAS, as described previously). These interaction terms and their regression coefficients are listed in Table 6. As discussed in chapter three, interaction terms in the logistic regression model were evaluated for statistical significance in this step by the  $p$ -value associated with the regression estimate (Jaccard, 2001).

During the log likelihood analysis, it was noted that there were four interaction terms with statistically significant  $p$ -values when the logistic regression model contained all main effects variables plus one interaction. Those interactions were race/ethnicity with (a) SES, (b) test score quartile, (c) teacher expectations for the student, and (d) student expectations in 2004 for higher educational progress. Of note, the modes for SES and test quartile were different for Latino and White students in the descriptive data, so it was established that the subgroups were not alike along those dimensions. However, when the 21 interactions that passed the likelihood ratio test were entered together into the logistic regression model, only one remained statistically significant (race/ethnicity times student expectations). As a test, the researcher entered the four previously significant interactions simultaneously into a logistic regression model with the main effects.

Table 6

*Summary of Logistic Regression with Race/Ethnicity (R/E) Interaction Terms (N = 4748)*

Interaction Term	Estimate	Standard Error	95% Confidence Limits
R/E x no plan to continue immediately	0.1942	0.5109	(-0.8072, 1.1956)
R/E x SES quartile	-0.1366	0.1711	(-0.4719, 0.1987)
R/E x free/reduced lunch	-0.0028	0.0705	(-0.1409, 0.1353)
R/E x Hours/week working	0.0844	0.0596	(-0.0325, 0.2013)
R/E x low expenses important	-0.2204	0.2390	(-0.6887, 0.2479)
R/E x living at home important	0.1006	0.1750	(-0.2424, 0.4436)
R/E x vocational HS curriculum	-0.2436	1.4194	(-3.0256, 2.5384)
R/E x highest math in HS	0.0220	0.1763	(-0.3236, 0.3676)
R/E x reading/math test quartile	-0.2058	0.1815	(-0.5616, 0.1500)
R/E x time on homework	0.0152	0.1082	(-0.1969, 0.2273)
R/E x try to learn something hard	0.1564	0.2344	(-0.3073, 0.6201)
R/E x can learn something well	0.0506	0.2964	(-0.5615, 0.6627)
R/E x keep studying	-0.0134	0.2652	(-0.5537, 0.5269)
R/E x English homework	0.1130	0.2278	(-0.3337, 0.5597)
R/E x teacher expectations	-0.1240	0.1130	(-0.3456, 0.0976)
R/E x student expectations (2002)	0.2856 <sup>^</sup>	0.1575	(-0.0231, 0.5943)
R/E x student expectations (2004)	-0.4976 <sup>**</sup>	0.1724	(-0.8355, -0.1597)

Table 6, continued

Interaction Term	Estimate	Standard Error	95% Confidence Limits
R/E x parent aspirations	-0.0188	0.1262	(-0.2662, 0.2286)
R/E x Yes to SAT/ACT	0.1058	1.4463	(-2.7289, 2.9405)

Note: \*\* $p < .01$ , ^ = (.05 <  $p < .07$ ), Wald tests  $F(56, 315)$  from 17.04 to 18.24,  $p(F > f) = 0$

Table 7

*Selected logistic regression coefficients: Main effects predictors of intended college choice with four interaction terms (N=4748)*

Variable	Estimate	Standard Error	95% Confidence Limits
Constant	-6.944200**	0.817336	(-8.54631, -5.34209)
Race/ethnicity (R/E)	3.338600**	0.881269	(1.61134, 5.06586)
Student expectations (2004)	1.131000**	0.085412	(0.96360, 1.29840)
Teacher expectations	0.202200**	0.068259	(0.06842, 0.33598)
ELS reading/math test quartile	0.176600*	0.077542	(0.02460, 0.32860)
SES quartile	0.022800	0.067203	(-0.10892, 0.15452)
R/E x student expectations (2004)	-0.355000*	0.152567	(-0.65403, -0.05597)
R/E x teacher expectations	-0.132400	0.102581	(-0.33346, 0.06866)
R/E x reading/math test quartile	-0.153600	0.149901	(-0.44740, 0.14020)
R/E x SES quartile	-0.190000	0.159227	(-0.50208, 0.12208)

Note: \* $p < .05$ , \*\* $p < .01$ , Wald test  $F(39,332)$  from 22.03 to 23.10, all  $p(F > f) = 0$

Race/ethnicity-student expectations continued to be the only interaction that showed statistical significance ( $p < .05$ ). Selected output from that test regression (done with all five data sets and then unified in SAS) is found in Table 7.

Deducing that the other interaction terms were canceling each other out, one more data check was performed. Two three-way interaction variables were created: race/ethnicity-SES-test score quartiles, and race/ethnicity-test quartile-teacher expectations. These interactions were tested with the main effects logistic model using one of the five variable groups in AM, and neither proved to be significant. Although not definitive, this test suggested that putting those variables in context together was changing their overall level of significance for the outcome.

*Race/Ethnicity and Students' Expectations for Highest Educational Attainment (2004)*

By the spring of 2004, most of the students in the sample were finishing their senior year of high school. In this survey administration, students who indicated that they would be continuing their studies past high school were asked both which type of school they were planning to attend (outcome variable) and "how far do you think you will get?" Although these questions sound similar, they have different aims (one to describe an intended starting point, one to describe a future attainment goal). Of the students in the current sample who indicated that they were planning to enter a two year college, 51% of the Whites and 42% of the Latinos thought that an associates degree was the highest degree they would ever get. More Latinos than Whites indicated that they would at least enroll in a four year college (eight percent versus four percent), if not graduate. Twenty five percent of each group thought that completing a bachelor's degree was as far as they would go and another 11%

thought they would obtain a master's degree after starting at a community college. More Latinos than Whites indicated they would go on from their initial enrollment in community college to earn doctoral degrees (eight percent versus four percent) as well.

Table 8 shows selected logistic regression estimates and error terms for the model that included the constant, 35 main effects predictors, and the lone significant interaction term (race/ethnicity times student expectations). Logits and predicted probabilities presented in Table 9 were from the same logistic regression model.

As with the main effects model, a calculation of the percent correctly predicted by the model with one significant interaction was undertaken. The overall PCP (using the weighted  $N$ 's) for this model was 83.2%, which is a level very similar to the main effects model. However, when this calculation was done with White students and Latino students separately, the numbers changed. Given the racial/ethnic differences in numbers in the dataset and also in proportions in the outcome variable, different cut-off points were used to evaluate the percent correctly predicted for Whites and for Latinos. The weighted mode of Latino students in the outcome was 0.56962, while for White students it was 0.76046. Table 10 shows the output for PCP by race/ethnicity. From the overall PCP the percent reduction in error (PRE) can also be calculated, which was 32.7% for Whites and 49.3% for Latinos.

It has been established that both groups had increased probability of the reference outcome when their future educational objectives were taken into account. This is demonstrated graphically in the slopes of the lines in Figure 3. Looking at the first level of the student expectations variable, the predicted probability for Latino students started at a higher value (8.54% as compared to 1.35% for Whites). However, predicted probability for

Table 8

*Selected results of logistic regression analysis for interaction between race/ethnicity and students' expectations (2004 survey) for highest educational attainment (N=4748)*

Parameter	Estimate	Standard Error	95% Confidence Limits
Constant	-6.6646**	0.8002	(-8.2336, -5.0956)
2004 student expectations	1.1416**	0.0848	(0.9753, 1.3079)
Race/ethnicity	2.3336**	0.8819	(0.6046, 4.0626)
Interaction term	-0.4098**	0.1508	(-0.7054, -0.1142)

Note: \*\* $p < .01$ , Adjusted Wald scores  $F(36,335)$  range from 23.94 to 25.28, all with  $p(F > f) = 0$

Table 9

*Predicted probability of the reference outcome based on one significant interaction term  
(race/ethnicity times student expectations in 2004)*

Interaction variable	Logit for interaction and component terms	Logit for all other predictors at modal levels	Final Logit	Predicted Probability
Latinos				
Less than HS Diploma (1)	3.0654	-5.4362	-2.3708	8.54%
HS GED (2)	3.7972	-5.4362	-1.639	16.26%
HS diploma (3)	4.529	-5.4362	-0.9072	28.76%
Attend/complete 2-year college (4)	5.2608	-5.4362	-0.1754	45.63%
Attend 4-year college (5)	5.9926	-5.4362	0.5564	63.56%
Graduate from 4-year college (6)	6.7244	-5.4362	1.2882	78.38%
Obtain Master's (7)	7.4562	-5.4362	2.02	88.29%
Obtain Doctorate (8)	8.188	-5.4362	2.7518	94.00%

Table 9, continued

Interaction variable	Logit for	Logit for all	Final Logit	Predicted Probability
	interaction and component terms	other predictors at modal levels		
Whites				
Less than HS				
Diploma (1)	1.1416	-5.4362	-4.2946	1.35%
HS GED (2)	2.2832	-5.4362	-3.153	4.10%
HS diploma (3)	3.4248	-5.4362	-2.0114	11.80%
Attend/complete 2-year college (4)	4.5664	-5.4362	-0.8698	29.53%
Attend 4-year college (5)	5.708	-5.4362	0.2718	56.75%
Graduate from 4-year college (6)	6.8496	-5.4362	1.4134	80.43%
Obtain Master's (7)	7.9912	-5.4362	2.555	92.79%
Obtain Doctorate (8)	9.1328	-5.4362	3.6966	97.58%

Latinos ended slightly lower (94% as compared to 97.58%) at the highest value of the student expectations variable. The line graph in Figure 3 shows that the White students overtake the Latino students in predicted probability of the reference outcome at the level of student expectations equal to completing four year college (level six). Both lines have an overall positive slope, but their rate of change and overall relationship to each other change as the student expectations predictor changes.

Due to the fact that 2004 student expectations was the only variable to have a significant interaction with race/ethnicity in this traditional interpretation, further description of its range was undertaken. Figure 4 shows all levels of expectation for both Latino and White students. However, the percentage of Latinos indicating expectations level four (complete a two year degree) was higher than Whites, and the percentages of Whites indicating expectations level six (complete a four year degree) was higher than Latinos.

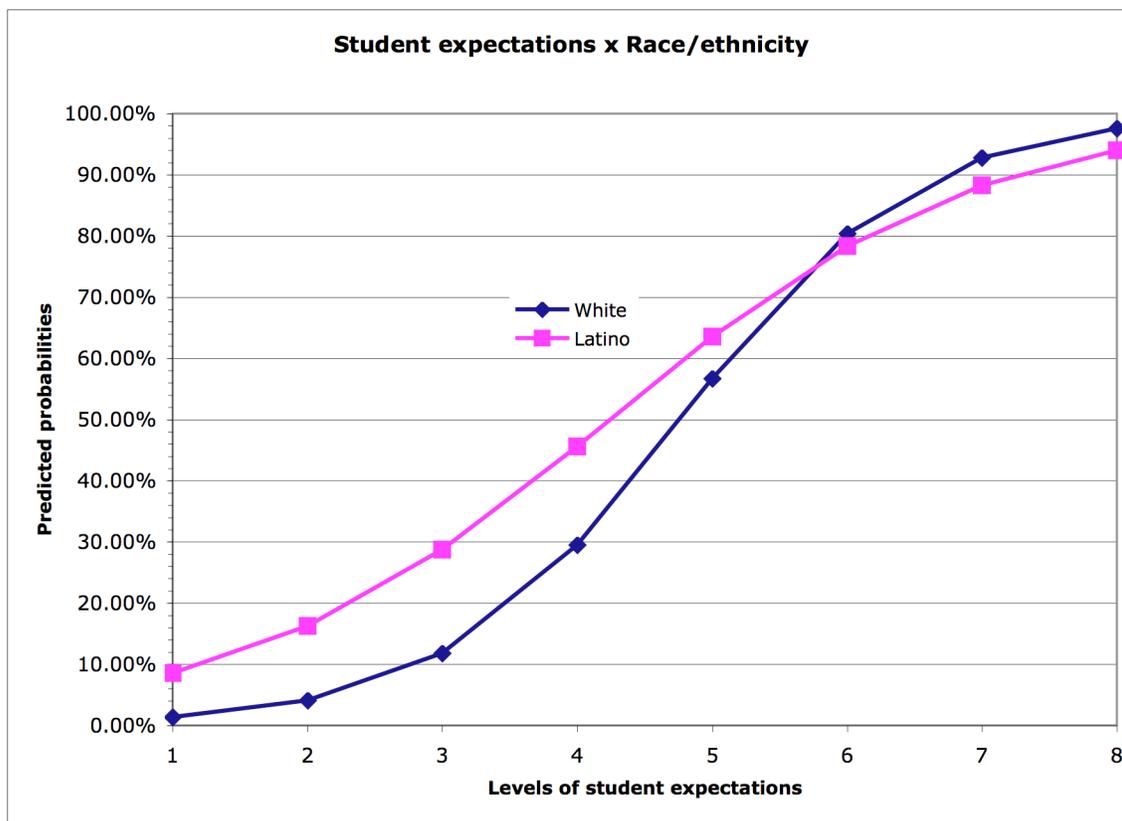
In order to explore the possibility that educational aspirations had changed over time, a new variable was created which reflected the change between individual student expectations in 2002 and 2004. When 2002 expectation values were subtracted from 2004 expectation values (after standardizing the scales), both Latino and White students had negative adjusted expectation scores. Latino students had a more substantial decrease (average adjustment of -0.32) than did White students (average adjustment of -0.24), and the difference was statistically significant ( $\chi^2 = 47638.9, df=10, p<.0001$ ). The modal value of the adjustment score was zero, indicating that most students did not experience a change in expectations from 2002 to 2004.

Table 10

*Percent correctly predicted by race/ethnicity in logistic regression model with one significant interaction term (weighted N = 5,420,150)*

Whites		Latinos	
Prediction model for two-year college			
Correct	Incorrect	Correct	Incorrect
80.6%	19.4%	76.9%	23.1%
Prediction model for four-year college			
Correct	Incorrect	Correct	Incorrect
84.9%	15.1%	79.1%	20.9%
Overall Prediction			
Correct	Incorrect	Correct	Incorrect
83.9%	16.1%	78.2%	21.8%

Note: Cut-off point for Whites is 76.0% and for Latinos is 57.0%



*Figure 3.* Predicted probabilities of reference outcome by interaction of race/ethnicity with levels of student expectations (2004) variable (level 1 = less than high school diploma, 2 = GED only, 3 = diploma only, 4 = attend/complete two year degree, 5 = attend four year college, no degree, 6 = complete four year degree, 7 = masters degree, 8 = doctoral degree)

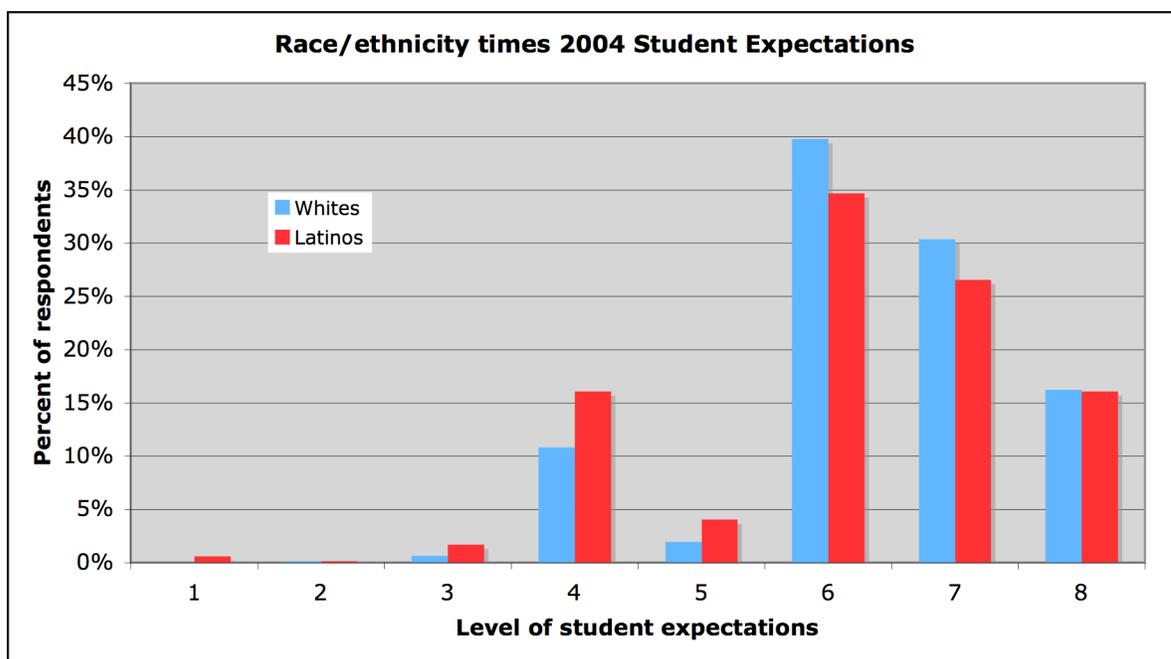
### *Alternative Interpretation of Interactions*

The interaction terms were further analyzed using a cross derivative. This interpretation was derived from Ai and Norton's (2003) strategy for analyzing interaction terms in logistic regression. While the traditional interpretation is based only on the regression coefficient of the interaction term, viewing the interaction across the entire range of observations may show changes in significance, magnitude and sign. Thus, Ai and Norton assume that in a non-linear model, interpretation of the interaction must also take into account the effects of the other covariates and not depend solely on the isolated term. It is possible that interaction terms with significant  $p$ -values will have specific observations where the interaction effect is not significant and vice versa. Interaction effect is defined as "how the effect of one independent variable on the dependent variable depends on the magnitude of another independent variable" (Ai & Norton, 2003p. 123). Although unpublished, the credit for translating Ai and Norton's mathematical models and Stata code (Norton *et al.*, 2004) into SAS for the current investigation belongs to Jesús M. Gonzalez.

The Ai and Norton (2003) method was used to investigate the four interaction terms that had significant  $p$ -values when they were added individually to the main effects model. Those were race/ethnicity and SES, test scores, teacher expectations, and student expectations in 2004. Although each one was evaluated in turn, they were kept in a model that included the other three interactions in order to maintain the conditions that previously produced non-significant results. This also permitted interpretation of how one interaction behaved while controlling for the effects of the other three interactions. Graphing the cross derivative permitted the researcher to visually inspect a range of observations to see where

the interaction effect (y-axis) was positive or negative, and where the interaction effect was significant or non-significant. The x-axes in these graphs are always predicted probability of the reference outcome, and the data points in the graph represent the interaction when race/ethnicity is set to one (Latino) and the other predictor takes all of its values. Using this strategy, the student expectations predictor continued to have observations for which the interaction was significant, and the SES predictor continued to be non-significant for all observations (when in context of the other interactions). However, both test score quartiles and teacher expectations, which were not significant by traditional evaluation, contained significant portions of their graphs in this analysis.

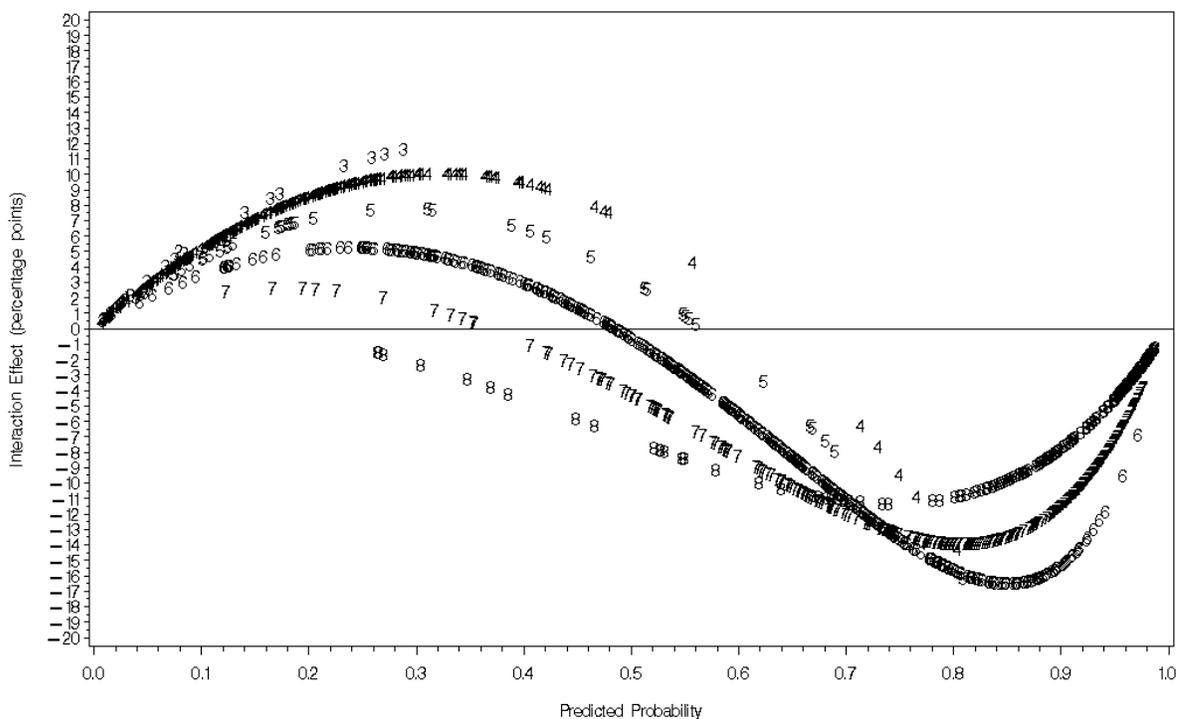
The interaction of race/ethnicity and student expectations is presented first and in the greatest detail, in order to illustrate the method of interpretation. A graph of the interaction effect of race/ethnicity and student expectations on predicted probability of outcome showed various curves for the values of the interaction term (Figure 5). The figure showed the difference the interaction term made for Latinos as compared to the baseline population of White students, but only Latino data points were graphed. The interaction effect was positive in some areas and negative in others, which is typical according to Ai and Norton (2003). Expectations values (1) will not graduate from high school and (2) will obtain a GED were not shown on the graph. The graph showed that the interaction effect was positive for Latinos with the student expectations values (3) obtain a high school diploma, (4) obtain a two year degree, (5) attend a four year college, (6) obtain a four year degree, and (7) complete a Master's degree. However, as was demonstrated in Figure 6, not all of those points were statistically significant. The positive interactions accounted for 37%



*Figure 4.* Interaction of race/ethnicity and 2004 student expectations variable by percent of respondents in each level (see Figure 3 for detail of levels).

of all of the significant interactions in the Latino sample. The interaction effect was negative for Latinos for the student expectations values (5) attending four year college, (6) graduating from four year college, (7) completing a Master's degree, and (8) completing a doctoral degree. The few observations that were coded as "4's" below the zero effect line were not significant. The negative interactions accounted for 63% of all of the significant interactions in the Latino sample. The maximum positive interaction effect was 11.58% and the maximum negative interaction effect was 16.51%. To illustrate numerically, the predicted probability of planning for four year college was 86% at the lowest point on the curve representing student expectations level six. The negative interaction effect for Latinos at that point subtracts 16.5% to give a predicted probability of 69.5% for the reference outcome.

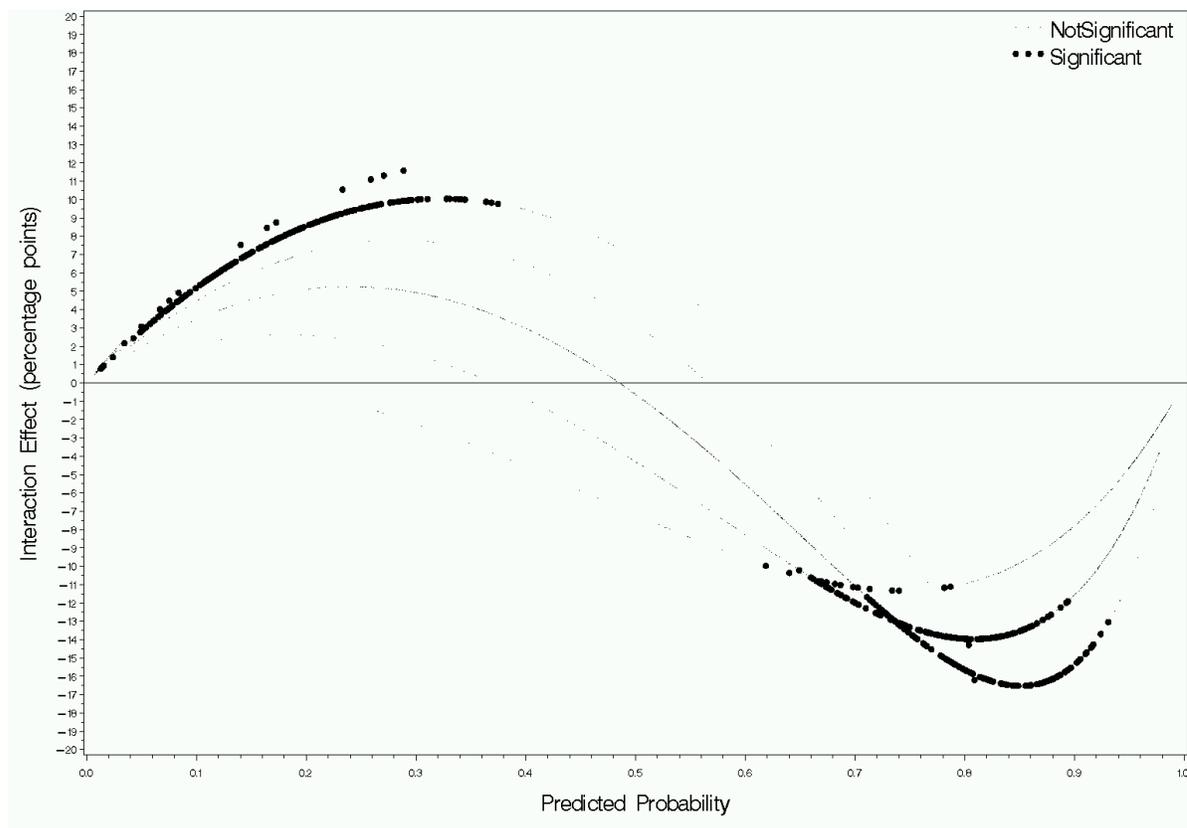
Figure 6 shows the same interaction data, but highlights where the interaction effect was significant for Latinos as compared to Whites. The significant observations were seen closer to the beginning and end of the x-axis, not in the middle. The positive significant interactions occurred in the range of predicted probabilities between 1.3% and 37.5%. At the predicted probability of 28%, the curve for student expectations level three was the highest, adding 11.58% to the predicted probability that Latinos would plan for four year college (39.58%). The negative significant interactions occurred in the range of predicted probabilities between 61.9% and 93.1%. The significant observations that were positive in their interaction effect were from student expectations values three and four, and the significant observations that were negative in their interaction effect were from expectations values six, seven, and eight.



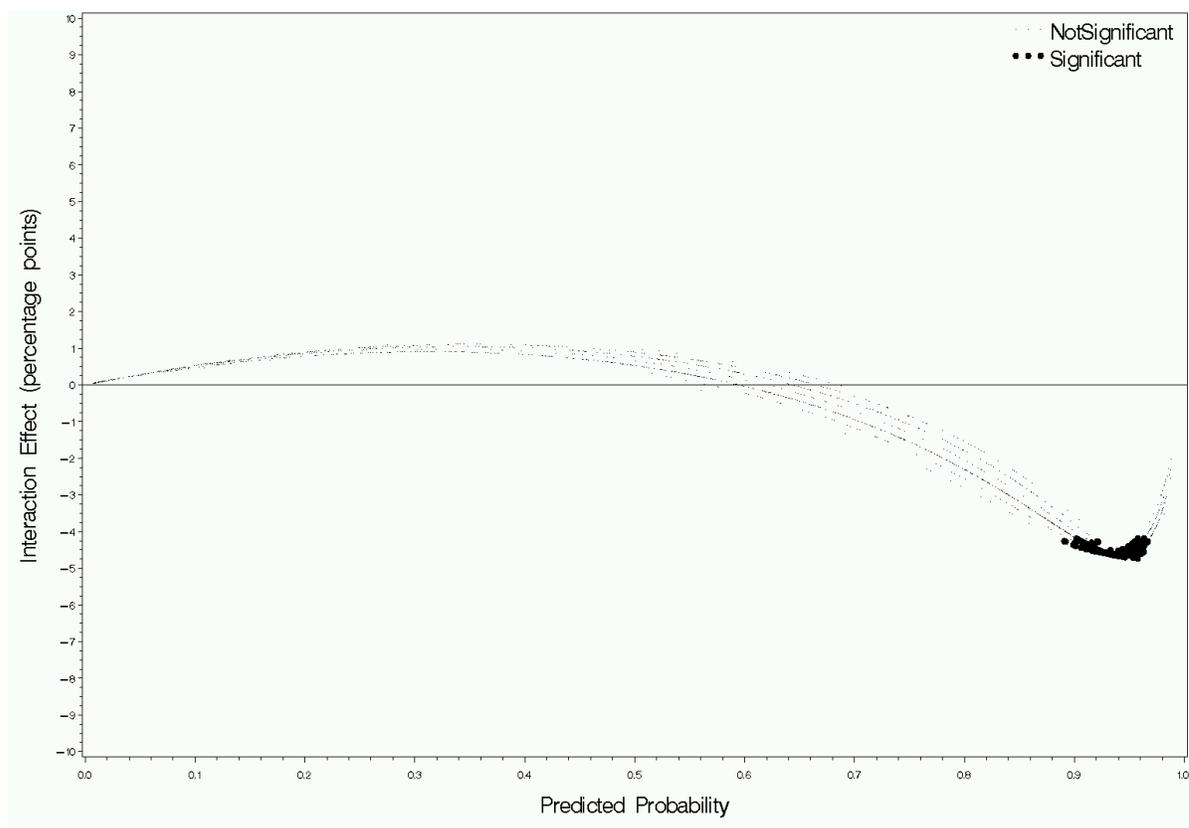
*Figure 5.* Interaction effect of race/ethnicity and 2004 student expectations graphed by predicted probability of reference outcome at each level of expectations (level 3 = high school diploma, 4 = two year degree, 5 = attend four year college, 6 = four year degree, 7 = master's degree, 8 = doctoral degree).

The interaction of teacher expectations with race/ethnicity of the student is graphed in Figure 7. The observations that demonstrated significant differences between Latino and White students all had a negative interaction effect. As displayed in Figure 7, most of the observations for the interaction of teacher expectations and race/ethnicity were not significant. The bolded points, where the observations were significant, begin at predicted probability value 89.1% and end at 96.7%. Along the y-axis, the significant observations range from -4.5% to -4.73%. Of the small subset that were significant, only 13% of observations were from the four lowest teacher expectations values, leaving 87% of the significant observations in the expectations categories five (obtain a four year degree), six (master's degree) and seven (doctoral degree). In fact, 56% of the significant observations were in category five alone. Those were the areas in which Latino students experienced a negative interaction effect that was statistically significant in comparison to White students. These differences were in the context of controlling for the interactions of SES, test scores, and student expectations with race/ethnicity.

The graph of the interaction between race/ethnicity and ELS test score quartile (Figure 8) had a similar shape to the previous graph (Figure 7). The points that were statistically significant were all negative in their effect (-3.87 to -4.32), and they spanned the predicted probability range from approximately 93.6% to 97.2%. As displayed in Figure 8, most of the observations for the interaction were not significantly different. Of the small subset that were significant, over 80% were from the two highest test score quartile values (three and four). There was a very small statistically significant difference at test score quartile level two and almost none at level one.



*Figure 6.* Significance of race/ethnicity and 2004 student expectations interaction graphed by predicted probability of reference outcome at of each level of expectations (see Figure 5 for detail of levels). The interaction effect was significant for Latino students at the bolded observations and non-significant at the single points.



*Figure 7.* Interaction effect for race/ethnicity and teacher expectations graphed by predicted probability of the reference outcome. The interaction effect was significant for Latino students at the bolded observations and non-significant at the single points.

In practical terms, the Latino students with the two highest test quartile scores were those who were experiencing a negative interaction effect as compared to White students, holding constant three other predictors (SES, teacher expectations, and student expectations).

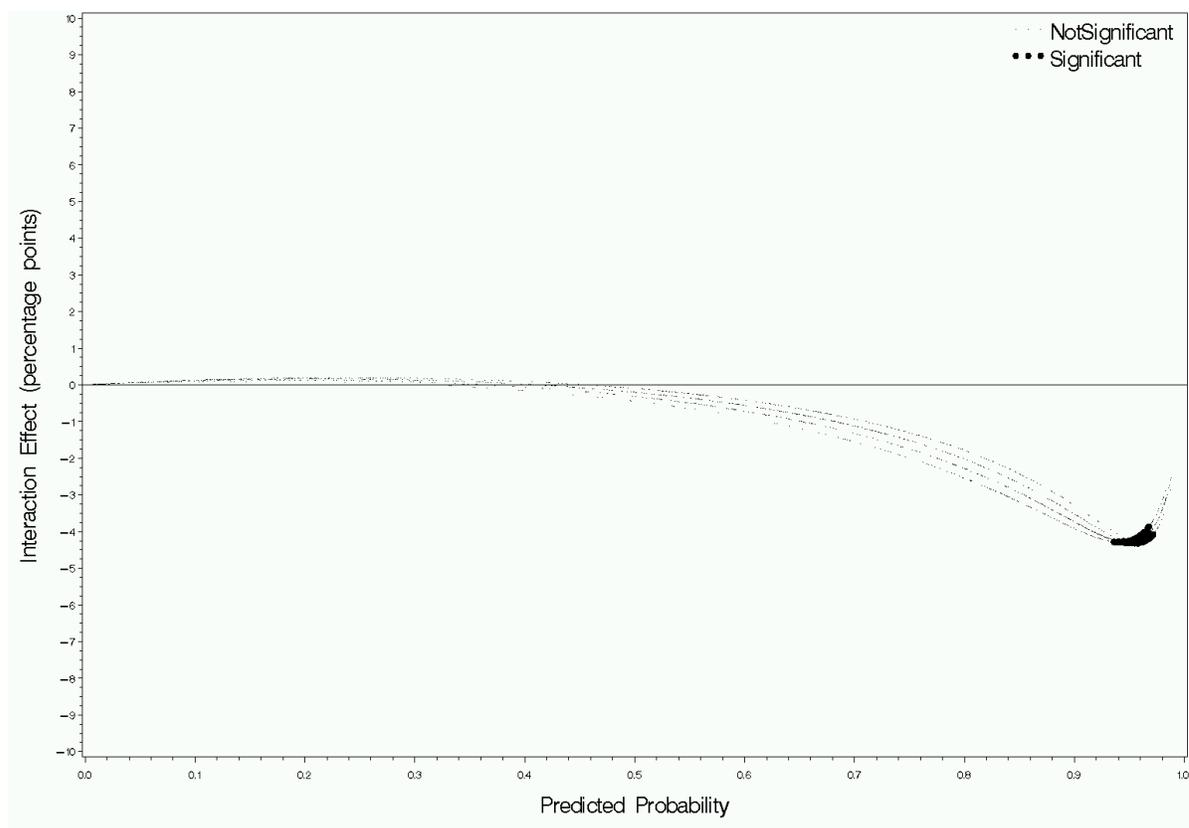
### *Hypothesis Three*

Neither of the variables selected for interaction with SES (test score quartiles and student expectations) were significant. These interactions were evaluated in the traditional manner, not with the alternative Ai and Norton (2003) approach.

### Summary

The main effects logistic regression model produced 11 statistically significant predictors of the reference outcome for the participants in this sample. The race/ethnicity variable was not among them, meaning that being Latino or being White by itself does not influence the outcome, holding the other identified variables in the model constant. It is always possible that a predictor exists in the real world that was not identified by the researcher. Of the initial categories for predictors (demographic, academic preparation, and academic self efficacy), all were represented in the findings. In terms of social cognitive theory, the main effects also spanned environmental, behavioral, and person factors.

For most of the interactions between race/ethnicity and one other predictor, the trends for Latino students and White students were not significantly different. Only student expectations in 2004 was significant when the interaction was evaluated by the *p*-value of the estimate. When using an alternative approach, 2004 student expectations continued to have a significant interaction effect, as did teacher expectations and reading/math test score quartile. Interactions of SES with test scores and student expectations were not significant.



*Figure 8.* Interaction effect for race/ethnicity and ELS reading/math test score quartile graphed by predicted probability of the reference outcome. The interaction effect was significant for Latino students at the bolded points and non-significant at the single dots.

## Chapter Five

### DISCUSSION

#### Overview

The goal of this research was to examine the decision being made by many Latino students to begin their post-secondary education in two year community colleges rather than four-year colleges or universities. A comparison group was used in order to contrast the factors which may be important to Latino students or White students in this decision making process. Initial level of post-secondary education is important because it may influence many subsequent outcomes that have an impact on an individual's future. Will this student persist and finish a degree? Will the degree lead to the occupational opportunities the individual desires? Will he or she be satisfied with his or her ability to earn, to contribute meaningfully, to sustain a lifestyle? As a community or a country, will we be maximizing the potential of our citizens and visitors?

The analysis of the research questions was done with logistic regression models and the data were drawn from one of the National Center for Education Statistics surveys (ELS:2002). Predictors were related to demographic status, academic preparation, and academic self-efficacy beliefs/task management, and the outcome was planned enrollment in two year or four year college. Although the extant variables selected from ELS:2002 were organized into three predictor categories for convenience, the underlying theoretical structure was drawn from social cognitive theory (Bandura, 1999). As was explained in more detail in chapter two, one of the foundations of social cognitive theory is reciprocal triadic causation. This term indicates an interdependent relationship among three factors –

environment, person, and behavior. Choosing a college can be a complex process that includes environmental factors (e.g., socioeconomic status, types of available educational opportunities), person factors (e.g., beliefs, aspirations, ability to perform), and behavioral factors (e.g., signing up for the SAT or ACT, taking advanced math courses). The connections between Bandura's factors and the variables used in the current research were diagrammed in chapter two (see Figure 1). The relevance of social cognitive theory and the importance of the relationships among these vectors were born out in the findings.

The literature review was an additional source for critical variables to include in the research. One of the most frequently mentioned variables was family socioeconomic status or SES. This variable has an influence that may be difficult to separate from other demographic variables, such as generation of immigration, hours working at a paid job, free and reduced lunch programs at the schools, etc. The way the SES variable was constructed in the ELS survey also added complexity – it included parental occupation, parental level of education, and household income. Therefore, conclusions about the range of effect that SES could have must take these relationships into account.

In terms of academic variables, Latino students in the U.S. have made some steps forward since the earliest citations in the literature review. For example, the modal value for highest math taken in high school was the same for Latinos and Whites in the current research project – pre-calculus, trigonometry, or calculus. The percent of Latinos who drop out of high school and thus are not immediately eligible for four year colleges has decreased from 30% in 1995 to 22.4% in 2005 (Kewal-Ramani *et al.*, 2007). Garcia (2001) reported that more Latinos were earning baccalaureate degrees in the late 1990's than 25 years

earlier. However, when putting those gains in context of overall population increase of Latinos and similar educational improvements in other U.S. racial and ethnic groups, Latinos are still comparatively “about half as likely than most others to attain bachelor’s degrees” (Garcia, 2001, p. 2).

The psychosocial variables that surfaced in the literature review are sometimes difficult to access or measure in survey research. The principle psychosocial predictor evaluated in the current investigation was academic self-efficacy, which was represented by items that had good conceptual grounding. Unfortunately, their placement at the end of a timed survey meant they had large percentages of missing data, and thus were the primary targets of the researcher’s multiple imputation efforts. Although multiple imputation proceeded with relative efficiency ratings between 92% and 99% (per SAS output), it still introduced a degree of uncertainty into the data. Other psychosocial variables mentioned in the literature were narrowly represented by the survey data (e.g., social capital theoretically could be based on the teacher expectations variable or discussions of college with parents) or not able to be accessed in this survey (e.g., ethnic identity, racial climate of schools). Qualitative research remains the best way to learn the rich details about psychosocial variables but has limitations in terms of scope and generalizability.

This chapter is organized by hypothesis, presenting a brief review of the findings from chapter four. The findings are then put into context from theory and the literature review, and critical analysis is offered. Limitations of the investigation are discussed, as are recommendations for future research, suggestions for practice in education and counseling, and implications for policy.

In order to personalize the discussion of the hypotheses and findings, the portrait of a typical student in the sample is provided here. Based on the modal values (Appendix B) for the predictors that were the same for both Latinos and Whites, the typical student represented in the current research went to a high school with a very small proportion of the student body receiving free and reduced lunches (less than five percent). These students were taking pre-calculus, trigonometry or calculus in the 2004 school year, spending a total of four to six hours a week on their homework, and planning to take the SAT or ACT college entrance exams. They discussed their thoughts about going to college often with their parents, and in both their sophomore and senior years of high school, they had the aspiration to complete a four-year degree. Their parents and their teachers shared that same educational aspiration for them. The typical student was a U.S. citizen who spoke English as his or her first language, and was working 16-20 hours a week to earn some extra money. These students found that the academic reputation of a college or the specific curricula a student could take there were the most important reasons to choose a college, with low expenses being a somewhat important factor in the selection and living at home not rating as important at all. Most of the students in the sample had reasonably good self-efficacy beliefs; when asked if they could perform some given academic tasks at a high level, the modal response was “often.”

The only ways in which the typical Latino and the typical White student in this sample differed were with respect to SES (the mode for Latinos was the lowest quartile, for Whites it was the highest quartile), ELS math and reading test quartile (the mode for Latinos was the third highest quartile, for Whites it was the fourth), and the importance assigned to

easy admissions standard in the college choice process (Latinos indicated it was somewhat important, Whites that it was not important).

#### Hypothesis One (Main Effects)

The main effects equation demonstrated which variables were statistically significant to the intended level of college matriculation of all students in the sample, and which were not. This was a nationally representative sample, so the findings were descriptive of a large population (although causality cannot be implied). In both the modal values of the predictors and the statistically significant main effects, White students and Latino students were shown to have several similarities. For all students in the sample, statistically significant variables associated with the plan to attend a four-year college were (a) valuing the academic reputation of an institution as a factor in choosing, (b) having taken trigonometry, pre-calculus, or calculus in high school, (c) having good standardized test scores, (d) having the self-efficacy to keep studying even when material was difficult, (e) having the aspiration to higher levels of education during the 2004 school year, and (f) having a high school teacher who expected good higher education outcomes for the student. This list represented a combination of personal, behavioral, and environmental factors, as described by Bandura (1977).

Looking at the problem from the other direction, several variables were associated with the plan to attend a two-year college instead (with those who were opting out of higher education removed from the sample). For Latino and White students alike, those statistically significant negative predictors included (a) percent of students in the high school receiving free and reduced lunch, (b) valuing low expenses in an academic institution as a

factor in choosing, (c) valuing the option to live at home while attending the institution as a factor in choosing, (d) not planning to take the SAT or ACT entrance exams, and (e) seeking admissions information from a college representative in 2002. The last predictor, although significant, was ambiguous and difficult to interpret. The ELS survey did not indicate if the representative was from a four year or two year college or if the conversation was helpful or unhelpful. In addition, the pool of participants in the present study were all planning to continue their studies past high school, but the sophomore spring may not have been perceived as a critical junction in their timeline. Thus, this finding may not be very helpful in the practical sense. However, the first four significant negative predictors tended to confirm some common perceptions about choosing a two year college. This list contained demographic and task management factors but not academic preparation factors or self-efficacy factors. In terms of social cognitive theory, these predictors spanned all three factors.

Overall, the statistically significant main effects variables from the demographic group were found to exert influence in both directions (toward the baseline and reference outcomes). The academic preparation variables that were significant pointed only toward the reference outcome, as did the significant academic self-efficacy predictors. This suggests that first inculcating some positive self-beliefs and then the willingness to translate those beliefs into efforts on academic tasks could benefit all students who are interested in a four year degree. Although maintaining a focus on academic aspirations and objectives may pay important dividends, it is not always easy to accomplish. Some environmental pressures (e.g., impoverished high schools, desire to pay low tuition or live at home) were associated

with the decision to go to two year college for both Latino students and White students. In some of those cases, community college could have represented the best access point to higher education. The current study does not argue that all students must begin in four year colleges, only that it is potentially a more productive route for students who intend to complete a bachelor's degree. The main effects suggest that students who have the will to accomplish their academic aspirations by hard work are less likely to be slowed down by life circumstances, whereas students who are focused on the challenges in their environments are more likely to be distracted from high level academic goals.

#### *Contextualizing the Main Effects*

Comparing the current findings of the main effects with previous research literature, some of the predictors functioned as expected. Other studies (Adelman, 2006; Goldsmith, 2004; Swail et al., 2004) have mentioned the role of high level math courses in high school, good scores on achievement tests, and aspirations to higher education as positive factors in the educational pathway. Also, all four of the variables that were associated with the choice to attend a two year college were factors that had already been identified in the literature (Contreras, 2005; Fry, 2002; Fry, 2004; Hernandez & Lopez, 2004). For all students in the current study, community college was a more attractive choice when they had reasons (financial, personal, or other) to live at home while attending school. Low costs and convenient location are two of the main selling points of community colleges. Although some of the prevalent discourse more often connects those two factors with Latino students, they were equally compelling for the White students in this study.

The new and notable findings with respect to main effects in the current study were that academic self-efficacy beliefs and expectations were important influences in a student's trajectory toward four year college. General educational expectations have been included in some prior research endeavors (e.g., Goldsmith, 2004), but academic self-efficacy beliefs had not been included in prior studies of Latinos and level of college choice. Although self-efficacy beliefs are person factors in terms of social cognitive theory, they evolve with inputs from the external environment and behavioral attempts toward mastery of the task. External influences initially can be categorized as positive (e.g., encouragement from teachers) or negative (e.g., few educational role models in the family), but their impact is not realized until they are filtered through a person's self-belief system. Social cognitive theory indicated that individuals "act agentially on that [external] influence in cognitive, affective, and behavioral ways that enhance, neutralize or subvert it" (Bandura, 1999, p. 15). Human beings have the personal agency necessary to organize themselves around a goal (such as entering a four year college) and enhance their level of functioning in order to reach it. The academic self-efficacy belief that was significant as a main effect (i.e., I keep studying even when material is difficult) reflected the qualities of effort and perseverance (having been derived from that subscale on the PISA) (Adams & Wu, 2002). These are behaviors that can be encouraged in any student regardless of ability, family circumstances, school environment, cultural values, or other characteristics. The quality of perseverance may serve to diminish the effect of other negative factors and help advance students toward their goals. Bandura (1977) defined the function of self-efficacy beliefs as influencing both goal selection and effort (perseverance, and resilience in the face of difficulties).

While the student's expectations for his or her future education were important in the current study, the expectations of teachers who worked closely with the students were also significant. Based on these findings, it is possible that a teacher's expectations for the student's post-secondary education may be more predictive than a parent's expectations. Although the encouragement and support of family may be of great personal importance, the professional opinion of a teacher that a student has the necessary qualities to succeed in higher education may provide a more accurate predictor. Both are important in lay terms, but only one rose to the level of statistical significance in the study. The fact that this variable functioned equally for Latinos and Whites is encouraging; teachers who can see the potential in a student regardless of race/ethnicity or other identifiable characteristics can do them a great service.

Some of the trends discussed in the literature review (chapter two) did not make significant contributions to the outcome in the current study. Some of them were not addressed due to limits in the availability of longitudinal data. The second follow-up survey of ELS:2002 has not yet been released to the public, so the experiences of the sample members as they arrived at their campuses of choice could not be accessed. Thus, campus climate, patterns of enrollment, and ease of transition to higher education were not factored in to the current study. They remain in the literature review as important aspects to consider when examining college choice. Some predictors listed in the literature review were complex variables that were only partially represented in the current study (e.g., social capital, family orientation, ethnic identity). They also remain worthwhile concepts that deserve to be more fully operationalized. Finally, some of the predictors that were included

in the study did not meet the test of significance (e.g., parent aspirations for the student's educational progress, generation of immigration, student's first language, SES). Although several of those could be important in terms of their influence in a person's life, they were not statistically associated with the outcome when other explanatory variables were also present. That conditional statement is important to emphasize. Other research may describe variables like SES, generation of immigration, or parent aspirations as key to understanding post-secondary choices, but those studies may be controlling for the covariation of fewer other predictors than the current study did.

More attention is given to the composite SES variable, which NCES constructed by combining family income, parental occupation, and highest level of parental education. The fact that it was not a significant predictor merits discussion. The NCES process of taking information from other content items then standardizing the scales, combining the data, and arranging the new variable into quartiles is complicated. This data manipulation could have had an impact on how the variable performed in the logistic regression. Alternatively, it could be the case that a different variable (e.g., percent of free and reduced lunches) ended up being more important in demonstrating any economic effects on the outcome, and that SES would only be significant in a reduced model. It may be the case that some Latino students were in the first quartile of the composite SES variable because of low levels of parental education and/or blue collar family occupations, but that the family income was comparatively not as dire. The composite nature of the variable or its limited range (e.g., four quartiles) may therefore have limited its ability to discriminate in the model. A final

possibility is that any practical downward effect of a low SES quartile (not seen in the model but perceived by a student) could be overcome by human factors such as motivation.

The last possibility mentioned would be the view espoused in social cognitive theory – that people have the power of agency to choose a path and regulate their own activities, not just be “shepherded by external events” (Bandura, 1999, p. 2). Some families with economic hardships suffer from the experience, but other families are able to mediate the effect of the deprivation through their actions and choices. Bandura commented that “in the theory of triadic reciprocal causation, sociostructural and personal determinants are treated as cofactors within a unified causal structure” (1999, p. 27). In other words, although a low socioeconomic status can influence a family, the family can also influence and structure their environment in a way that ameliorates the low SES.

Another predictor set that was mentioned frequently in reports and literature regarding Latinos and education was immigration status or native language (e.g., Fry, 2002; Hagy & Staniec, 2002). It is possible that the language variable was not well represented in the sample, as students needed to have sufficient English skills to complete the written ELS survey in order to be eligible participants. Ninety five percent of the total participant group was born in the United States, although that response was reported on the parent’s survey and may not have been checked in any other way. Cross tabulation shows that 30.6% of the Latino portion of the sample was born outside of the 50 states, which would include those born in Puerto Rico. Given that individuals born in Puerto Rico are U.S. citizens and there is frequent passage between the island and the mainland, it may be difficult to categorize Puerto Ricans as typical first, second, or third generation immigrants. There are no

hypothesized explanations for why immigration status was not a significant predictor in the current study.

There was no difference between the Latino students and the White students in the sample in terms of hours per week spent on homework or spent working at a job. The perception that Latinos might study less and work more was not born out here, perhaps correcting a stereotypical image. High school curricula were also comparable between the two groups, judging by the modal values and the lack of significance in the logistic regression. Thus, Latino students who were similar to White students in terms of courses taken at the secondary level, hours studied, and job commitments were still planning to attend two year colleges to a greater degree.

The main effects findings have relevance for the hypotheses of the current research because they show what Latino students and White students may have in common. For some casual observers, it may be easier to view a problem from a demographic standpoint and assume there are differences between two groups. That is to say that race politics and class politics in the U.S. can cause even well-meaning individuals to fixate on those differences first as they consider a social phenomenon. Even some research may begin with this perspective, but it may only be a partial perspective. It can be tempting to look at differences ascribed to racial or ethnic groups when trying to understand behaviors like college choice, and thus to miss other factors. Bandura (1999) wrote, "The influence of personal factors on human functioning is often insufficiently recognized because the issue tends to be construed in static terms of individual differences rather than personal

determination of action” (p. 13). Choice is behavior, and behavior has multiple sources and contexts.

Many of the demographic factors in the current research did not reach the level of significance for any student. When asking, “Why do such a high percentage of Latinos attend community college?” it is important to go beyond the stereotypical answers. The main effects predictors highlighted the influences that were associated with planning to attend a two year college or a four year college for both White and Latino students. Therefore, part of the answer to that question is, “They go for the same reasons that many other students go.”

#### Hypotheses Two and Three (Interactions)

Hypothesis two examined the interaction of race/ethnicity with various other predictor variables. If there were some differences in the influences on Latino student decision making and White student decision making, they would manifest themselves in these interactions. Keeping both subpopulations together in one equation also allowed the researcher to control other important influences. For example, the interaction of race/ethnicity and test scores could be examined in the context of White and Latino students with the same SES background, the same type of higher education expectations, etc. Hypothesis three functioned similarly, but the interactions were between SES and two other predictors (one academic, one self-efficacy).

The only predictor that made a significant difference (looking at the average effect with the coefficient having a  $p < .05$ ) between the two subpopulations was students' expectations for how far they could go in post-secondary education (measured in 2004). Of

the students who stated that they planned to enroll in a two year college (outcome variable), more Whites than Latinos thought that an associate's degree was as far as they thought they were get (student expectations). More than half of the Latinos in the sample who provided the baseline outcome response (planning for a two year college) had other degree expectations as well. This suggested that more Latino students could be using two year colleges as a means to other ends, whereas more White students who planned to use that route were viewing it as the end itself.

When using the Ai and Norton (2003) analysis for the four interactions that had been significant when added individually to the main effects model (race/ethnicity interacting with SES quartile, test score quartile, student expectations in 2004, and teacher expectations), different terms were significant. Although student expectations was the only predictor determined significant by the *p*-value of its estimate when the other three interactions were also present, two additional interactions had some significant observations along the range of the predictor (using the cross derivative method). A model that included the main effects and those four interaction terms demonstrated that, even while controlling for the combined effects of race/ethnicity and the other predictors, there were significant contributions to the outcome made by the test score quartile and teacher expectations. These were partial effects, only seen in limited portions of the logistic curves, but still significant.

The differences seen between White students and Latino students along those variables were mainly in the area that could be referred to as high profile. Students with relatively high test scores, high levels of expectations from their teachers and themselves, and high predicted probabilities of choosing four year colleges were the ones that were

experiencing negative effects from the interactions (with Latino students planning to attend four year colleges less often than similar White students). Socioeconomic status was therefore the only one of the four predictors that did not have any significant observations when test score, student expectations, and teacher expectations for each subpopulation were being taken into account.

The percent reduction in error (PRE) statistic highlighted interesting differences in how the model with the single significant interaction term performed for each racial/ethnic group. The percent correctly predicted (PCP) overall of the model including one interaction was 83.2% (see Table 10 in chapter four), which was very similar to the PCP for the main effects model (83%). The PCP of White students was slightly higher than for Latino students, which may reflect the fact that the sample was 86% White and the regression model attempted to fit the data that were present. However, the PRE showed that the researcher's model including the interaction term was a better fit to the observed data for Latinos (49.3%) than for Whites (32.7%). As stated earlier, a model that makes no improvement in prediction over the selected baseline (or percent observed to be in the modal category of the outcome variable) would have a PRE of 0. Therefore, the inclusion of the interaction term (race/ethnicity times student expectations) provided a better perspective on the Latino portion than the White portion of the data.

#### *Interpretation of the Interactions – Student Expectations*

In order to appreciate the findings uncovered by the Ai and Norton (2003) analysis, the traditional analysis should be clearly understood first. The traditional interpretation was applied to the only significant interaction, which was race/ethnicity with student

expectations in 2004. A detailed interpretation of the line graph showing predicted probabilities for each group across the spectrum of student expectations values (Figure 3 in chapter four) may be illustrative. Latino students who stated that receiving a high school diploma was as far in school as they thought they would get (student expectations predictor) also had a 28.76% predicted probability of responding that they would be most likely to attend a four year (versus two year) college at some point in the future. For White students the predicted probability was 11.8%. These responses seemed contradictory at face value and could point to some inconsistencies in how students interpreted the items. However, if some form of logic was assumed to be present in their answers, it may have pointed toward a segmented view of education by the Latinos in the sample. In comparison to the White participants with lower scores on the student expectations variable, there was a greater probability that the Latino participants would still picture themselves attending four year colleges some day, even if they thought at the moment that a high school diploma was as far as they could go. This may be an unrealistic idea, or a tremendously optimistic idea, but the data seemed to indicate that it was not an incompatible idea for these Latino students.

The middle of the x-axis of Figure 3 showed that Latinos who expected to get as far as a two year degree (level four) or attendance at a four year college without completing a degree (level five) still had higher predicted probabilities than White students of planning to attend a four year college in the future. As stated by the Community College Research Center (2006), many students (including Latinos) may decide that community colleges represent an entry point to higher education, but may also have an interest in obtaining a bachelor's degree eventually. The description of students (both Latino and White) in the

current study who planned to enter a community college showed that they simultaneously had aspirations to complete a degree beyond an associates degree. It is possible that they were visualizing a route to higher education that included both two year and four year colleges, not necessarily as continuous parts of one degree goal, but perhaps as distinct and separate goals. Once the student expectations variable reached level six (complete a four year degree) the predicted probability line for the White students crossed and exceeded that of the Latino students. That is to say, for White students who thought they would get as far as a bachelor's degree, a master's degree, or a doctoral degree, they had a higher predicted probability than did Latino students of initially planning to attend four year colleges. The lines were not separated by a large amount, but the trend was reversed.

With Figures 5 and 6 from chapter four, the interpretation of the student expectations predictor was expanded using the Ai and Norton (2003) analysis. The interaction of interest was always understood to be in the context of the other three interactions with race/ethnicity (e.g., test scores, teacher expectations, and SES). Figure 5 in chapter four plotted the interaction effect for race/ethnicity times student expectations against the probability predicted by the model. Overlaying the numbers in Figure 5 with the observations that were statistically significant in Figure 6, the levels of student expectations marked three and four (attain a high school diploma, attain a two year degree) had a positive interaction effect for Latinos as compared to Whites. Technically, all predicted probabilities were for the reference outcome. However, in practical terms, a predicted probability of 30% meant three out of ten students would plan for four year college, but seven would plan for two year college. Therefore, when considering White and Latino students of similar academic and

economic profiles with low predicted probabilities, the interaction effect favored the Latino students. Their highest predicted probability was 39.5%, as compared to 28% for White students who had stated their educational goal was only a high school diploma. When stating they wanted to obtain an associate's degree, the difference in predicted probability between Latinos and Whites was slightly smaller (38% versus 28%). It is important to note that this positive interaction for student expectations occurred with students in the low predicted probability range. In terms of planning for four year college, Latino students were aided by their expectations more than White students were, but the majority of each group was still likely to plan for two year college (based on the other covariates in the model).

Further along on the x-axis (predicted probability of the outcome) in Figure 6, the interaction effects that were statistically significant were all negative. In this area, the Latino students stated higher expectations for postsecondary education, such as graduating with bachelor's, master's, or doctoral degrees. One could assume some degree of similarity among the observations in this quadrant, as the students' other characteristics had combined to give them a predicted probability of .60 or higher. Based on their responses to the student expectations items, most of them were interested in four year degrees or more, and based on their position along the x-axis, they were increasingly likely to attain those goals. Of course, the negative interaction effect meant that Latino students were less likely to experience the reference outcome than their White counterparts. Said in another way, their expectations for how far they might get in post-secondary education did not help them toward their desired outcome in the same way that the White students were bolstered by their expectations. Some of those Latino students (69.5% at the point with the most negative interaction effect)

would be predicted to choose four year college, but not at a rate similar to the White students (86% at the same point on the curve). While it is encouraging that almost 70% of the high profile Latinos were predicted to experience the reference outcome, the probability of two year college for the additional 16% was disconcerting in that the other covariates in the model indicated they could be good candidates for four year college.

*Interpretation of the Interactions – Test Scores and Teacher Expectations*

The interaction of race/ethnicity with the ELS test score quartile predictor had negative significant values for Latinos with otherwise high predicted probabilities of choosing to attend four year colleges. Latino students scoring in the highest test quartile were significantly less likely to experience the reference outcome than were White students in the same test quartile (approximately 4% difference in predicted probability). This was true in the context of SES, student expectations, and teacher expectations being held constant for each subpopulation as well. Thus, the academic promise represented by high reading and math test scores provided an opportunity, and it was not counteracted by barriers such as low SES or low expectations. Simply put, some of the Latino students who had the option of planning for a four year college (based on test scores) did not exercise the option as often as White students did. This leads to the question “why not?” Assuming that these students did value education and the possibility to study in a baccalaureate granting institution, one might also conjecture there was something else that they valued more that caused them to turn down that opportunity. Causal questions cannot be answered in a descriptive study.

In a parallel track, Latino students for whom English teachers in 2002 held high academic expectations had significant negative interaction effects at high predicted probabilities of the reference outcome. Compared to the White students in the current study, Latino students who were evaluated by their teachers as being capable of completing a bachelor's degree or a graduate degree were less likely to be planning to go to a four year college (approximately 4.5% lower predicted probability). Again, this was true even when controlling for SES, test scores, and the student's own expectations. Thus, it was presumably not the inability to afford a baccalaureate institution or the lack of a competitive admissions profile that accounted for this difference. It was not a greater expectation of education on the part of the White students or a lack of interest by the Latino students. Although both teacher expectations and test scores had areas of significant negative interactions, the impact on predicted probability was smaller than the impact seen in the student expectations graphs.

It may be useful to add some descriptive context to further understand the influence of teachers and test scores, which are both variables with a school level connection. Although the mode in the current sample was that both Latinos and Whites attended high schools where very few students received free and reduced lunches, NCES data describing national trends show that 49% of Latino students attended schools where over 75% of the student body received free and reduced lunch in 2005 (Kewal-Ramani et al., 2007). The total distribution of students being educated in such schools in the United States was 22%. In addition, 58% of Latinos were attending high schools in 2004 where over 75% of the student body was Black, Latino, Native American, or Asian heritage. Therefore, although

the ELS data are weighted to describe the educational universe in the U.S., findings should be understood in the context of the probability that a Latino student attends a less wealthy school with few White students. Such schools are often challenged to recruit and keep the best teachers, and may have fewer resources to help students excel on tests.

There is a notable pattern in the graphs of Figures 6, 7, and 8. When predicted probability is high, the interaction effect of race/ethnicity with student expectations, teacher expectations, and test scores is always negative for Latinos. This prompts the question of whether an underlying common factor (unidentified by the model) is influencing all three of these variables to behave the same way in the high predicted probability range. For example, if ice cream sales, lemonade stand sales, and movie ticket sales are all increasing, one might suspect the common factor is a hot day. Similarly, if the interaction effect for high profile Latinos is negative for the only three significant variables, one might speculate about what other influences are at work. One such hypothetical factor could be the schools. If a given high profile Latino student is similar to a given high profile White student in many ways, the negative impact of attending a low quality school theoretically would be greater for the Latino. The effect would not be as meaningful for low profile Latino students who were less likely to plan for four year colleges.

Research demonstrates that high school students with post-secondary aspirations develop a mental list of colleges that are salient to them (Cabrera & LaNasa, 2000a). These predispositions can be based on ability to pay tuition, perceptions of academic strengths, and opinions of peers, counselors, and teachers. Type of high school environment is likely to influence some of those decisions, and thus to impact type and level of college considered

by students. Thus, it is feasible that the negative interaction effect seen for test scores, teacher expectations, and student expectations for high profile Latinos could be rooted in lower quality schools, with the effect being a decreased salience of four year colleges for some of those capable students.

### *Proposed Explanation*

A speculative idea is that the Latino students at two year colleges can be visualized in two groups – those who are similar to the core group of all races/ethnicities at community colleges and are influenced by the same variables, and another group of Latinos who are different in many ways from the core. The negative main effects predictors identified in the current research could be the ones that influenced all students who were likely community college attendees – those who needed a higher education institution that imposed low cost burdens and allowed flexibility in terms of lifestyle and academics. The interaction terms highlighted the second portion of the Latino community college attendees – those who had high expectations, positive academic feedback from teachers, and good test scores, and yet still planned to attend a two year college over a four year college.

In one study that used the NELS:88 survey, the percent of all eighth grade students who eventually had their first higher education enrollment in a two year college was 32% (Swail, Cabrera & Lee, 2004). Of the Latino youth followed by NELS:88, 40% enrolled at a community college and an additional three percent attended a shorter vocational/technical program, 22% enrolled at a four year college, and 34% did not continue to higher education. Instead of considering the 40-43% of Latinos who pursued a post-secondary option other than a four-year college as a monolithic group, it may be more useful to view them as the

students who are like the standard attendees plus an additional group. The additional attendees would inflate the total percentage of Latino students choosing the two year option and they may confound researchers because they are not responding to the same predictors.

The interaction effects demonstrated by the Ai and Norton analysis did not counter this speculative hypothesis. Beyond the explanation for all students offered by the main effects model, the interactions showed that, for a range of values of test scores, student expectations, and teacher expectations, Latino students were less likely than their White counterparts to plan to go to four year college. These were students with good test scores and high expectations from their teachers, and the interactive effect of SES on each group had been accounted for. They were students who thought that they would go far in education. Some of those students could have comprised the additional percentage of Latinos at community college; those students may have decided not to go to four year colleges after high school even though they appeared to be academically eligible and financially capable. For some other compelling reasons, this subset of Latino students may have planned to start at two year colleges. The non-significant values of the interactions demonstrated that for White students and Latino students with low test scores and lower levels of educational expectation from teachers, there was no difference in the outcome. Those students were making similar plans for post-secondary education and were not distinguishable by their racial/ethnic backgrounds.

#### *Comparison with Social Cognitive Theory*

How can these findings about the interaction of race/ethnicity with test quartile, teacher expectations, and student expectations be illuminated by the social cognitive theory

of Bandura (1999)? The first point is that although the interaction of race/ethnicity with SES was present in the model, it did not make a difference to the outcome. Even though the variable modes showed that the two groups had differences in the financial status of their families, the predictor was not significant when other variables were also controlled for in the logistic regression. Social cognitive theory would indicate that environmental inputs such as SES make their impact after an individual assigns them meaning. There could also have been buffering influences, such as strong family support for a degree that could have diminished the psychosocial power of low SES. Phinney, Dennis and Osorio (2006) found that Latino and African-American students from all SES brackets endorsed helping one's family as one of the most important reasons to attend college. Family-centered motivation would be culturally relevant for many Latino students and could ameliorate other factors.

High test scores can be attributed to person factors (intellectual ability), and one might still expect them to move a student in the direction of higher starting levels of post secondary institutions. That they did not in all cases may have indicated that other person factors (e.g., values, interests) were stronger influences, or that the test scores had not been translated into behavior (selecting a college with other high scoring students) due to an influence not yet identified. Perhaps a social or environmental influence (e.g., peers) was countering the high test scores to produce unexpected college choice behavior. While the reason for this was not entirely clear, it does place more focus on the person factors involved in choosing a level of college.

Expectations for future educational attainment are forms of self-efficacy beliefs, although perhaps longer range and more complex than a typical task. In order for a student

to determine “how far I think I can get,” he or she must select the appropriate level of aspiration first, neither too easy nor too difficult. Teachers evaluating student potential would follow a similar process. High expectations are tied to environment or context via self-efficacy beliefs – they are in effect a statement of what a person believes he or she can accomplish in a given situation. Student expectations could be formed internally (reflecting on person factors such as ability or motivation), but it is more likely they are formed socially (person factors in the context of environmental influences). Those beliefs are shaped over time by several types of input; Bandura’s (1999) social cognitive theory was detailed in chapter two. In general, the inputs are “past experience, social comparison, and reinforcement from significant others” (Bong & Skaalvik, 2003, p.6). If the participants in this sample had similar levels of aspirations (as judged by the modal values of four expectation variables) but dissimilar predicted probabilities of the outcome, then it could be that their academic self-efficacy beliefs were constructed from different types of interactions between person factors and social/environmental factors.

How might these inputs differ between White and Latino students? Past experience can include vicarious modeling from others and attempts to master skills oneself. It includes interactions with family, peers, role models, teachers, schools, communities, states, and other settings. Those key actors are also likely to comprise a social comparison group and a support/reinforcement group. Therefore, the inputs to self-efficacy beliefs were evaluated through those relationships with the goal of identifying possible influences on the observed differences between Latino and White students.

Vicarious learning or verbal encouragement from the environment can occur and be processed in a variety of ways. Individuals are simultaneously products of their environment and agents who can create and control aspects of the environment. Bandura (1999) indicated that “information conveyed by events must be distinguished from how that information is selected, weighted and integrated into self-efficacy judgments” (p. 47). If a hypothetical Latino student from a low SES family used that information to build a determined sense of self-efficacy for academic tasks and a better future, and a hypothetical White student from a high SES family used that information as part of a default sense of self-efficacy for continuing the family’s expectation of education, then they have used different processes to arrive at a similar destination.

Most of the literature regarding Latinos and education indicated that parents are encouraging of higher education for their children, even if they did not have that opportunity themselves (Plunkett & Bamaca-Gomez, 2003). Although parental education was removed as a predictor variable from the logistic regression analysis due to multicollinearity concerns, the information contained in the variable was available for descriptive purposes. The Latino students in the sample had a higher percentage of parents with less than a high school education (15% as compared to 1% for Whites), and the White students had a higher percentage of parents with bachelor’s degrees (28% as compared to 18% for Latinos) and master’s degrees (17% as compared to 9% for Latinos). Some of the literature indicated that the vicarious learning done by Latino students with relatively uneducated parents had resulted in a renewed commitment toward higher education, in order to avoid the difficult labor they had seen performed by family members (Ceja, 2004). They took the raw

information available in daily observations of their parents and reflected on their own choices and preferred outcomes. In some cases, the parents also reinforced their children's desires to use education as a pathway to a different future. However, in terms of direct role modeling or social comparisons, Latino students with less educational legacy in the family would have to look elsewhere to learn about the impact of obtaining a baccalaureate degree.

The influence of peers or other student role models would vary, depending on whether Latinos were looking only to other Latinos for vicarious learning, social comparison, or verbal encouragement. Role modeling does not have to be within racial/ethnic groups, but it is most effective when it involves a model with whom the student can identify. Depending on the state where the student was located, peers and role models in two year or four year college could vary. An extreme case is represented by California, a state where over 35% of the population is Latino (<http://quickfacts.census.gov/qfd/states/06000.html>). Garcia (2001) stated that the "percentage distribution of the 34,000 Hispanic freshmen enrolled in California in 1996 by sector was: 76 percent at the California Community College System, 16 percent at the California State University System, and 8 percent at the University of California System" (p. 9). For this input to build self-efficacy beliefs, young Latino students may not have had as many family or peer models in four year colleges as young White students. Given that Latinos have the highest high school drop out rate of any group in the U.S., a student using social comparison between him or herself and a similar peer who left high school could view their choice to attend a two year college in a positive light (Wheeler et al., 1997). Depending on how an individual interpreted the significance of the models he or she observed, they could be inspiring or discouraging.

Teacher expectations played a statistically significant role when they were at higher levels. Whether students were receiving verbal reinforcement from their teachers when they were demonstrating academic work with high potential or whether they were learning vicariously from the teacher's values and behaviors was unknown. It is also possible that Latino students perceived teachers as different from themselves in a way that convinced them to discount the impact of their expectations. For a reason not identified, some Latino students for whom teachers had high expectations did not make the same choices as similar White students. It is possible that another environmental vector was having greater impact on their decision making processes, or that they made meaning of the expectations of their teachers in a different way.

In the current research, Latino and White students had the same modal values for the school level variables (e.g., percent of students receiving free and reduced lunch, type of high school curriculum). Only two to three percent of the high school teachers responding in the ELS:2002 survey indicated that they were Latino/Hispanic in origin (J. Wirt, personal communication, 9/12/2006). It is difficult to tell whether that would be an influential environmental input for students or how they might process the experience. The current research did not address any variables related to racial climate in schools, but it could be important. It is possible that maladaptive beliefs that originate in prejudiced cultural sources can depress a person's self-efficacy beliefs (Pajares, 2002).

Social capital is another way to consider the importance of the relationships that are present in a person's environment. The literature showed that students who did not have strong social capital inputs in the home were still able to succeed if their school

environments provided encouragement (e.g., positive teacher expectations) and networking (Talbot & Kuehn, 2002). Bandura (1999) also reminded readers that the media has great impact on how we see the world and what perceived social realities influence our thoughts and actions. The media at the present time reflects more information regarding immigration laws and Latinos as undocumented workers than as educational success stories, so that is unlikely to generate encouragement or positive social capital. The current research did not have direct answers regarding social capital, and could only speculate on how encouraging or discouraging the environment is perceived to be by Latino students. Given the importance of social networking in communal cultures, the lesson learned from the environment could be “those I know and trust are attending community college, I will do the same.” It is unknown whether the positive social capital that Latinos garner (from school, family, friends, or other sources) encourages and motivates them simply to stay in school and move forward into any level of higher education, or whether it has a more specific effect regarding level of post secondary institution (Perna, 2000).

In sum, social cognitive theory provided a lens through which to view the many forces (internal and external, psychological and non-psychological) that potentially were compelling this additional group of Latinos to attend community college. Reciprocal triadic determinism is a dynamic model where the behavior component interacts with and emerges from the environmental and personal factors present at that moment in time. The reciprocal triadic field surrounding a Latino high school student preparing to choose a college seemed to vary depending on whether the student was high profile or low profile (in terms of

predicted probability generated by the model). Further description of the forces present in this conditional decision field would be useful.

Of course, the dynamic equilibrium among person, environment and behavior can be altered or re-established at levels that move more students toward four year colleges. For example, Latino students have historically taken lower levels of high school math than White students (Llagas & Snyder, 2003), although the gap could be shrinking. A recent NCES report showed that rates of completing a math as high as pre-calculus or calculus had increased for all racial/ethnic groups between 1982 and 2004 (Dalton *et al.*, 2007). For Latinos, the percentage of students completing these levels of math went from five percent to 22%, and for White students it increased from 12% to 37%. Perhaps over time, the increased academic profile and increased academic self-efficacy implied by these gains could translate into more Latinos matriculating into four year colleges (e.g., a mediating effect as opposed to a direct effect). Bandura (1980) showed that people are more willing to attempt a target action when their fears of failure are lower and their confidence in their ability to master the action is increased. More Latinos mastering higher levels of math could eventually improve the academic self-efficacy beliefs of a critical mass of students.

The mere fact that so many Latino students have been entering two year colleges could have created a critical mass or momentum in that direction. This was not measured in the current study. The message of the social network directed toward Latinos could contain both a pull toward community colleges (we are here and you should be also) and a push away from four year colleges (why are you going there instead). The social network of peers also could be used to gain information in order to rank salient institutions or to

generate social comparisons regarding future options (Wheeler *et al.*, 1997). Given the fact that Latinos have the highest high school drop out rate among U.S. students (22.4% in 2005, as compared to 9.4% total), and that foreign-born Latinos have a much higher drop out rate than U.S.-born Latinos (38% versus 13%), social comparisons may be between those who are college bound and those who are not. In that case, any post-secondary institution may be viewed as equally beneficial, which would not help channel eligible Latino students toward the more costly and more challenging four year institutions. Other forces contributing to the momentum toward two year college could be cultural emphasis placed on family relationships and the desire to be in a position to help family during and after degree completion (Phinney *et al.*, 2006).

It would be possible to engage the notion of stereotype threat (Steele, 1997) in deciphering what meaning a four year college could have for a Latino whose friends were making other choices. Whether the stereotype was that four year colleges were for the socially dominant group (e.g., European Americans, wealthy, from educated families) or that Latinos were not likely to complete a bachelor's degree successfully, the threat could cause qualified students to identify a community college as a more reasonable first step. Given that "In 2005, some 11 percent of all Hispanic young adults (ages 25 to 29) had completed at least a college degree, a lower percentage than the 28 percent of all young adults in the United States who had completed at least a college degree," a more productive first step might be the four year college itself (Kewal-Ramani *et al.*, 2007, p.124). Over time, more students making that decision could lead to a shift in the communal momentum and a lessening of stereotype threat.

A choice to attend higher education, and then a particular level of institution, is a behavioral expression. Bandura (1999) wrote that understanding human behavior “requires an integrated perspective in which sociostructural influences operate through psychological mechanisms to produce behavioral effects” (p. 27). From a social cognitive theory viewpoint, the choice to attend a community college would have environmental inputs, but those would be mediated through a person’s cognitive and emotional processes. The fact that the significant race/ethnicity interactions when viewed over a range of observations were test scores, student expectations and teacher expectations suggests that the environmental factors (e.g. verbal encouragement from teachers) could make contributions to some degree, but that at least part of the decision being made by Latinos would come from the person factors (e.g., ability as reflected in test scores, goals as reflected in student expectations or internalization of teacher expectations). The fact that the interaction effect was negative as compared to the White students in the current study does not negate the importance of person factors. It may point to barriers perceived by Latinos in the environmental inputs, or it may point to a social preference to attend the two year colleges that are close to friends, family and community. In either case, it is possible that raising self-efficacy beliefs would provide students the confidence they need to overcome the perceived barriers or to recognize the opportunities represented by four year colleges.

#### *Comparison with Literature*

The literature regarding reading and math test scores as predictors of college choice was fairly clear. Given the way academic profiles are used in the admissions process at universities, students usually need to have a certain level of test score to be competitive

candidates at certain levels of post-secondary (Contreras, 2005; Fry, 2004; Garcia et al., 1999; Llagas & Snyder, 2003). Students with very low test scores often have fewer options with four year colleges and may therefore turn to community colleges, some of which have open door admissions. Whether or not standardized tests are a fair indicator of a student's academic ability is a different (and considerably more contentious) question (Fuentes & Sedlacek, 1994). The ELS reading and math test was based on other standardized tests, as described in chapter three, but was created by NCES. However, there was little in the literature that could shed light on the question of students with relatively good test scores making the decision to attend a community college.

Although Kurlaender (2006) noted that Latino students at median and high levels of math test scores had higher likelihoods of attending community college than did similar White and African-American students, her discussion indicated that more explanatory factors should be investigated. Otherwise, she concluded that "race influences the type of college a student chooses to attend, above and beyond differences in prior academic achievement and socioeconomic status" (p. 12). Race as a complex concept could be further unpacked in that statement. General college choice literature suggests that students assess their own preferences and abilities as they compile a mental list of post-secondary institutions that are salient to them (Cabrera & LaNasa, 2000b). If students with good test scores are finding two year colleges more salient in their matrix of choices, it could be for other reasons. Of course, the current study controlled for expectations of students and teachers and SES, so those would not be the alternative factors in the matrix.

The literature regarding the impact of teacher expectations on students' educational outcomes offered some interesting perspectives. One study (Xie *et al.*, 1999) examined national data for students in grades four through twelve and stated that “teacher-ratings of spelling and math are consistently superior to self-ratings in the prediction of college attendance and early school drop-out” (p. 178). The students at each grade level tended to have a more optimistic view of their abilities, whereas teachers had expectations that were in line with external criteria for spelling and math, and therefore considered to be more objective. However, teacher expectations are not formed in a vacuum. Another study found that teacher expectations were lower for boys than for girls, and for low SES students than for middle SES students (VanMatre *et al.*, 2000). Teacher expectations were also influenced by the differences in state policies regarding end of year testing and school accountability. Schiller and Muller (2000) used NELS:88 data to show that teacher expectations had a weaker relationship to whether or not a student earned a high school diploma when the state policies held the individual student accountable for low test performance. When the entire school (and thus the teachers as well) experienced consequences for low test scores, the relationship between teacher expectations and student diplomas was strengthened. Thus, the context in which teachers and students were working did seem to mediate the formation and impact of expectations.

In the current research, teacher expectations was significant as a main effects predictor for all students (in a positive direction). In the model with interactions, teacher expectations and student expectations were both high for a subset of Latino students. However, the interaction effect was localized to a very small area in the range of predicted

probabilities. For Latino students who otherwise had a high predicted probability of choosing a four year college, the impact of positive expectations from their 2002 English teachers (expecting them to earn a bachelor's degree or more) was negative. Thus, when comparing a portion of the Latino and White populations that represented good candidates for baccalaureate degrees, there was a four or five percentage point drop in the interaction effect of this variable. These findings cannot indicate why fewer of these particular Latino students were planning to go to a four year college, but they did show that barriers like ability to impress one's high school teachers, compete for college admission, or pay tuition were not likely to be the reasons. These factors were held constant while examining the teacher expectations interaction. Therefore, regardless of whether the teacher expectations were biased or objective (per the literature), they were in the same range as the students' own expectations and the interaction effect was still negative. Perhaps another factor was at work that caused Latino students to discount those expectations even as they and their teachers espoused them (e.g., the context of a poorly resourced school).

Existing research regarding the impact of student expectations is mixed (Behnke *et al.*, 2004; Chemers *et al.*, 2001; Goldsmith, 2004; St-Hilaire, 2002). Some younger Latino students (average age of 14 in the study) could state their aspirations for education or occupations but could not express what steps should be taken in order to reach those goals (Behnke *et al.*, 2004). A high percentage of eighth and ninth grade Latino students in St-Hilaire's research indicated an interest in higher education, but documented high school drop out rates show that perhaps not all of those students would achieve their stated goal later on. The average high school drop out rate for Latinos was 22.4% in 2005, with the rate

being higher for foreign-born students (38%) and lower for U.S.-born students (13%) (Kewal-Ramani et al., 2007). St-Hilaire stated that there is “an imperfect match between aspirations and realistic expectations for education beyond the ninth grade” (2002, p. 1036). Goldsmith (2004) also commented on the difference between abstract attitudes and concrete attitudes that come from life experience. Although expectations may have become more concrete (and thus lower at times) as students moved from ninth to twelfth grade, he wrote that even abstract and optimistic aspirations were better than no aspirations at all. “Blacks and Latinos have an advantage over Whites: more optimism and more pro-school attitudes. Neither advantage is enough to overcome the entire gaps in achievement, but these differences in beliefs help reduce them” (p. 142).

Gonzalez and Hilmer (2006) stated that “educational expectations formed prior to college enrollment are important factors in the postsecondary outcomes of students” (p. 257). Their research examined a number of different factors related to college choice for an ethnically varied participant group. Chemers, Hu and Garcia (2001) worked with ethnically diverse research participants who were already in their first year of college, and they demonstrated that academic expectations for performance on courses were mediating the relationship between academic self-efficacy beliefs and academic performance. This suggests that student expectations are important throughout the educational pathway but perhaps function in a more concrete and specific way as students progress.

In the current research, the most common response from both Whites and Latinos to the question “how far do you think you will get?” was to complete a four year degree. The modal response was the same in the 2002 ELS survey of 10<sup>th</sup> grade students and the 2004

ELS survey, although a more detailed description of the response pattern showed statistically significant differences between the Latino and White students (as shown in Figure 4 in chapter four). Both groups of students had slightly lowered their expectations by the 2004 survey with the Latino students having a larger decrease. The current study thus replicated the finding in the literature that student expectations tended to move downward (sometimes interpreted as becoming more realistic) as students progressed through their secondary education. The unanswered question for Latinos is whether their downward adjustment was an appropriate correction of overly exuberant expectations or whether they came to underestimate their future educational potential for some reason. This is important in the context of the large numbers of Latinos entering two year colleges and thus reducing the chance that they might someday obtain a bachelor's degree, as many of them stated they wished to do (Swail et al., 2004).

Social cognitive theory and reciprocal triadic determinism (person-environment-behavior) describe some of the mechanisms that may come into play as individuals attempt to regulate themselves and move toward a future goal. "These [mechanisms] are governed by appraisal of personal capabilities for different pursuits, long-range aspiration merged with working proximal subgoals that lead to its fulfillment, positive and negative outcome expectations for different life courses, the value placed on those envisioned outcomes, and the perceived environmental constraints and opportunity structures" (Bandura, 1999, p. 15). A downward adjustment in expectations may have been due to a new appraisal of academic ability after encountering higher level courses in the senior year, the change from a positive to a negative expectation for the outcome of attending or graduating from a four year

college, or an increased perception of constraints or difficulties in the environment. In the dynamic triad of person, behavior and environmental factors, student expectations (P-E aspect) may be the force pushing Latinos on toward post-secondary goals while external barriers (E-B aspect) slow their rate of progress. Some of the downward adjustments may have been reasonable given the reality of the student's environment (e.g., family constraints). However, some timely support given to the student as he or she sought to make meaning of the sociostructural inputs could have altered the behavioral output. Support for academic self-efficacy beliefs potentially could shift the balance of the interacting forces enough that the positive aspirations could still be pursued or the opportunity structures could still be recognized.

#### *Non-Significant Interaction Terms*

Although it seems to run counter to conventional wisdom, there was a precedent for the finding that some important predictors like SES or level of math taken in high school did not explain the different rates at which White students and Latino students chose to enter community colleges. Cabrera and LaNasa (2000a) state that "The dominant role of socioeconomic backgrounds in college destinations appears to diminish when longitudinal data bases, along with powerful statistical models that control for socioeconomic background, preparation for college, and college application behaviors, are brought to bear" (p. 15). Kurlaender (2006) also used data from NCES and found that even Latinos with mid to high range SES family backgrounds were "disproportionately choosing community colleges over four-year institutions" (p. 12). She noted a similar trend with academic achievement and Latinos; their preference for community college was consistently higher

than White and Black students, regardless of the level of their math test scores. Kurlaender also investigated the role of degree intentions, as measured by SAT/ACT completion and stated educational goals. As with the other variables, Latinos continued to be more likely than all other students with the desire to complete a bachelor's degree to choose a community college first. Together, the current study and Kurlaender's research suggest that some of the typical explanations for community college attendance do not tell the whole story for Latino students.

Some of the factors that Kurlaender (2006) did not address were self-efficacy beliefs, the ability to live at home while attending school, delays in initial enrollment, course taking patterns in high school, and access to information about college. The current investigation helped to fill some of those gaps in the overall picture, but still concluded that those additional variables did not fully describe the observed trend of Latinos attending community colleges. At its most basic level, a choice of post secondary institution is a multidetermined piece of human behavior, a form of expression. It is always prudent to remember the caution that "it is exceedingly difficult (if not futile) to develop broadscale theories aimed at predicting human behavior in general" (Heppner *et al.*, 1999 p. 10). This particular behavior may not be easily reducible to component pieces, or there may be other influences that research has not yet addressed. As suggested in an earlier section of the chapter, there also could be two distinct groups of Latinos choosing community college for a divergent set of reasons.

### Summary Analysis

The current research has provided a few new perspectives on the question of Latino student selection of community colleges, and a few new questions as well. The logistic regression analysis indicated several common factors that were associated with college level choice for both Latino students and White students, however the differences in rate between the two groups were still largely unexplained. The traditional tests ( $p < .05$ ) with interaction terms demonstrated only one variable (student expectations) which differentiated Latinos and Whites and their probabilities of the reference outcome. The newer approach (Ai & Norton, 2003) uncovered some observations that were significant across the range of teacher expectations and test scores when interacting with race/ethnicity. Each of those interactions should be understood as significant when controlling for the interactions of race/ethnicity with the other three predictors (i.e., SES, test scores, teacher expectations, or student expectations). Put together with prior research studies, this project added a few more items to the list of variables that do *not* predict the different rate at which Latino students choose to attend two year colleges. When holding constant some focal variables such as highest math course or SES, Latinos still indicated that they planned to attend a two year college at a greater rate than did similar White students. Latino students who gave positive responses regarding their academic self-efficacy beliefs for certain tasks continued to be more likely to plan for community college than White students with the same self-efficacy beliefs. It is possible that the right combination of predictors has not yet been studied, and that there is still an answer embedded in a new variable set.

However, the significant interactions with race/ethnicity and student expectations, teacher expectations, and test scores were important discoveries. The model that contained the main effects predictors plus the four interactions of interest was useful in that it could control several pertinent variables at once. The predictors present in the main effects equation meant that effects could be examined while the other variables were held constant for the whole sample. Having the four interactions present in the same equation as well meant that SES, for example, could be controlled for as it was moderated by the race/ethnicity variable. Therefore, to state that some ranges of test scores had a different interaction effect for Latinos and Whites while accounting for SES in each group is a much more powerful finding. These were the only variables to contribute meaningfully to the observed difference in probability of the outcome, so it is also important to look at their relationship to each other (e.g., possible connection to school environments). For Latino students who were similar in many other ways to their White peers, the impact (while controlling for SES) of having high test scores, high regard from their teachers, and high expectations for their own future education was negative. Why this should be the case is not within the scope of the analysis, but speculation is possible.

If a fully satisfactory answer so far has not come from examining a laundry list of discrete predictor variables, a step back to view the macro level may be instructive. The ethnic category, “Latino,” is a cultural one. This sense of shared culture arises from some internal values or traditions, and in the United States, may also be shaped by external reactions to the group. Phinney (1990) suggested that to claim the ethnic identity of Latino in the U.S. would include self-identification as a member of the group (behavior factor), a

sense of belonging with the group (person factor), and reflection on feelings such as pride or discontentment with the group (person factor). Although unstated, it is the case that ethnic identity is often formed in the context of the norms of the dominant cultural group (environment factor).

This is not dissimilar from social cognitive theory, which also emphasizes the interactions among person factors (beliefs, values, abilities, etc.), environmental or sociocultural factors, and behavior (Bandura, 1999). Bandura refers to emergent interactive agency as a way to encapsulate this idea. People are not fully autonomous in that we are always in turn influenced by and influencing our social context. Claiming a Latino ethnic identity in the U.S. may also be thought of as an interactive process with bidirectional social influences. Making a decision about higher education from that particular vantage point could mean balancing competing interests or could be a simple and coherent act, depending on the individual involved. In the current study, the idea of two different Latino sub-groups based in different social contexts was advanced as a possible framework.

What does the literature tell us are common traits or values in the Latino community? Bearing in mind that there is variation in terms of adherence to traditional Latino value systems or level of acculturation to individualistic U.S. values, the literature reflected collectivism and connection to family as characteristic of many Latinos (Marín & Marín, 1991). This would not likely differ by academic circumstance (e.g., high profile or low profile), and the authors also indicated that this familialism did not tend to diminish with generational status in the U.S. Bandura (1999) might have phrased it as people “selecting environments compatible with their values, attributes, and aspirations and [by]

constructing social environments through their actions” (p. 19). The focus on family connections may also include “ (a) perceived obligations to provide material and emotional support to the members of the extended family; (b) reliance on relatives for help and support; and (c) the perception of relatives as behavioral and attitudinal referents” (Marín & Marín, p. 13).

Viewing the choice to attend community college through this focus on family connections, the sense of obligation to relatives or the desire to maintain close relationships for support are potential influences. The idea that family could be the most important reference point for actions, thoughts, and beliefs may also be important. Whether Latino students tended to listen more to their families and abide by collective decision making or whether they tended to follow other family members to the same campuses, this network may be one of the most crucial to attend to. It is possible that Latino students with higher socioeconomic status or higher academic profiles have chosen to attend community college for reasons that primarily relate to family, while Latinos that fit the more traditional community college profile have made cost, admissions and location their primary decision factors, with family as an underlying factor.

In a process parallel to immigration networking, where many members of the same family or town in another country may settle in proximity to each other in the U.S., there could be a networking process in the higher education selection of Latinos. If students with good academic credentials and sufficient financial resources were choosing community colleges above the other options that were available to them, the reasons could have been social in nature. More than just living at home and attending whatever colleges are in

proximity, there may have been an expressed or unexpressed desire to go where other members of your network were. There were not any variables in the current research that related to social networks other than the preference to live at home and few that tapped the importance of family beyond the surface level. Those aspects may require more qualitative investigation.

### Limitations

#### *Measurement*

In the course of all research, decisions must be made which place limitations on the study. In the present investigation, one limiting factor was the reliance on extant data. If there were limitations in the ELS survey construction (such as item validity) or implementation (such as appropriate student interpretation of the items or limited age range of student participants), those were beyond the influence of the current research. In general, the NCES datasets are both vast and rigorously prepared for research use by experienced professionals. Any limitations due to the inability to create new survey items or direct attention to a specific topic were more than compensated for with the national scope of the data, the wide variety of existing variables, and the expertise of the NCES staff. The fact that the researcher could not access restricted data and had to accept the public-level data meant that certain types of information was not available (e.g., national origin of Latino participants, state location of the high schools surveyed). Therefore, the potential omission of important variables was a related limitation.

If the ELS:2002 survey was not a perfect fit to the academic self-efficacy research questions posed in the current study, it was an acceptable compromise. The

operationalization of academic self-efficacy as a concept was defensible; it could be linked to Bandura's (1977) original ideas and other instruments with established psychometric properties (e.g., PISA). Measurement of beliefs through self-report survey data is always difficult and some amount of bias or error is expected.

Additionally, the missing data that were associated with the self-efficacy items could have been seen as limitations. The position of the items at the end of the ELS written survey created this problem, as opposed to any difficulty with the content. Although the researcher attempted to deal with missing data in the most logical manner possible, any effort to recreate data must include a degree of error. A larger participant group had to be narrowed due to general nonresponse issues, which could reduce statistical power. However, the trade-off could be that the analysis was strengthened through judicious use of imputation to fill in some of the non-response categories.

By using multiple imputation to deal with missing data, the researcher also made certain assumptions which could be seen as limitations. As described in a previous chapter, data were assumed to be missing at random, which is a necessary foundation for multiple imputation but was difficult to verify. The researcher also had to make decisions about the various reasons NCES provided for missing data, and whether particular categories of missing data would be dropped from the research or imputed. The complex sample design utilized by NCES meant that weights associated with data observations needed to be maintained throughout the missing data procedures. This was done to the extent possible, although the Markov Chain Monte Carlo step in multiple imputation would not allow a

frequency statement to be included. Although the final imputation step did include weights, the MCMC procedure was limited.

The researcher had to make decisions about how to treat ordinal variables that were present in the database. For example, the ELS:2002 survey collected data about how many students at a high school were receiving free and reduced lunches, and then clustered those responses into seven categories. While the categories did progress from least number of free and reduced lunches to most, the distance between each step was not uniform. Some other variables also had qualitative steps that were treated as equidistant but may not have been (e.g., expectations for future education ranging from high school diploma to two-year degree to attending but not graduating from four-year college and beyond). Finally, the ELS coding was with whole integers, but the regression analysis would allow the variable to take on fractional values between the integers. These fractions did not exist in the database and may not be interpretable. These assumptions about ordinal variables were part of the coefficient estimation process, so the results should be interpreted under the same assumptions.

Another limitation related to measurement encompasses interpreting the responses provided by the Latino participants. Marín and Marín (1991) indicated that “Hispanics may often provide inaccurate and socially desirable responses, may produce large proportions of missing data, may prefer extreme and acquiescent responses, and may show low self-disclosure to strangers” (p. 101). Although the research support for these assumptions varied in strength and relevance, there could be consequences for the current research related to this list of potential complicating factors. Even if it could not be verified whether

or not those problems were present, a responsible researcher would be careful to evaluate them and describe their potential impact on the analysis.

The tendency to emphasize positive or socially approved responses or to cooperate with what is perceived as the researcher's agenda (acquiescence) may be even more pronounced among Latino populations, due to cultural tendencies such as *simpatia* and collectivism (Marín & Marín, 1991). Socially desirable responses may be seen more often with questions regarding sensitive behavior (e.g., smoking, drinking, HIV risks, etc.). However, educational choices may still tap into issues of respect and pride. The outcome was phrased in terms of intentions to attend a two-year or four-year college, and some students may have chosen to report the four-year college planning outcome due to perception of status or social hierarchy. A tendency for individuals with lower social status markers or less acculturation to the U.S. to defer to individuals with higher social status markers could also mean that some of the Latino participants said yes just to maintain accord with the NCES data collector. By controlling for SES, immigration status, or primary language, however, this threat to the response validity would be minimized. The use of a social desirability index in future research is a suggestion, but Marín and Marín also indicated that no single scale had yet been evaluated for appropriate use with Latinos.

Although missing data were dealt with in the current research by multiple imputation procedures, the possibility of low levels of self-disclosure to strangers still merits reflection. It would not be possible to ascertain which Latino respondents participated in the telephone survey, which ones completed items with a researcher present in the room, or if there were different disclosure tendencies on the written portions of the survey. Also, setting (home or

school) might have affected comfort level and willingness to disclose, as would personal attributes of the interviewer (Marín & Marín, 1991). In the ELS:2002 survey, the presence of multiple viewpoints (e.g., student, parent, teacher, and school administrator responses) could help round out any poorly represented data items. Other than making data collection as comfortable as possible, it can be very difficult to control for low self-disclosure.

To deal with the potential problem of extreme responses to Likert scale items (such as the academic self-efficacy items), Marín and Marín (1991) cited other studies that suggested reviewing the full range of score distributions for Latino respondents, not simply the means or modes. Another remedy could be grouping high and low extreme response categories with the neighboring responses (e.g., Strongly Agree and Agree) in the scoring procedures. The range of responses to Likert scale items in the current research did not appear to pose any problems.

The phrasing of the outcome variable in the ELS survey could be seen as a limitation. After students responded in a previous item that they intended to continue with their educations at some future point after high school, they were routed to the outcome item. The item was phrased in terms of the particular level of higher education that students were most likely to attend. It did not specify the order in which students planned to matriculate, so it is possible that students could have interpreted the timeline of their postsecondary intentions loosely. The outcome variable may not distinguish reliably between students who wanted to go directly into a four-year college and those who planned to eventually enter a four-year college.

In addition, intentions are not a perfect proxy for actual enrollment. It is a fair guess that many students were sure of their post secondary destinations by the spring of their senior years, but nothing would be certain until fall enrollments actually occurred. For example, the Latino students in the current study were planning to attend two year college at a lower rate than the actual attendance rate that has been reported in the literature. In an older NCES survey with a similar age range (NELS:88), Swail, Cabrera, and Lee (2004) showed that 61% of the college-bound Latinos actually matriculated in a two-year college. In addition, Latinos were reporting higher percentages of intention to go to four year college in the current study (57%) versus the NELS:88 Latinos who actually enrolled at that level (33.7% of those who proceeded with higher education). This phenomenon was not limited to Latinos. White students also reported their intentions in the current study in a manner that favored four year colleges (76% were observed to make that choice as opposed to 24% planning to go to two year colleges). Swail et al. (2004) showed that 42% of White students matriculated in two year colleges and 54.8% began their studies in four year colleges in the NELS:88 data. It is possible that the newer ELS dataset is showing different trends, or that it will look the same as NELS in this regard and that students were overstating their intentions. The data regarding the actual enrollment of the ELS:2002 students were collected in 2006 and planned for release in mid-2007, according to the NCES website.

Another potential limitation involved circularity between the outcome variable and the 2004 student expectations variable. In other terms, it was possible that a student's plan for his or her starting point in higher education affected future goals and expectations, as opposed to the assumption that the future goal drove the planned starting point. A linear and

uncomplicated path from high school to a baccalaureate may have existed in the past, but research increasingly shows that students are moving among institutions and “swirling” on their way to a degree (McCormick, 2003). The starting point and the finishing line may not be where researchers traditionally have expected to find them, potentially prompting some redefinitions in approaches to higher education progress or attainment studies.

### *Internal Validity*

As is always the case with correlation designs, a logistic regression study does not permit statements about causality. However, quantitative descriptive research can still offer some valuable findings even with that limitation. Statistics like the percent correctly predicted (PCP) and percent reduction in error (PRE) helped guide readers in estimating how much confidence they could have in the study. Given the range of human variability, research in the social sciences is somewhat less exact than research in the hard sciences, so diagnostic statistics will be comparatively lower (Heppner et al, 1999). The PCP of 83% (for both the main effects model and the model including the interaction term) was a fairly good number, given that it was an improvement over what one could have achieved simply by using the mean of the outcome variable (73.6%) as a guide. The overall PRE (35.6%) was also fairly good but not excellent, given the selected baseline (Hagle & Mitchell, 1992). The higher PRE for Latino students in the model with one interaction term lends more evidence to the inclusion of the student expectations variable. In addition, the Wald tests and likelihood ratio tests all indicated that the researcher’s model contained some predictors that made it stronger than simply the constant alone (null model). Taken together, these

were reasonable signs that the study had some ability to describe the influences on the outcome as it purported to do.

Some of the main effects variables were found to be statistically significant, but the magnitude of the effect on the outcome was very small. It is possible with large datasets to meet the criteria of statistical significance due to the sheer numbers, but in reality to have a finding of little consequence (Pampel, 2000). In particular, the free and reduced lunch variable had an effect of 7.95% decrease in predicted probability, low expenses as an important factor in college choice had an effect of a 9.5% decrease in predicted probability, the math and reading test score quartiles had an effect of a 7.63% increase in predicted probability, and the act of seeking college entrance information from a representative had an effect of a 7.1% decrease in predicted probability of the outcome.

Some researchers believe that having a “laundry list” of predictor variables in a regression is a limitation. For example, if a study contained 20 predictors and was being evaluated at the .05 level of significance, one of those predictors could emerge as significant solely by chance (Garson, n.d.). With a large sample size (such as the current research), there should have been a sufficient number of observations to sustain analytical power over a large number of predictors. However, it is also true that a more parsimonious model has advantages in terms of degrees of freedom for statistical testing. There is always a balance between trying to include potentially important variables and trying to prune out superfluous variables. When deciding how many variables to include as predictors, a researcher should consult the literature to see how many variables have been identified as conceptually important and how many have already been ruled out by prior investigation. Since there has

been some research about Latino students and choice of level of college, but not an exhaustive and comprehensive amount, the decision was made to treat the list of predictors as exploratory. Trimming predictors away before confirming that they had no effect on the outcome could result in a misspecified model, which could produce bias (Jaccard, 2001). However, it also appears that predictors that contribute significantly to the observed outcome for Latinos and were not identified in the current research still exist. Therefore, the exploratory phase for this research question cannot be considered closed.

### *External Validity*

The national scope of the NCES datasets was a benefit for generalizability, although they cautioned that the clustering phase of the complex sampling means it could not be considered representative at the state level. The researcher was unable to access respondent location in the U.S. with the public level data, and so the regional distribution of Latino students was unknown. This geographical limitation could be important because there are several states with high Latino population densities, such as California, that also have distinctive educational policies and structures. Eligibility guidelines established in California's Master Plan for Higher Education created three tiers of students – those who can apply to the elite University of California campuses, those who can apply to the Cal State campuses, and those who must begin higher education at community colleges and hope to transfer after several semesters (Martin *et al.*, 2005). Martin and his colleagues also demonstrated that there was a negative correlation between the percentage of Latinos attending a high school and the percent of students graduating from that school with the courses required to be UC eligible ( $r = -0.36$ ). If a majority of Latinos in the current

research were subject to this kind of downward pressure when making their selection of a higher education institution, it could cause a bias in the findings. Although the current study cannot rule this out, the literature (Kurlaender, 2006) indicated that controlling for state location did not change the outcome in terms of Latinos and community college selection rate.

It was also difficult to generalize results when the community that fits under the umbrella term “Latino” is so diverse in character. It may have been better to examine college choice by the various national affiliations that exist within the larger group. That option was not available in the public level ELS:2002 data release. The current research could control for variables like generation of immigration at a general level but not for every distinguishing characteristic of Latinos in the U.S. For example, students who are still in the process of learning English as a second language are important candidates for research, but it can be challenging to find the means to include them.

### Recommendations

#### *Implications for Research*

Future researchers can still endeavor to specify predictor variables that differentiate between the reasons why Latinos choose community colleges in relatively large numbers and the reasons that students of other racial or ethnic backgrounds do so with less frequency. The Ai and Norton (2003) analysis also suggested that interactions in logistic regression that were initially evaluated as non-significant overall could have a range of values where the interaction effect was indeed significant. It might be illuminating to repeat some past research using this technique. An interesting hypothesis suggested by the current study is

that of two distinct groups of Latino students entering community colleges – to date, that angle has not been investigated and would require qualitative details to truly understand any existing differences. The fact that student and teacher expectations were two of the three significant interactions with race/ethnicity in the current investigation means that it is reasonable to consider person level variables (e.g., motivation, influence of family, other forms of self-efficacy beliefs) in addition to the environmental and behavioral variables that are more commonly selected. Variables related to family and collective values are candidates for future research due to their importance in the cultural lives of many Latinos.

Due to that emphasis on social connections and social norms that comes with a collectivistic orientation, a social network analysis may be an alternate research strategy to consider. If Latinos are making decisions based on the actions or recommendations of others in their network, that influence could be highlighted. This would not be a causal analysis but could test whether these relationships merit more attention in other types of research. Another method which could be considered is a path analysis. A path analysis could describe the way such predictors relate to each other, potentially circumventing the difficulty encountered in the current research with interaction terms canceling each other out. In this way, the investigator would be able to see if SES is moderating another variable, for example, instead of having a direct relationship with the outcome variable.

Whether research is conducted by creating surveys and experiments or by analyzing extant data, investigators should always use great care in creating or selecting variables. In the current study, the composite SES quartile score was selected because it could triangulate data from different scales (e.g., parents' education, parents' occupation, family income) in

order to describe a family's economic situation more completely. However, the inclusion of several types of measures for SES then caused problems with multicollinearity and potentially created overlap with other interaction terms. Thus, even though Latino and White students had vastly different SES modes in the sample, the variable did not emerge as significant. Research intuition may have indicated that Latinos from the lowest SES quartile and Whites from the highest SES quartile would have significantly different experiences in selecting an institution of higher education, and perhaps in a different variable context, the findings would have followed the intuition.

One of the implications of the research procedures used in the current study is the importance of using the literature to identify the newest techniques for addressing missing data or analyzing results. Procedures continue to evolve, and even though the familiar route for data analysis may be the most expedient, attempting a new form of analysis may provide better information and may contribute to advancing scientific methods. In particular, the multiple imputation procedure for missing data and the use of a cross derivative to evaluate interaction effects across a range of observations were implemented in the current research.

#### *Implications for Practice*

It is important to note the things human beings have in common, not just the things that seem to make us distinct from each other. The main effects variables that were statistically significant were for all members of the sample, regardless of race/ethnicity. The fact that there were eleven significant predictors associated with the outcome for all students, and only one predictor that was significant in the traditional interpretation (three in the alternate interpretation) when race/ethnicity mediated the relationship to the outcome is

telling. As counselors and educators, we have an ethical duty to examine our assumptions when assisting clients of a different background. Instead of asking, “Why do Latino students want to live at home instead of moving away to attend college?” we might broaden our focus to include students from other racial or ethnic groups who are making the same choice. Unexamined bias regarding Latino students could influence the way the question is asked. Bandura (1999) wrote “What theorists believe people to be determines which aspects of human functioning they explore most thoroughly” (p. 2). The current investigation suggested that social or environmental variables may have had a greater impact on decisions regarding post-secondary education than racial/ethnic categories. That is to say that students facing the same social situations may have more in common than students marking the same racial/ethnic categories on demographic forms. Therefore, it is important for counselors and educators to treat people as more than typical exemplars of a racial or ethnic group.

Self-efficacy was not the only significant influence in the current study, but it was an important addition to the scope of research. Student expectations emerged as significant in both the main effect equation and the interaction terms. Therefore, counselors and educators who are not accustomed to assessing students for academic self-efficacy beliefs and educational expectations may consider including them. Students could be encouraged to reflect on their own self-beliefs, and counselors/educators could help provide the constructive and realistic feedback that can improve beliefs and expectations. In particular, the academic self-efficacy item regarding sustained efforts in studying difficult material was an influential one. This attitude of resilience and determination may come easily to some but can be learned by all. Counselors and teachers can be key support people for students

who feel like giving up when confronted with a challenging task, and students who learn to be more resilient can potentially benefit in many areas of their lives. Bandura (1999) indicated that mastery experiences such as these are one of the most important sources of self-efficacy beliefs. Simple success does not build resilience in the same way as “overcoming obstacles through perseverant effort” (p. 46).

The teacher expectations predictor was statistically significant as a main effect and when interacting with race/ethnicity, and that serves to remind all practitioners that our private assessments of clients’ capabilities may be important anecdotal evidence. Whether or not the teachers in the ELS study shared their expectations for future educational accomplishments with their students, their professional opinions had some accuracy. Particularly in the case of students for whom teachers have positive expectations, sharing that information could serve to bolster academic self-efficacy or provide social capital to the students. Even beyond encouragement toward goals, teachers are in an excellent position to give students incremental experiences that build abilities and confidence. Bandura (1999) wrote, “Effective social persuaders do more than convey faith in people’s capabilities. They arrange activities for others in ways that bring success and avoid placing people prematurely in situations where they are likely to fail” (p. 47).

School counselors may take note of the significant main effects predictors regarding influences on the decision-making process. Students who have not considered why the academic reputation of an institution could be an important factor can be encouraged in this direction. Students who seem to be preoccupied with cost factors or with distance from home may be making an appropriate choice regarding community college. However, if

counselors also know them to have high academic profiles or high aspirations for future education, then a respectful conversation exploring ways to finance education or stay in touch with family while away from home could be useful.

Counselors and educators are in good positions to work systemically as partners with or advocates for cohorts of Latinos students who want to maximize their educational potential. A noted strength of both disciplines is the focus on personal development, and in the current research the psychosocial predictor was the strongest. This suggests continued support for community and school-based programs that enhance self-efficacy beliefs in Latinos (e.g., providing collegiate role models or mentors to younger students, linking motivation or degree expectations to concrete performance steps, preparing school counselors to provide appropriate, non-biased encouragement and persuasion to all students, working with upper level secondary or community college students to improve their academic self-efficacy for university study).

Finally, student development or student affairs professionals at four year colleges may be interested in attracting more Latino students who are baccalaureate candidates. This includes program-level implications in addition to student-level implications. Educators can begin to assess the strengths and weaknesses of the K-12 educational system that feeds their campuses and determine where to create or enhance partnerships. Community agencies and outreach programs (e.g., TRIO, GEARUP or Gaining Early Awareness and Readiness for Undergraduate Programs) are also important service providers (Swail, 2000). The goals of these programs often include exposure to college, awareness of options, improvement of academic skills and self-esteem, and introduction of mentors. Communication networks that

bring together interested parties from all of these systems (primary and secondary schools, agencies, two year and four year colleges) can start to identify the needs of local Latino students. Depending on the recency of arrival of Latinos in the area, there may be a plethora or a scarcity of information about them in each level of the educational system. Providing the leadership to connect the points along the educational pathway can assure that there are no needless barriers preventing students from reaching their goals. This lays the groundwork for the individual efforts mentioned earlier (augmentation of student expectations and self-efficacy beliefs). As in any multicultural counseling endeavor, knowledge and awareness are the starting points (Ponterotto *et al.*, 1995).

#### *Implications for Policy*

Based on the main effects findings, there are several ways that concerned individuals and organizations can make an impact for both Latino and White students. Programs aiming to encourage higher education participation could focus on improving conditions at high schools with high percentages of free and reduced lunch program recipients, encouraging more participation in pre-calculus or calculus for a wider cross-section of high school students, providing incentives for taking SAT/ACT or support for the registration fees, or giving preparatory classes so that students can take advantage of the opportunity provided by a standardized test. Although the current investigation could not confirm whether federal and state laws about undocumented immigrants and tuition rates at post-secondary institutions had any effect, it remains an important policy item to monitor.

It must be re-emphasized that the current research was not intended as a criticism of community colleges nor those students who attend them. It is an acknowledgment that

students who enter community colleges with other goals in mind (four year degrees or more) are perhaps less successful in reaching those goals than similar students who enter baccalaureate institutions. Garcia (2001) noted simply that “some paths are potentially more productive than others” (p. 27) in higher education. Tracking and improving transfer rates between community colleges and baccalaureate granting universities is not a new goal for educational administrators. Given the high proportion of Latino students in two year colleges and the relatively low transfer rates that have been noted, this educational policy item continues to merit attention. A study done by the Center for the Study of Community Colleges with the cooperation of several states noted an average transfer rate of 22% but for Latinos an average transfer rate of 12% (Palmer, 2001). Participating states included most of those with large community college systems (i.e., California, Colorado, Florida, Illinois, Kentucky, Louisiana, Maryland, Minnesota, New Jersey, New York, North Carolina, Oklahoma, Texas, Washington, and West Virginia).

Since the scope of policy recommendations can vary from national legislation to best practices in a classroom, it is challenging to address every level. However, it is also important to have coherent policies at the large, systemic level (national and state) as well as targeted local policies that reach individuals and their specific areas of need (Swail, 2000). The investigator can confidently direct interested readers to the Pew Hispanic Center (<http://pewHispanic.org>) or Excelencia for Education (<http://www.edexcelencia.org/>), two national research organizations that have detailed policy recommendations related to Latinos and education. In particular, the Pew Hispanic Center has a recent document entitled “Federal Policy and Latinos in Higher Education” that is useful (Santiago & Brown, 2004a).

It is too comprehensive to be summarized here but provides an excellent context for understanding the scope of policy issues. *Excelencia in Education* also provides a document entitled “What Works for Latino Students,” which lists exemplary programs functioning from pre-kindergarten to the university level (Santiago & Brown, 2004b).

The current research has made a contribution in terms of identifying academic self-efficacy as an important predictor of the choice Latino students are making between attending two year colleges or four year colleges. This opens the door for more awareness of the role of human agency in such decisions and perhaps cautions against over-attribution to environmental or demographic factors. There may still be additional mechanisms contributing to this choice, so the present work should not be the final piece of research in this area.

Bandura (1999) wrote,

Humans have an unparalleled capacity to become many things. The qualities that are cultivated and the life paths that realistically become open to them are partly determined by the nature of the societal systems to which their development is entrusted. Social systems that cultivate generalizable competencies, instill a robust sense of efficacy, create opportunity structures, provide aidful resources, and allow room for self-directedness increase the chances that people will realize what they wish to become. (p. 65)

The vision of providing such a nurturing social system to every child has not yet been realized in our imperfect world. However, counselor educators and all others who try to find ways to maximize human potential through education are a key component of that social

system. Healthy student development by definition involves the natural unfolding of a person's traits and talents, their attitudes, interests, and aspirations. Students should be moving stage by stage to more complex and capable positions, becoming more integrated in their sense of selves. College choice is not a single decision, but the culmination of many decisions along the way. With a positive set of self-efficacy beliefs, all students have the building blocks to realize their educational dreams. Our job is to clear the path of barriers and enrich the environment, providing the best possible conditions for choice and growth.

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APPENDICES

## Appendix A

## Changes due to Markov Chain Monte Carlo (MCMC)

## and Multiple Imputation (MI) procedures

Variable	# missing	item means	# missing	item means	# missing post
	pre-MCMC	pre-MCMC	post-MCMC	post-MCMC	final MI
Outcome	26	0.7717069	0	0.7704297	0
Country of birth	10	0.0470663	0	0.0469671	0
Continue in school	10	1.1158717	0	1.1156276	0
Free/reduced lunch	342	2.5921471	4	2.6172283	0
Hours working/week	41	4.3433185	0	4.3494103	0
Low expense choice					
factor	29	2.0894257	0	2.0899326	0
Curricula choice factor	50	2.6247339	0	2.6229992	0
Living at home choice					
factor	40	1.5531011	0	1.5562342	0
Academic reputation					
choice factor	62	2.530303	0	2.5288543	0
Easy admissions choice					
factor	56	1.7448849	0	1.7468408	0
Highest HS math	18	5.3775899	0	5.3748947	0
Hours on homework	10	4.4371043	0	4.4380792	0
Try to learn	1016	2.9694534	967	2.9381634	0

## Appendix A, continued

Variable	# missing	item means	# missing	item means	# missing post
	pre-MCMC	pre-MCMC	post-MCMC	post-MCMC	final MI
Learn it well	1145	3.1326672	1145	3.10615	0
Keep studying	1114	2.8271877	1071	2.8038332	0
English HW	1065	2.9872387	1017	2.9625527	0
Math text	931	2.4671208	903	2.4559393	0
Teacher expectation	57	4.6894052	0	4.6918703	0
Parent aspiration	69	5.5622996	0	5.5633951	0
Discuss college	611	2.45927	533	2.4490733	0
Take SAT/ACT	42	2.8954526	0	2.8951137	0
Guidance Couns as source of info	366	0.4696486	121	0.4704718	0
Teacher as source of info	366	0.3210863	121	0.3241786	0
College web as source of info	366	0.4098585	121	0.407203	0
College rep as source of info	366	0.150388	121	0.1505055	0

Note: Variables not listed had zero missing prior to MCMC procedure

## Appendix B

## SAS output to test multicollinearity

<u>Variable Label</u>	<u>Tolerance</u>	<u>Variance Inflation</u>
Intercept	----	0
Whether 10th grader's was born in US	0.77221	1.29499
Whether English is student's first language	0.48861	2.04662
Whether English is parent's first language	0.51040	1.95925
Plans to go on to college immediately	0.87097	1.14815
Sex	0.86262	1.15926
Parent's highest level of education	0.36679	2.72636
Quartile coding SES	0.34256	2.91918
Percent free/reduced lunch in HS	0.80755	1.23831
How many hours usually works a week	0.89786	1.11376
Low expenses important in choosing college	0.84537	1.18291
Curriculum important in choosing college	0.86834	1.15163
Living at home while attending college important	0.73006	1.36976
Academic reputation of college important	0.76748	1.30297
Easy admission important in choosing college	0.71933	1.39018
High school program reported by student	0.96380	1.03756
Highest math course in 2004	0.64023	1.56195
Standardized ELS test quartile	0.56839	1.75935
Hours/week spent on homework	0.81538	1.22642

## Appendix B, continued

<u>Variable Label</u>	<u>Tolerance</u>	<u>Variance Inflation</u>
Can learn something really hard	0.57820	1.72950
Can learn something well if wants to	0.52025	1.92216
Keeps studying even if material is difficult	0.57989	1.72447
Can do excellent job on English HW	0.65841	1.51880
Can understand difficult math texts	0.70351	1.42145
How far teacher expects student to get in school	0.57372	1.74302
How far in school student thinks will get (2002)	0.65677	1.52259
How far in school student thinks will get (2004)	0.58595	1.70664
How far in school parent wants student to go	0.74626	1.34002
How often discussed going to college with parents	0.82888	1.20645
Took or plans to take SAT or ACT	0.81430	1.22804
Has gone to guidance counselor for college info	0.89663	1.11529
Has gone to teacher for college info	0.90912	1.09997
Has gone to college publications/websites for info	0.83834	1.19283
<u>Has gone to college representatives for info</u>	<u>0.92406</u>	<u>1.08218</u>

## Appendix C

## Modal values of predictor variables

All participants	White	Latino	Variable
Mode	Mode	Mode	Meaning
1	1	1	0-5% students receive free lunch
2	2	2	Low expenses somewhat important factor in choice
1	1	1	Living at home not an important factor in choice
3	3	3	Academic reputation of college very important factor
6	6	6	Completing math level trig/pre-calc/calc in 2004
4	4	3	Highest/3 <sup>rd</sup> highest ELS test scores quartiles
3	3	3	I keep working even if material is difficult - often
5	5	5	Teacher expectation: student completes 4 year degree
6	6	6	Student expectations in 2004: complete 4 year degree
0	0	0	Haven't thought about taking SAT (vs don't plan to)
0	0	0	Did not go to college representative for info in 2002
0	0	1	Race/ethnicity (0 = White, 1 = Latino)
0	0	0	Student born in 50 states (versus other country)
1	1	1	English is student's first language
0	0	0	Plans to continue studies right after HS (vs no)
0	0	0	Plans to continue studies right after HS (vs not sure)
4	4	1	Highest/Lowest SES quartile

## Appendix C, continued

All			
participants	White	Latino	
mode	mode	mode	Variable meaning
5	5	5	16-20 hours worked/week in 2004
3	3	3	Specific curriculum very important factor in choice
2	1	2	Easy admissions not/somewhat important factor
1	1	1	I'm in college prep HS program (vs vocational)
0	0	0	I'm in general course HS program (vs vocational)
1	1	1	Female
4	4	4	Spend 4-6 hours/week on HW
3	3	3	Try to learn something hard, can do it - often
3	3	3	Can learn something well if I want - often
3	3	3	Can do excellent job on English HW - often
2	2	2	Can understand most difficult math texts - sometimes
5	5	5	Student expectations in 2002: complete 4 yr degree
5	5	5	Parent aspirations for student: complete 4 yr degree
3	3	3	Discuss going to college with parents - often
1	1	1	Yes, plan to take SAT (vs haven't thought about it)
0	0	0	Went to guidance counselor for info in 2002 - no
0	0	0	Went to teacher for college info in 2002 - no
0	0	0	Went to college website for info in 2002 - no