

THE INFLUENCE OF ACADEMIC, CULTURAL, AND SOCIAL FACTORS ON THE  
MATRICULATION OF LATINA/O STUDENTS IN HIGHER EDUCATION

DISSERTATION

Presented to the Graduate Council of  
Texas State University-San Marcos  
in Partial Fulfillment  
of the Requirements

for the Degree

Doctor of PHILOSOPHY

by

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San Marcos, Texas

June, 2010

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June, 2010

## **DEDICATION**

This dissertation is dedicated to my husband, Emmanuel Bayona Belasco, your prompting encouraged me to pursue this degree; and my parents, John Edward Mathison, and Martha Elizabeth Padgett Mathison. Thank you all from the bottom of my heart for your unfailing love and support.

## **ACKNOWLEDGEMENTS**

I would like to acknowledge all who have helped me along the way on this journey of exploration, discovery and growth. First of all, my husband, Emmanuel Bayona Belasco, who has never failed to provide the encouragement and support that I needed. He has been an emotional rock for me, and has picked up the slack in numerous ways so that I could devote my time and energy to the task at hand. And, he has done it all without complaint.

Dr. Larry R. Price graciously agreed to serve as Chair of my dissertation committee. His answers to my questions were always clear, concise, and to the point. I greatly appreciate his support and his prompt responsiveness.

My committee members, Dr. Michael Boone, Dr. Sandria Stephenson, and Dr. Gail Ryser have been most gracious in their appraisals of my work, and most responsive to each of my requests. I cannot thank all of you enough.

Dr. Denise Doyle, Provost, University of the Incarnate Word, deserves special mention for informing me about the Ph.D. program at Texas State. Thank you as well, for giving me the opportunity to change career tracks by hiring me to teach in the university's then fledgling program for adult students. Finally, thank you for our occasional lunches, and most especially for your friendship

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## **ABSTRACT**

### **THE INFLUENCE OF ACADEMIC, CULTURAL, AND SOCIAL FACTORS ON THE MATRICULATION OF LATINA/O STUDENTS IN HIGHER EDUCATION**

by

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2010

#### **SUPERVISING PROFESSOR: LARRY R. PRICE**

Bayesian statistical inference within structural equation modeling was used to examine the influence of hypothetical constructs on the successful persistence of college freshmen to degree completion. The affects of three latent variables: a) academic capital; b) cultural capital; and, c) social capital were compared between White/Caucasian students and Latina/o students. The regression of social capital on cultural capital produces a statistically significant difference between the two groups of students, and produced a moderate effect size.

## **CHAPTER I**

### **Introduction to the Study**

Recent trends in enrollment rates for higher education are cause for both celebration and concern. While educational attainment rates have increased at all levels, the gap in graduation rates at both secondary and postsecondary levels, between White majority students and Latinas/os tenaciously persists. The Census Bureau (2005) recently reported 84% of adults over the age of 25 had at least a high school or equivalent education, while 27% had completed a bachelor's degree or higher. However, examining these data by racial/ethnic strata reveals a substantial gap between the education levels of Latinas/os in comparison to the White majority. At the high school or equivalent level, 60% of Hispanics successfully complete a secondary education versus almost 90% of non-Hispanic Whites. The educational attainment gap widens substantially at the undergraduate level where only 12% of Hispanics complete a baccalaureate degree compared to 30% of non-Hispanic Whites (Crissey, 2007).

Exacerbating the educational attainment gap are feelings of isolation and inequality on the part of Latinas/os across all levels of the American education system (Aguirre Jr. & Martinez, 1993; Carter, 2006; Chapa & De La Rosa, 2006). A related issue confounding feelings of isolation and inequality are negative and deficient perceptions of intellectual ability based on race or ethnicity that continue to permeate the minds of

teachers and administrators (Kimura-Walsh, Yamamura, Griffin, & Allen, 2009). In turn, deficit-based perceptions and attitudes on the part of teachers and administrators result in a repeating cycle of social injustice fueled by low expectations of Latina/o student performance and achievement (Delany, 1991; Horvat, Weininger, & Lareau, 2003; Solorzano, Villalpando, & Oseguera, 2005).

The impact of the educational attainment gap extends beyond the boundaries of the Latina/o population segment. Placed within the context of population and/or demographic shifts, the educational attainment gap poses dramatic effects on the long-term social and economic well-being of the United States. David Ward, President of the American Council on Education stated

Our nation faces many global challenges – among them are those related to national security, energy policy, and healthcare – and our answers to each will depend on the creativity and innovation of an educated citizenry and workforce. That makes our educational system a matter of national priority and means we cannot afford to leave anyone behind (in Edmonds & McDonough, 2006).

As we move firmly into the 21<sup>st</sup> century, the face of our nation is rapidly changing. Based on current population trends (U.S. Census Bureau, 2008b) Hispanics are growing faster than any other group, having already replaced African Americans as our largest minority (Devall, Vail, & Resendez, 2005). At just over 46 million, Hispanics now comprise 15% of the population and are projected to increase to approximately 133 million, or 30% by 2050 (U.S. Census Bureau, 2008a). In fact, within two generations, census experts in the United States expect to document the second largest Hispanic population in the world, exceeded only by Mexico (Gándara, 2005a). As the Latina/o

segment of our population continues to grow, persistent underrepresentation in the workforce and low levels of educational attainment will exert considerable stress on the economy of regional areas and on the United States as a nation. So, while we celebrate the gradual, yet steady increase in enrollment levels among Latinas/os over the last three decades (Gándara, 2005a) we must recognize that such students approach higher education with lower aspirations and expectations than any other group (Fiske, 1988; Gándara, 2005b).

Low level educational aspirations and expectations of Latina/o students are hypothesized to occur due to an environment characterized by factors such as (a) parents with low levels of academic achievement (Gándara, 2005b), (b) low socioeconomic status (Devall, et al., 2005; Gándara, 2005b), (c) weaker high schools (Fiske, 1988), (d) fragile academic preparation (Contreras, 2005; Miller, 2005), (e) academic tracking (Aguirre & Martinez, 1993), and (f) social and cultural isolation (Aguirre & Martinez, 1993). Given their typically inadequate academic and social preparation for higher education, it is not surprising that overall levels of educational attainment for Latinas/os are lower than for any other group (Gándara, 2005a) in the United States. In fact, the very different resources that Latina/o students bring to higher education are reflected in both the opportunities they are able to secure and the academic outcomes they achieve (Gándara, 2005b). Specifically, the meager resources that Latinas/os accumulate to facilitate higher education include (a) inadequate academic preparation (Miller, 2005), (b) limited familial experience with higher education (Gándara, 2005b), (c) deficient breadth and depth of social networks and/or contacts in higher education circles (Boggs, et al., 2001), and (d) insubstantial financial wherewithal (Devall, et al., 2005). Given such



comprehensive under-preparation for higher education, it is astonishing that Latinas/os have achieved the levels of academic success previously cited in this document.

Regardless of how outcomes are measured, Latinas/os consistently perform at lower levels than peers in other ethnic groups at any given point in the education pipeline (Solorzano, et al., 2005). This fact is not limited to students of average or below average ability – even high-achieving Latina/o students perform at a lower level than high-achieving White students (Gándara, 2005b). In the face of such dismal circumstances, how do the successful Latina/o students manage to overcome the obstacles they face?

### **Statement of the Problem**

Latina/o enrollment levels and completion rates in higher education lag substantially behind their peer ethnic groups relative to the percentage of the population they represent. As the Latina/o population segment continues to grow at appreciably higher rates than other groups, this gap in educational attainment will likely continue to expand given the factors cited thus far. Latinas/os approach higher education with severe disadvantages in numerous areas, including academics, financial resources, as well as social and cultural assets. Nonetheless, many Latinas/os successfully persist to degree completion. Ideally, a better understanding of the factors that facilitate or impede their success can contribute to a higher level of enrollment retention and an increase in degree completion rates for Latinas/os.

### **Introduction of the Variables**

Because Latinas/os often enter higher education academically disadvantaged (Chapa & De La Rosa, 2006; Contreras, 2005; Oseguera, Locks, & Vega, 2009), it follows that the wherewithal to persist to degree completion is substantial with alternate

support mechanisms playing an essential role. In a study using data from the National Educational Longitudinal Study (NELS), Perna (2000) found that for African American and Latina/o students, the relative contribution of social and cultural capital was comparable to the relative contribution of academic capital possessed by Whites. In her study, Perna underscores the contemporary view that cultural and social resources function as capital and have the ability to substitute for more traditional or concrete forms of capital such as financial, economic or academic. Conventional forms of capital share certain characteristics that create value, including productive capacity, convertibility, and the ability to measure, count, or quantify the asset (Mankiw, 1997). Classical economics defines capital as a factor of production that is calculated then employed or invested in order to produce economic goods. Historically, students who acquired high levels of academic resources (i.e., capital) in high school have entered higher education with the highest possibility of succeeding. Cabrera, La Nasa, and Burkum (2001) found that approximately 77% of high school students who enjoyed high levels of academic capital successfully completed their college programs. Therefore, academic success at the secondary level appears to be a determinant of success at the post-secondary level. In other words, once acquired, academic capital is easily invested to produce even greater amounts of academic capital (Adelman, 2006).

The path to identifying and/or defining unique social and cultural resources as forms of capital that in turn can yield more fruitful academic capital has been less straightforward. Pierre Bourdieu (1977b) proposed foundational definitions for cultural and social capital. Subsequently, Bourdieu's definitions were expanded by James Coleman in the 1980s. Contemporary researchers, including Sanford Dornbusch, Patricia

McDonough, Laura Perna, Ricardo Stanton-Salazar, and Angela Valenzuela continue to expand the conceptual understanding of social and cultural capital and their affect on academic achievement. These implicit forms of capital are now identified as symbolic goods that can be converted into explicit types of capital (McDonough, Antonio, & Horvat, 1997).

Cultural capital contributes to the formation of shared attitudes, preferences, obligations, and expectations (Cerna, Perez, & Saenz, 2007). It is used by families and communities as a substitute for economic capital to facilitate maintaining or improving class status and privilege (K. P. González, Stoner, & Jovel, 2003). The significance of cultural capital to academic achievement specifically relates to its influence on shaping academic aspirations (A. F. Cabrera, et al., 2006).

Social capital is defined (operationalized) in terms of relationships that have the capacity to facilitate access to resources that would otherwise be inaccessible to the individual (Cerna, et al., 2007; Perna & Titus, 2005; Stanton-Salazar, 1997; Valenzuela & Dornsbusch, 1994). Social capital is made up of social structures that provide access to opportunities, privileged information, knowledge, or social connections (Stanton-Salazar, 1997), and often serves as an emotional support mechanism (K. P. González, et al., 2003).

In summary, Latina/o enrollment levels and completion rates in higher education lag significantly behind their peer ethnic groups relative to the percentage of the population they represent. Given the increasing proportion of the American population Latinas/os represent, the potential social and economic impact of this phenomenon poses a looming crisis for America. To this end, the impetus for this investigation is provide an

increased understanding of the factors that either facilitate or impede the success of Latina/o students to matriculate successfully through the American higher education system. To achieve this goal, an exploratory or model generating strategy will be used to posit a multidimensional model of Latina/o student attainment in higher education. Ideally, the model will be useful for explaining, and ultimately predicting, the degree that specific factors contribute to a higher level of enrollment, retention, and degree completion for Latinas/os.

### **Research Questions**

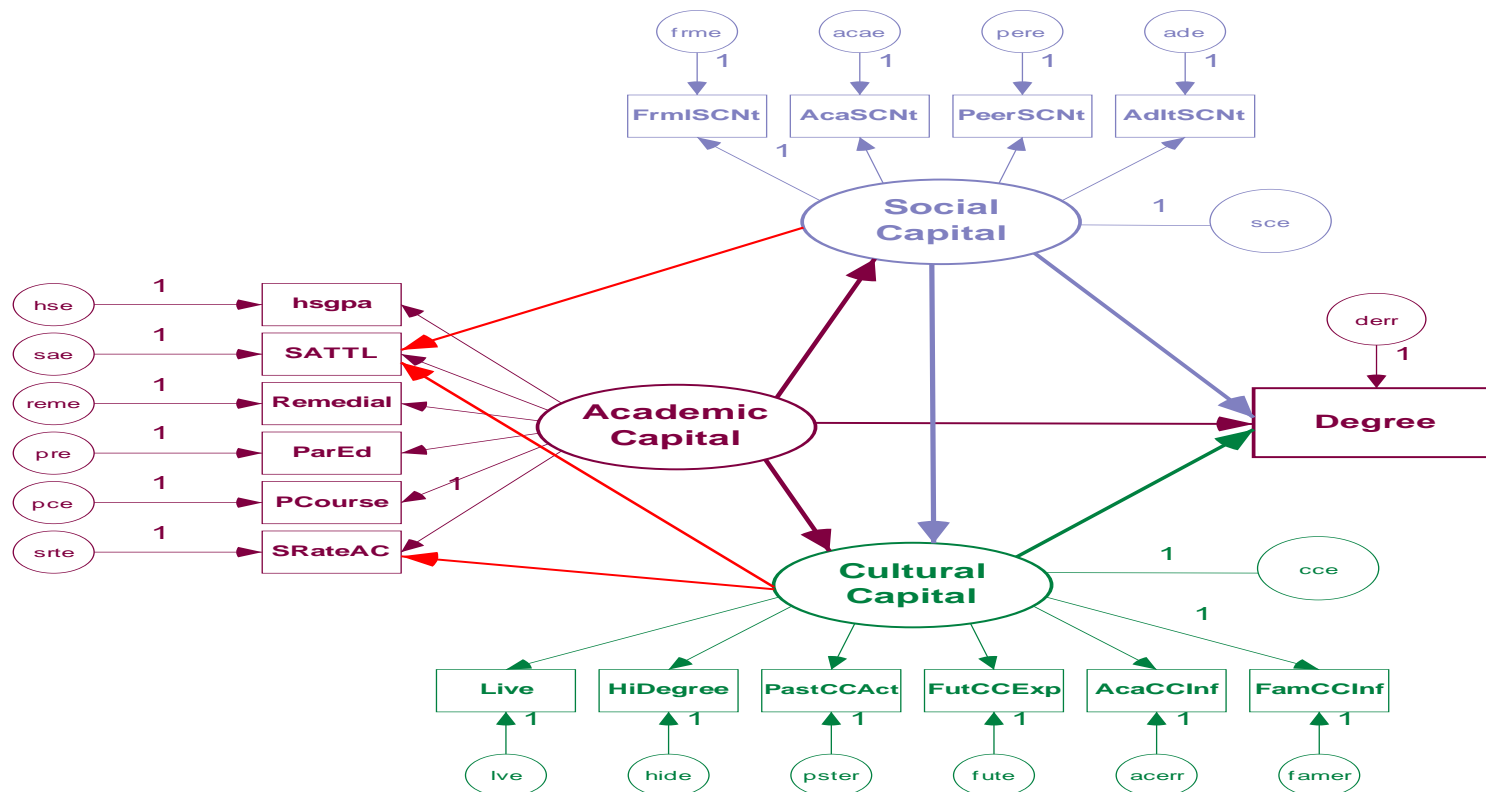
1. To what degree does academic capital explain and/or predict persistence for White/Caucasian and Latina/o students to matriculate through higher education?
2. Does cultural capital statistically mediate academic capital in relation to graduation rates for Latina/o students and White/Caucasian students?
3. Does social capital statistically mediate academic capital in relation to graduation rates for Latina/o students and White/Caucasian students?
4. Does social capital statistically mediate cultural capital in relation to graduation rates for Latina/o students and White/Caucasian students?
5. Are there significant differences in the total effects of the full mediation model for cultural, social, and academic capital on the graduation rates of Latina/o students in relation to their White/Caucasian peers?

### **Research Hypotheses**

1. Directional hypothesis: There is a significantly different direct effect between White/Caucasian and Latina/o students regarding the contribution of academic

capital to persistence (i.e., graduation) from a public 4-year institution of higher education.

2. Directional hypothesis: Cultural capital significantly mediates academic capital for Latina/o students, but not White/Caucasian students.
3. Directional hypothesis: Social capital statistically mediates academic capital for Latina/o students, but not White/Caucasian students.
4. Directional hypothesis: Social capital statistically mediates cultural capital for Latina/o students, but not White/Caucasian students.
5. Directional hypothesis: There will be significant differences regarding the total effects between Latina/o students and their White Caucasian peers in relation to graduation rates.



**Figure 1. Conceptual Structural Equation Model.** This diagram depicts the structural equation model developed for the study. Ovals represent independent latent variables. Arrows from each latent variable pointing to a group of small rectangles indicate directly observed independent variables used to construct the latent variables. Arrows drawn between latent variables specify mediating effects. Circles designate residual effects. Finally, arrows from each latent variable point to the dependent variable in the larger rectangle on the right, indicating successful completion of the bachelor’s degree.

## **Delimitations**

The model used in this study will examine the contribution that three types of capital, academic, cultural, and social, have on graduation rates for Latina/o students as compared to White students at a four-year university in south central Texas. It will cover the freshman classes of 2000, 2001, and 2003.

## **Definition of Terms**

Academic Capital – the cognitive skills a student brings to higher education, typically measured by high school GPA, SAT or ACT scores, general academic ability and or aptitude (Cabrera, La Nasa, & Burkum, 2001; Cabrera, et al., 2006).

Cultural Capital – a symbolic property or good that families and communities transmit to their offspring, which substitutes for or supplements the transmission of economic capital as a means of maintaining class status and privilege across generations (Bourdieu, 1977b). “Trust, obligations, expectations, norms, relationships to authority, and shared information are examples of cultural capital because they are resources that arise from the social relations of individuals who share membership in a common social structure” (Coleman, 1990, p. 302). As such, cultural capital influences an individual’s sense of self, place, and identity.

Hispanic – a term coined by the U.S. Census Bureau and viewed by many Latinas/os as a political expression implying “uniformity, Whiteness, and Spain” (C. González & Gándara, 2005). Because of the politically sensitive nature of this word, it will only be used in connection with government documents throughout this manuscript.

Latina/o – a term “coined by Mediterranean countries to resist Anglo dominance in the 19<sup>th</sup> century, currently being used by people of Spanish-speaking ancestry in the

United States to express ethnic pride” (C. González & Gándara, 2005, p. 392). In its broadest interpretation, the term Latina/o identifies cultural descendants of “any country whose official language derives from Latin” (p. 393). As a result, Latina/o may include non-Spanish-speaking individuals.

Social Capital – a set of durable, deliberate, institutionalized relationships and the benefits that accrue to individuals as a result of the existence of such social bonds (Bourdieu, 2001); relationships with institutional agents that can be converted into socially valued resources and opportunities (Bourdieu, 1977a; Coleman, 1988; Stanton-Salazar, 1997). Social capital, then acts as a bridge between potential constraints deriving from cultural factors, and provides access to more expansive opportunities.

**Independent Variables.** Investigating cause and effect relationships in the social sciences is challenging due to difficulty in controlling extraneous factors related to the primary questions of interest. Social scientists conduct their research in the midst of “complex real-life phenomena in the round” (Loehlin, 2004, p. ix). Social constructs or variables are often difficult to measure directly because they deal with behaviors, attitudes, or concepts like intelligence, depression, or self-efficacy. In order to gauge the presence or value of such traits it is necessary to rely on other factors that can be measured and observed directly. Intelligence, for example, is often inferred by a particular set of behaviors or skills that act as a proxy or index (Loehlin, 2004), such as school grades, test performance, or the time required to figure out a puzzle (Norman & Streiner, 2003). Because they cannot be observed directly, these kinds of variables are often called hypothetical constructs, or latent variables (Loehlin, 2004; Norman &



Streiner, 2003). The three independent variables used in this study, academic capital, cultural capital, and social capital, are all latent constructs.

Since latent variables by their very nature are not directly observable, social science researchers seldom rely on a single observable variable to indicate the presence of the latent construct. There are a number of reasons for this. First, it is rare that a single variable provides an ideal estimation of the latent construct. If that were the case, the individual variable would stand on its own without the need to proxy for something else. This innate flaw leads to the second condition. Using more than one factor to represent a latent variable compensates for this unreliability, resulting in an improved estimation of the latent construct (Norman & Streiner, 2003). Thirdly, these groups or clusters of factors provide greater insight into the characteristics of the hypothetical construct, and are often necessary because of the abstract nature inherent in latent variables (Pett, Lackey, & Sullivan, 2003). The factor groups used to construct academic, cultural, and social capital are discussed individually, below.

**Academic capital.** Not surprisingly, a number of studies have demonstrated a positive correlation between academic success at the high school level and successful persistence at the college level. In an analysis of previous research Carter (2006) summarizes a number of background characteristics that influence persistence. Focusing on work conducted by St. John, Carter, Chung, and Musoba in 2006, Braxton in 2000, and Pascarella and Terenzini in 1991, she notes strong relationships between high school curricula, completion of preparatory or honors courses, availability of advanced placement courses and exams, high school grades, and parental education levels. Interestingly, these researchers also found positive correlations between persistence and

remedial coursework, perhaps indicating a level of commitment to academic achievement. Echoing these findings, Keup (2005) also affirms that pre-matriculation characteristics such as family educational background and high school achievement positively influence persistence.

However, on a somewhat more provocative note, the debate over the equity and predictive capacity of standardized entrance exams such as the SAT continues to rage (Walpole, et al., 2005). There is general agreement among a number of researchers (Bollinger, 2002; Gándara & Lopez, 1998; McDonough, 1994) that SAT scores add little to no predictive accuracy to expected academic performance levels beyond that already inherent in high school grade point averages (GPAs). Nonetheless, continued reliance on entrance exams appears to be driven by increased competition for admission to select colleges and universities (Walpole, et al., 2005), and the normal effects of supply and demand. Perhaps part of the institutional appeal of standardized test scores is their seeming non-partisan nature. As Bollinger (2002) points out “they are clear, crisp, and numerical – and not subject to the whims of personal judgment” (para. 19).

A final set of pre-entry attributes that contribute to the academic resources students bring to higher education relate to their own perceptions about their skills and abilities. In a study of the 2002 Cooperative Institutional Research Program (CIRP) survey, Keup (2005) uses questions related to self-confidence and self-rated academic ability to gauge individual levels of institutional commitment. She found that 87.7% of students who reported high self-confidence and strong belief in their own academic abilities re-enrolled at the end of their first-year.

The table below summarizes each of these components of academic capital and indicates whether specific questions are available on the CIRP survey that relate to them.

Table 1

*Components of Academic Capital and Availability of Related Data on the CIRP*

Academic Capital Component	Suitable Question(s) Available on CIRP
High school curriculum	Not available
College preparatory/honors program	Not available
Advanced placement courses or exams	Available only on 2000 and 2001 surveys However, questions relating to previous courses at an institution of higher education are available on all three surveys
High school GPA	Available on all three surveys
Parent's education level	Available on all three surveys
Remedial courses	Available on all three surveys
SAT Score	Available on all three surveys

**Cultural capital.** In a broad perspective, cultural capital is seen as a set of “shared attitudes, preferences, and credentials” (McDonough, et al., 1997, p. 3). It is a symbolic good that is transmitted across generations, often substituting for economic capital, as a means of maintaining or improving class status (K. P. González, et al., 2003). With respect to higher education, “cultural capital is defined as a student’s perceptions, aspirations and cultural values related to college choice as they begin college” (Cerna, et al., 2007, p. 2).

How do students succeed in the face of an educational environment where few understand their culture? Hurtado and Carter (1997) explored this question by investigating the affect that students’ sense of belonging had on their persistence. An interesting aspect of this study is that the authors take issue with the idea of integration

which historically carries with it the expectation of “normative congruence” (p. 325). Normative congruence implies conformity between the individual’s and the community’s set of expectations, values, and attitudes. This point of view conveys an underlying concept of acculturation that stresses a reduction in cultural differences. The expectation is that success precedes adoption of the dominant values. In a break from this established theory, initially proposed by Spady, Tinto, and Durkheim in the 1970s, Hurtado and Carter (1997) find that “integration can mean something completely different to student groups who have been historically marginalized in higher education” (pp. 326-327). The findings in their report reflect those of other contemporary researchers including Stanton-Salazar (1997), Villanueva (1996), and Valenzuela and Dornbusch (1994). All of these researchers argue for the importance of prior communities as a critical support mechanism for minority students. Their premise is that minority students can feel connected to the university community without “acculturating, confirming, or adopting the values of the majority” (S. Hurtado & Carter, 1997, p. 329). In fact, they assert that strong family relationships, particularly parental relationships, are positively correlated with persistence to graduation. In addition to familial relationships, Hurtado and Carter (1997) analyzed other affiliations that were reflective of specific interests of Latina/o students, including religion, and community service or activism (earlier studies that supported congruent integration failed to include culturally relevant activities other than those of the dominant culture).

The significance of parental (including both parents and grandparents) support is established in Villanueva’s (1996) multi-generational study of Chicano families and the changes in educational achievement and aspirations that occurred over the course of time.

Villanueva reveals how older generations used life histories to pass on moral and cultural traditions, values, and hopes for the future. Most of the grandparents in her study immigrated to the US with only an elementary education. Their focus was simply survival. Nonetheless, though they themselves “were alienated from the educational system” (p. 16), they set an example of hard work and perseverance, and planted seeds of hope for a better life for their children. Unprepared to provide help with schoolwork, they provided crucial support in other ways. As a result, the parent’s generation attributed their academic success to the lessons, experiences, and responsibilities provided by their parents. It is important to note here, that while succeeding generations did aspire to and achieve higher levels of education, not all of the children pursued educational paths. Nor did the families calculate the cost of education in terms of acculturation. In fact, each family in Villanueva’s study actively pursued a bi-cultural orientation, teaching children to function in both worlds.

In their examination of pre-college characteristics that influence the success of Latina/o students, Cerna, Perez, and Sáenz (2007) also found family encouragement to be a primary support mechanism that provided the psychological and emotional reinforcement needed to tackle academic demands of college. They see family and community as being central to establishing a student’s individual values, expectations, and aspirations. Using the CIRP survey as the source for their analysis, they operationalize the concept of cultural capital by evaluating degree aspirations, proximity of college to home, anticipated career choice, expectations about level of satisfaction with college, the amount of time necessary to complete a bachelor’s degree, level of civic or social-mindedness, and future academic expectations. Based on their analysis, Cerna,

Perez, and Sáenz conclude that for Latina/o students, pre-existing social and cultural capital values exert significant influence on persistence.

Cultural capital factors influence the past, the present, and the future. Reflecting on Villanueva's (1996) study, past experiences and responsibilities shape the individual of today, and also help to shape the individual of tomorrow by affecting choices that are made today. This idea guides the groupings of cultural capital variables detailed in the table below. The factors identified in the preceding discussion provide a grouping strategy for four major categories. The first category, past cultural activities, is comprised of culturally relevant activities that students participated in prior to their enrollment in higher education. The second category, future cultural activities, anticipates culturally relevant activities that students expect to engage in. The third category measures the influence of family on the student. This category spans time by including past family responsibilities, the influence of family on the student's current academic choice, and the cultural expectations shaped by family experience. The last category, academic influences, also spans time. It measures the cultural influence of past academic habits and analyzes the future cultural influence on expectations.

Table 2

*Components of Cultural Capital and Availability of Related Data on the CIRP*

<b>Cultural Capital Category and Component</b>	<b>Factor Measured</b>	<b>Available on CIRP</b>
Past cultural activities		
Religious association	Importance of religion	Available on all three surveys
Performed volunteer work	Community mindedness	
Voted in student election	Civic mindedness	

(Table 2 continues)

(Table 2 continued)

Cultural Capital Category and Component	Factor Measured	Available on CIRP
Future cultural activities		
Influence social values		
Help others in difficulty	Community mindedness	
Participate in volunteer work		
Participate in community action		Available on all three surveys
Become community leader		
Be satisfied with college	Life view	
Develop meaningful philosophy of life		
Influence political structure	Civic mindedness	
Keep up with political affairs		
Family influences		
Attending college because parents wanted me to		
Chose this college because relatives wanted me to		
Live near home	Family influences	Available on all three surveys
Better job		
Make more money		
Household/child care responsibilities		
Academic influences		
Studying/homework		
Make a “B” average		
Get bachelor’s degree	Academic influences	Available on all three surveys
Prepare for graduate/professional school		
Gain general education or appreciation of ideas		

**Social capital.** Simply stated, social capital means that “involvement and participation in groups can have positive consequences for the individual” (Portes, 1998, p. 2). Although the term “social capital” appeared in literature as early as 1920 (Dika & Singh, 2002), its theoretical foundations were established through the work of French sociologist, Pierre Bourdieu, in the 1970s (1977b) and 1980s, and expanded by James Coleman, Robert Putnam, and others (Portes, 2000). Researching the intersection of economic, social, and cultural capital, Bourdieu developed pivotal insights into the nature of various forms of capital. First, with respect to social capital Bourdieu proposed that individuals intentionally fostered relationships specifically for the future benefits they could produce (Bourdieu, 1985). Secondly, Bourdieu believed all forms of capital to be fungible, regardless of whether the basis for the particular form of capital was economic or nonmonetary. Furthermore, not only did Bourdieu credit all forms of capital with the capacity of exchangeability, he believed the development of capital depended upon such trades, and that all forms of capital are eventually converted into economic value. The assumption, then, is that investing in social resources increases the likelihood of eventually achieving economic success (Dyk & Wilson, 1999).

In relation to education, social capital is defined in terms of “relationships a student has with key figures that may provide them access to resources and knowledge pertinent to college enrollment and degree attainment” (Cerna, et al., 2007, p. 2). Key figures may include immediate or extended family, peers, teachers, counselors or other school personnel (Choy, Horn, Nuñez, & Xianglei, 2000; K. P. González, et al., 2003), as well as other adults outside of school and family (Dyk & Wilson, 1999; Smith, Beaulieu, & Seraphine, 1995; Villanueva, 1996). Dyk and Wilson (1999) also found that



discussions about education with adults outside of the family were positive predictors of educational attainment. After interviewing 19 Hispanic students in a qualitative look at their college experiences, Fiske (1988) concluded “scratch a Hispanic college student, and you’ll probably find someone in his or her background who showed a special interest in them, who took them aside and gave them the aspiration and encouragement to go on to higher education” (p. 31).

The influence of peers cannot be underestimated. In their study of factors that help at-risk students successfully transition to college, Choy, et al., (2000) found the strongest predictor of college enrollment was having friends with college plans. Peer influence may be particularly important for Latina/o students. Person and Rosenbaum (2006) use the phenomenon of “chain migration” (p. 52) to guide an analysis of enrollment decisions by minority students. Chain migration demonstrates the impact of social networks on immigration decisions and patterns, where the strength of “kinship, friendship, and client ties result in migration to the same destination by network members” (MacDonald & MacDonald in Person & Rosenbaum, 2006, p. 52). In their conclusion, Person and Rosenbaum note that Latina/o students are more likely than their non-Latina/o counterparts to cite “family and friends from their own ethnic group attending an institution as a reason for their own enrollment at that school” (p. 54). Keup (2005) and Villanueva (1996) also note the importance of meaningful connections including peer support networks and involvement in both formal and in-formal extra-curricular activities as a means of developing social resources that are both mainstream as well as culturally relevant. These studies echo the nature of interdependence, or

*familismo* (Ong, Phinney, & Dennis, 2006) that is characteristic of the Latino community, and contribute to the set of expectations that form the basis for this study.

The various factors discussed above can be grouped into four categories: peer networks; adult networks; and networks associated with academic activities; and, extra-curricular activities. The table below summarizes how each of these categories are assessed using data from the CIRP survey.

Table 3

*Components of Social Capital and Availability of Related Data on the CIRP*

Social Capital Category and Component	Factor Measured	Available on CIRP
Peer Networks		
Close friendships with other students	Influences of peer networks on acquisition of social capital	Available on all three surveys
Social fraternity or sorority		
Socialize with other racial/ethnic groups		
Adult Networks		
Ask teacher for advice	Influences of adult networks on acquisition of social capital	Available on all three surveys
Guest in teacher's home		
Teacher advised to pursue college education		
Talk to teacher(s) outside of class		
Communicate regularly with professors		
Guidance counselor advised to pursue college education		
Private college counselor advised to pursue college education		
Mentor/role model advised to pursue college education		

(Table 3 continues)

(Table 3 continued)

<b>Social Capital Category and Component</b>	<b>Factor Measured</b>	<b>Available on CIRP</b>
Participation in organized activities		
Frequency of participation in exercise or sports activities	Influences of organized extra-curricular activities on acquisition of social capital	Available on all three surveys
Frequency of involvement in organized clubs or groups		
Academically oriented activities		
Involvement in tutoring other student(s)	Influences of academically organized activities on acquisition of social capital	Available on all three surveys
Frequency of studying with other students		

### Assumptions

Research has established social classes and racial/ethnic groups differ not only in the types and quantities of academic, cultural, and social capital they possess, but in the strategies they adopt to convert those forms of capital into educational achievement (Perna, 2000). According to Astin (2005), for minority students the influence of social capital more than offsets any deficiency in academic capital. One of the great strengths of Latino culture is the close-knit family and community ties (Fiske, 1988) that can foster a sense of belonging to something larger than self. As one student in Fiske's study said, "Everyone from my community is watching me. If I do well, people will encourage their children to do well in school and go to college" (p. 32).

The assumptions guiding the constructs presented in this study reflect the dense, embedded social and cultural network-oriented characteristics of Latino traditions. The strength of such network characteristics is posited to aid Latina/o students in developing the resiliency necessary to persist despite deficiencies in academic capital. Based on related literature, the correlation between social and cultural capital is expected to be

higher for Latina/o students (as contrasted with White students), when degree completion is directly associated (i.e., mediated) with these constructs.

### **Importance of the Study**

Among White majority students academic aptitude and ability serve as reliable predictors of success in higher education (Contreras, 2005). Importantly, the ability to secure academic resources in high school appears to be a determinant of success in post-secondary institutions (Cabrera, et al., 2006). However, for many racial and ethnic minority students it is also a long-standing reality that the level of academic capital they bring to higher education is deficient in comparison to the majority. Carter (2006, p. 38) describes deficiency as the product of “cumulative disadvantages” and include: (a) low academic expectations on the part of teachers, counselors, and administrators (Fiske, 1988); (b) underperforming high schools that do not provide competitive academic experiences (Chapa & De La Rosa, 2006); (c) relative isolation and segmentation (Aguirre & Martinez, 1993); and (d) limited financial resources to invest in advanced education (Gándara, 2005b). The collective force of such overwhelming circumstances often defeats dreams and aspirations, replacing them with academic disillusionment and complacency. In the face of circumstances like these, it is no wonder that Latina/o students tend to “shoot low” (Gándara, 2005b, p. 5), enrolling preferentially in community colleges rather than four-year colleges and universities.

These systemic problems and entrenched prejudices (Boggs, et al., 2001) have contributed to producing a dichotomy where Latinas/os have the dubious distinction of being both the largest and fastest growing ethnic/racial group in the country, and having the poorest representation in higher education (Sólorzano, et al., 2005). Where do they

find the resources they need to compete successfully? If they enter institutions of higher education with a deficit in their academic capital account, what other resources do they call on to make up the difference?

The popular conception for White majority students, who possess deep academic capital, is that they need to break away from family and community to be successful academically, professionally, and financially. However, research conducted by Sólórzano (2005) challenges that notion for minority students. Other recent studies, as well, have supported the idea that social and cultural capital can compensate for weaknesses in academic capital (Astin, 2005; Perna, 2000). Nonetheless, the literature is not yet conclusive with respect to the direct impact that social and cultural capital have on completion rates in higher education (Contreras, 2005).

## **CHAPTER II**

### **Literature Review**

This chapter uses current research to establish the foundations for academic, cultural, and social capital. It develops definitions for each factor, and discusses sources and influences particularly as they relate to educational attainment.

#### **Academic Capital and Its Influences**

Numerous studies have established reliable links between scholastic success in high school and achievement in post-secondary education. Cabrera, La Nasa, and Burkum (2001) found that degree completion rates are most strongly affected by socio-economic status, academic resources, degree aspirations, and taking college courses in math and science. Consistent with these findings, Cabrera et al., (2006) determined that the path most likely to lead to a four-year degree was to acquire high academic resources in high school and enroll in a four-year institution immediately following graduation. In their analysis of data from the High School and Beyond study they identified nine different pathways students followed to a four-year degree. Students from high socio-economic backgrounds who acquired high levels of academic capital in high school and enrolled in four-year institutions following high school graduation enjoyed an 81% graduation rate. At the other extreme, students from the lowest socio-economic status were only able to accumulate moderate academic capital, and typically enrolled

in two-year colleges. Only 3.3% of these students eventually earned a four-year degree. The path most likely to lead to a baccalaureate degree is simply not available to most of our nation's minority students.

Long-standing criticism of standardized tests such as the Scholastic Aptitude Test (SAT), the American College Testing program (ACT) and numerous state-level high school exams notwithstanding, the proliferation of these exams and the amount of effort that goes into preparing for them suggests that key stakeholders continue to reaffirm them as reliable predictors of success in the post-secondary world (Contreras, 2005). Despite claims of cultural bias against most standardized tests, these instruments continue to be a primary determinant of whether or not a student is college-qualified (Swail, Cabrera, & Lee, 2004). And that classification directly affects the type of institutions that are open and available to students. Further, being classified as unqualified for college may cause many Latina/o students to self-select out of the educational pipeline. Consider this finding from Swail's (2004) study: 73% of Latinas/os aspired to post-secondary education, but only 55% aspired to a bachelor's degree. This is a full 20% below the national average. Further, the academic aspirations of Latina/o students are the lowest of any group in their analysis. This echoes the findings of Cabrera, La Nasa, and Burkum (2001) who conclude that the lowest socio-economic status students were the least prepared academically for higher education.

The current version of the *Standards for Educational and Psychological Testing*, developed jointly by the American Education Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME), in 1999, emphasizes the importance of assessing the fairness of

any standardized test (Mattern, Patterson, Shaw, Kobrin, & Barbuti, 2008). The most widely used methods of gauging fairness involve differential item functioning and differential prediction. Differential item functioning indicates the potential for members of different groups (e.g. groups based on gender or ethnicity) with statistically similar abilities or skills to answer a particular question differently. The SAT excludes all questions exhibiting moderate or high degrees of differential item functioning. Differential prediction exists whenever the correlation between SAT scores and an outcome variable (e.g. first year GPA) statistically varies by subgroup. The presence of differential prediction does not necessarily indicate bias, but does indicate that the relationship between the predictor variable and the outcome variable varies in some potentially important way by subgroup (Mattern, et al., 2008). In their own analysis of the current version of the SAT, The College Board recognizes that the SAT is “most predictive for white students...[and] less predictive for underrepresented groups (pp. 6-7).

In an award address to the American Psychological Association, Helms (2006) points out that any test yielding different mean scores by racial/ethnic group is “potentially unfair even if considerable evidence exists that the test yields valid and nonbiased scores between and within racial groups” (p. 845). This position is representative of many who oppose using the SAT as an instrument of selection or differentiation. This opposition asserts potential injury occurs to an individual when their score is compared to a mean score that is affected by racial or cultural factors.

However, Sackett, Borneman, and Connelly (2008) defend standardized exams and refute accusations of unfairness by presenting evidence from the testing literature. In



addressing the issue of bias based on lower mean scores for minority groups they acknowledge that while it is true that minority groups score lower than whites, this does not necessarily imply bias. While the mean differences between Hispanics and Whites are of sufficient magnitude to affect selection decisions, the test should not stand alone as the sole criteria for admission. They go on to say that any inference of bias has been “unequivocally rejected within mainstream psychology” (p. 222). Once again, referring to the *Standards*, they point out that the idea of fairness does not require equality of performance. In fact, variances in performance between groups is to be expected and can indicate true differences in ability, or may simply be a symptom of background differences in experience, opportunity or interest. In dealing with these performance issues, the *Standards* recognizes that while such differences do not necessarily indicate test bias, they do call for “heightened scrutiny for possible sources of test bias” (p. 222). Sackette, Borneman, and Connelly argue the extensive efforts that have been expended to reduce bias are evidence of intense scrutiny relative to standardized exams. They conclude by pointing out that a more accurate definition of fairness would be to expect relatively equal test scores between individuals of comparative standing or preparation, regardless of group membership.

Given the ongoing debate over the accuracy, applicability, and fairness of SAT scores it is included in this analysis simply in an exploratory effort to assess its relative contribution, if any, to the latent variable academic capital.

### **Cultural Capital and Its Influences**

Cultural capital is less tangible than academic capital; more difficult to quantify and measure. It is primarily a symbolic good that consists of cultural signals, dispositions,

attitudes, preferences and behaviors that are desired and rewarded in particular contexts (Cabrera, et al., 2006). As such, cultural capital is used for inclusion or exclusion and allows class status and privilege to be transmitted across generations (Bourdieu, 1977b). “Members of the dominant class possess the most economically and symbolically valued kinds of cultural capital” (Perna, 2000, p. 74) and are required to make few adjustments in attitude or behavior as they move between the worlds of family, community, school, and work.

However, the same is untrue for minority classes. Members of lower socio-economic groups often need to develop what Stanton-Salazar (1997) calls a “bicultural network orientation” (p. 25) to facilitate moving between worlds that reward differing value systems. The ability to succeed in mainstream institutions like schools, is more than a matter of acquiring a particular set of technical skills; instead, it is fundamentally a matter of learning how to decode the system. Members of the dominant group have the advantage of acquiring all of the right behaviors, attitudes and signals at a very early age. But, for those who belong to subordinate groups, these socially constructed and transmitted norms may appear completely foreign and require a facility for “tapping into the cultural logic” (Stanton-Salazar, 1997, p. 13) of the majority group.

Academic success depends on the ability to manage life in multiple worlds, and may be jeopardized when the cultural components of one world are viewed as less important or even inferior to another world. This kind of reasoning is responsible for the attitude that in order to succeed in the majority world, an individual has to detach from his or her community set of values and “go native” (Stanton-Salazar, 1997, p. 33) so to speak within the mainstream social world. To contest the prevalence of this notion, a

number of minority scholars have conducted studies that support the value of non-dominant cultures and their impact on academic achievement. For instance, Cuadraz (2005) found that academic achievement was fortified by identification with one's ethnic group. In a similar vein, Stanton-Salazar (1997) found that being embedded in family and community networks of support helped students develop a resilient ability to cope with differing sets of values and expectations.

### **Social Capital and Its Influences**

Education and academic achievement are highly social processes, shaped by human exchange and bounded by social networks (Carter, 2006). While the nuclear family may bear the initial responsibility for engendering positive dispositions toward education, children grow up and function in dense social networks that not only formulate expectations and aspirations, but also provide access to resources necessary for academic achievement (Stanton-Salazar, 1997; Valenzuela & Dornbusch, 1994). These networks provide the opportunity to interact with individuals outside the family through participation in organizations in school, church or community, or discussions with the parents of friends or other adults who have the capacity to provide access to educational resources that might otherwise be inaccessible (Dika & Singh, 2002; González, et al., 2003). Perna and Titus' (2005) multilevel, multinomial analysis found that the likelihood of enrolling in college is dependent on the volume of social capital that can be accessed via social networks.

Social networks play a highly complex role in fostering educational aspirations. Not only do they serve as conduits that transmit the ideals of one's socio-economic background, race, ethnicity and gender (which may be viewed in a somewhat restrictive

role) at the same time they often also serve as lifelines for low-status- individuals to help them overcome social barriers and expand the opportunities for educational achievement and social mobility (Stanton-Salazar & Dornbusch, 1995). While the literature on the role of social capital is not conclusive with respect to direct translation into greater educational achievement, there is ample evidence to suggest that it plays a significant role in exposing students to additional resources that are likely to have a positive effect on educational achievement (Contreras, 2005).

## **CHAPTER III**

### **Research Methodology**

This chapter reviews the criteria that were crucial to the selection of the appropriate methodology to analyze the contribution of academic, cultural, and social capital factors on matriculation rates for White/Caucasian and Latina/o students. It also includes details on how each of these latent variables were constructed using summed variables from the Cooperative Institute Research (CIRP) freshman survey and defines a number of key terms.

#### **Structural Equation Modeling**

Several characteristics of structural equation modeling (SEM) made it the preferred methodology for this analysis. First of all, SEM takes an a priori (Byrne, 2001; King & Minium, 2003; Kline, 2005) approach to research which permits the researcher to specify either a causal or exploratory relational model based on current knowledge, theory, and hypotheses. In other words, based on what is already known about certain components related to the research problem, the researcher can specify, in advance, which relationships are of interest. In this case, the literature convincingly argued that Latina/o students, even high-achieving Latina/o students, enter institutions of higher education with lower levels of academic capital compared to White students, and further, that cultural and social factors have a more profound influence on Latina/o students.

SEM makes it possible to diagram these relationships and test the hypothesis that higher levels of cultural and social capital mediate for lower levels of academic capital.

Secondly, SEM has the ability to test both observed and latent variables (Kline, 2005). This is particularly important to this project, because academic, cultural, and social capital are all hypothetical constructs. These variables are representations of social behaviors, attitudes and values that cannot be counted or measured directly; they are composites of variables that characterize these cultural and social qualities. As such, SEM brings a “higher level of abstraction” (Kline, 2005, p. 11) to social and behavioral research.

Finally, SEM functions effectively as both a confirmatory and an exploratory (i.e., model generating) statistical tool (Kline, 2005). This capacity enabled the researcher to refine the initial a priori model to achieve an improved fit. Perhaps Kline (2005, p. 18) said it best, “researchers like SEM because it addresses questions they want answered and it ‘thinks’ about research as researchers do.”

### **Bayesian Model Development and Analysis**

Bayesian methods are based on the concept of conditional probability rather than the traditional or classical relative frequency (i.e., long-run) probability. Bayesian methods are particularly useful when little is known about a complex set of existing conditions, yet where one wishes to construct a quantitative model approximating the dynamical system. The utility of the Bayesian model generating approach rests in the fact that given any set of conditions or circumstances in a social or dynamic system, one can construct a model to approximate the system using existing information that accurately represent the relevant “state of affairs”. This is true regardless of sample size because

Bayesian probability (Bayes, 1763) is not based on long run, frequentist probability, but only on the subject conditions as they exist in the system under study (Jackman, 2000; Price, Laird, Fox, & Ingham, 2009). “A primary motivation for using Bayesian analysis is that it facilitates a common-sense interpretation of statistical conclusions” . . . by providing a “practical method for making inferences from data using probability models for [variables] we observe and for [others] about which we wish to learn” (Gelman, Carlin, Stern, & Rubin, 2004, p. 3). This practicality derives from the prior, observed information, and from replication. If the sample size is sufficiently large enough to allow replication through iterative sampling, then the parameters of the prior distribution can, themselves, be estimated from the data thereby reducing the natural subjectivity associated with relying on a prior distribution. Bayesian analysis, therefore, presents a formal means of informing decision making by evaluating observed information in light of new data and assigning probabilities to potential outcomes. In other words, “Bayesian statistics directly addresses questions asked by the user . . . How should these data modify my beliefs? How should they affect my plans and actions?” (Pollard, 1986, p. 13). Nonetheless, effective application of Bayesian analysis relies on scientific judgment of data to include in the analysis, definitions of relationships, and model review and evaluation (Gelman, et al., 2004).

### **Key Terms**

Structural equation modeling and Bayesian analysis use terminology common to all statistical methods, as well as other terms more uniquely associated with these methods. The following list of terms and their meanings is provided as an aid to a

common understanding of the analysis methodology used in this study, and its implications.

1.  $\alpha$  level. Commonly referred to as alpha (or  $p$  level), and typically set to a value of either .01 or .05, this value indicates the probability of misinterpreting analytical results to indicate a genuine effect on the population when in fact there is no effect (also referred to as a Type I error). At a  $p \leq .05$  there is a 5% or less chance of making a Type I error. Or, stated another way, there is a 95% or better chance of the results being correct (Field, 2005).
2. Causal arrow. A straight, single-headed arrow in a structural equation diagram, indicating that a change in the variable at the tail-end of the arrow will produce a change in the variable the arrow points to (Loehlin, 2004).
3. Chi-Square. A statistical test used to determine goodness-of-fit for a hypothetical model when the data are categorical (non-parametric) and are therefore not normally distributed (Pett, 1997).
4. Correlation. A widely accepted measure of correlation is Pearson's  $r$ , a measure of the strength of the relationship between standardized variables. The strength of correlation over covariance is that the measurement is based on standard deviation units, making interpretation of the statistic more meaningful, and facilitating an estimation of effect size (Field, 2005).
5. Covariance. A measure of how change in one variable predicts change in a second variable. Variables can co-vary in the same or directly opposite direction, indicating either strong positive or strong negative relationships. Because the native units of measure for each variable may be different, covariance does little more than indicate



- the presence of a positive or negative relationship; it does not allow interpretation of effect size (Field, 2005).
6. Covariance arrow. Structural equation diagrams use curved double-headed arrows to indicate the possibility of a hypothesized relationship between two variables (Byrne, 2001).
  7. Degrees of freedom. The number of variables or factors that are free to assume any value in an equation is the degrees of freedom (Field, 2005).
  8. Dependent variable. The variable whose outcome is influenced by other variables in the model is the dependent variable (Schumacker & Lomax, 2004).
  9. Effect size. A number of measures can be used to estimate the “magnitude of the phenomenon of interest...include[ing] mean differences (raw or standardized), correlations and squared correlation[s] of all kinds, odds ratios, [and] kappas” (Cohen, 1990, p. 1310). However, the most common method of interpreting effect size is to use Pearson’s *r*. An *r* value of about 0.2 indicates a small effect; a medium effect is around 0.5; and, a large effect is approximately 0.8 (Norman & Streiner, 2003).
  10. Endogenous variable. The dependent variable in a structural equation model, endogenous variables have straight, single-arrows pointing to them, indicating they are influenced by independent variables (Byrne, 2001).
  11. Exogenous variable. Representative of causal sources, exogenous variables in structural equation modeling have straight arrows leading away from them, but never to them indicating external influences (Loehlin, 2004).

12. Independent variable. Variables that are under the control of the researcher, and are either manipulated or measured directly in order to predict the change in a dependent variable are called independent variables (Norman & Streiner, 2003).
13. Latent variable. Latent variables are not directly observable or measured. They are “inferred constructs” (Schumacker & Lomax, 2004, p. 196) that must be estimated in terms of components believed to contribute to the latent.
14. Non-parametric tests. Focusing on frequencies, rank orders, or  $X^2$ , these tests are used primarily to analyze nominal and ordinal data. Non-parametric tests make few assumptions about the population’s distribution and can be used to interpret small sample sizes (Pett, 1997).
15. The table below summarizes the differences between the four types of scale data used in statistics.

Table 4

*Comparison of Statistical Scale Measures*

<b>Qualitative Measures Nonparametric</b>	<b>Quantitative Measures Parametric</b>
<b>Nominal</b>	<b>Interval</b>
Classification with no judgment regarding classes	Mathematical measurement on scale of equal unit magnitudes
Examples: eye color, ethnicity	Examples: Celsius, Fahrenheit, dates
Common statistical tests: frequency, mode	Common statistical tests: mean, variance, standard deviation, Pearson’s r (note: nonparametric tests may also be used)

(Table 4 continues)

(Table 4 continued)

<b>Qualitative Measures Nonparametric</b>	<b>Quantitative Measures Parametric</b>
<b>Ordinal</b>	<b>Ratio</b>
Classification indicating value judgment, or ranking of classes	Mathematical measurement on scale using absolute zero as point of origin
Examples: military rank, gold, silver, or bronze medals	Examples: Kelvin, height, distance, age, weight
Common statistical tests: all of the above, plus median, percentiles	Common statistical tests: all of the above, plus geometric mean

(Field, 2005; Norman & Streiner, 2003; Price, 2009)

Note: Descriptive statistics in this analysis will come from nominal data. The structural equation model will use nominal, ordinal, and interval data.

### **Population and Sample**

Undergraduate students for the academic years beginning in the fall of 2000, 2001, and 2003 comprised the population of this study. All students were attending a four-year university in south central Texas, which offers bachelor, master, and doctoral degrees. Average fall enrollment for these three years was 19,785. Of this sample, an average of 4,140 were freshmen, 4,354 were sophomores, 4,729 were juniors, and 6,562 were seniors. Analyzing enrollment by ethnic categories, 71.7% were White/Caucasian, 18.9% were Hispanic, and 5.0% were Black. The remaining 4.4% were Asian, American Indian/Alaskan Native, international, or unknown. This study focuses on White/Caucasian and Hispanic freshman students.

Sample data came from the Cooperative Institutional Research Program (CIRP) Freshman Survey for the university. Entering freshmen completed this survey during orientation sessions prior to the beginning of their first semester. In addition to the responses provided by students, the Office of Institutional Research for the university populated SAT scores and matched student ID numbers against graduation records.

Sample size is a crucial consideration in any statistical design because of its effect on reliability, or power. As a general rule the more complicated the design, the greater the number of cases required to produce tenable results (Kline, 2005). This is particularly true with structural equation modeling which is “very hungry when it comes to sample size” (Norman & Streiner, 2003, p. 174). The need for larger sample sizes is due in part to the multiple observed variables used to construct the latent variables (Schumacker & Lomax, 2004). A further complication pertinent to this study is the inclusion of categorical variables. In fact, the only continuous variable used in this analysis was the SAT score. All other variables are either nominal or ordinal. Loehlin (2004) points out categorical variables require larger sample sizes in order to produce accurate results, and recommends doubling the sample size that would be needed for a comparable analysis using continuous variables (p. 59).

The structural equation modeling software program that was used, Analysis of Moment Structures (AMOS), calculates Hoelter’s Critical N to evaluate sample size. This statistic “focuses directly on the adequacy of sample size” (Byrne, 2001, p. 87). Values  $>200$  for  $p = 0.05$  or  $p = 0.01$  indicate the sample size is sufficient. Preliminary investigation of CIRP data for 2007 freshmen yielded Hoelter’s Critical N values of 63 at the  $p = 0.05$ , and 71 at the  $p = 0.01$  levels for Latina/o students. This indicated the number of cases for Latina/o students from a single freshman class was not adequate to produce reliable information.

Another critical issue is missing data. There are two basic approaches to dealing with cases containing incomplete responses. The options are to delete the case, or somehow impute the missing information. Methods of imputing data include mean

substitution, regression imputation, maximum likelihood estimation, or use of a matching response pattern (Schumacker & Lomax, 2004). In this analysis, because the majority of the factors used to construct the latent variables were qualitative in nature, listwise deletion was used to delete cases that contained incomplete data (Byrne, 2001). The cost associated with case deletion was the resulting reduction in sample size.

These two issues: 1) sample sizes required by structural equation modeling; and, 2) the potential loss of cases due to missing data provided the impetus to combine multiple years of data to construct a larger sample. As a result, the sample set included all cases containing complete data for White/Caucasian and Latina/o students from the CIRP freshman surveys of 2000, 2001, and 2003.

### **Variables Used in the Study**

The design of this study included one endogenous variable and three exogenous variables. The endogenous variable, “Degree”, indicates degree completion status, where “0” means no degree and “1” means the degree was completed at this university. The exogenous variables “Academic Capital”, “Cultural Capital”, and “Social Capital” are all made up of composite or summed variables. Each of these latent variables and their component indicators are summarized in the following tables.

Table 5

*Construction of “Academic Capital” Variable*

<b>CIRP Variable Name</b>	<b>CIRP Question</b>	<b>Response Categories</b>	<b>Summed Variable Name</b>
HADREM1	Have you had remedial work in English?	1 = not marked; 2 = marked	<b>Remedial</b>
HADREM2	Have you had remedial work in reading?	↓	↓
HADREM3	Have you had remedial work in mathematics?	↓	↓
HADREM4	Have you had remedial work in social studies?	↓	↓
HADREM5	Have you had remedial work in science?	↓	↓
HADREM6	Have you had remedial work in a foreign language?	↓	↓
HADREM7	Have you had remedial work in writing?	↓	↓
NEEDREM1	Do you need remedial work in English?	↓	↓
NEEDREM2	Do you need remedial work in reading?	↓	↓
NEEDREM3	Do you need remedial work in mathematics?	↓	↓
NEEDREM4	Do you need remedial work in social studies?	↓	↓
NEEDREM5	Do you need remedial work in science?	↓	↓
NEEDREM6	Do you need remedial work in a foreign language?	↓	↓
NEEDREM7	Do you need remedial work in writing?	↓	↓
PREVCRED	Have you taken previous courses for credit at this institution?	1 = no; 2 = yes	<b>PCourse Prior coursework</b>
CRED1	Have you taken previous courses for credit at a junior/community college?	↓	↓
CRED2	Have you taken previous courses for credit at a 4-year college/university?	↓	↓
CRED3	Have you taken previous courses for credit at another postsecondary institution?	↓	↓
NOCRED1	Have you taken non-credit courses at a junior/community college?	↓	↓
NOCRED2	Have you taken non-credit courses at a 4-year college/university?	↓	↓
NOCRED3	Have you taken non-credit courses at another postsecondary institution?	↓	↓

(Table 5 continues)

(Table 5 continued)

CIRP Variable Name	CIRP Question	Response Categories	Summed Variable Name
FATHEDUC	What is the highest level of formal education obtained by your father?	1 = grammar school or less 2 = some high school 3 = high school graduate 4 = other postsecondary school 5 = some college 6 = college degree 7 = some graduate school 8 = graduate degree	<b>ParEd</b> Parents' education level
MOTHEDEC	What is the highest level of formal education obtained by your mother?	↓	↓
RATEXX01	Compared with the average person your age, rate your academic ability	1 = lowest 10% 2 = below average 3 = average 4 = above average 5 = highest 10%	<b>SRateAC</b> Self-rated academic ability
RATE2K11 RATE0110 RATE0309	Compared with the average person your age, rate your mathematical ability	↓	↓
RATE2K15 RATE0116 RATE0316	Compared with the average person your age, rate your intellectual self-confidence	↓	↓
RATE2K20 RATE0121 RATE0321	Compared with the average person your age, rate your writing ability	↓	↓
HSGPA	What was your average grade in high school?	1 = D 2 = C 3 = C+ 4 = B- 5 = B 6 = B+ 7 = A- 8 = A or A+	No change required
SATTL	SAT total score supplied by the Office of Institutional Research	Continuous variable	No change required

Table 6

*Construction of “Cultural Capital” Variable*

<b>CIRP Variable Name</b>	<b>CIRP Question</b>	<b>Response Categories</b>	<b>Summed Variable Name</b>
ACT01	Last year, how frequently did you attend a religious service?	1 = not at all 2 = occasionally 3 = frequently	<b>PastCCAAct</b> Past activities influence on cultural capital
ACT21	Last year, how frequently did you discuss religion?	↓	↓
ACT12	Last year, how frequently did you perform volunteer work?	↓	↓
ACT17	Last year, how frequently did you vote in student elections?	↓	↓
REASON01	How important is it to you that your parents wanted you to attend this university?	1 = not important 2 = somewhat important 3 = very important	<b>FamCCInf</b> Family influences on cultural capital
REASON04	How important is it to you that attending this university might help you get a better job?	↓	↓
REASON09	How important is it to you that attending this university might help you make more money?	↓	↓
CHOOSE10	How important is it to you to live at home while attending this university?	↓	↓
CHOOSE01	How important is it to you that your relatives wanted you to attend this university?	↓	↓
RHPWXX10	Last year, how frequently did you perform household/childcare duties	1 = not at all 2 = occasionally 3 = frequently	↓
GOAL04	How important is it to you to be able to influence the political structure?	1 = not important 2 = somewhat important 3 = very important 4 = essential	<b>FutCCExp</b> Cultural capital influences on future activities
GOAL05	How important is it to you to be able to influence social values?	↓	↓
GOAL09	How important is it to you to help others who are in difficulty?	↓	↓
GOAL15	How important is it to you to develop a meaningful philosophy of life?	↓	↓

(Table 6 continues)



(Table 6 continued)

<b>CIRP Variable Name</b>	<b>CIRP Question</b>	<b>Response Categories</b>	<b>Summed Variable Name</b>
GOAL16	How important is it to you to participate in community action programs?	↓	↓
GOAL18	How important is it to you to keep up to date with political affairs?	↓	↓
GOAL19	How important is it to you to become a community leader?	↓	↓
FUTACT16 (2000/2001) FUTACT12 (2003)	How likely are you to be satisfied with college?	↓	↓
FUTACT17 (2000/2001) FUTACT13 (2003)	How likely are you to participate in volunteer or community service work?	↓	↓
FUTACT09 (2000/2001) FUTACT08 (2003)	How likely are you to make at least a “B” average?	1 = no chance 2 = some chance 3 = very good chance	<b>AcaCCInf</b> Academic influences on cultural capital↓
FUTACT11 (2000/2001) FUTACT09 (2003)	How likely are you to get a bachelor’s degree?	↓	↓
REASON05	How important is it to you to gain a general education and appreciation of ideas?	1 = not important 2 = somewhat important 3 = very important	↓
REASON11	How important is it to you to prepare for graduate or professional school	↓	↓
RHPWXX01	Last year, how frequently did you study or do homework?	1 = not at all 2 = occasionally 3 = frequently	↓
LIVEPLAN	Where do you plan to live during the fall semester?	1 = family or relatives 2 = other	<b>Live</b>
DEGASP2K DEGASP01 DEGASP03	What is the highest degree you plan to attain at any institution?	1 = none 2 = vocational certificate 3 = associate 4 = bachelor’s 5 = master’s 6 = Ph.D. or Ed.D. 7 = MD, DO, DDS, DVM 8 = LL.B. or J.D. 9 = B.D. or M.Div. 10 = other	<b>HiDegree</b>

(Table 6 continues)

(Table 6 continued)

CIRP Variable Name	CIRP Question	Response Categories	Summed Variable Name
HIDEGHRE	What is the highest degree you plan to attain at this institution?	↓	↓

**Note. Five component variables of cultural capital were rescaled as indicated in Table 9, in the section on data screening.**

Table 7

*Construction of “Social Capital” Variable*

CIRP Variable Name	CIRP Question	Response Categories	Summed Variable Name
FUTACT06	How likely are you to join a social fraternity or sorority?	1 = no chance 2 = very little chance 3 = some chance 4 = very good chance	<b>PeerSCNt</b> Peer network influences on social capital
FUTACT15	How likely are you to develop close friendships with other students?	↓	↓
FUTACT17	How likely are you to socialize with someone of another racial or ethnic group?	↓	↓
ACT06	Last year, how often were you a guest in a teacher’s home?	1 = not at all 2 = occasionally 3 = frequently	<b>AdltSCNt</b> Adult network influences on social capital
ACT14	Last year, how often did you ask a teacher for advice?	↓	↓
REASON12	How important is it to you that a mentor or role model encouraged you to attend college?	1 = not important 2 = somewhat important 3 = very important	↓
CHOOSE02	How important is it to you that a teacher encouraged you to attend college?	↓	↓
CHOOSE08	How important is it to you that a high school guidance counselor encouraged you to attend college?	1 = not important 2 = somewhat important 3 = very important	↓
CHOOSE09	How important is it to you that a private counselor encouraged you to attend college?	↓	↓

(Table 7 continues)

(Table 7 continued)

CIRP Variable Name	CIRP Question	Response Categories	Summed Variable Name
RFUTACT20 (2000/2001) RFUTACT16 (2003)	How important is it to you to communicate regularly with your professors?	↓	↓
RHPWXX03	Last year, how often did you talk with teachers outside of class?	1 = not at all 2 = occasionally 3 = frequently	↓
HPW04	How many times per week, last year, did you engage in organized exercise or sports?	1 = 0 2 = <1 3 = 1-2 4 = 3-5 5 = 6-10 6 = 11-15 7 = 16-20 8 = >20	<b>FrmlSCNt</b> Influence on social capital of formally organized activities
HPW08	How many times per week, last year, did you participate in organized student clubs or groups?	↓	↓
ACT04	How often last year did you tutor another student?	1 = not at all 2 = occasionally 3 = frequently	<b>AcaSCNt</b> Academically oriented activities that influence social capital
ACT05	How often last year did you study with other students?	↓	↓

Note: two component variables of social capital were rescaled as indicated in Table 9, in the section on data screening.

### Instrumentation

Established in 1966, the Cooperative Institutional Research Program (CIRP) is the nation's oldest and largest empirical study of higher education. To date, the survey program covers data on approximately 1,900 institutions, 15 million students, and 300,000 faculty, and is regarded as the most comprehensive source of information on higher education (Higher Education Research Institute, 2009). The freshman survey is one of three survey instruments administered by the Higher Education Research Institute at the University of California, Los Angeles. Each year, this survey is given to entering

freshmen at approximately 700 postsecondary institutions nationwide. This survey instrument covers a wide range of student characteristics, including demographic data as well as information on values, attitudes, beliefs, and self-concept. Data from the freshman survey are widely used by researchers interested in exploring historic, current, or evolving characteristics associated with students as they enter higher education. Several studies using data from the CIRP Freshman Survey contribute to the design of this study, including Cerna (2007), Keup (2005), and McDonough (1997).

This research study used raw data from the university for entering freshman for the years 2000, 2001, and 2003. Individual student records were populated with total SAT scores by the Office of Institutional Research. They also matched student identification numbers to graduation records in order to determine whether individuals successfully persisted to degree completion at this institution.

### **Data Screening**

Once data were acquired, data screening became the first, and one of the most important steps in assuring a reliable structural equation model (Schumacker & Lomax, 2004). Screening and data preparation were particularly important in this study due to the complications associated with combining survey information from multiple years, and building composite variables to proxy for the latent components in the model.

Before information from different years could be combined, the coding schemes for each survey year had to be compared to ensure variables of interest were included in each survey and to identify instances where variable names differed across the years. An example of changing variable names is “RATEXX01” where “XX” indicates a survey year. In order to successfully combine surveys a new variable was created to indicate the

survey year. Following that, variables like “RATEXX01” were renamed to simply “RATE01”. This ensured the same variable name occurred in all years.

Creating composite variables is not a complicated process, but it does require careful attention to detail. The “Independent Variables” section of this document describes how individual variables were selected for grouping based on previous research efforts. In the process of screening and preparing the data, these variables were summed to create the composite variables that in turn were used to construct the latents.

Composite variables were used as a means of data reduction (Rowe, 2006) because they have a direct influence on sample size and power, and thereby reduced the required sample size. These composite variables had the same number of response categories, but the values of those responses became multiples of the originals. To illustrate, if four variables with original response options of 1, 2, 3, or 4 were added together, then the resulting composite variable would have response values of 4 – 16. The example below shows how four original variables were combined to create one new variable.

Table 8

*Example of Procedure to Sum Variables*

Original Variable	Student #1 Responses	Student #2 Responses	Student #3 Responses	Student #4 Responses
GOAL04, importance of influencing political structure, 1=not important; 2=somewhat important; 3=very important; 4=essential	1	1	4	4
GOAL05, importance of influencing social values, 1=not important; 2=somewhat important; 3=very important; 4=essential	1	2	3	4
FUTACT12, likelihood of being satisfied with college, 1=no chance; 2=very little chance; 3=some chance; 4=very good chance	1	3	2	4

(Table 8 continues)

(Table 8 continued)

Original Variable	Student #1 Responses	Student #2 Responses	Student #3 Responses	Student #4 Responses
FUTACT13, likelihood of participating in volunteer or community service work, 1=no chance; 2=very little chance; 3=some chance; 4=very good chance	1	1	2	4
New Variable named FutCCExp: measures the potential that cultural capital has for influencing future activities. In this example, the variable would have a minimum value of 4 and a maximum value of 16. It is the sum of the component variables.				
New values of students' original responses:	4	7	11	16

It goes without saying that variables can only be combined when they contain the same number of response categories. Seven original variables required rescaling so that they could be included in composite variable groupings that contained fewer response options. This rescaling procedure adhered to accepted statistical practices and attempted to reflect the original frequency distributions and other characteristics as closely as possible. Specifically, original means, standards deviations, skewness, and kurtosis were compared to the rescaled variables as a test for accuracy. The table below lists the variables that required rescaling.

Table 9

*Variables to Rescale*

<b>Original Variable Name</b>	<b>Latent Construct Independent Variable</b>	<b>CIRP Question</b>	<b>Original Response Categories</b>	<b>Rescaled Response Categories</b>
FUTACT09	Cultural Capital AcaCCInf Academic influences	Likelihood of making at least a “B” average	1 = no chance 2 = very little chance 3 = some chance 4 = very good chance	1 = not important 2 = somewhat important 3 = very important
FUTACT11	Cultural Capital AcaCCInf Academic influences	Likelihood of getting a bachelor’s degree	1 = no chance 2 = very little chance 3 = some chance 4 = very good chance	1 = not important 2 = somewhat important 3 = very important
FUTACT20	Social Capital AdltSCNt Adult network influences	Importance of communicating regularly with professors	1 = no chance 2 = very little chance 3 = some chance 4 = very good chance	1 = not important 2 = somewhat important 3 = very important
HPW01	Cultural Capital AcaCCInf Academic influences	Hours per week, last year, spent studying or doing homework  After rescaling, question is interpreted as frequency instead of number of hours	1 = 0 2 = <1 3 = 1-2 4 = 3-5 5 = 6-10 6 = 11-15 7 = 16-20 8 = >20	1 = not at all 2 = occasionally 3 = frequently
HPW10	Cultural Capital FamCCInf Family influences	Hours per week, last year, spent on household or child care responsibilities  After rescaling, question is interpreted as importance of activity instead of number of hours	1 = 0 2 = <1 3 = 1-2 4 = 3-5 5 = 6-10 6 = 11-15 7 = 16-20 8 = >20	1 = not important 2 = somewhat important 3 = very important

(Table 9 continues)

(Table 9 continued)

Original Variable Name	Latent Construct Independent Variable	CIRP Question	Original Response Categories	Rescaled Response Categories
HPW03	Social Capital AdltSCNt Adult network influences	Hours per week, last year, spent talking with teachers outside of class  After rescaling, question is interpreted as importance of activity instead of number of hours	1 = 0 2 = <1 3 = 1-2 4 = 3-5 5 = 6-10 6 = 11-15 7 = 16-20 8 = >20	1 = not important 2 = somewhat important 3 = very important
LIVEPLAN	Cultural Capital Live	Where do you plan to live during the fall semester  After rescaling, response categories are reduced to either family/relatives, or other	1 = family/relatives 2 = private home 3 = dormitory 4 = fraternity/sorority 5 = other campus housing 6 = other	1 = family/relatives 2 = other

Finally, unused variables in the data set were deleted in the interest of producing a small and efficient set of data for the model.

### Data Analysis

Bayesian Structural Equation Modeling (BSEM) was used for model fitting and parameter estimation. The resulting parameter estimates (i.e., regression weights) provided the necessary information to produce two prediction equations relative to the probability of persistence for White/Caucasian and Latina/o students based on pre-enrollment levels of academic, cultural, and social capital. Several aspects of structural equation modeling made it the statistical method of choice for this study. First, because the model and associated inter-variable relationships are required to be specified *a priori*, SEM forces the researcher to base hypotheses on the existing knowledge base, thereby



providing a method for confirming or failing to confirm the posited model based on the researcher's hypotheses. Secondly, structural equation modeling provided explicit estimates of residual effects, which allowed the researcher to improve model fit through modifications.

Bayesian analysis enhanced the capabilities of structural equation modeling through its ability to: a) manage complex models; b) take existing known conditions into account; c) incorporate both directly observed and latent variables; and, d) effectively analyze both interval and categorical data (Gelman, et al., 2004). The most critical contribution that Bayesian analysis provided for this research was the ability to analyze data from differing scales of measurement. While interval estimates rely on a normal, cumulative density function, nominal, categorical, and ordinal measures use either logistic or probit functions. Bayesian analysis applies the principles of probability distributions to create continuous ranges around categorical responses so that levels of measurement no longer restrict effective analysis of mixed data (Price, 2010).

A second crucial consideration in choosing Bayesian analysis was a concern regarding sample sizes. While Latina/o enrollment at this university has enjoyed significant growth over the past few years, the freshman classes used in this analysis included far fewer Latinas/os. Bayesian analysis employs Markov Chain Monte Carlo (MCMC) resampling procedures that minimize concerns over sample size. Briefly summarized, MCMC draws repeated sub-samples from the data and analyzes cumulative results based on the resampling. The effect of repeated sampling is that the resulting means of the sampling distributions tend toward normal statistical parameters even though the sample data may possess non-normal characteristics (Loehlin, 2004).

Analysis began with the *a priori* model shown on page 9. AMOS software was used to calculate model effects. Comparisons were made between White/Caucasian and Latina/o students, and model fit statistics were evaluated in order to achieve the best fit possible.

### **Summary**

Structural equation modeling and Bayesian analysis was used to analyze the contributions that academic, cultural, and social capital made in the ability of students to persist to degree completion. Specifically, this study analyzed the statistical differences in the ability of academic capital to predict likelihood of persistence for White/Caucasian students as compared to Latina/o students. This analysis also evaluated the individual capacity for both cultural and social capital to mediate for lower levels of academic capital for Latina/o students, thereby improving the ability to predict the likelihood of their persistence.

## **CHAPTER IV**

### **Results**

Chapter four provides the results of this study which analyzed the influences of academic, cultural and social capital on degree attainment for three freshman classes. It includes results for both Latina/o and White/Caucasian students. The chapter is organized according to (a) a demographic description of the sample, (b) assessment of model fit statistics, and (c) statistical and practical evaluation of research questions and associated hypotheses.

#### **Sample**

Sample data used herein are from the Cooperative Institute Research Program (CIRP) Freshman Survey for the freshman classes entering the university in the fall of 2000, 2001, and 2003 (data were not available for 2002). Table 10 provides a summary of the sample characteristics. The discrepancy existing in number of students comprising the total sample and those used in the analyses is the result of incomplete or missing data. Analyses conducted are based on participants with complete records (i.e., no missing data). In other words, a student might have reported their age, and distance from home, but not their high school G.P.A. Such a student will show up in the frequency counts for age and distance from home, but is not included in the analysis. Demographic information is reflected by frequency counts on all entering freshmen of both ethnicities.

Table 10 provides a cross tabulation of the sample by ethnicity, gender, age, and distance from the student's home to the university. Although White students are disproportionately represented in comparison to Latina/o students by a ratio of approximately 5.5:1, the proportion of males to females is close. Among Whites, males constitute 37.0% of the three freshman classes, while females represent 62.9%; Latino males compare at 38.0%, and Latina females at 61.8%.

Table 10

*Demographic Characteristics*

Characteristic	White/Caucasian Students N=2,934		Latina/o Students N=529	
	Frequency	Percent (%)	Frequency	Percent (%)
Gender				
Male	1,096	37.0	204	38.0
Female	1,861	62.9	332	61.8
Total	2,957	84.7	536	15.3
Age				
18 or younger	1,207	58.9	224	60.9
19	788	38.4	128	34.8
20 or older	52	2.5	15	4.0
Distance from home (miles)				
50 or less	775	26.2	187	34.9
51 – 100	413	14.0	94	17.5
101 – 500	1,622	54.8	216	40.2
>500	111	3.8	29	5.4
SAT Score				
<920	249	8.4	96	17.9
920 – 1,180	1,956	66.1	332	61.8
>1,180	402	13.6	35	6.5

Examining the data relative to age, Latinas/os are both slightly younger and slightly older than their White counterparts. Approximately 61% of entering Latina/o freshmen are 18 years of age or younger, compared to 58.9% of Whites, while 4.0% of

Latina/o freshmen are 20 or older versus 2.5% of Whites. Only among students nineteen years or older, is the proportion of Whites higher than Latinas/os, at 38.4% compared to 34.8%.

Families of Latina/o students also appear to live closer to the university than those of White students. For example, 34.9% of the Latina/o student sample lives within a 50-mile radius compared to 26.2% of Whites. In the range of 51 to 100 miles, Latina/o students still represent a larger sample, although the gap narrows to 17.5% versus 14.0%. The cumulative distribution of those students residing up to 100 miles from the university is 52.4% for Latinas/os and 40.2% for Whites. However, for those students residing over 100 miles the relative representation for each group reverses, with 54.8% of Whites living between 101 and 500 miles from the university compared to 40.2% of Latinas/os. Over 500 miles, there is a considerable drop in the proportion for both groups, although once again, Latinas/os are slightly higher at 5.4% compared to 3.8% for Whites.

The final category in this table compares frequencies for the Scholastic Aptitude Test (SAT) for both groups. Results indicate that a larger proportion of Latina/o students score lower on this standardized exam than do their White counterparts. For example, 17.9% of Latinas/os scored less than 920 points compared to 8.4% for Whites. Between 920 points and 1,180 points, White students out-weigh Latinas/os by a small margin of 66.1% versus 61.8%. Over 1,180 points, that gap widens to 13.6% for White students and 6.5% for Latina/o students. Mean differences and tests of statistical significance for SAT total scores are provided in Table 11. Although the mean score for Whites ( $M = 1,060$ ,  $SE = 2.313$ ) is higher than Latinas/os ( $M = 998$ ,  $SE = 5.532$ ) and the difference between the means is significant,  $t = 10.427$ ,  $p = .000$  with 3,068  $df$ , the effect size is small at  $r = .18$ .

As noted earlier, in the definitions of key terms, an effect size smaller than 0.2 is considered small.

Table 11

*Independent t-Test*

<b>Ethnicity</b>	<b>N</b>	<b>Mean</b>	<b>Standard Error of the Mean</b>
White	2,607	1,060.74	2.313
Latinas/os	335	998.57	5.532

*Test for Equality of Means*

<b><i>t</i></b>	<b><i>df</i></b>	<b>Significance</b>	<b><i>r</i></b>
10.427	3,068	.000	.18

Recognizing that the large difference in sample sizes between these two groups can affect the results of a *t*-test, the test was repeated using equal sample sizes. Three random sub-samples from the White/Caucasian student population, equal in size to the Latina/o sample were compared to validate the results shown above. These statistical tests confirmed the accuracy of the analysis presented in Table 11. Effect sizes remained small, ranging from 0.208 to 0.239, indicating the mean difference explained less than 6% of the total variance. Complete results are included in Appendix A.

Examining the length of time to graduation shows Latinas/os persistently narrow the gap in attainment over time. For the freshman classes of 2001 and 2003, the gap closes from 5% at the end of four years to 1% (2001) or 2% (2003) after more than six years. This is consistent with the combined results for all three years where we see a gap of 4% after four years decreasing to 2% after more than six years. The freshman class of 2000 differs a little, starting with a gap of 2% at the end of four years that widens slightly

to 3% after more than six years. The results of the analysis are presented in Table 12 below.

Table 12

*Number of Years to Degree Completion*

	N	White Caucasian Students Percent Completing Bachelor's Degree Within			N	Latina/o Students Percent Completing Bachelor's Degree Within		
		4 Years	6 Years	> 6 Years		4 Years	6 Years	> 6 Years
Freshman Class of 2000	1,081	20%	54%	55%	209	18%	51%	52%
Freshman Class of 2001	972	18%	54%	60%	164	13%	51%	59%
Freshman Class of 2003	905	19%	56%	61%	187	14%	52%	59%
Totals	2,958	19%	55%	58%	560	15%	51%	56%

### Assessing Overall Model Fit

The goal of structural equation modeling is to posit a hypothetical model that, ideally, produces an accurate fit to a set of observed or acquired data. To this end, evaluating the efficacy of model-data fit is fundamental to structural equation modeling. Table 13 provides a set of descriptive measures of fit (also known as goodness-of-fit measures) that assess discrepancies between the covariance matrix generated based on the observed data relative to the expected (i.e., based on the theoretical model) matrix. Importantly, descriptive measures of fit serve as guideposts for the researcher to inform his or her evaluation of model-data fit or discrepancy. Seldom should a model be accepted or rejected on the basis of a single measure. Instead, a set of fit measures provides a means of viewing the model from multiple perspectives to assess model-data fit from within accepted tolerances (Bollen, 1989; Garson, 2009).

Table 13

*Model Fit Indices*

	$\chi^2$	df	p	CMIN/df	CFI	RMSEA	NPAR	AIC	BCC
White/Caucasian	707.309	105	.000	6.736	.812	.053	65	837.309	838.461
Saturated Model	.000	0			1.0		170	340.000	343.013
Independence Model	3,336.457	136	.000	24.533	.000	.107	34	3,404.45	3,405.059
Latina/o	264.431	105	.000	2.518	.724	.064	65	394.431	401.136
Saturated Model	.000	0			1.000		170	340.000	357.536
Independence Model	713.839	136	.000	5.249	.000	.108	34	781.839	785.346

The two groups of fit indices above each contain three lines of information. The first line in each group includes statistics for the hypothesized model using data for either White/Caucasian students or Latina/o students. Each of these rows is followed by information for the saturated and independence models. These three models represent points along a continuum where the independence model is the most restrictive (correlations among all variables are presumed to be zero); the saturated model is the least restrictive (all variables correlate perfectly with each other); and the hypothesized model is somewhere in between (Byrne, 2001; Schumacker & Lomax, 2004). The saturated and independence models serve as references along the model-data fit continuum and are particularly useful in assessing goodness of fit for the statistical criteria in the last two columns. Each of these fit measurements is discussed in detail below.

**$\chi^2$ , df, p, and CMIN/df.** These first four statistics are evaluated as a group because they all relate to the chi-square statistic. Generally, a chi-square statistic observed as significant ( $p < .05$ ) indicates that a model should be rejected (i.e., the model-data fit is poor). In this case,  $\chi^2 = 707.309$  with  $df = 105$  and  $p = .000$  (White/Caucasian) and  $\chi^2 = 264.431$  with  $df = 105$  and  $p = .000$  (Latina/o) would cause concern. However, Garson



(2009) notes that the chi-square statistic's tendency to produce Type II errors provides reason to discount a significant chi-square providing that other measures of model fit are supported. The Chi-square statistic is particularly problematic in 1) highly complex models; 2) very large sample sizes, or 3) in cases where the assumption of multivariate normality is violated. In the present case, the model satisfies both the first and third criteria, and as such constitutes a valid argument for discounting the significant chi-square measure. The fourth column,  $CMIN/df$ , is referred to as relative chi-square, this measurement is computed as  $\frac{\chi^2}{df}$ . The opinion of researchers varies regarding the use of the  $CMIN/df$  criteria. Byrne (2001) and Carmines and McIver (1981) offer recommended cut-off points for acceptable models ranging from a low of two to a high of five (Marsh & Hocevar, 1985; Wheaton, Muthen, Alwin, & Summers, 1977). This model produces a relative chi-square for Whites of 6.736, and 2.518 for Latinas/os.

**CFI.** The Comparative Fit Index (CFI) is among those least affected by sample size. The CFI is derived by statistically comparing the hypothesized model to the independence model. Values of the CFI vary from zero to one with values approaching one indicative of better fit (Byrne, 2001). The recommended criteria for model acceptance is for the CFI statistic to be greater than or equal to .9, indicating that 90% of the covariation in the data can be accounted for by the model (Garson, 2009). While a CFI of .812 for Whites and .724 for Latinas/os falls below this criterion, they nonetheless imply a relatively robust fit.

**RMSEA.** One of the most informative measures in structural equation modeling is the Root Mean Square Error of Approximation (RMSEA). The RMSEA is a population-based measure of fit that focuses on the amount of error observed in the

proposed model relative to the theoretical model (Price, Tulskey, Millis, & Weiss, 2002). It is expressed per degree of freedom in the proposed model, making the index sensitive to model complexity (i.e., estimated number of parameters). The RMSEA produces a bias toward increasingly complex models (Arbuckle, 2008; Byrne, 2001; Garson, 2009). There is agreement among SEM researchers that an RMSEA value of about .08 or less indicates reasonable model fit, and a value of .05 or less suggests good fit. An RMSEA value of 0.0 indicates a perfect fit of the model relative to the population. The RMSEA values produced by this model indicate relatively good model fit at .053 for Whites and .064 for Latinas/os.

**NPAR and AIC.** The number of distinct parameters to be estimated is denoted as NPAR. The model presented herein includes 65 hypothesized unique parameters consisting of 21 regression weights, seven co-variances, 20 residuals (i.e., error terms), and 17 intercepts. Each of these items correspond to “presumed relations among observed or latent variables” (Kline, 2005, p. 64).

Another measure of model-dat fit is the Akaike Information Criterion (AIC). The AIC is based on the  $\chi^2$  statistic and incorporates the number of parameters to be estimated. The AIC is computed as  $\chi^2 + 2(\text{NPAR})$  or  $707.309 + 2(65) = 837.309$  for Whites and  $264.431 + 2(65) = 394.431$  for Latinas/os. Lower values of the AIC between the hypothesized, saturated and independence models represent the best fit (Byrne, 2001; Kline, 2005; Schumacker & Lomax, 2004). However, due to its dependence on the  $\chi^2$  statistic AIC penalizes a model due to its complexity in the same fashion as the chi-square statistic.

**BCC.** The Browne-Cudeck Criterion (BCC) is similar in function to the AIC, but takes sample size and degrees of freedom into account. It is computed as  $\frac{\chi^2}{n} + \frac{2k}{n-v-2}$  where  $n$  = sample size,  $v$  = number of variables, and  $k = (.5v(v + 1)) - df$  (Garson, 2009). This model produces a BCC of 838.461 for Whites and 401.136 for Latinas/os. The BCC statistic is even more sensitive to model complexity than AIC because it includes not only the  $\chi^2$  statistic but also sample size and the number of variables. As with AIC, the best fitting model is supported by evidence exhibited as the smallest number between the hypothesized, saturated and independence models.

Ideally, the hypothesized model will have the smallest AIC and BCC statistic among the three models, as discussed above. However, in this particular instance, due to the high level of complexity, the fact that both the AIC and BCC statistics are much closer to the low end of the continuum represented by the three models indicates a moderately good fit.

Although the statistics presented above do not unanimously point to an acceptable level of model fit, CMIN/ $df$ , CFI, and RMSEA all fall within acceptable levels of tolerance. The remaining measures of  $\chi^2$ , AIC, and BCC should be viewed cautiously due to their high level of sensitivity to model complexity.

**Hoelter's Critical N.** The last measure of overall model fit that will be addressed is the question of sample size. The results of Hoelter's Critical N test are presented below.

Table 14

*Adequacy of Sample Size*

	Hoelter's Critical N (.05)	Hoelter's Critical N (.01)
White Caucasian Students	377	411
Latina/o Students	181	197

Hoelter's index differs from the measures previously discussed in that it focuses directly on the adequacy of the sample size itself. AMOS reports critical n levels for significance levels of both .05 and .01. The accepted rule-of-thumb is that a value >200 indicates adequacy of sample size. The White/Caucasian sample of 2,050 cases appears to be adequate with a Hoelter's value of 377 at the .05 level, and 411 at the .01 level. On the other hand, results for the Latina/o sample of 368 cases might be improved with a slightly larger sample as indicated by the Hoelter's values of 181 at the .05 level and 197 at the .01 level.

## Bayesian Results

**AMOS posterior summary and regression results.** Tables 15 and 16 provide unstandardized posterior summary results for both ethnic groups. The information is grouped by latent and dependent variables for ease of reading. The first group pertains to academic capital, the second to social capital, the third to cultural capital, and the fourth to successful degree attainment.

Table 15

### *Posterior Summaries for White/Caucasian Students*

	Mean	Std. Error	Sig.	Conver- gence Statistic	95% Lower Bound	95% Upper Bound
<b>Regression Weights</b>						
Social Capital<--Academic Capital	0.117	0.002	58.500	1.001	0.024	0.204
Cultural Capital<--Academic Capital	0.042	0.001	42.000	1.001	0.005	0.081
ParEd<--Academic Capital	0.003	0.002	1.500	1.000	-0.147	0.140
Remedial<--Academic Capital	-0.948	0.009	-105.333	1.002	-1.246	-0.721
Pcourse<--Academic Capital	0.062	0.003	20.667	1.001	-0.091	0.218
SATTL<Academic Capital	36.102	0.519	69.561	1.001	11.580	60.125
PeerSCNt<--Social Capital	0.994	0.004	248.500	1.001	0.810	1.206
AdltSCNt<--Social Capital	1.495	0.005	299.000	1.001	1.263	1.780
AcaSCNt<--Social Capital	1.539	0.005	307.800	1.001	1.282	1.861
SATL<--Social Capital	-123.990	1.970	-62.939	1.001	-221.029	-39.477
Cultural Capital<--Social Capital	0.504	0.002	252.000	1.001	0.394	0.645
PastCCAct<--Cultural Capital	2.543	0.007	363.286	1.001	2.155	2.960
FutCCExp<--Cultural Capital	3.101	0.007	443.000	1.000	2.639	3.608
HiDegree<--Cultural Capital	1.214	0.006	202.333	1.001	0.913	1.557
Live<--Cultural Capital	10.646	0.483	22.041	1.008	3.947	18.483
AcaCCInf<--Cultural Capital	2.548	0.006	424.667	1.000	2.157	2.988
SRateAC<--Cultural Capital	0.545	0.008	68.125	1.001	0.215	0.902
SATL<--Cultural Capital	169.300	3.161	53.559	1.001	25.444	312.039
Degree<--Academic Capital	0.012	0.002	6.000	1.001	-0.064	0.088
Degree<--Social Capital	-0.323	0.008	-40.375	1.001	-0.716	0.017
Degree<--Cultural Capital	0.666	0.012	55.500	1.001	0.078	1.276

Table 16

*Posterior Summaries for Latina/o Students*

	Mean	Std. Error	Sig.	Conver- gence Statistic	95% Lower Bound	95% Upper Bound
<b>Regression Weights</b>						
Social Capital<--Academic Capital	-0.146	0.024	-6.083	1.023	-0.317	0.064
Cultural Capital<--Academic Capital	0.094	0.020	4.700	1.025	-0.030	0.236
ParEd<--Academic Capital	0.066	0.028	2.357	1.022	-0.175	0.313
Remedial<--Academic Capital	-1.119	0.099	-11.303	1.015	-2.403	-0.033
Pcourse<--Academic Capital	0.363	0.042	8.643	1.023	0.073	0.085
SATTL<Academic Capital	18.783	7.616	2.466	1.016	-74.635	94.328
PeerSCNt<--Social Capital	1.436	0.078	18.410	1.023	0.842	2.132
AdltSCNt<--Social Capital	1.893	0.056	33.804	1.020	1.354	2.421
AcaSCNt<--Social Capital	1.700	0.044	38.636	1.018	1.277	2.088
SATL<--Social Capital	-129.340	11.304	-11.442	1.019	-252.348	-29.426
Cultural Capital<--Social Capital	0.602	0.049	12.286	1.024	0.299	1.042
PastCCAct<--Cultural Capital	2.897	0.141	20.546	1.022	1.537	3.961
FutCCExp<--Cultural Capital	3.429	0.179	19.156	1.022	1.995	4.712
HiDegree<--Cultural Capital	1.525	0.079	19.304	1.020	0.843	2.381
Live<--Cultural Capital	5.378	1.278	4.208	1.022	-3.301	19.057
AcaCCInf<--Cultural Capital	2.622	0.098	26.755	1.019	1.747	3.557
SRateAC<--Cultural Capital	1.209	0.080	15.113	1.020	0.476	1.998
SATL<--Cultural Capital	125.653	23.029	5.456	1.022	33.684	382.017
Degree<--Academic Capital	0.191	0.035	5.457	1.024	-0.026	0.489
Degree<--Social Capital	0.352	0.134	2.627	1.025	-0.470	1.417
Degree<--Cultural Capital	0.533	0.142	3.754	1.023	-1.679	0.610

While it is difficult to make comparisons between pairs of variables because of differences in measurement scales, each row of data can be analyzed in terms of its individual contribution to the overall model, and comparisons between the results for White/Caucasian students and Latina/o students are valid. In fact, unstandardized coefficients are particularly useful in making comparisons across different populations (Loehlin, 2004). This fact facilitates the assessment of variances of specific effects for each observed and latent variable between ethnic groups.

The mean for each pair of variables represents a predictive regression point and indicates the strength of their relationship. These regression weights predict the effect of one variable on another based on the data supplied to the model. One of the strengths of regression analysis is that it moves us beyond simply analyzing whether or not a relationship between two variables exists. Regression weights use observed information to calculate the change that will be produced in an outcome variable relative to a fixed amount of change in a predictor variable. For example, reading the first line of Table 15 for White/Caucasian students, the regression weight measuring the direct affect of social capital on academic capital is 0.117 with a standard error of 0.002, significance of 58.5, a convergence statistic of 1.001 and a 95% credible interval of 0.024 on the lower bound and 0.204 on the upper bound. The reported means are the result of a Markov Chain Monte Carlo (MCMC) simulation based on repeated sampling of the observed data. For each group, over 100,000 samples were extracted from the data for analysis. The effect of repeated sampling is that the resulting means of the sampling distributions tend toward normal statistical parameters even though the sample data may possess non-normal characteristics (Loehlin, 2004). The significance of each variable and parameter is computed by dividing each mean by its associated standard error. “If the absolute value of the result exceeds 1.96, the effect is significantly different from zero at the .05 level of significance” (MacKinnon, 2008, p. 106). By this measurement, all parameters and variables are significant with the exception of parents’ education level for White students (1.500).

Several other comparisons of note between the two groups include the mediating effect of social capital on academic capital. The two variables are positively related for

White students at 0.117, and inversely related for Latina/o students at -0.146. Another comparison of interest is the contribution that remedial coursework makes to academic capital. While remedial coursework is inversely related to academic capital for both groups, there is a stronger negative influence for Latina/o students (-1.119 versus -0.948). Previous coursework at institutions of higher education (Pcourse) is positively related to academic capital, and the impact for Latina/o students is much greater (0.363 compared to 0.062). Finally, the effect of SAT total score (SATTL) on academic capital for Whites is approximately twice the magnitude than for Latinas/os (36.102 compared to 18.783).

No individual variable in the social capital group stands out in comparing one group to the other. However, each manifest a stronger contribution to social capital for Latinas/os. The same pattern is true for the mediating effect of cultural capital on social capital.

Similar relationships are observed for the cultural capital group, where all independent variables exhibit slightly stronger influences on cultural capital for Latinas/os, with only two exceptions. The independent variable 'Live' which indicates whether a student intends to live with family or on campus during their freshman year has a higher coefficient for White students than for Latina/o students (10.646 versus 5.378), as does SAT total score (169.300 compared to 125.653). It is also interesting to note the difference in the relationship between a student's self-assessment of their academic capital (SRateAC) and the contribution that makes to cultural capital. The coefficient for Latina/o students of 1.209 indicates over twice the magnitude of association in this relationship than for Whites at 0.545.



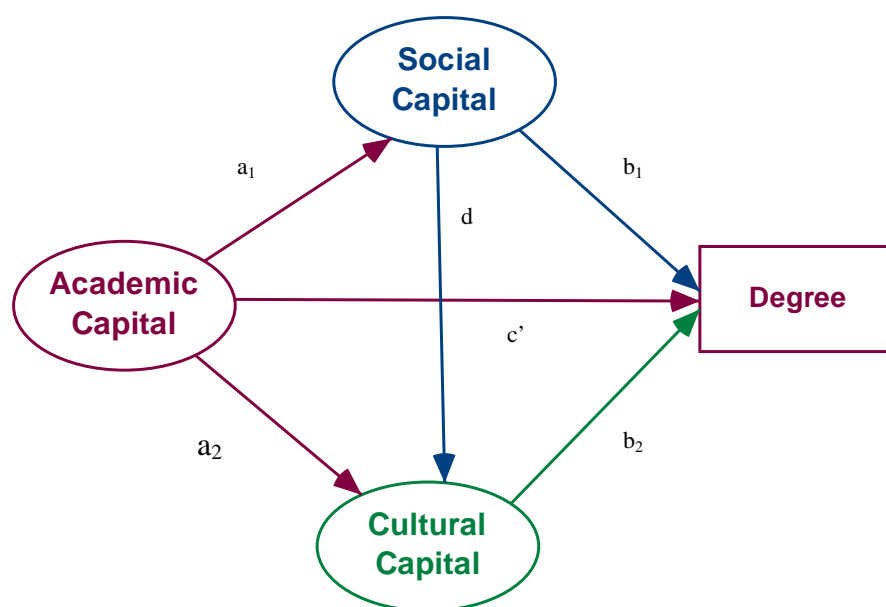
The last group of variables focuses on the contribution of each latent variable on persistence to degree completion. For Latina/o students, academic capital has a slightly stronger influence (0.191 compared to 0.012); social capital exerts a significantly stronger impact (0.352 versus -0.323); while cultural capital seems to have a slightly weaker effect (0.533 compared to 0.666).

Other key points observed in the analysis include small standard errors relative to their corresponding means, and relatively tight upper and lower bounds. All variables satisfy these criteria with the possible exception of the contribution that the variable labeled 'Live' makes to cultural capital.

Finally, the column labeled convergence statistic is a measure of adequacy regarding the repeated sampling algorithm convergence toward asymptotic normalcy. The AMOS program incorporates a conservative level of 1.002 to indicate there is little if any additional variation in the data to be gained by continuing the MCMC resampling. Once again, with the exception of the variable 'Live', all paired variables satisfy the 1.002 criterion for White/Caucasian students. However, a high number of the convergence statistics for the Latina/o sample fall in the range of 1.020 to 1.025. While this exceeds the default criteria in the AMOS program, Gelman, Carlin, Stern, and Rubin (2004, p. 308) suggest that for many analyses, values of 1.10 or smaller are sufficient. All of the convergence statistics in this model satisfy their criteria.

**Standardized direct, indirect, and total effects.** Meaningful comparisons across variables are difficult to make with unstandardized coefficients because of differences in measurement metrics for manifest variables. The model in the present study incorporates a summed variable approach as an intermediate step in developing manifest variables that

serve as proxies for latent variables. Included within the summed variables are heterogeneous measurement metrics. The conversion of coefficients to standardized form provides a mechanism to make meaningful judgments about the effects each of these variables has on the dependent outcome (Loehlin, 2004). Additionally, it becomes possible to identify both direct and indirect effects. Consider the core portion of the model (see Figure 2). The three arrows pointing to 'Degree' ( $b_1$ ,  $b_2$ , and  $c'$ ) represent the direct effects exerted on degree completion by the three latent variables academic, cultural, and social capital. Other examples of direct effects include the paths labeled  $a_1$ ,  $a_2$ , and  $d$ , that flow from academic capital to both social and cultural capital and from social capital to cultural capital.



**Figure 2. Core Model with Direct and Indirect Paths.** This diagram shows the core portion of the structural equation model and identifies direct and indirect paths. It can be used with the data in Tables 17, 18, and 19 to identify regression weights by path.

Consider all the paths that lead from academic capital to degree. In addition to the direct path labeled  $c'$ , there are other paths that pass through the mediating latent

variables of cultural and social capital. The product of path  $a_1b_1$  measures the indirect affect of academic capital on degree completion as it is mediated by social capital.

Likewise, the product of path  $a_2b_2$  measures the indirect affect of academic capital on degree completion as it is mediated by cultural capital.

Total effects on degree completion were obtained by computing the sum of direct and indirect effects.

Standardized coefficients for direct, indirect and total effects are presented in tables 17, 18, and 19 below. The path identifiers ( $a_1$ ,  $b_1$ ,  $a_2$ ,  $b_2$ ,  $c'$ , and  $d$ ) aid the interpretation of these tables and will be used to address the research questions in the next section. Please note each of these tables also includes the individual factor loadings for every observed variable used to construct the hypothetical latent variables.

Table 17

*Standardized Direct Effects*

	White/Caucasian Students			Latina/o Students		
	Academic Capital	Social Capital	Cultural Capital	Academic Capital	Social Capital	Cultural Capital
<b>Mean</b>						
Social Capital	0.156			-0.314		
Cultural Capital	0.094	0.863		0.195	0.937	
FamCCInf			0.212			0.224
AcaCCInf			0.541			0.527
Live			0.172			0.168
HiDegree			0.258			0.258
FutCCExp			0.658			0.621
PastCCAct			0.540			0.535
FrmlSCNt		0.370			0.324	

(Table 17 continues)

(Table 17 continued)

	White/Caucasian Students			Latina/o Students		
	Academic Capital	Social Capital	Cultural Capital	Academic Capital	Social Capital	Cultural Capital
AcaSCNt		0.564			0.488	
AdltSCNt		0.546			0.565	
PeerSCNt		0.364			0.405	
HSGPA	0.490			0.288		
SATTL	0.155	-0.396	0.319	-0.089	-0.841	0.686
SRateAC	0.496		0.120	0.292		0.324
PCourse	0.038			-0.056		
Remedial	-0.460			-0.703		
ParEd	0.002			0.090		
Degree	0.010	-0.244	0.294	-0.019	-0.057	0.014

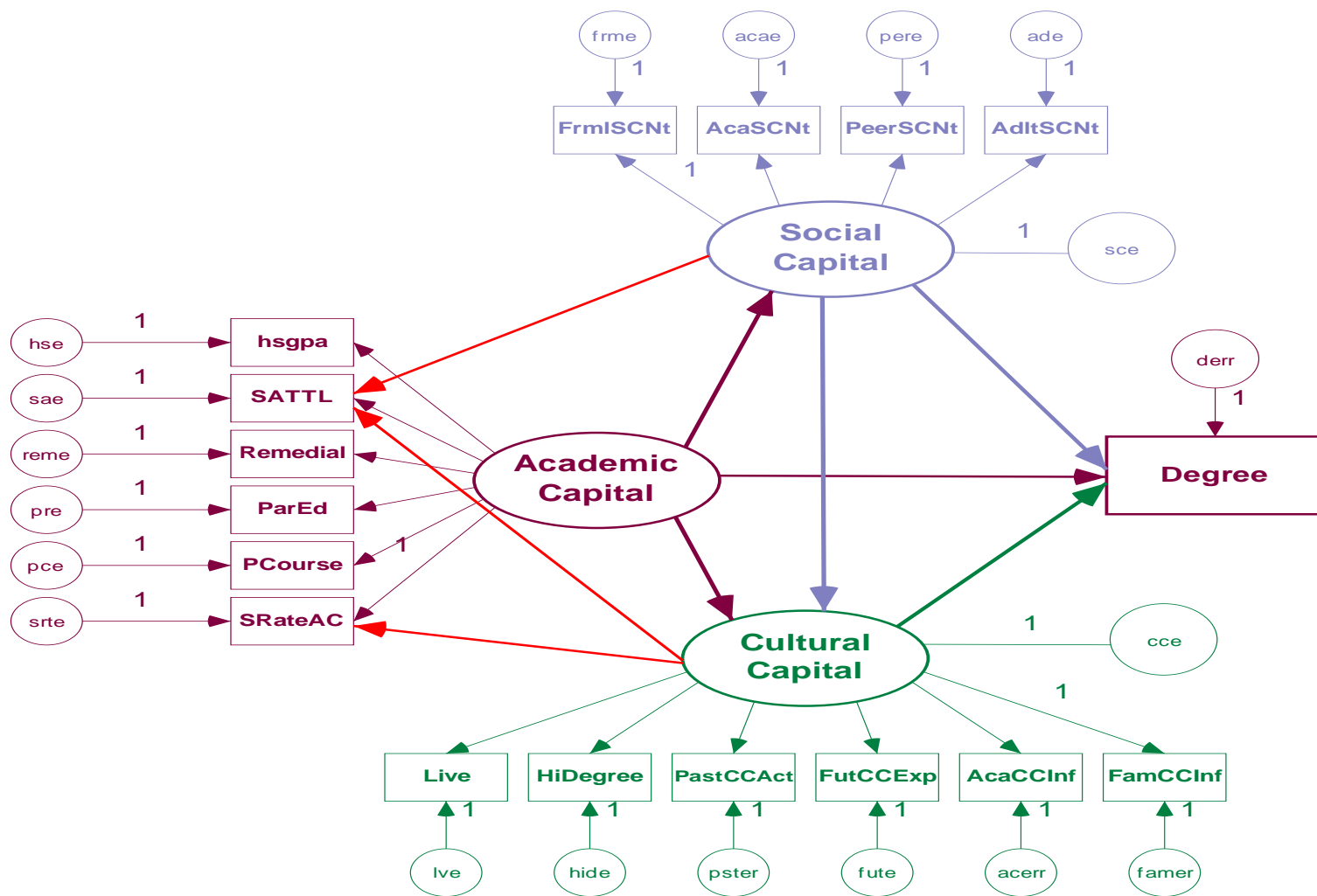


Figure 3. Complete Structural Equation Model.

Referring to the complete model, direct effects are computed for every straight arrow included on the diagram. This provides a means of determining the validity of the independent variables used to construct the latent variables. For example, these coefficients function much like measurement models constructed within factor analysis. Looking first at the column labeled Academic Capital, high school G.P.A. (HSGPA) has a relatively high contribution compared to SAT total score (SATTL) for both groups. Variables that do not appear to contribute much in explaining academic capital include previous coursework (PCourse), and parents' education levels (ParEd). In the Social Capital column, all four independent variables appear to make an important contribution to the latent variable, however, SAT total score is inversely associated with social capital for both groups. Finally, under the column heading Cultural Capital, the only relatively weak contribution is the variable 'Live' which indicates whether a student plans to live on campus or with family during their freshman year.

Direct effects for the three latent variables on degree completion are found in the last row. The most notable contributions for White/Caucasian students are the negative contribution of -0.244 for social capital, and 0.294 for cultural capital.

Table 18

*Standardized Indirect Effects*

	White/Caucasian Students			Latina/o Students		
	Academic Capital	Social Capital	Cultural Capital	Academic Capital	Social Capital	Cultural Capital
<b>Mean</b>						
Social Capital						
Cultural Capital	0.135			-0.295		
FamCCInf	0.048	0.183		-0.023	0.210	
AcaCCInf	0.124	0.467		-0.053	0.493	

(Table 18 continues)

(Table 18 continued)

	White/Caucasian Students			Latina/o Students		
	Academic Capital	Social Capital	Cultural Capital	Academic Capital	Social Capital	Cultural Capital
Live	0.039	0.148		-0.017	0.158	
HiDegree	0.059	0.223		-0.025	0.241	
FutCCExp	0.150	0.568		-0.062	0.582	
PastCCAct	0.124	0.466		-0.054	0.501	
FrmlSCNt	0.058			-0.102		
AcaSCNt	0.088			-0.153		
AdltSCNt	0.085			-0.177		
PeerSCNt	0.057			-0.127		
HSGPA	0.000			0.000		
SATTL	0.011	0.275		0.194	0.646	
SRateAC	0.026	0.103		-0.032	0.303	
PCourse						
Remedial						
ParEd						
Degree	0.029	0.254		0.018	0.013	

Collectively, the indirect effects demonstrate less influence on outcome(s), with a few exceptions. For example, (a) for White/Caucasian students the model results exhibit indirect loadings on social capital by academic cultural capital influences (AcaCCInf) of 0.467; (b) future cultural capital expectations (FutCCExp) of 0.568; (c) past cultural capital activities (PastCCAct) of 0.466; and (d) the indirect effect of 0.254 exerted on degree completion by social capital of 0.254. Comparing the results for Latina/o students, the model exhibits (a) a strong inverse relationship exists between cultural capital and academic capital of -0.295; (b) relatively strong influences on social capital by academic cultural capital influences (AcaCCInf) of 0.493; (c) future cultural capital expectations (FutCCExp) of 0.582; (d) SAT total score (SATTL) of 0.646; and (e) self-rated academic ability (SRateAC) of 0.303.

Table 19

*Standardized Total Effects*

	White/Caucasian Students			Latina/o Students		
	Standardized Total Effects			Standardized Total Effects		
	Academic Capital	Social Capital	Cultural Capital	Academic Capital	Social Capital	Cultural Capital
<b>Mean</b>						
Social Capital	0.156			-0.314		
Cultural Capital	0.229	0.863		-0.100	0.937	
FamCCInf	0.048	0.183	0.212	-0.023	0.210	0.224
AcaCCInf	0.124	0.467	0.541	-0.053	0.493	0.527
Live	0.039	0.148	0.172	-0.017	0.158	0.168
HiDegree	0.059	0.223	0.258	-0.025	0.241	0.258
FutCCExp	0.150	0.568	0.658	-0.062	0.582	0.621
PastCCAct	0.124	0.466	0.540	-0.054	0.501	0.535
FrmlSCNt	0.058	0.370		-0.102	0.324	
AcaSCNt	0.088	0.564		-0.153	0.488	
AdltSCNt	0.085	0.546		-0.177	0.565	
PeerSCNt	0.057	0.364		-0.127	0.405	
HSGPA	0.490	0.000		0.288	0.000	
SATTL	0.166	-0.121	0.319	0.105	-0.195	0.686
SRateAC	0.522	0.103	0.120	0.260	0.303	0.324
PCourse	0.038			-0.056		
Remedial	-0.460			-0.703		
ParEd	0.002			0.090		
Degree	0.039	0.010	0.294	-0.001	-0.043	0.014

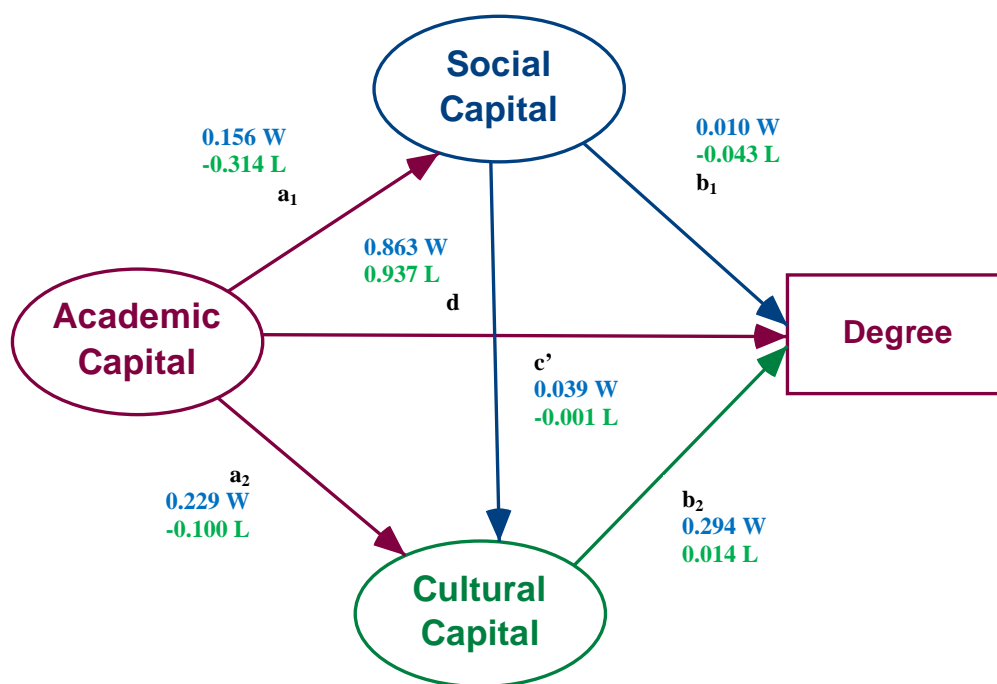
Finally, looking at total effects, the strongest relationship exhibited by both groups, is the direct path between social and cultural capital (i.e., standardized regression weights of 0.863 for Whites and 0.937 for Latinas/os). Relationships exhibited by direct and indirect effects continue to exhibit similar influences here. However, the difference in the effect that remedial coursework demonstrates between ethnic groups is notable: it measures -0.46 for Whites and -0.703 for Latinas/os. Furthermore, high school G.P.A. (HSGPA) continues to make a relatively larger contribution to academic capital for both



groups as compared to SAT total score (SATTL). For White students HSGPA measures 0.490 compared to 0.166 for SATTL; Latina/o students indicate 0.288 versus 0.105. Nonetheless, although the relationship between academic capital and SAT total score is relatively weak, there is a strong relationship to cultural capital for both groups; 0.319 for Whites and 0.686 for Latinas/os.

### Research Questions and Hypotheses

The total effect coefficients from table 19, displayed on the core model below, provide answers to the research questions and hypotheses.



**Figure 4. Core Model with Regression Coefficients.** This diagram shows the core portion of the structural equation model. In addition to the direct and indirect paths (as first shown in Figure 2) it includes the regressions weights for each path. Data for White/Caucasian students is indicated in **blue followed by a “W”**, while information for Latina/o students is indicated in **green followed by an “L”**.

**Definitions.** The following definitions apply to all equations in this section.

$Y$  = the dependent variable Degree

$AC$  = the latent variable Academic Capital

$CC$  = the latent variable Cultural Capital

$SC$  = the latent variable Social Capital

$a_1$  = the relation between  $AC$  and  $SC$ , adjusted for the partial effect of  $c'$

$b_1$  = the relation between  $SC$  and  $Y$ , adjusted for the partial effect of  $c'$

$a_2$  = the relation between  $AC$  and  $CC$ , adjusted for the partial effect of  $c'$

$b_2$  = the relation between  $CC$  and  $Y$ , adjusted for the partial effect of  $c'$

$d$  = the relation between  $SC$  and  $CC$ , adjusted for the partial effect of  $c'$ ,  $a_1$ ,  $a_2$ ,  $b_1$ , and  $b_2$

$c'$  = the relation between  $AC$  and  $Y$ , adjusted for the partial effects of  $a_1$ ,  $b_1$ ,  $a_2$ ,  $b_2$ , and  $d$

$df = 105$

$LN$  = the natural logarithm

$N$  = sample size

**Testing for significance.** The regression weights for each path in Figure 4 are Pearson's correlation coefficients. As such, although they indicate the strength of the relationship between the two variables, it is not possible to determine if there is a statistically significant difference between the two groups of students directly from the regression weights because Pearson's  $r$  is not standardized. In order to test for significance, the correlation coefficients were first transformed to standardized coefficients using Fisher's  $Z'$  transformation equation, shown below (King & Minium, 2003).

$$Z' = .5[LN(1 + Y) - LN(1 - Y)]$$

The resulting  $Z'$  value, because it has been transformed to standardized form, possesses the familiar properties of the normal curve, with a mean value of 0 and a standard deviation of 1, and makes it possible to compare results between student groups to test for significance. The test for significance between two groups with independent

samples computes a value for  $Z_{Obtained}$  using the following formula (King & Minium, 2003).

$$Z_{Obtained} = \frac{Z'_W - Z'_L}{\sigma_{Z'_W - Z'_L} \sqrt{\frac{1}{N_W - 3} + \frac{1}{N_L - 3}}}$$

Finally, significance was tested at  $\alpha = .05$ . A  $Z_{Obtained}$  value  $\geq \pm 1.96$  indicated a significant difference between the results of the model as it reflected the data for the student groups. The results of these computations are shown for each research question.

### Findings for Research Questions and Hypotheses

1. To what degree does academic capital explain and/or predict persistence for White/Caucasian and Latina/o students to matriculate through higher education?

*Directional hypothesis:* There is a significantly different direct effect between White/Caucasian and Latina/o students regarding the contribution of academic capital to persistence (i.e., graduation) from a public 4-year institution of higher education.

This question considers only the effect represented by path  $c'$ . It is answered by the equation:

$$Y = c'$$

	White/Caucasian Students	Latina/o Students
Path Regression Coefficient	$Y = 0.039$	$Y = -0.001$
Fisher's $Z'$	0.039	0.001

$$Z_{Obtained} = 0.669$$

There is no statistically significant difference between the groups.

2. Does cultural capital statistically mediate academic capital in relation to graduation rates for Latina/o students and White/Caucasian students?

*Directional hypothesis:* Cultural capital significantly mediates academic capital for Latina/o students, but not White/Caucasian students.

This question considers the effects represented by paths  $a_2$  and  $b_2$ . It is answered by the equation:

$$Y = a_2 b_2$$

	White/Caucasian Students	Latina/o Students
Path Regression Coefficient	$Y = (0.229)(0.294)$ $Y = 0.067$	$Y = -(0.100)(0.014)$ $Y = -0.0014$
Fisher's Z'	0.067	-0.001

$$Z_{Obtained} = 1.2056$$

There is no statistically significant difference between the groups.

3. Does social capital statistically mediate academic capital in relation to graduation rates for Latina/o students and White/Caucasian students?

*Directional hypothesis:* Social capital statistically mediates academic capital for Latina/o students, but not White/Caucasian students.

This question considers the effects represented by paths  $a_1$  and  $b_1$ . It is answered by the equation:

$$Y = a_1 b_1$$

	White/Caucasian Students	Latina/o Students
Path Regression Coefficient	$Y = (0.156)(0.010)$ $Y = 0.002$	$Y = -(0.314)(-0.043)$ $Y = 0.0135$
Fisher's Z'	0.002	0.014

$$Z_{Obtained} = -0.202$$

There is no statistically significant difference between the groups.

4. Does social capital statistically mediate cultural capital in relation to graduation rates for Latina/o students and White/Caucasian students?

*Directional hypothesis:* Social capital statistically mediates cultural capital for Latina/o students, but not White/Caucasian students.

This question considers the effects represented by paths  $d$  and  $b_2$ . It is answered by the equation:

$$Y = db_2$$

	White/Caucasian Students	Latina/o Students
Path Regression Coefficient	$Y = (0.863)(0.294)$ $Y = 0.254$	$Y = (0.937)(0.014)$ $Y = 0.013$
Fisher's $Z'$	0.260	0.013

$$Z_{Obtained} = 4.342$$

$$r = \sqrt{\frac{Z_{Obtained}^2}{Z_{Obtained}^2 + df}}$$

$$r = 0.39$$

There is a statistically significant difference between the groups, with a moderate effect size  $r = 0.39$ , which accounts for approximately 15% of the total variance between White and Latina/o students in this study.

5. Are there significant differences in the total effects of the full mediation model for cultural, social, and academic capital on the graduation rates of Latina/o students in relation to their White/Caucasian peers?

*Directional hypothesis:* There will be significant differences regarding the total effects between Latina/o students and their White Caucasian peers in relation to graduation rates.

This question considers the effects represented by paths  $a_1$ ,  $b_1$ ,  $a_2$ ,  $b_2$ ,  $d$ , and  $c'$ . It is answered by the equation:

$$Y = a_1b_1 + a_2b_2d + c'$$

	White/Caucasian Students	Latina/o Students
Path Regression Coefficient	$Y = (0.156)(0.010)$ $+ (0.229)(0.294)(0.863)$ $+ 0.039$ $Y = 0.099$	$Y = (-0.314)(-0.043)$ $+ (-0.100)(0.014)(0.937)$ $+ (-0.001)$ $Y = 0.012$
Fisher's $Z'$	0.099	0.012

$$Z_{Obtained} = 1.537$$

There is no statistically significant difference between the groups.

### Total explained variances

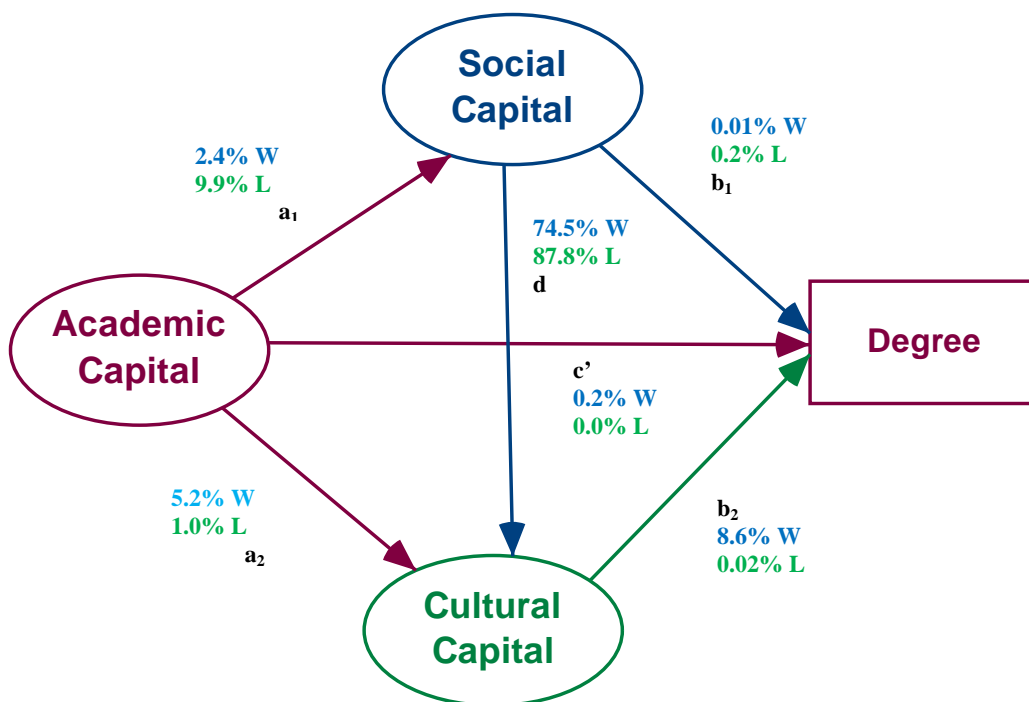
An estimate of total variance explained by the model can be obtained by converting the path regression coefficients to coefficients of determination ( $R^2$ ). This is accomplished by squaring each of the path coefficients. The  $R^2$  coefficients represent the percent of the full variance in the dependent variable (successful persistence to degree completion) attributable to each unique path. Table 20, below, illustrates these computations.

Table 20

*Conversion of Regression Coefficients to  $R^2$  Coefficients of Determination and Percent Variance Explained*

<b>Path Identifier</b>	<b>Regression Coefficient</b>		<b><math>R^2</math></b>		<b>% Variance Explained</b>	
	<b>White</b>	<b>Latina/o</b>	<b>White</b>	<b>Latina/o</b>	<b>White</b>	<b>Latina/o</b>
a <sub>1</sub>	0.156	-0.314	0.024	0.099	2.4%	9.9%
a <sub>2</sub>	0.229	-0.100	0.052	0.010	5.2%	1.0%
b <sub>1</sub>	0.010	-0.043	0.000	0.002	0.0%	0.2%
b <sub>2</sub>	0.294	0.014	0.086	0.000	8.6%	0.0%
c'	0.039	-0.001	0.002	0.000	0.2%	0.0%
d	0.863	0.937	0.745	0.878	74.5%	87.8%

To facilitate interpretation of the explained variances, the percentages associated with each path are shown on Figure 5, below.



**Figure 5. Core Model with Proportions of Explained Variance.** This diagram of the core portion of the structural equation model shows percentage of total variance explained by each path. Again, as in Figure 4, data for White/Caucasian students are indicated in **blue followed by a “W”**, while information for Latina/o students is indicated in **green followed by an “L”**.

### Summary

The structural equation model uses Bayesian statistical inference within SEM to describe the effect of theoretically posited latent variables on the tenability of both White/Caucasian and Latina/o students to persist to degree completion. Adequacy of model-data fit is supported by the RMSEA and CFI indices. The Hoelter’s Critical N index indicates the potential for improved results with a small increase in the sample size for Latina/o students.

The regression of social capital on cultural capital produces a statistically significant difference between these two groups of students, with a moderate effect size. This relationship accounts for approximately 75% of total variance for White/Caucasian



students, and over 87% for Latina/o students. Further, although the regression of social capital on academic capital does not produce a statistically significant difference, it nonetheless accounts for approximately 10% of the total variance for Latina/o students. Likewise, the effect of cultural capital on degree attainment, while not significantly different, accounts for almost 9% of total variance for White/Caucasian students.

## **CHAPTER V**

### **Discussion and Conclusions**

The last chapter discusses the implications of the findings from this investigation into the roles that academic, cultural, and social capital play in the pursuit of a bachelor's degree for both White/Caucasian and Latina/o students. It also enumerates a number of lingering questions that continue to challenge efforts to improve educational attainment levels. These particular areas call for ongoing exploration and research to inform and improve our understanding of the intricate relationships that exert pressure, whether positive or negative, on an individual's choices as they relate to higher education.

The pursuit of a bachelor's degree can be compared to a journey. For some, the territory is familiar because family and cultural traditions have prepared them for the trip, equipping them with the knowledge and experience to maximize their likelihood of success. For others, the world of higher education may feel more foreign than domestic, filled with higher levels of uncertainty and doubt, placing the ultimate outcome at greater risk.

Increasingly, there is a focus toward increasing higher education attainment rates for Latina/o students through Hispanic Serving Institutions (HSIs). The initiative *Closing the Gaps* (The Texas Higher Education Coordinating Board, 2000) is an example of a state-wide movement aimed at increasing higher education attainment rates. To this end,

the present study focused on contributing to an empirical understanding of the support that academic, cultural, and social capital provide for Latina/o students. Recent work by contemporary researchers in the field of education provided the impetus for the conceptual development of the structural equation model used for this analysis.

### **Review of the Research Study**

The purpose of this study was to develop a structural equation model to analyze the interactions of hypothetical constructs and to identify how they help or hinder Latina/o students persist to successful degree completion. Current knowledge and understanding of the characteristics of academic, cultural, and social capital informed the theoretical foundation and design of the model. Existing data from the Cooperative Institute Research Program (CIRP) for the freshman classes of 2000, 2001, and 2003 were used for the analysis. Due to the fact that virtually all of the questions on the survey instrument were categorical, a Bayesian inferential approach with resampling provided the optimum analytic approach to the problem.

The model consists of three latent variables: a) academic capital; b) cultural capital; and, c) social capital. Mediation paths measure the influence of cultural capital on academic capital, and the impact of social capital on both academic and cultural capital, as they relate to successful degree completion while simultaneously accounting for other relationships within the model. The effects produced by the model were calculated for 2,050 White/Caucasian students and 368 Latina/o students, for comparison purposes.

The model presented herein produced some intriguing results. Based on the descriptive demographic information presented at the beginning of chapter IV, differences between these two groups of students appear to be subtle and relatively

insubstantial. Indeed, many of the variances identified in the model support this impression. For example, when the total effects of the complete mediation model were considered, differences between the two groups of students seem to dissipate. Yet, in the final analysis, although the total effects produced by the model appear to be relatively insignificant, closer inspection revealed that crucial opposing mediational processes were present at a number of intermediate points (MacKinnon, 2008). Each of these significant distinctions are discussed in detail, in the sections that follow.

### **Review of the Literature Findings**

The literature provided the context for the present research and substantiated the factors used to characterize academic, cultural, and social capital.

The current environment is distinguished by oppositional forces of rapid population growth for the Latina/o population segment (U.S. Census Bureau, 2008b), and relatively low educational attainment levels (Gándara, 2005a). The situation is further complicated by the fact that Latinas/os approach higher education with lower expectations and aspirations than any other group (Fiske, 1988; Gándara, 2005b). These powerful forces combine to intensify the urgency of increasing attainment levels in higher education for Latinas/os.

Within this context, a number of contemporary researchers propose the support systems that help Latina/o students persist to degree completion differ from the more conventional methods available to majority students. In fact, the absence of a family and/or cultural tradition of success in higher education accentuates the necessity of perseverance and reliance on alternate support mechanisms (Perna, 2000). Contrary to majority students who enter higher education with a history of academic success, and a

cultural tradition of educational accomplishment, Latina/o students must find encouragement, motivation, and determination from other sources. Those alternative resources include, but are not limited to, support and encouragement from parents and relatives, as well as other influential adults, and a sense of belonging to something bigger than the individual, that combine to inspire these students to aspire to new levels of attainment.

Using the theoretical foundations of cultural and social capital first established by Pierre Bourdieu (1977a), and incorporating the work of contemporary researchers such as Perna (2000), Hurtado (2008), Cerna, Perez, and Sáenz (2007), Oseguera (2005), and Stanton-Salazar (1997) among others, this study groups pre-enrollment characteristics associated with persistence according to the following categories.

**Academic capital.** This latent variable measures pre-enrollment characteristics traditionally associated with academic success. It includes items such as high school G.P.A., SAT total score, remedial coursework, parents' education levels, exposure to courses at institutions of higher education, and a self-assessment of academic ability.

**Cultural capital.** Cultural capital measures the impact of family, friends, and immediate environment on the formation of the individual's dreams, hopes, aspirations, and belief in self. It includes questions related to culturally relevant activities, family ambitions, and future culturally relevant expectations.

**Social capital.** Social capital estimates the influence of peers and adults outside of family on the choices the individual makes. Social capital becomes particularly significant when it functions as a bridge to hopes, dreams, and accomplishments that exceed or differ from those found within the cultural realm. Specifically, social capital

may provide access to privileged information related to admissions and financial aid, and demonstrates the conviction on the part of an influential adult in the ability of the student to succeed at a higher level.

### **Discussion of the Results**

The results of this research are informative in several respects and are discussed in greater detail next. Specifically, the magnitude of demographic and academic disparities between these two groups of students is relatively minor and produces small effect sizes. Of greater interest is the impact that social capital exerts on Latina/o students, particularly in comparison to the value of cultural capital for White students.

**Demographic influences.** Aside from the sizeable disparity in enrollment rates, differences between White/Caucasian and Latina/o students are relatively small yet consistent. The portrait of Latina/o students that emerges is one of subtle distinctions. As a group, Latina/o students were slightly younger than White students, they tended to come from a somewhat closer proximity, they were less prepared academically, although the impact of that under-preparation was small, and given time, they persistently narrowed the gap in attainment rates.

Families of Latina/o students also appear to live closer to the university than those of White students. For example, 34.9% of the Latina/o student sample lives within a 50-mile radius compared to 26.2% of Whites. This group is particularly interesting because the university allows students living within 50 miles to commute rather than live on campus, and because two major metropolitan areas fall within this distance.

**Key paths.** The regression of social capital on cultural capital (path labeled *d*) uncovered a significant relationship for both White/Caucasian and Latina/o students. This

single link accounts for just under 75% of the model variance for Whites, and almost 88% of the variance in the model for Latinas/os. This finding points to the powerful influence exerted by both peers and adults outside of the cultural environment on the persistence of Latina/o students in particular. Such a conclusion is supported by previous research studies. As far back as 1988, in summation of his findings, Fiske said “scratch a Hispanic college student, and you’ll probably find someone in his or her background who showed a special interest in them, who took them aside and gave them the aspiration and encouragement to go on to higher education” (p. 31). In her multi-generational study, Villanueva (1996) identifies the critical role played by adults outside of family in the lives of those Latinas/os who were the first in their families to attend higher education. Finally, in an empirical study of CIRP data from 262 colleges and universities, Cerna, et al., (2007) also underscore the importance of encouragement from high school faculty and staff, and mentors in the decision of Latina/o students to attend higher education. In this study, the interaction with adults other than family members was one of the most important factors of those used to construct social capital. When combined with the amount of time spent studying with or tutoring other students, these two factors constituted just under 65% of the variance in social capital for Latina/o students.

The regression of social capital on academic capital (path labeled  $a_1$ ) highlights another important correlation for Latina/o students in particular. The relationship between social capital and academic capital is inverse (the path coefficient is -0.314), and it accounts for 9.9% of the variance in the model for Latinas/os. This inverse relationship indicates that as one variable decreases the other variable increases. In other words, as academic capital decreases, greater amounts of social capital are necessary to mitigate the

deficiency in academic resources. The results of this model underscore the importance of social connections that provide access to opportunities and information that is otherwise unavailable, to academic success for Latina/o students.

Finally, the path that measures the impact of social capital on both academic and cultural capital, and its ultimate affect on degree completion (represented by path components  $a_1$ ,  $d$ , and  $b_2$ ) identifies a statistically significant difference between White and Latina/o students. This complete path accounts for just over 85% of model variance for Whites, and almost 98% for Latinas/os, and produces a moderate effect size ( $r=0.39$ ). While this path demonstrates the importance of social capital to both groups, it emphasizes the critical value of social capital for Latina/o students. The body of literature that informed this research identified a set of cumulative disadvantages that thwart academic aspirations for many Latinas/os. Briefly summarized, the relative segmentation and isolation of Latina/o communities combined with economic disadvantages and high schools that under perform academically do more than obstruct access to higher education. The collective impact constructs a wide gulf between Latinas/os and institutions of higher learning, and provides no visible means of crossing the divide. Stanton-Salazar (1997) likened the effect to freeways of “privilege and power” (p. 4) with no access ramps for Latinas/os. Social capital provides those crucial connections or bridges to a world that is otherwise not within grasp.

**Key observed variables.** A number of the manifest variables used to create the hypothetical constructs of academic, cultural, and social capital merit discussion due to the magnitude of their contributions to the latent variables.



**Academic capital factors.** Considering academic capital first, the single largest impact for Latina/o students came from remedial coursework. Not surprisingly, remedial coursework loads negatively on academic capital for both groups. However, with a beta weight of  $-.703$  for Latinas/os, it accounts for  $-49.4\%$  of the variable. For White students, although the impact is smaller, it is still important, accounting for  $-21.2\%$  of the variance, with a beta weight of  $-0.46$ . The impact for both groups is to actually reduce academic capital, but the influence on Latinas/os is considerably greater.

Another important factor comprising academic capital is the student's own self-evaluation of their academic abilities. White students demonstrated a higher opinion of their academic abilities. As a result, this factor explained just over  $27\%$  of the variance in academic capital for Whites, compared to only  $6.8\%$  for Latinas/os.

The interaction of remedial coursework and self-evaluated academic ability provides insight into what may be a negative feedback loop that could have a pronounced affect on academic aspirations and academic success for Latinas/os. Results from this project do not provide conclusive evidence of this point, but certainly point to the possibility that these variables may combine to dissuade many Latinas/os from pursuing higher education.

The impact of high school grades and SAT scores is intriguing. The contribution of high school G.P.A to academic capital, compared to SAT scores is much higher for both groups. High school grades explain  $24\%$  of the variance in academic capital for White students, and  $8.3\%$  for Latinas/os. In comparison, SAT scores only account for  $2.8\%$  of the variance for Whites, and  $1.1\%$  for Latinas/os. The longitudinal track-record

established by G.P.A. appears to be much more significant compared to performance on a solitary, standardized test.

Previous coursework at institutions of higher learning and parents' educational levels explained less than 1% of model variance for both groups.

**Cultural capital factors.** Most factors used to construct social capital demonstrated expected relationships. For example, past culturally relevant activities, future expectations relative to cultural involvement, and academic expectations influenced by culture all provided relatively strong contributions to cultural capital for both groups, and also compared quite closely between the groups. However, two factors were surprising. SAT total score explained approximately 47% of the variance in cultural capital for Latina/o students compared to only 10% for Whites; and, self-rated academic abilities explained over 10% of the variance for Latinas/os compared to just over 1% for Whites. Combined, these two variables represent 57% of the variance in cultural capital for Latinas/os compared to 11% for Whites. This connection between culture and the perception of academic abilities adopted by this group of Latina/o students is also reflected in their performance on the SAT test. While these connections are not surprising, the degree of impact is intriguing.

The last two variables included in cultural capital, freshman year living plans and degree aspirations contributed relatively little to the latent variable, and differed very little between the two groups.

**Social capital factors.** The most important factor relative to social capital for Latina/o students was the impact that interactions with adults had on them. For Latina/o students, this single factor explained almost 32% of the variance in social capital. It was

also an important factor for White students, explaining just under 30% of the variance for them. The second factor that demonstrated a strong contribution to social capital for both groups was the degree of involvement in studying with or tutoring other students. This factor explained almost 32% of the variance for Whites compared to just under 34% for Latinas/os.

Other factors used to compute social capital, involvement in formally organized activities, peer interactions, and SAT total score all demonstrated relatively small contributions of approximately equal size for both groups.

### **Limitations of the Study**

This study used a compilation of pre-enrollment characteristics for three freshman classes at one university. Results are therefore, limited in applicability, and reflective of characteristics represented by a relatively small sample size that appears to be somewhat homogeneous.

### **Implications for Future Research**

The current study establishes groundwork for future empirical investigations of the relationship between academic, cultural, and social capital as they relate to attainment of a bachelor's degree. The findings reported serve as guides for model modifications that should improve our understanding of the complicated relationships that affect formation of academic dreams and aspirations, as well as the sources of support that contribute to degree completion. Future research should focus on the following areas.

1. Replication of this study with a variety of populations is needed to confirm or contradict these findings. Particularly, application of the model to private universities and public universities with differing diversity profiles holds the

potential to reveal additional pertinent insights. Results obtained from replication will serve to inform further research (e.g., more comprehensive models). Specifically, additional research in the areas listed below is indicated.

2. Adult influences appear to play a crucial role in providing the encouragement necessary for Latina/o students to persist to degree completion. Additional information related to the positions these adults occupy, how the influential relationships develop, and the type of support they provide might prove useful in (a) developing outreach programs for Latina/o communities or (b) cultivating mentor programs for freshman students.
3. Likewise, peer activities related to academics also appear to be highly influential. Additional insights into whether this influence continues on through college could inform the formation of formal study groups or student led tutoring programs.
4. A fourth area that warrants further study is the slightly longer length of time Latina/o students need to complete their degrees. This research effort did not look into the reasons behind this trend. However, further investigation of this evidence might uncover opportunities for institutional support that enhances the likelihood of degree completion for Latina/o students.
5. Finally, modification of the model to accommodate high school students promises to be especially informative. By modifying the dependent variable to reflect either high school graduation or intent to pursue higher education, and gathering data at the high school level, information could be captured on the

fraction of high school students who never knock at the door of colleges and universities.

### **Summary**

Importantly, this research examined a topic crucial to American higher education in the 21<sup>st</sup> century. Groundwork is now established for ongoing empirical investigation of the relationship of cultural and social capital as they mediate the influence of academic capital on degree completion results. Despite the limitations of using a student population from a single university, and working within the constraints of data obtained from a standardized freshman survey, a number of provocative insights into the process of persistence to degree completion were revealed. These findings have the potential to affect the rate of degree attainment for Latina/o students in the future. However, before that possibility can be realized, the model needs to be refined, and the results need to be replicated with other student populations.

## Appendix A

### Independent *t*-Tests Conducted on Random Sub-samples

<b>Ethnicity</b>	<b>N</b>	<b>Mean</b>	<b>Standard Error of the Mean</b>
<b>Random Sub-sample 1</b>			
White	335	1064.45	6.356
Latinas/os	335	1006.96	6.423
<b>Random Sub-sample 2</b>			
White	335	1057.28	6.515
Latinas/os	335	1006.96	6.423
<b>Random Sub-Sample 3</b>			
White	335	1057.13	6.441
Latinas/os	335	1006.96	6.423

<b>Test for Equality of Means</b>				
<b>Sample</b>	<b><i>t</i></b>	<b><i>df</i></b>	<b>Significance</b>	<b><i>r</i></b>
Random Sub-sample 1	6.362	668	.000	.239
Random Sub-sample 2	5.501	668	.000	.208
Random Sub-sample 3	5.517	668	.000	.208

## Appendix B

Frequency Responses to Questions Used to Construct "Academic Capital"						
Summed Variable Name	Question	Response Categories	White/Caucasian Students		Latina/o Students	
			N = 2,050		N = 368	
			Frequency	Percent (%)	Frequency	Percent (%)
<b>HSGPA</b>	What was your average high school G.P.A.?	A or A+	441	21.5%	73	19.8%
		A-	694	33.9%	129	35.1%
		B+	527	25.7%	94	25.5%
		B	305	14.9%	59	16.0%
		B-	67	3.3%	8	2.2%
		C+	13	0.6%	3	0.8%
		C	3	0.1%	2	0.5%
		D	0	0.0%	0	0.0%
<b>Remedial</b>	Have you had remedial work in English?	Not marked	1,991	97.1%	353	95.9%
		Marked	59	2.9%	15	4.1%
	Have you had remedial work in reading?	Not marked	2,001	97.6%	351	95.4%
		Marked	49	2.4%	17	4.6%
	Have you had remedial work in mathematics?	Not marked	1,846	90.0%	320	87.0%
		Marked	204	10.0%	48	13.0%
	Have you had remedial work in social studies?	Not marked	2,014	98.2%	358	97.3%
		Marked	36	1.8%	10	2.7%
	Have you had remedial work in science?	Not marked	1,993	97.2%	355	96.5%
		Marked	57	2.8%	13	3.5%
	Have you had remedial work in a foreign language?	Not marked	1,981	96.6%	352	95.7%
		Marked	69	3.4%	16	4.3%
	Have you had remedial work in writing?	Not marked	2,006	97.9%	355	96.5%
		Marked	44	2.1%	13	3.5%

(Appendix B continues)

(Appendix B continued)

Frequency Responses to Questions Used to Construct "Academic Capital"						
Summed Variable Name	Question	Response Categories	White/Caucasian Students		Latina/o Students	
			N = 2,050		N = 368	
			Frequency	Percent (%)	Frequency	Percent (%)
	Do you need remedial work in English?					
		Not marked	1,876	91.5%	314	85.3%
		Marked	174	8.5%	54	14.7%
	Do you need remedial work in reading?					
		Not marked	1,991	97.1%	348	94.6%
		Marked	59	2.9%	20	5.4%
	Do you need remedial work in mathematics?					
		Not marked	1,560	76.1%	218	59.2%
		Marked	490	23.9%	150	40.8%
	Do you need remedial work in social studies?					
		Not marked	1,985	96.8%	348	94.6%
		Marked	65	3.2%	20	5.4%
	Do you need remedial work in science?					
		Not marked	1,845	90.0%	307	83.4%
		Marked	205	10.0%	61	16.6%
	Do you need remedial work in a foreign language?					
		Not marked	1,818	8.9%	319	86.7%
		Marked	232	11.3%	49	13.3%
	Do you need remedial work in writing?					
		Not marked	1,854	90.4%	313	85.1%
		Marked	196	9.6%	55	14.9%
<b>ParEd</b>	What is your father's highest education level?					
		Grammar school or less	10	0.5%	25	6.8%
		Some high school	48	2.3%	42	11.4%
		High school graduate	324	15.8%	74	20.1%
		Postsecondary other than college	43	2.1%	12	3.3%
		Some college	453	22.1%	99	26.9%
		College degree	699	34.1%	71	19.3%
		Some graduate school	37	1.8%	5	1.4%
		Graduate degree	436	21.3%	40	10.9%
	What is your mother's highest education level?					
		Grammar school or less	6	0.3%	21	5.7%
		Some high school	43	2.1%	20	5.4%
		High school graduate	373	18.2%	92	25.0%
		Postsecondary other than college	64	3.1%	10	2.7%
		Some college	548	26.7%	114	31.0%
		College degree	636	31.0%	70	19.0%
		Some graduate school	49	2.4%	8	2.2%
		Graduate degree	331	16.1%	33	9.0%

(Appendix B continues)



(Appendix B continued)

Frequency Responses to Questions Used to Construct "Academic Capital"						
Summed Variable Name	Question	Response Categories	White/Caucasian Students		Latina/o Students	
			N = 2,050		N = 368	
			Frequency	Percent (%)	Frequency	Percent (%)
<b>Pcourse</b>	Have you taken for credit courses at this institution?	Not marked	1,973	96.2%	349	94.8%
		Marked	77	3.8%	19	5.2%
	Have you taken for credit courses at another junior or community college?	Not marked	1,587	77.4%	298	81.0%
		Marked	463	22.6%	70	19.0%
	Have you taken for credit courses at another 4-year college or university?	Not marked	1,985	96.8%	352	95.7%
		Marked	65	3.2%	16	4.3%
	Have you taken for credit courses at any other postsecondary institution?	Not marked	2,047	99.9%	366	99.5%
		Marked	3	0.1%	2	0.5%
	Have you taken non-credit courses at any junior or community college?	Not marked	1,895	92.4%	337	91.6%
		Marked	155	7.6%	31	8.4%
	Have you taken non-credit courses at any 4-year college or university?	Not marked	1,925	93.9%	344	93.5%
		Marked	125	6.1%	24	6.5%
	Have you taken non-credit courses at any other postsecondary institution?	Not marked	1,929	94.1%	342	92.9%
		Marked	121	5.9%	26	7.1%
<b>SRateAC</b>	Compared to the average person your age, rate your academic ability	Highest 10%	242	11.8%	41	11.1%
		Above average	1,176	57.4%	190	51.6%
		Average	625	30.5%	135	36.7%
		Below average	7	0.3%	2	0.5%
		Lowest 10%	0	0.0%	0	0.0%
	Compared to the average person your age, rate mathematical ability	Highest 10%	219	10.7%	38	10.3%
		Above average	674	32.9%	117	31.8%
		Average	738	36.0%	128	34.8%
		Below average	362	17.7%	74	20.1%
		Lowest 10%	57	2.8%	11	3.0%

(Appendix B continues)

(Appendix B continued)

<b>Frequency Responses to Questions Used to Construct "Academic Capital"</b>						
<b>Summed Variable Name</b>	<b>Question</b>	<b>Response Categories</b>	<b>White/Caucasian Students</b>		<b>Latina/o Students</b>	
			<b>N = 2,050</b>		<b>N = 368</b>	
			<b>Frequency</b>	<b>Percent (%)</b>	<b>Frequency</b>	<b>Percent (%)</b>
	Compared to the average person your age, rate intellectual self-confidence					
		Highest 10%	325	15.9%	56	15.2%
		Above average	847	41.3%	169	45.9%
		Average	758	37.0%	135	36.7%
		Below average	115	5.6%	7	1.9%
		Lowest 10%	5	0.2%	1	0.3%
	Compared to the average person your age, rate writing ability					
		Highest 10%	216	10.5%	36	9.8%
		Above average	734	35.8%	128	34.8%
		Average	840	41.0%	170	46.2%
		Below average	229	11.1%	32	8.7%
		Lowest 10%	32	1.6%	2	0.5%

## Appendix C

Frequency Responses to Questions Used to Construct "Cultural Capital"					
Summed Variable Name	Question	White/Caucasian Students		Latina/o Students	
		N = 2,050		N = 368	
	Response Categories	Frequency	Percent (%)	Frequency	Percent (%)
<b>Live</b>	Where do you plan to live during the fall term?				
	With family or relatives	192	9.4%	56	15.2%
	On campus	1,858	90.6%	312	84.8%
<b>HiDegree</b>	What is the highest academic degree you intend to obtain?				
	None	19	0.9%	3	0.8%
	Vocational Certificate	3	0.1%	0	0.0%
	Associate	12	0.6%	107	29.1%
	Bachelor's	743	36.2%	182	49.5%
	Master's	877	42.8%	47	12.8%
	Doctorate	207	10.1%	17	4.6%
	Medical	87	4.2%	0	0.0%
	Law	71	3.5%	9	2.4%
	Divinity	6	0.3%	0	0.0%
	Other	25	1.2%	0	0.0%
	What is the highest academic degree you intend to obtain at this institution?				
	None	31	1.5%	8	2.2%
	Vocational Certificate	1	0.0%	0	0.0%
	Associate	23	1.1%	3	0.8%
	Bachelor's	820	40.0%	145	39.4%
	Master's	251	12.2%	63	17.1%
	Doctorate	23	1.1%	5	1.4%
	Medical	6	0.3%	0	0.0%
	Law	4	0.2%	2	0.5%
	Divinity	1	0.0%	0	0.0%
	Other	14	0.7%	0	0.0%
<b>PastCCAct</b>	Last year, how frequently did you attend a religious service?				
	Not at all	306	14.9%	42	11.4%
	Occasionally	863	42.1%	169	45.9%
	Frequently	881	43.0%	157	42.7%

(Appendix C continues)

(Appendix C continued)

Frequency Responses to Questions Used to Construct "Cultural Capital"					
Summed Variable Name	Question	White/Caucasian Students		Latina/o Students	
		N = 2,050		N = 368	
		Frequency	Percent (%)	Frequency	Percent (%)
FutCCAAct	Last year, how frequently did you discuss religion?				
	Not at all	248	12.1%	47	12.8%
	Occasionally	1,148	56.0%	223	60.6%
	Frequently	654	31.9%	98	26.6%
	Last year, how frequently did you perform volunteer work?				
	Not at all	408	19.9%	73	19.8%
	Occasionally	1,167	56.9%	197	53.5%
	Frequently	475	23.2%	98	26.6%
	Last year, how frequently did you vote in student elections?				
	Not at all	525	25.6%	92	25.0%
	Occasionally	1,139	55.6%	186	50.5%
	Frequently	386	18.8%	90	24.5%
	How important is it to you to be able to influence the political structure?				
	Not important	887	43.3%	138	37.5%
	Somewhat important	833	40.6%	149	40.5%
	Very important	245	12.0%	51	13.9%
	Essential	85	4.1%	30	8.2%
	How important is it to you to be able to influence social values?				
	Not important	368	18.0%	60	16.3%
	Somewhat important	907	44.2%	143	38.9%
	Very important	604	29.5%	118	32.1%
	Essential	171	8.3%	47	12.8%
	How important is it to you to help others who are in difficulty?				
	Not important	103	5.0%	11	3.0%
	Somewhat important	729	35.6%	120	32.6%
	Very important	822	40.1%	146	39.7%
	Essential	396	19.3%	91	24.7%
	How important is it to you to develop a meaningful philosophy of life?				
	Not important	584	28.5%	92	25.0%
	Somewhat important	715	34.9%	126	34.2%
	Very important	485	23.7%	99	26.9%
	Essential	266	13.0%	51	13.9%
	How important is it to you to participate in community action programs?				
	Not important	826	40.3%	112	30.4%
	Somewhat important	886	43.2%	162	44.0%
	Very important	276	13.5%	73	19.8%
	Essential	62	3.0%	21	5.7%

(Appendix C continues)

(Appendix C continued)

<b>Frequency Responses to Questions Used to Construct "Cultural Capital"</b>					
<b>Summed Variable Name</b>	<b>Question</b>	<b>White/Caucasian Students</b>		<b>Latina/o Students</b>	
		<b>N = 2,050</b>		<b>N = 368</b>	
		<b>Frequency</b>	<b>Percent (%)</b>	<b>Frequency</b>	<b>Percent (%)</b>
	How important is it to you to keep up to date with political affairs?				
	Not important	580	28.3%	107	29.1%
	Somewhat important	896	43.7%	141	38.3%
	Very important	413	20.1%	85	23.1%
	Essential	161	7.9%	35	9.5%
	How important is it to you to become a community leader?				
	Not important	634	30.9%	94	25.5%
	Somewhat important	826	40.3%	132	35.9%
	Very important	443	21.6%	103	28.0%
	Essential	147	7.2%	39	10.6%
	How likely are you to be satisfied with college?				
	No chance	21	1.0%	3	0.8%
	Very little chance	87	4.2%	18	4.9%
	Some chance	1,024	50.0%	187	50.8%
	Very good chance	918	44.8%	160	43.5%
	How likely are you to participate in volunteer or community service work?				
	No chance	220	10.7%	28	7.6%
	Very little chance	651	31.8%	111	30.2%
	Some chance	840	41.0%	166	45.1%
	Very good chance	339	16.5%	63	17.1%
<b>AcaCCInf</b>	How likely are you to make at least a "B" average?				
	Very little chance	54	2.6%	13	3.5%
	Some chance	743	36.2%	154	41.8%
	Very good chance	1,253	61.1%	201	54.6%
	How likely are you to get a Bachelor's degree?				
	Very little chance	84	4.1%	7	1.9%
	Some chance	380	18.5%	71	19.3%
	Very good chance	1,586	77.4%	290	78.8%
	How important is it to you to gain a general education and appreciation of ideas?				
	Not important	98	4.8%	12	3.3%
	Somewhat important	642	31.3%	106	28.8%
	Very important	1,300	63.4%	248	67.4%
	How important is it to you to prepare for graduate or professional school?				
	Not important	326	15.9%	52	14.1%
	Somewhat important	639	31.2%	102	27.7%

(Appendix C continues)

(Appendix C continued)

Frequency Responses to Questions Used to Construct "Cultural Capital"					
Summed Variable Name	Question	White/Caucasian Students		Latina/o Students	
		N = 2,050		N = 368	
		Frequency	Percent (%)	Frequency	Percent (%)
FamCCInf	Last year, how frequently did you study or do homework?				
	Not at all	90	4.4%	8	2.2%
	Occasionally	1,534	74.8%	270	73.4%
	Frequently	426	20.8%	90	24.5%
	How important is it to you that you parents wanted you to attend this university?				
	Not important	443	21.6%	85	23.1%
	Somewhat important	806	39.3%	124	33.7%
	Very important	801	39.1%	159	43.2%
	How important is it to you that relatives wanted you to attend this university?				
	Not important	1,413	68.9%	246	66.8%
	Somewhat important	521	25.4%	105	28.5%
	Very important	116	5.7%	17	4.6%
	How important is it to you that attending this university might help you get a better job?				
	Not important	426	20.8%	59	16.0%
	Somewhat important	284	13.9%	52	14.1%
	Very important	1,340	65.4%	257	69.8%
	How important is it to you that attending this university might help you make more money?				
	Not important	193	9.4%	21	5.7%
	Somewhat important	371	18.1%	57	15.5%
	Very important	1,486	72.5%	290	78.8%
	How important is it to you to live at home while attending this university?				
	Not important	996	48.6%	142	38.6%
	Somewhat important	707	34.5%	163	44.3%
	Very important	347	16.9%	63	17.1%
	Last year, how frequently did you perform household or childcare duties?				
	Not at all	1,122	54.7%	194	52.7%
	Occasionally	808	39.4%	151	41.0%
	Frequently	120	5.9%	23	6.2%

## Appendix D

Frequency Responses to Questions Used to Construct "Social Capital"						
		White/Caucasian Students		Latina/o Students		
Summed Variable Name	Question		N = 2,050		N = 368	
		Response Categories	Frequency	Percent (%)	Frequency	Percent (%)
FrmlSCNt	Last year, how many hours per week did you spend engaged in organized exercise or sports?	0 hours per week	72	3.5%	17	4.6%
		< 1 hour per week	178	8.7%	30	8.2%
		1 - 2 hours per week	289	14.1%	59	16.0%
		3 - 5 hours per week	406	19.8%	68	18.5%
		6 - 10 hours per week	352	17.2%	55	14.9%
		11 - 15 hours per week	258	12.6%	55	14.9%
		16 - 20 hours per week	191	9.3%	33	9.0%
		> 20 hours per week	304	14.8%	51	13.9%
	Last year, how many hours per week did you spend participating in organized student clubs or groups?	0 hours per week	546	26.6%	72	19.6%
		< 1 hour per week	264	12.9%	40	10.9%
		1 - 2 hours per week	475	23.2%	75	20.4%
		3 - 5 hours per week	310	15.1%	84	22.8%
		6 - 10 hours per week	190	9.3%	40	10.9%
		11 - 15 hours per week	118	5.8%	29	7.9%
		16 - 20 hours per week	60	2.9%	11	3.0%
		> 20 hours per week	87	4.2%	17	4.6%
AcaSCNt	How frequently last year, did you tutor another student?	Not at all	889	43.4%	129	35.1%
		Occasionally	1,018	49.7%	207	56.2%
		Frequently	143	7.0%	32	8.7%
	How frequently last year, did you study with other students?	Not at all	270	13.2%	40	10.9%
		Occasionally	1,260	61.5%	242	65.8%
		Frequently	520	25.4%	86	23.4%

(Appendix D continues)

## (Appendix D continued)

Frequency Responses to Questions Used to Construct "Social Capital"						
Summed Variable Name	Question	White/Caucasian Students		Latina/o Students		
		N = 2,050		N = 368		
		Response Categories	Frequency	Percent (%)	Frequency	Percent (%)
PeerSCNt	How likely are you to join a social fraternity or sorority?	No chance	604	29.5%	101	27.4%
		Very little chance	558	27.2%	129	35.1%
		Some chance	563	27.5%	102	27.7%
		Very good chance	325	15.9%	36	9.8%
	How likely are you to develop close friendships with other students?	No chance	18	0.9%	1	0.3%
		Very little chance	52	2.5%	1	1.1%
		Some chance	468	22.8%	128	34.8%
		Very good chance	1,512	73.8%	235	63.9%
	How likely are you to socialize with someone of another racial or ethnic group?	No chance	31	1.5%	1	0.3%
		Very little chance	76	3.7%	12	3.3%
		Some chance	519	25.3%	66	17.9%
		Very good chance	1,424	69.5%	289	78.5%
AdltSCNt	Last year, how often were you a guest in a teacher's home?	Not at all	1,507	73.5%	257	69.8%
		Occasionally	440	21.5%	99	26.9%
		Frequently	103	5.0%	12	3.3%
	Last year, how often did you ask a teacher for advice?	Not at all	314	15.3%	54	14.7%
		Occasionally	1,304	63.6%	225	61.1%
		Frequently	432	21.1%	89	24.2%
	Last year, how often did you talk with teachers outside of class?	Not at all	819	40.0%	122	33.2%
		Occasionally	1,056	51.5%	208	56.5%
		Frequently	175	8.5%	38	10.3%
	How important is it to you that a teacher encouraged you to attend college?	Not important	1,636	79.8%	257	69.8%
		Somewhat important	372	18.1%	100	27.2%
		Very important	42	2.0%	11	3.0%
	How important is it to you that a high school guidance counselor encouraged you to attend college?	Not important	1,658	80.9%	274	74.5%
		Somewhat important	342	16.7%	73	19.8%
		Very important	50	2.4%	21	5.7%

(Appendix D continues)



(Appendix D continued)

<b>Frequency Responses to Questions Used to Construct "Social Capital"</b>					
<b>Summed Variable Name</b>	<b>Question</b>	<b>White/Caucasian Students</b>		<b>Latina/o Students</b>	
		<b>N = 2,050</b>		<b>N = 368</b>	
		<b>Response Categories</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Frequency</b>
				<b>Percent (%)</b>	
	How important is it to you that a private counselor encouraged you to attend college?				
	Not important	1,915	93.4%	337	91.6%
	Somewhat important	118	5.8%	25	6.8%
	Very important	17	0.8%	6	1.6%
	How important is it to you that a mentor or role model encouraged you to attend college?				
	Not important	1,200	58.5%	203	55.2%
	Somewhat important	627	30.6%	113	30.7%
	Very important	223	10.9%	52	14.1%
	How important is it to you to communicate regularly with your professors?				
	Not important	304	14.8%	53	14.4%
	Somewhat important	1,217	59.4%	224	60.9%
	Very important	529	25.8%	91	24.7%

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## **VITA**

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