Factors Associated with Latina/o College Aspirations: A Structural Equation Modeling Multiple Group Comparisons Approach

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Abstract

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This study utilizes Confirmatory Factor Analysis and Structural Equation Modeling Multiple Group Comparison Framework to explore the college aspiration of Latina/o sophomore students. The purpose of this study was to highlight the potential heterogeneity of Latinos as a whole, when gender is taken into consideration. Results indicate potential differences in how Latina/os experience their education. For Latina/os overall, parental support and friend networks are significantly related to college aspirations. The models that have been provided in this study represent a possible way of representing the actual processes that contribute to a student's college aspirations; however different model specifications are possible.

Keywords: Structural Equation Modeling, Latina/o, College Aspirations, Gender

Table of Contents

List of Tables

Page

List of Figures

Page

Chapter 1

The Research Problem

Latinos comprise the largest minority population in the United States; the Census Bureau projects that Latinos make up more than 16 percent of the total population. Although a rapidly growing minority group, Latinos have remained fairly stagnant in both academic achievement and educational attainment when compared to whites. There is an abundance of literature focusing on how Latinos, as a whole, struggle to successfully navigate through the educational pipeline. Latina/os still experience significantly disproportionate high school drop-out rates when compared to their white counterparts. Out of all US degree attaining students, only 5.2 percent obtain an Associate's degree, 8.4 percent obtain a bachelor's degree and only 3.8 percent obtain a graduate degree.

Latinos are highly underrepresented in higher education programs and prompt serious questions about the possible causes for these trends. For example, Latino students, on average, attend schools with high minority populations in low socio-economic school districts that have limited resources (Darling-Hammond, 1999). It would seem appropriate to attribute the low levels of academic achievement in K-12 to these aforementioned factors; however, the situation is far more complex than that, and the struggles of Latinos in K-12 schooling are likely to reflect a multitude of factors. For example, large variations in student's financial and social capital might paint a more complete picture of the Latino student academic achievement and attainment gap (Gandara & Contreras, 2009). Furthermore, recent scholarship (Darling-Hammond,

2010) suggests that, as a result of structural inequalities in access to knowledge and resources, Latino students and other minority student populations continue to face crippling barriers in their path to complete their educational goals.

There is reason to believe that a student's development of social capital—defined as access to social resources and helpful relationships may play an important role in the process and outcomes of Latino students' schooling experience. In essence, student's social capital enables him/her to create social networks and intangible exchanges with institutional agents in the way of advice or assistance in the school environment (Stanton-Salazar, 2001). Institutional agents, as defined by Stanton-Salazar (1997), are "individuals who have the capacity and commitment to transmit directly, or negotiate the transmission of, institutional resources and opportunities" (p. 5). The resources include information about institutional programs, academic tutoring, advising, and others. These relationships with institutional agents can function as vital connections to resources and opportunities that allow underrepresented students of color (in this case Latinos) the ability to overcome structural barriers and experience school success and social mobility. Another function of social capital, according to Coleman (1988), is as source of parental and kin support. By this argument, a student's intellectual development is strongly affected by the amount and level of his or her parent's social capital.

Aside from this heavily scrutinized evident racial gap in educational attainment, Latina/os seem to exhibit the seemingly growing gender gap in educational attainment across all student populations (Lie, 1994). However, as the gender gaps between other student populations seem to be plateauing, the Latino gender gap continues to grow (American Council on Education, 2010). Latina/o dropout rates, when disaggregated

between genders are as follows: 28% of Latino males drop out of high school versus only 17% of Latina students (NCES, 2005).This divergence in educational attainment is consistent as both groups navigate the educational pipeline. College enrollment data reveals that Latina women enroll at a higher percentage than their male counterparts [30% vs. 20%]. Bachelor's degree attainment provides perhaps more alarming trends, where Latina women's degree attainment numbers continue to be on the rise and Latino men who have the lowest degree attainment numbers among every other group (10%) remain precariously stagnant (Saenz & Ponjuan, 2009; American Council on Education, 2010).

While a lot of attention has been devoted to the overall achievement and attainment gaps of Latinos taken as a monolithic group, research has not yet tried to explain this curious divergence of pathways and performance between Latino men and women. Current research that takes into consideration the significant variation between males and females focuses more on career decision self-efficacy and political affiliation. These studies do highlight significant differences between Latino males and females and how acculturation, culture, and gender roles manifest themselves differently for males and females (Ojeda et al., 2011; Welch & Sigelman, 1992).

This study will attempt to sort out differences between Latino/a males and females and what influences their decisions about their educational aspirations, as they approach the decisions about applying to and attending College. This study will examine (1) the conditions and influences that shape the life course decisions made by Latino male and female students, as they approach the end of their high school years, specifically pinpointing the kinds of information they seek out about their options after high school,

in relation to their higher education aspirations. (2) The study will also investigate the role institutional, family, and peer groups play in the context of support in their decision to pursue a college education. (3) Focusing on the growing gender gap, this study will try to reveal differences, if any, between the decisions Latino males and females make at this stage about their future educational plans.

The study will approach the problem by employing sophisticated quantitative analyses of a large scale databases that offer a window in on this problem, in aggregate terms. Through confirmatory factor analysis and multiple group comparisons, within the structural equation modeling framework, the study will be able to examine the relationships between hypothesized factors that are believed to influence a student's college aspirations. Furthermore, through multiple group comparisons, differences between Latino males and females will be highlighted and analyzed.

The remaining chapters of this write-up will, first of all, locate the problem in relevant literatures (in Chapter 2), then in chapter 3 describe and justify the design and analytic approach. Following that in Chapter 4, I will provide an in-depth discussion about the different findings in this study. Chapter 5 will provide a discussion on the implications of the findings of this research, study limitations and future directions.

Chapter 2

Framing the Literature

Several different lines of literature inform this study and the problem it seeks to explore. First of all, research has examined Latino participation in the pipeline and the possible causes of student attrition as they progress through the different educational levels. Little research has focused on unpacking Latinos as a monolithic group and looking at variations in educational attainment of Latino males and females. Research has also examined how two central cultural concepts—Machismo and Familismo—play a role in the development of Latino youth and their cultural identities here in the United States. Lastly, research has also examined how acculturation and generational status informs and influences their academic decisions.

Latino Participation in the Pipeline and Causes of the Leakage

Despite some positive signs of progress, educational outcomes for Latino students have not improved significantly in the last 30 years. Latinos continue to have low academic achievement patterns and continue to have the highest dropout rates among minority student populations. Furthermore, these trends are negatively affecting their college preparatory course enrollment in high school and overall postsecondary educational attainment.

There is some evidence that reveal that Latinos as a whole face unique educational barriers, some of which include: (1) poverty factors that affect a student's out of school circumstances; (2) inequitable educational practices and the varying beliefs, skills, and practices by school officials; (3) differential investment of educational

resources and (4) inadequate English language acquisition support for first generation students (Bohon, Macpherson, & Atiles, 2005; Conchas, 2001; Contreras, 2011; Gandara & Contreras, 2009; Lee & Bowen, 2006; Rivas-Drake, 2008). The reality is that historical inequalities in education between whites and minority groups have persisted throughout time (Darling-Hammond, 2003). Low socioeconomic students (most of them minority) for the most part attend schools that are staffed by "inadequately prepared, inexperienced, and ill-qualified teachers" (Darling-Hammond, pg. 612). This correlation acts as a compounding factor to the educational experience of poverty stricken students. On average, students that experience inequitable educational practices are mostly from low socio-economic backgrounds and minority student populations (Knapp, 2001; Darling-Hammond, 2003). Furthermore, the problem of inequitable educational practices is exacerbated by the "poverty" variable because of its high correlation with, "poorly structured curricula and schools...and inappropriate or ineffective teaching techniques" (Knapp, pg.178). In the same light, Latino students, on average, populate school districts Serving low-income populations at greater rates than their white counterparts (Gandara & Contreras, 2009; Gandara, Rumberger, & Callahan, 2003).

Information Networks and Social Capital in Relation to Higher Education Participation

This pattern of leakage is likely to reflect the way Latino students participate in informational networks and accrue and utilize social capital. A growing body of literature investigates how social capital impacts the educational development of students. Most empirical literature on social capital is theoretically grounded on the works of either French sociologist Pierre Bourdieu or American sociologist James Coleman (Portes,

2000). Both scholars focus on the benefits accrued to individuals or families by way of their physical and emotional interactions with others, and both emphasize the importance of social networks, particularly those available to students through their parents and the schools they attend (Coleman, 1988; Bourdieu, 1986). In terms of schooling and educational opportunities, the relationships students build with "institutional agents" are instrumental in the educational success of Latino and other minority students (Stanton-Salazar, Dornbusch, 1995). These "agents" have the ability to transmit information and resources that can facilitate the successful mobility of Latino students along the educational pipeline. Furthermore, counselors, teachers and other "institutional agents" play an instrumental role in the key transitional moment between High School and College for most minority student populations.

In general, Latino students and other minority student populations are the ones that need most of the help when it comes to figuring out how to navigate the educational system. For Latinos, however, these potentially fruitful relationships with school agents have led to "disappointments and frustrations" (Stanton-Salazar, 2001, p 29). For Latinos, accessing these complex information networks located outside of the home requires them to adapt to the dominant culture that is at odds with their own (minority and often with substantial language differences). In addition, the sources of these informational networks may not be as sensitive to, or knowledgeable about, Latino students' needs as they could be. These factors create potentially impenetrable barriers for some minority population students that are laced with the feelings of embarrassment and distrust between institutional agents and minority students (Fordham & Ogbu, 1986; Stanton-Salazar, 2001). As a result, minority students are crippled when it comes to

building relationships with school personnel (Stanton-Salazar, 2001). These factors have negative effects on the successful navigation of the educational pipeline by minority students. Ultimately, they have an equally negative effect on their decision to apply to college.

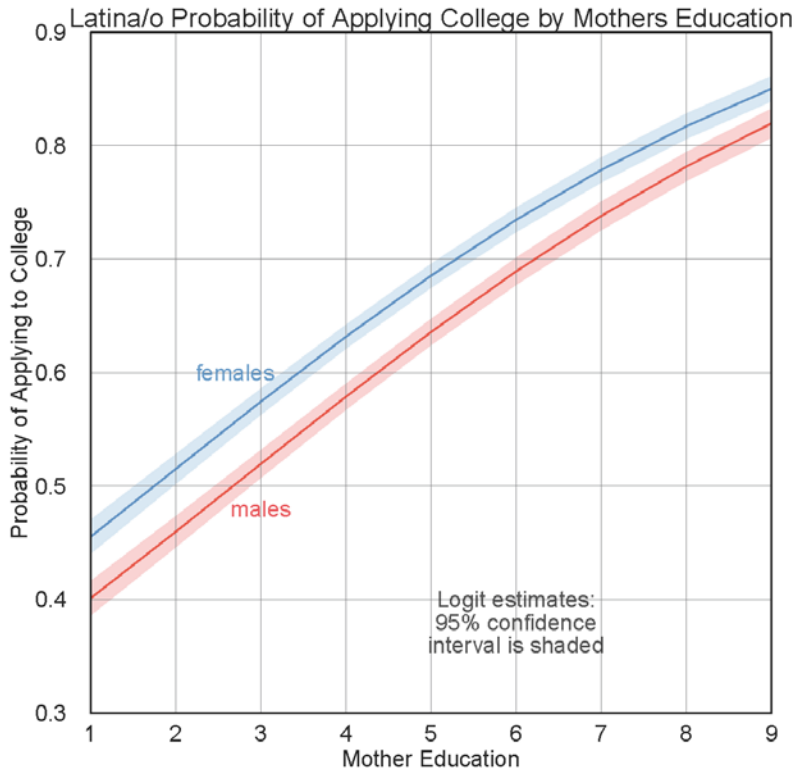
The Latino Gender Gap

The lack of these important information networks and social capital contribute to the overall Latino educational attainment gap. Within the Latino population, looking at males and females separately also reveals a growing gender gap. From 2000 to 2009, undergraduate enrollment for all student populations rose by 34 percent. During this time period, male enrollment grew 31 percent, from 5.8 million to 7.6 million students, while female enrollment grew 35 percent, from 7.4 to 10.0 million students. In 2009, females accounted for 57 percent of enrollment, and males, 43 percent in higher education institutions (National Center for Educational Statistics, 2011). Current research reveals that the gender gap for almost all other groups has been stabilizing; however the gender gap between Latino men and women is still growing (American Council on Education, 2010).

Aside from the previous barriers already established for minority student populations as a whole, what can be causing this compounding negative effect on the educational attainment of Latino men? Figure 1 further illustrates this phenomenon:

We have established the effects of several factors that contribute to the educational attainment gap between Latinos and the dominant group (i.e., mother's education) or how low parental education decreases the probability that students will apply to college.

Figure 1 : Latina/o Probability of Applying to College Given their Mothers Education



However, figure 1 reveals how these differences between genders persist and are salient throughout the different parental education levels of Latino mothers (1=no education; 9=professional degree).

Furthermore, researchers like Cammarota (2004) who explores the difference that race and gender play in influencing perceptions about education between Latina/os, uses the theory of resistance through achievement to explore this phenomena. In short, differences between males and females within the Latino community can be attributed to

how these different gender groups utilize and internalize resistance against societal stereotypes of failure established by the dominant cultures. In short, Cammarota (2004) reveals a significant difference in the patterns associated with valuing achievement in school as a form of resistance between Latina/o children. In short, the motivation to graduate and attend college, a student's decision to cut class or drop out completely on any given day, and the drive to seek assistance from educational programs, are driven by the different societal pressures derived from race and especially gender-related structural pressures. Latina women, in general, see high achievement in school as a form of resistance, while male students, for the most part, choose to resist by cutting class and going against school personnel (Cammarota, 2004).

Gender and Culture from "Machismo" to "Familismo"

Latino cultures ascribe certain behaviors to each gender, which are reinforced through socialization during childhood and continue throughout their adult lives (Cammarota, 2004; Stanton-Salazar, 2001). These gendered norms will eventually have an impact on the decisions these individuals make about their educational futures. Latino males, in particular, are a special case where living up to the rigid stereotypes associated with "Machismo" can prove to be debilitating to a young man's educational aspirations.

"Machismo" can have multiple meanings and has been defined in negative ways by many scholars. However, for this study, "Machismo" will be defined in terms of its positive traits that have been derived from recent scholarship and from the researcher's own life experiences as a Mexican American man. In this context, the definition of "Machismo" will revolve around the key concepts of honor, respect and bravery that is central to the

protection of the family (Kulis et al., 2003; Gil & Vazquez, 1996). There seems to be an informal expectation that these young men have to play a specific role in the household, that of being the breadwinner and having a responsibility for contributing to family income. It is as a result of this pressure to be the "man" of the family that most Latinos are more prone to enter the workforce at an earlier age rather than complete college or even high school (Pew Hispanic Center Study, 2010).

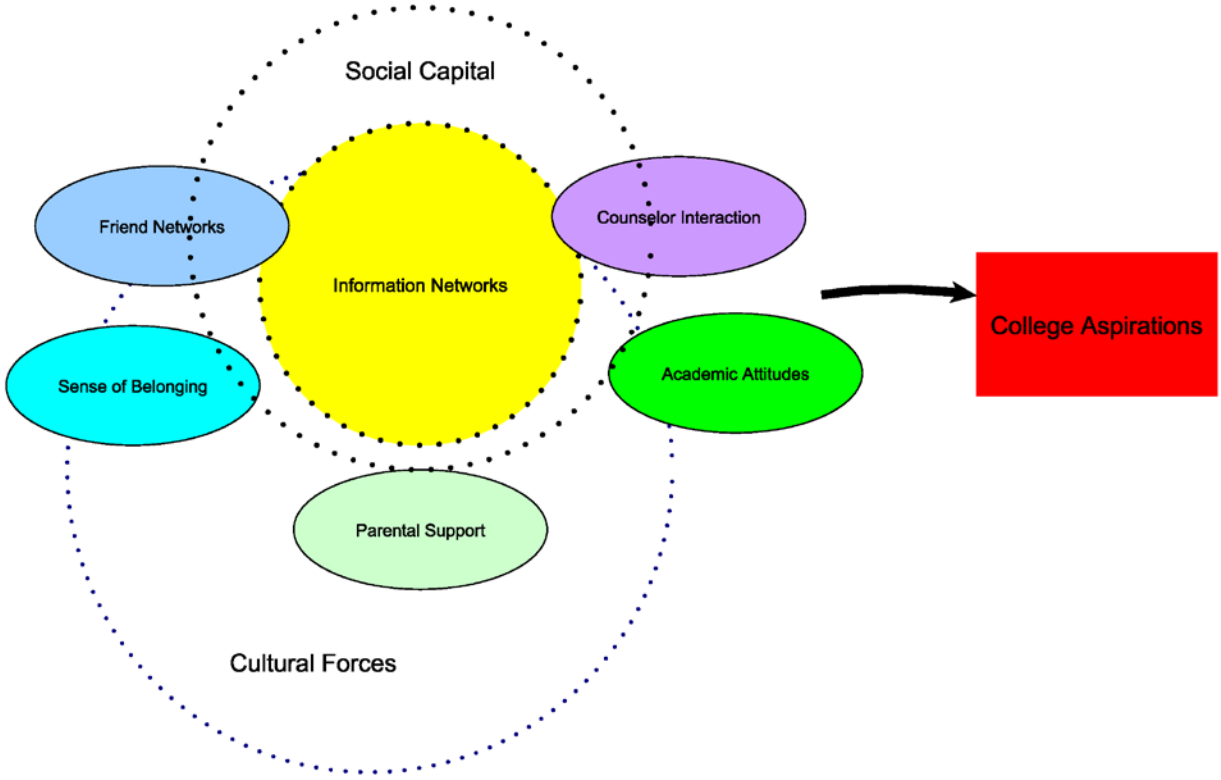
Furthermore, Latino culture reinforces a strong emphasis on strong family relationships and family obligations that transcend both genders. This family interdependence is most commonly referred to as "Familismo", where "loyalty, reciprocity, and solidarity within the immediate and extended family" are at the core (Galanti, 2003). In the context of Latinos and their decision making processes associated with education and LIFE in general, "Familismo" plays a very peculiar role (Galanti, 2003, p 191). As a result, when students are faced with the task of making an important decision about their educational future, many mediating factors (some positive and some not) must be taken into consideration. To be explicit here, I am not implying that other cultures do not make potentially big decisions without the blessings of their immediate and sometimes even extended family members, but for Latinos, coupled with other cultural and gendered cultural pressures, this process might work in a conjunction with other cultural pressures and serve as a potential barrier to advancing their educational goals. This is evident in the case when the goals of the family unit as a whole (making next months rent) are at odds with getting a college degree.

Lastly, an individual's system of beliefs and values in the context of education and gender are socially constructed and are reinforced both at the home and school

environments (Adler et al., 1992). For instance, a study done on elementary school children looking for what was perceived as high success amongst their peers, revealed that boys achieve the feeling of high status on the basis of their athletic ability, coolness, toughness, social skills, and success in cross-gender relationships, while girls gained popularity and achieved this self-perceived high status because of their physical appearance, social skills, and their academic success (Adler et al., 1992). This compounded with "machismo" for Latino boys and the unique gendered pressures associated with "familismo" for Latina women, might provide an insight into the seemingly growing educational attainment gap between genders in the Latino community.

Conceptual Framework

Figure 2: Conceptual Framework



Latino students educational ambitions and the factors that might contribute to it, take place within the context of social capital (and the information networks available to them) and cultural forces (where machismo and familismo reside). Together they influence the educational aspirations of Latino youth. Social capital and cultural forces together shape the relationships between a students friend networks, sense of belonging, parental support, counselor interactions, and academic attitudes. These factors might resonate differently for male and female students.

Research Questions

1. What is the relationship between these latent constructs and a students college aspirations?

2. What are the effects of these latent constructs on a students college aspirations?

3. Are these relationships and effects consistent across gender in the proposed population?

Chapter 3

Design and Analytical Approach

In this chapter, I describe the sources of my data and the main analytical measures on which the subsequent analyses are based. I also review the two analytic approaches I have adopted (confirmatory factor analysis and structural equation modeling), and note the role each plays, and why taken together they offer a satisfactory way of answering the research questions.

Data Source and Sample: Texas Higher Education Opportunity Project

This study utilizes data collected by the Texas Higher Education Opportunity Project (THEOP). Originally funded through a grant from the Ford Foundation, the THEOP collected data from Texas students enrolled as sophomores in 2002 with the intention of investigating college planning and enrollment behavior as a result of the Texas Top 10% law, which guarantees students graduating in the top 10% of their high school class admission to a Texas post-secondary institution. Along with the initial surveying of sophomores (Wave 1), the project conducted a follow-up survey record their progress in high school, post-high school plans, and any circumstantial changes (Wave 2). In addition to the sophomore cohort survey, the THEOP also conducted a longitudinal survey of students enrolled as high school seniors in 2002, and re-interviewed them one and three years after high school graduation. For the purpose of this study, Wave 1 of the sophomore cohort survey will be utilized.

In total, 19,969 students were interviewed in Wave 1 of the sophomore survey. Given the intent of this study, I limit the sample to only Latino students. This is further

disaggregated to only include Latino males in our primary structural equation model and all Latina females in our comparison model. Serving as constructs for the model, I utilize a series of questions from the Wave 1 survey to measure the impact of the believed agents of social capital (i.e., peers, counselors, parents), as well as the potential indicators of institutional neglect (i.e., student's perceived sense of belonging, academic attitudes). Each is discussed in further detail in the following section. Refer to Table 1 and the following section for a description of each hypothesized latent factor.

Measures

In accordance with the theoretical literature, I included five indicators of each latent factor to examine the relationships between these five factors and the student's college aspirations (Holland, 2011; Pérez & McDonough, 2008; Rodriguez, Mira, Myers, Morris, & Cardoza, 2003; Stanton-salazar, 2012).

Peers. The peer construct consists of a series of questions asking students about the attitudes of the peers they most associate with. In total, we include four questions, which as the following: "Number of friends who do well in school", "Number of friends who plan to go to college", "Number of friends who think it's important to work hard on school work", and "Number of friends who participate in extracurricular activities." From this series of questions, I not only measure the types of friends students choose to surround themselves with, but also control for how students perceive their peers. Given the ease with which peers can influence high school students, I consider this construct to be an integral part of the college decision process.

Counselors. As Gonzalez et al. (2003) mention, the utilization of counselors is instrumental in helping students decide to pursue a postsecondary education. Counselors are often knowledgeable in college admission requirements and can ensure that students are on track to being competitively eligible for higher education. Additionally, they can also help students realize that a postsecondary education is a viable option for them. To measure the influence of high school counselors, I use five survey questions asking the following: "Did guidance counselors provide information about school matters?"; "Did guidance counselors provide information about career options?"; "Did guidance counselors provide information about college options?"; "How often did you discuss course selection with your guidance counselor?"; and "How often did you discuss educational plans with your guidance counselor?"

Parents. Support to pursue higher education not only exists in the school setting, but also carries over into students' households. Parents themselves serve as a source of social capital in the development post-high school plans for students (Gonzalez et al., 2003), particularly for Latinos, who place a lot of value and respect on family and familial expectations (Hernandez, 2002). For this construct, I use five survey questions relating to the perceived support students felt they received from their families. The questions ask if their parents: "… give special privileges for good grades?", "… motivate [them] to work harder if [they] receive bad grades?", "…remind [them] to do their homework?", "… know when [they] are having trouble with homework", and "… help with school work?"

Sense of belonging. Students' sense of belonging is important in the educational experiences for multiple reasons. Feeling as though they fit in at their school helps in

offsetting any negative feelings associated with education by giving them a place within the educational setting. In the case of Latino males, I believe that having an increased sense of belonging at school helps situate them in a setting that may not be the most conducive to them. That is, Latino males that feel as though they belong at a school may use it to motivate to work past obstacles, such as a lack of Latino male role models or the underrepresentation of other Latino males choosing to pursue a postsecondary education. Along this line of reasoning, students with a decreased sense of belonging may be indicative of institutional neglect, either through the facilitation of an environment that students perceive as unwelcoming or through a perceived lack of support (Stanton-Salazar, 2012). The sense of belonging construct uses the following sophomore survey questions: "I am proud of belonging to this school", "I can really be myself at this school", "I feel like a real part of this school", and "I feel like I am successful when I am at school."

Academic attitudes. Lastly, I include a measure of students' attitudes towards their academic endeavors. Intuitively, a student's motivation to do well in school will be largely influenced by how they perceive their academics. Much like sense of belonging, institutions contribute to how students create these views. As an example, a school making it difficult for students to enroll in college preparatory courses, either through limiting space in these courses or only offering them to higher achieving students, may divert students into courses they may not be content with. This lack of satisfaction then increases the likelihood that a student does not value the quality of the courses they are forced to take. Measuring the academic attitude construct are the following survey questions: "Homework is a waste of time", "The things I learn will help me later in life",

"Grades are very important to me", and "The things I learn in school are interesting to me."

Outcome variable of interest*:* Aspiration to pursue a postsecondary education. Given the purpose of this study, the outcome variable of our models captures the students' aspirations to pursue a postsecondary education after graduating from high school. This variable asks respondents, "How far do you think you will go in school?" and it ranges from "high school graduation only" to "Ph.D., M.D., or other professional degree, spanning seven total categories.

Table 1		
Latent Factor Variable Selection		
Latent Factor Name	Description of Variables	Metric
Counselor Interaction	5 variables that provide information about how often respondent seek help from a counselor during their Sophomore year "How often did you discuss course selection with a counselor this year?"	0-never; 1=Once;2=Twice;3=Three +
Friend Networks	4 variables that asses positive relationships with peers at their school "How many of your friends plan on going to college after high school?"	0=none; 1=one; 2=two; 3=three +
Parental Support	5 variables that gage the level of parental involvement in a students school life "Do your parents help you with school work?"	1=strongly disagree-4-Stronlgy Agree
Academic Attitudes	4 variables that look into a respondents thoughts about the value of taking rigorous courses and getting good grades "Grades are very important to me")	1=strongly disagree-4-Stronlgy Agree
Sense of Belonging	4 variables that gage the respondents self-perception of comfort in their current school "I am proud of belonging to this school"	1=strongly disagree-4-Stronlgy Agree

Analytic Approach: Overview

Using variables from the Texas Higher Education Opportunity Project sophomore wave one cohort data, this study utilizes Confirmatory Factor Analysis (CFA) in the framework of Structural Equation Modeling (SEM) to create five statistically sound latent factors. Once an adequate measurement model (CFA) was established, a structural model (SEM) was estimated to assess the effects of the five latent constructs on a student's college aspirations. Lastly, in order to make comparisons between Latino males and females, a multiple group SEM was utilized to assess the potential differences in the effects of the five latent factors on a student's college aspirations. Factor relationships were also assessed using a multiple group framework, and differences in both magnitude and directions were compared between the two designated groups.

Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis is employed when substantive theory is available to inform the creation of latent constructs and priori information exists about the direction and magnitude of the parameter relationships (Brown, 2006; Loehlin, 2004). In this manner, effects on individual observed variables are used to indirectly inform unmeasured latent variables. A CFA model determines the appropriateness of a hypothesized measurement model by determining how well the data fits a proposed model. In statistics, a CFA model takes on the following form (K. G. Joreskog, Sorbom, 1996; K. Joreskog, 1973; Jöreskog & Sörbom, 1982; Kaplan, 2000):

Let subjects be (i=1,2,…,n) and j-items (j=1,2,3,…p)

$$y_{ij} = v_j + \Lambda_j \eta_i + \delta_{ij}, \qquad (1)$$

$$\eta_i \sim N(0, \Psi), \qquad (1.2)$$

$$\delta_{ij} \sim N(0, \Theta), \qquad (1.3)$$

Where, y_{ij} equals the ith subject's score on the jth item and is a px1 vector of indicators $(y_{i1}, \ldots, y_{ip})'$; v_y, is a px1 vector of intercept terms $(v_1 \ldots, v_p)$; η_i is an mx1 vector of underlying latent variables $(\eta_{i1} \ldots, \eta_{im})$; Λ_y is a p x m factor loading matrix that relates y_{ij} and η_i through individual factor loading 'λ'; δ_{ij} is a px1 vector of the measurement error terms. Lastly, in order to estimate the model assumptions (1.2 & 1.3) are necessary.

$$\begin{bmatrix} y_i \\ y_i \\ \ldots \\ y_p \end{bmatrix} = \begin{bmatrix} v_1 \\ v_2 \\ \ldots \\ v_p \end{bmatrix} + \begin{bmatrix} \lambda_{11} & \lambda_{12} \ldots & \lambda_{1m} \\ \lambda_{21} & \lambda_{22} \ldots & \lambda_{2m} \\ \vdots & \vdots \quad \vdots & \vdots \\ \lambda_{p1} & \lambda_{p2} \cdots & \lambda_{pm} \end{bmatrix} \begin{bmatrix} \eta_i \\ \eta_i \\ \ldots \\ \eta_p \end{bmatrix} + \begin{bmatrix} \delta_i \\ \delta_i \\ \ldots \\ \delta_p \end{bmatrix} \qquad (1.4)$$

CFA is a method strictly designed to sort out and test the relationships between individual observed variables and factors, as shown schematically in Figure 3. Aside from the factor covariance, factor loadings and error terms, this model is also assumed to have item intercepts and latent means. In the framework of Structural Equation Model (SEM), the relationships among latent factors form the measurement model (Kaplan, 2000; Kline, 2005).

Figure 3: Confirmatory Factor Analysis (CFA) Components

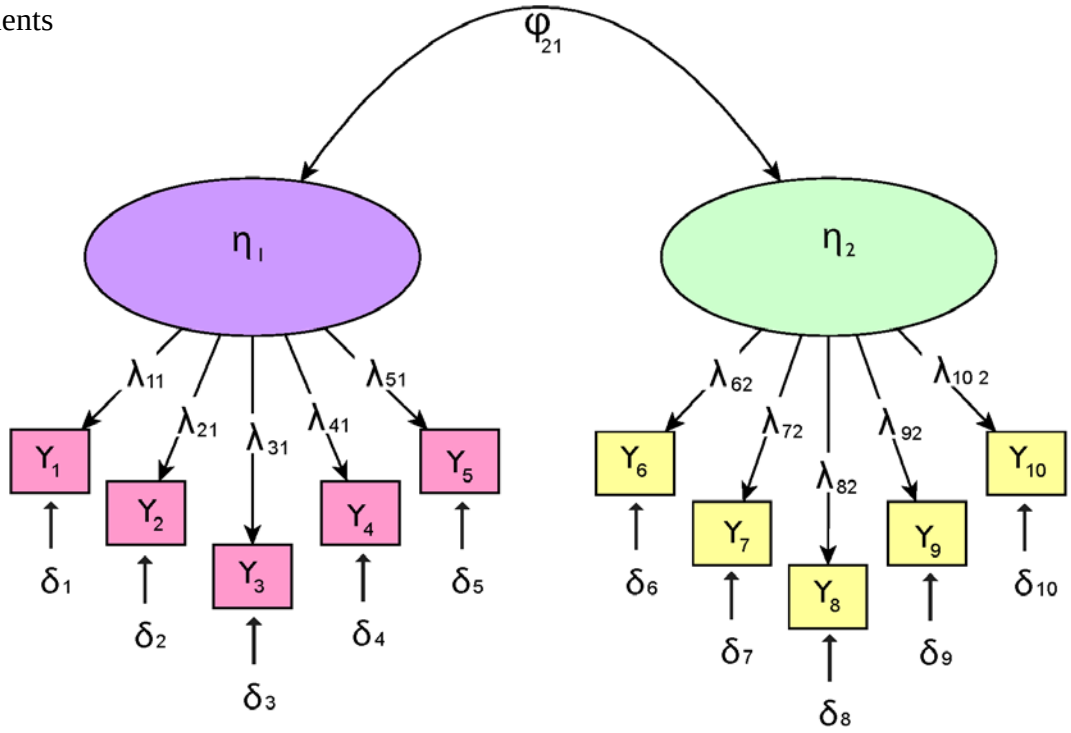
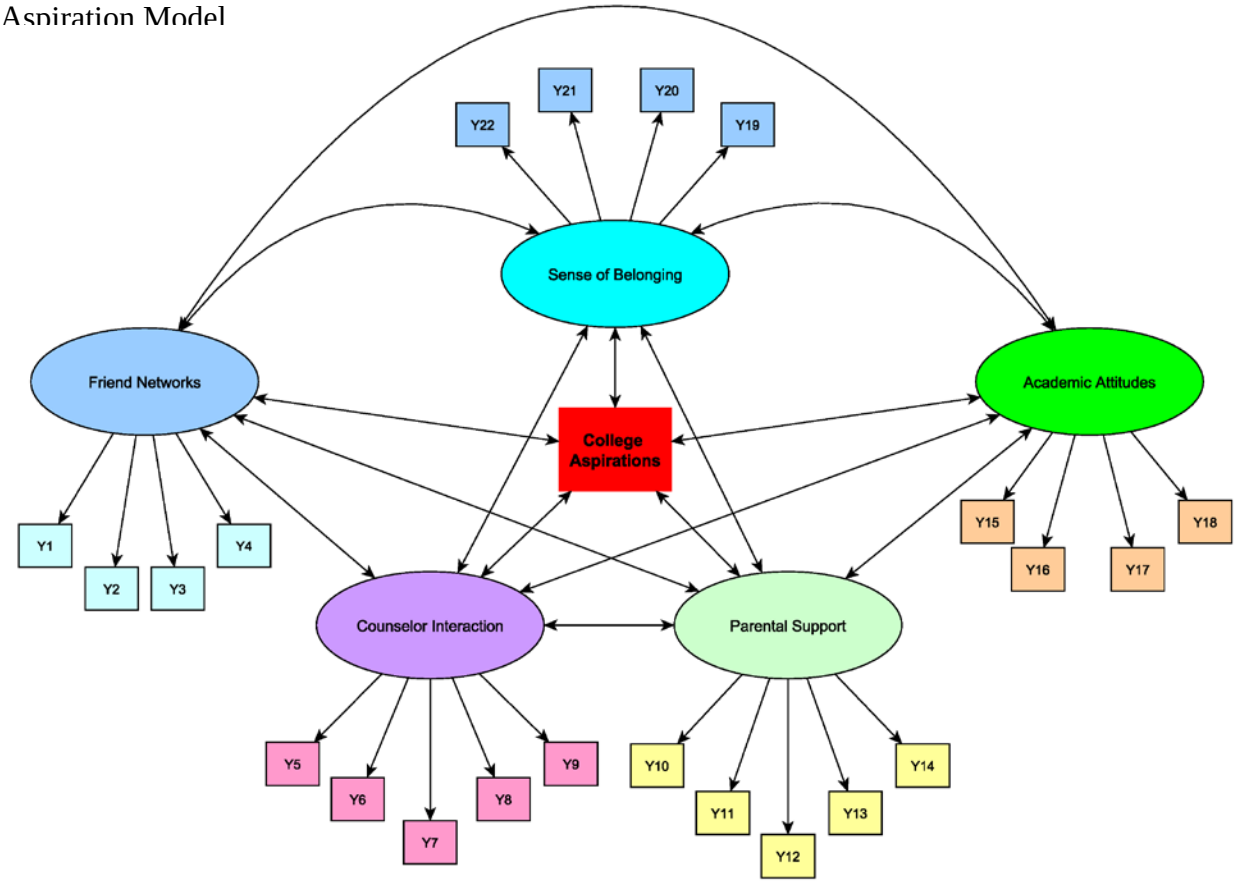


Figure 3 depicts a CFA diagram that contains two latent factors (η_1 and η_2). Latent factor η_1, is comprised of indicator variables Y_1-Y_5 and error variances δ_1-δ_5; latent factor η_2 is comprised of indicator variables Y_6-Y_{10} and error variances δ_6-δ_{10}. The relationship between latent factor η_1 and η_2 is represented by the double arrows and φ_{21}. The factor loadings, indicating the magnitude and degree that each indicator variable Y is representing the theorized latent construct is represented by λ and the directional arrow going into the Y indicator. The current study identifies five latent constructs with a total of 22 indicator variables and one outcome indicator. The proposed CFA model is illustrated in Figure 4.

Figure 4: Confirmatory Factor Analysis (CFA) Five Factor College Aspiration Model



Structural Equation Modeling (SEM)

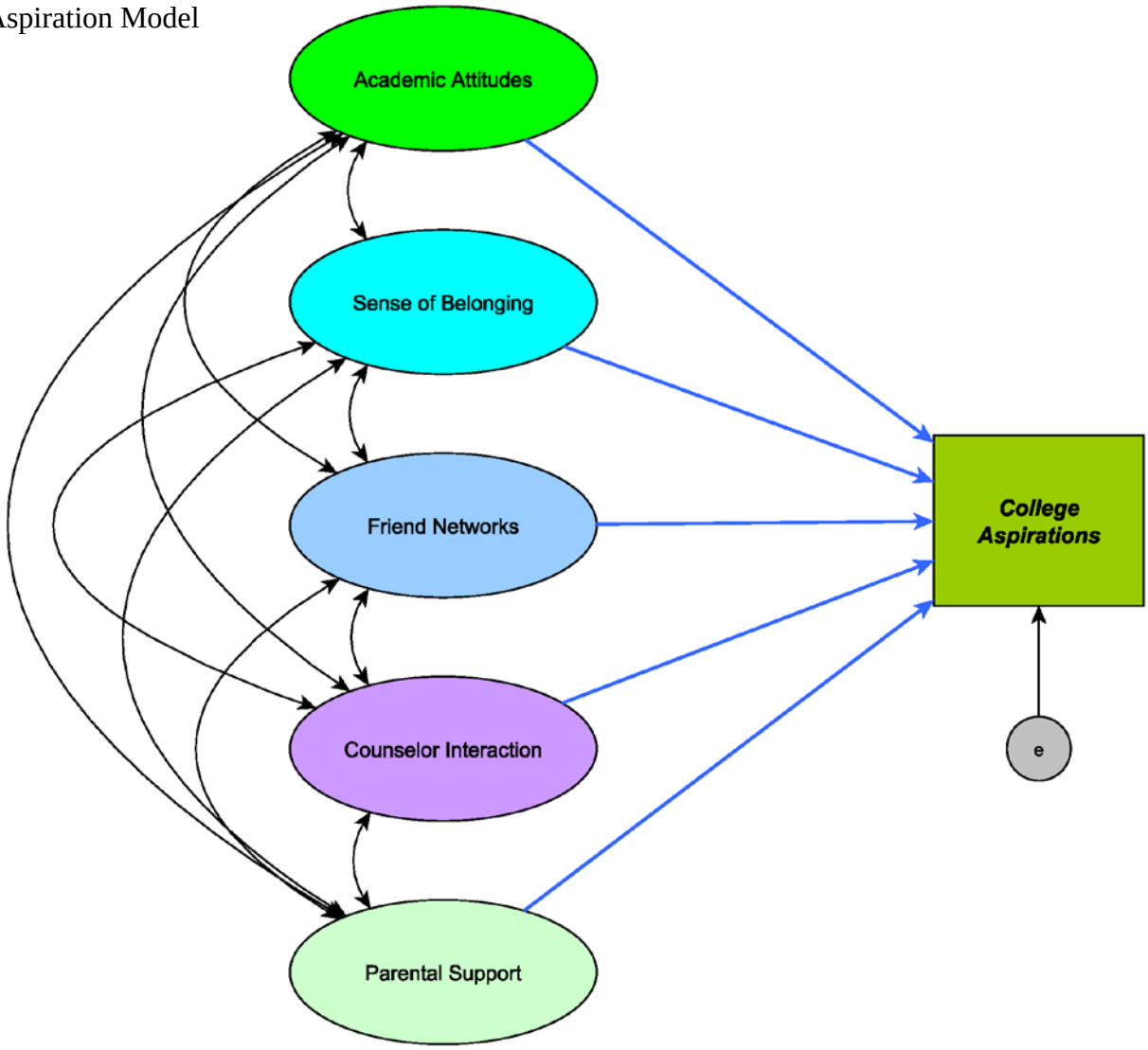
SEM is the structural component of a hypothesized CFA model (Kaplan, 2000; Kline, 2005; Skrondal & Rabe-Hesketh, 2004). SEM models complex dependencies of both observed and latent variables and is analogous to running linear regression equations simultaneously, while accounting for unique and indirect effects of explanatory variables (Muthén, 2002). In the case where exogenous predictors are used, no distributional assumptions are made and their relationships with each other (if multiple exogenous variables are used) and with the latent variables are captured and controlled for by the model (Fox, 2002; Jöreskog & Sörbom, 1982; Kaplan, 2000; Muthén, 2002). The

structural model for the effects of the latent factors on the observed covariate dependent variables is as follows:

$$\eta_i = \alpha + \beta\eta_i + \Gamma X_i + \zeta_i \qquad (2)$$

Where, β in an m x m parameter matrix of slopes for regressions of latent variables on other latent variables, and Γ is an m x q parameter matrix for regression coefficients of the effects of the latent variables on the dependent variables X_{1i}. Similarly as stated in the CFA model, α is a vector of intercepts, and ζ_i represents the unexplained components of the model (residuals).

Figure 5: Structural Equation Model (SEM) Five Factor College Aspiration Model



In SEM we are particularly interested in the directional paths from the latent factors (represented with ovals) to the outcome variable (represented by the squares). The relationships between latent factors are also modeled and are carried over from the measurement model. This represents the structural model.

Assessing Model Fit

The fit of both CFA and SEM models were assessed using suggested relative fit indices suggested in the literature (Hooper, Coughlan, & Mullen, 2008; Hu & Bentler, 1999). Two measures were especially given more importance: the comparative fit index (CFI) and the mean square error of approximation (RMSEA). Because of the categorical data being used for this study, more robust cutoff measures were used; cutoffs ≥.90 for CFI and ≤.05 for the RMSEA indicate adequate model fit (Yu & Muthen, 2002; Byrne, 2006; Kline, 2005; Hu & Bentler, 1999). Furthermore, because we had a substantial sample size in our data, we did not give much weight to the chi-square difference test. Several studies have revealed the high sensitivity of this test as sample size increases (Chen, 2007; Cheung & Rensvold, 2002; Hooper et al., 2008).

Multiple Group Comparison SEM Framework

Determining whether or not it is appropriate to make statistical comparisons between groups in a CFA/SEM analysis is an iterative process (Brown, 2006). In the Multiple Group Comparison (MGC) framework, Measurement Invariance (MI) is determined by comparing the covariance structure of a specified model across groups (Dimitrov, 2006; Sass, 2011). MI can be assumed if the measurement characteristics of indicators, factor loadings (lambda), intercepts (tau) and residual variances (theta) are equal across groups (Baumgartner & Steenkamp, 1998; Brown, 2006; Dimitrov, 2006; Lubke & Muthén, 2004; Milfont & Fischer, 2010). In this case, comparisons with how Latina/o men and women are influenced by different theorized CFA model will be assessed. In general MGC terms, the model can be represented as follows:

$$Y_k^g = v_k^g + \Lambda_k^g \eta^g + \delta_k^g, \qquad (3)$$

where, “g” and “k” represent the relationships between k items in the g-th group. For research, the interest is whether the underlying latent structures are perceived and interpreted in the same way by both Latino males and females. The following steps were taken to determine measurement invariance in the order of least restrictive invariance to most restrictive invariance (Brown, 2006; Cheung & Rensvold, 2002; Dimitrov, 2006; Milfont & Fischer, 2010; Vandenberg & Lance, 2000):

1. *Form/Configural Invariance*. The measurement model was freely estimated for both Latino males and Latina female samples. This will assess the validity of using the five factor measurement model on our groups of interest and will serve as the baseline model.
    a. $Y_k^{males} = v_k^{males} + \Lambda_k^{males}\eta^{males} + \delta_k^{males}$;

    $Y_k^{females} = v_k^{females} + \Lambda_k^{females}\eta^{females} + \delta_k^{females}$

All parameters are estimated freely for both groups.

2. *Metric Invariance*. The measurement model was estimated while holding the individual factor loadings of the indicators equal to each other for both groups. This step determines if the meaning of our theorized constructs have the same meaning for both groups.
    a. $\Lambda_k^{Males} = \Lambda_k^{Females}$ → Equality of the factor loadings in a nested model for both groups.
3. *Intercept Invariance*. The measurement model was estimated while holding the indicator intercepts equal in both groups. This condition is the last step needed to make comparisons on the latent means. This condition tells us whether observed

measures are related to the latent constructs in the same way for both groups. In other words, individuals who have the same mean on a latent construct also have similar scores on the observed variables regardless of group membership (Milfont & Fischer, 2010).

a. $v_k^{Males} = v_k^{Females}$ → Equality of the individual factor intercepts in a nested model for both groups.

It should be noted that a fourth (measurement error) test of invariance is often suggested (Chen, 2007; Cheung & Rensvold, 2002; Milfont & Fischer, 2010), however this last test is the most restrictive and is often never attainable (Dimitrov, 2006). This study will focus on assessing invariance in these initial three cases. If all three invariance tests hold, then MI can be assumed and comparisons and interpretation of groups is possible. However, if "full" invariance is not attainable, alternative specifications can be applied.

Partial invariance. When full invariance is not attainable then factor and intercept constraints can be relaxed individually to obtain partial invariance (Brown, 2006; Milfont & Fischer, 2010; Sass, 2011). Full invariance in practice is rarely obtainable and allowing combination of parameters in both groups to be estimated freely while keeping some constraints equal, allows for the appropriate comparison of groups even when full MI does not hold (Byrne, Shavelson, & Muthen, 1989; Milfont & Fischer, 2010).

Measurement Invariance Assessment

To assess MI, a baseline model must be specified (Configural Invariance) and used to compare changes in fit indices when additional constraints are made. This initial

model will be used as the baseline model for model comparisons in the multiple group framework. First, to establish metric invariance a model with the factor loadings fixed equal with both groups will be compared to the baseline model. If, there is evidence (via a nested goodness-of-fit test) that the factors are not equal for both groups, then individual constraints can be relaxed until the test reveals partial equality. Once partial equality is obtained, then the test for the intercepts can proceed.

Second, to assess intercept invariance, a model with both factor loadings and term intercepts were constrained equal and the fit of this model was compared to the fit of the freely estimated baseline model. A chi-squared difference test is used to assess invariance between models. If, there is evidence (via a nested goodness-of-fit test) that the term intercepts are not equal for both groups, then individual constraints can be relaxed until the test reveals partial equality. If partial invariance is achieved then the assumption of partial invariance is satisfied.

Goodness-of-Fit and MI. To assess measurement invariance changes in both absolute and relative fit indices will be assessed (Brown, 2006; Byrne et al., 1989; Kaplan, 2000). In short, if there is no significant difference between the constrained model and the baseline model, then we have evidence for measurement invariance.

Using recommendations from Cheung and Rensvold (2002) and Chen (2007), this study will not rely solely on changes in the absolute fit statistic X^2. The large sample size in this study makes the X^2 sensitive to even minimal changes between model comparisons (Hu & Bentler, 1999). Cheung and Rensvold (2002) recommended using changes in the comparative fit index (CFI), Change in Gamma Hat, and change in McDonalds Non-

Centrality Index (NCI). However, Chen (2007) rejects using Gamma Hat and concludes that changes in the CFI are a more appropriate in assessment of invariance. Both Cheung and Rensvold (2002) and Chen (2007) find that McDonalds Non-Centrality Index is highly correlated with CFI results. As a result this study will use the change in the comparative fit index (ΔCFI) in conjunction with change in X^2 (ΔX^2) to assess MI (Baumgartner & Steenkamp, 1998; Chen, 2007; Cheung & Rensvold, 2002; Meade, Johnson, & Braddy, 2006). In the case when ΔX^2 and ΔCFI do not agree, CFI will be given higher consideration. When comparing nested models, in the case that CFI is greater than or equal to .01 , the more restrictive model will be rejected (Chen, 2007; Cheung & Rensvold, 2002; Milfont & Fischer, 2010).

Chapter 4

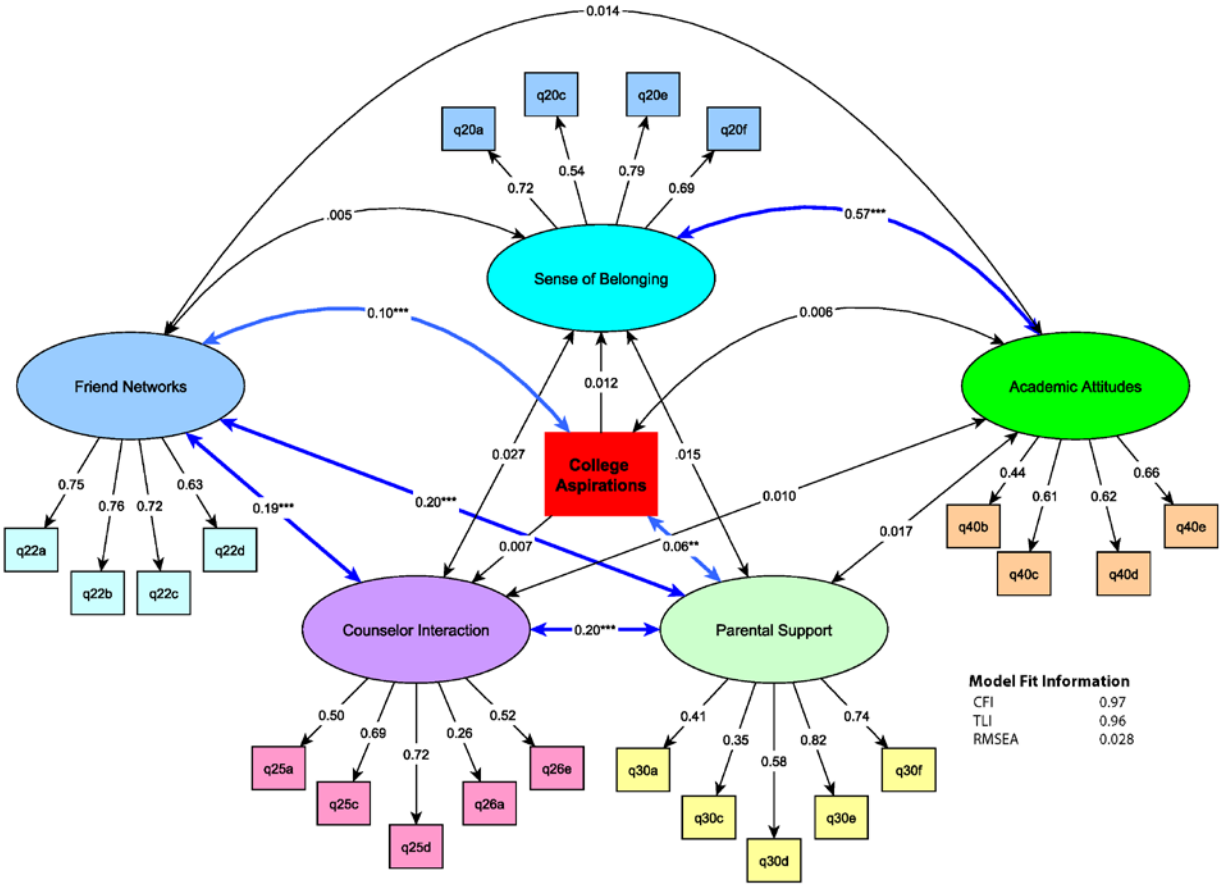
Results

Below I summarize what I found in carrying out, first, the confirmatory factor analysis, and the structural equation modeling analyses. Second, a multiple group comparison model was introduced and tested for measurement invariance. Once measurement invariance was assumed, a comparison between the theorized CFA and SEM models were compared for both Latino males and females.

CFA Findings

A confirmatory factor analysis (CFA) was conducted to specify how individual variables load on the five latent factors, "Friends Network", "Parental Support", "Counselor Interaction", "Academic Attitudes" and "Sense of Belonging" and to assess the relationships between the individual latent constructs through the inter-correlations between the latent factors. This initial analysis includes all Latinos in the data (6,880). Refer to Figure 6 for the standardized solution diagram with standardized factor loadings and factor correlations. To assess model fit of the specified model the comparative fit index (CFI) and the mean square root of approximation (RMSEA) was used. The CFA model for the five latent factors reveal adequate model fit by even robust standards; CFI = 0.96 and RMSEA= 0.028 (Yu & Muthan, 2002; Kline, 2005; Kaplan, 2008). The measurement error for similar items within the five factors of interest were correlated, as was suggested by the modification indices (Marsh, 1998; Cote & Greenberg, 1990; Graham, 2006).

Figure 6: CFA College Aspiration Model for Latina/os



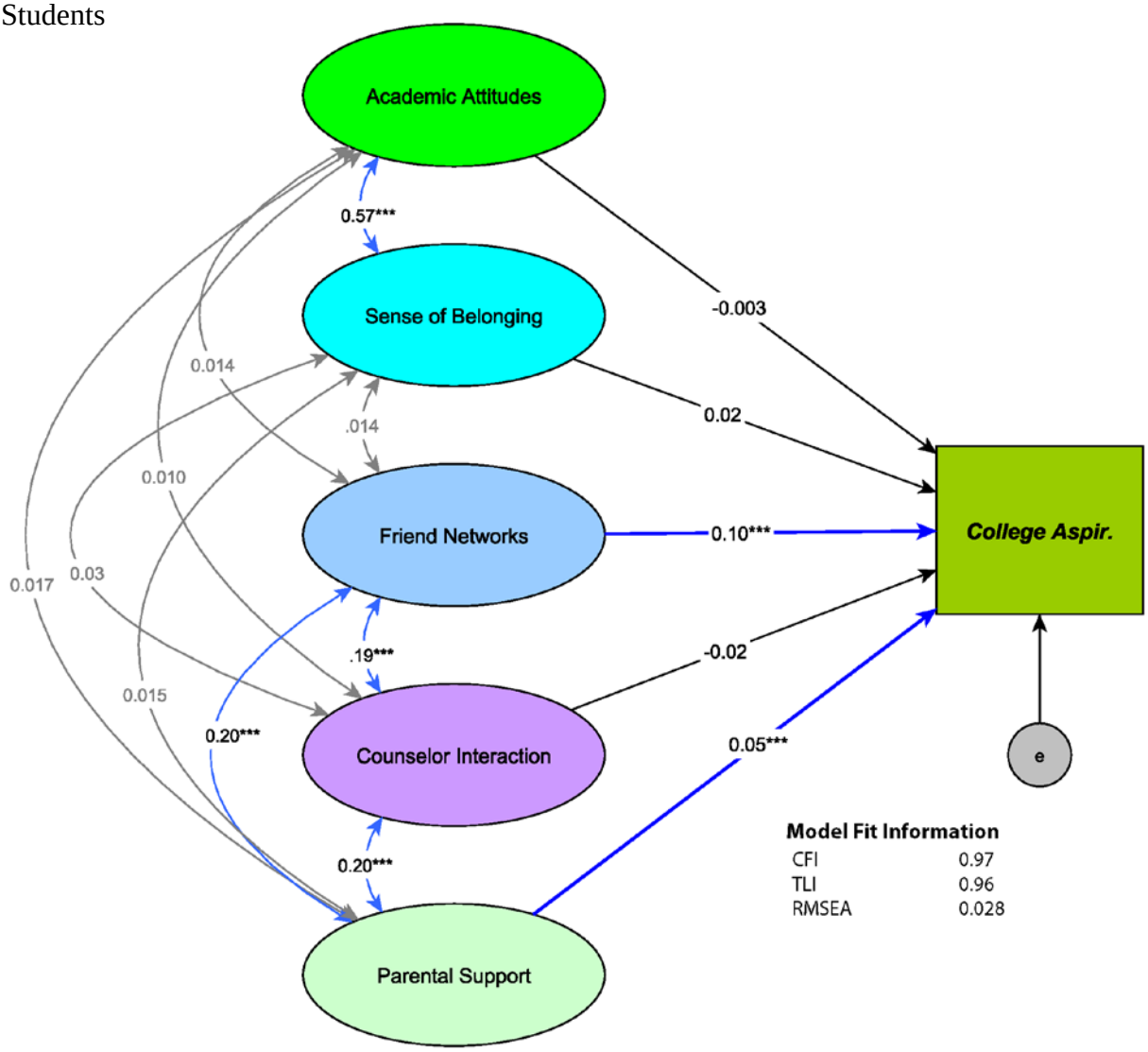
Overall, all factor loadings on the specified factors were statistically significant ($p < .001$). Factor inter-correlations for Parental Support, Counselor Interaction and Friend Networks were statistically significant ($p < .001$). Factor inter-correlations for Academic Attitudes and Sense of Belonging were also statistically significant. Factor correlations between Academic Attitudes and Parental Support, Counselor Interaction and Friend Networks were not statistically significant. Factor correlations between Sense of Belonging and Parental Support, Counselor Interaction and Friend Networks were also not statistically significant. In short, the levels of a Latino respondent's sense of belonging and academic attitudes are highly related. This is consistent with the notion

that students shape their academic attitudes in relation to how comfortable they feel with their school environment (Stanton-Salazar et al., 1995). Similarly, factors that measure the level of a Latino student's positive friend networks and the perception of the support given to students by their parents at home and their counselors at the school are significantly related in this model. This might be potential evidence that Latino Student relationships with school support agents are correlated with the support structure present at the home. Specifically, parental support is statistically correlated with counselor interactions (0.23, $p < .001$). Similarly, both levels of parental support and counselor interactions influence friend networks.

SEM with College Aspiration Outcome

A structural model was employed to assess the structural relationship of these five latent factors as predictors of Latina/o students' college aspirations. The SEM model for the five latent factors and the structural individual paths to a student's college aspirations reveal adequate model fit (CFI = 0.97, RMSEA= 0.028) (Kline, 2005; Kaplan, 2008). Figure 7 contains the correlations between the latent factor as well as the directional effects of the five factors on college aspirations.

Figure7: SEM Five Factor College Aspiration Model Results for Latina/o Students



Results from the structural model, summarized schematically in Figure 7 above, reveal statistically significant relationships between high levels of perceived parental support and high college aspirations (.05, $p < .001$). Similarly there is strong positive friend network relationship for Latino students as a whole and their college aspirations (.10, $p < .001$). In short, the results from this model show that Latino students' college aspirations are highly influenced by both parent support networks and by positive friend

networks. In other words, as the levels of both parental support and positive friend networks increase, so does a student's college aspiration.

Multiple group comparison model results. In the first part of the analysis, an adequate measurement model (CFA model) as well as a structural model (SEM with college aspiration outcome) was established. To test (MI), First, a base line model for both groups (male and female) was established and it was found that form invariance was in place (factor loadings on individual latent factors were similar in magnitude and direction) (Dimitrov, 2006). Second, the equality of factor loadings between Latino males and females were tested, to determine whether the five factors of interest had the same meaning for both groups. Lastly, the equality of intercepts was tested for both groups.

Table 2.

Test of Measurement Invariance of Latino College Attitudes and Support Structures in Male and Female Students

Measurement Invariance	x^2	df	Δx^2		Δdf	CFI	ΔCFI	RMSEA(90% CI)	TLI
Male Model	830.91	195				0.966		.031 (.029, .033)	0.96
Female Model	689.22	195				0.973		.026 (.024, .029)	0.96
Model 0 (Baseline-Freely Estimated)	1524.12	391				0.969		0.029 (.028, .031)	0.96
Model 1 (Equal Factor Loadings)	1584.98	408	60.86	***	17	0.968	0.001	0.029 (.028, .031)	0.96
Model 2 (Equal Factor Loadings and Intercepts)	1772.58	424	248.46	***	33	0.963	0.006	.031 (.029, .032)	0.96

Note: N=6809 (n_{male}=3309; n_{female}=3500); CFI, comparative fit index; RMSEA, root mean square of approximation; TLI, Tucker-Lewis Index; x^2 diff is nested x^2 difference; **p < .01, ***p < .001

As expected, the X^2 statistic does not support measurement invariance, however ΔCFI stays consistent between both tests of invariance. These results support the evidence towards measurement invariance of the proposed factor model between both Latino males and females. Changes in the ΔCFI are all under (.01).

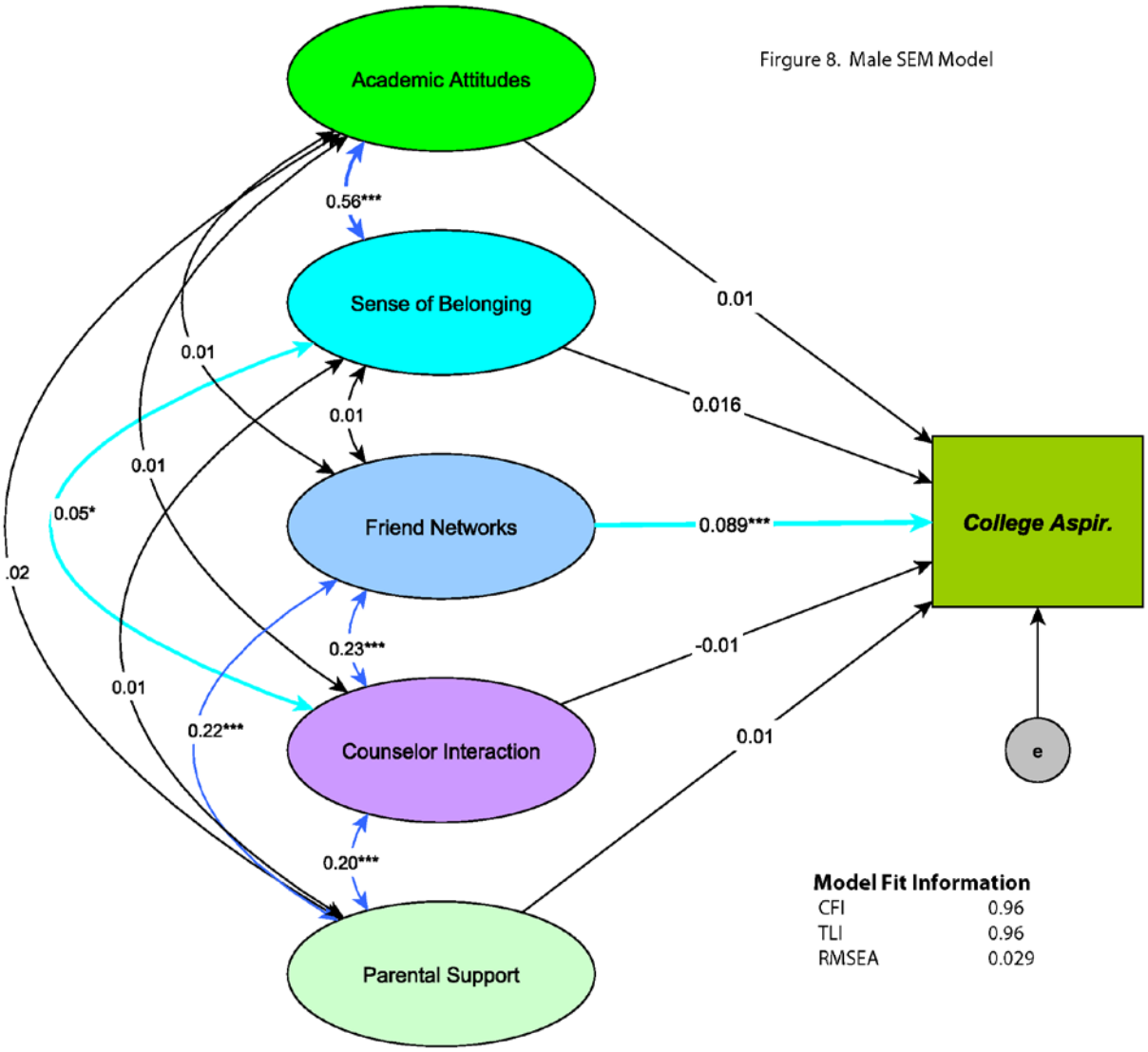
Comparing males and females under the CFA and SEM models. Figure 8 and 9 contain the results of the multiple group SEM analysis. Table 3 contains the factors loadings of the indicators on the latent factors for both male and female models. Overall there are no major differences between the factor loadings of Latino males and females when they are freely estimated using the nested models. To answer the question of whether the relationships between the latent factors are consistent between male and female students, refer to Figures 8 and 9 and the double headed arrows between the latent factors. Both male and female students remain consistent with the overall Latino model and have strong correlations between Friend Networks, Counselor Interaction, and Parental Support. The correlation between Sense of Belonging and Academic Attitudes also remains significant.

There is evidence of some deviation from the overall Latino model in terms of latent factor relationships. For Latino males, there is now a significant relationship between counselor interaction and sense of belonging. For Latina Females, there is a significant relationship between sense of belonging and friend networks. To answer the question of whether the predictive paths between the latent factors and the college aspiration outcome indicator are consistent between male and female students, refer to Figures 8 and 9 and the directional arrows between the latent factors and the college aspiration variable. In terms of differences between the latent factors and their predictive paths towards college aspirations, for Latino males, strong friend networks in the school remain the only significant predictor of their college aspiration. This result differs from that of our model including the whole sample of Latinos, which showed an overall statistically significant positive effect of parental support and college aspirations. Latina

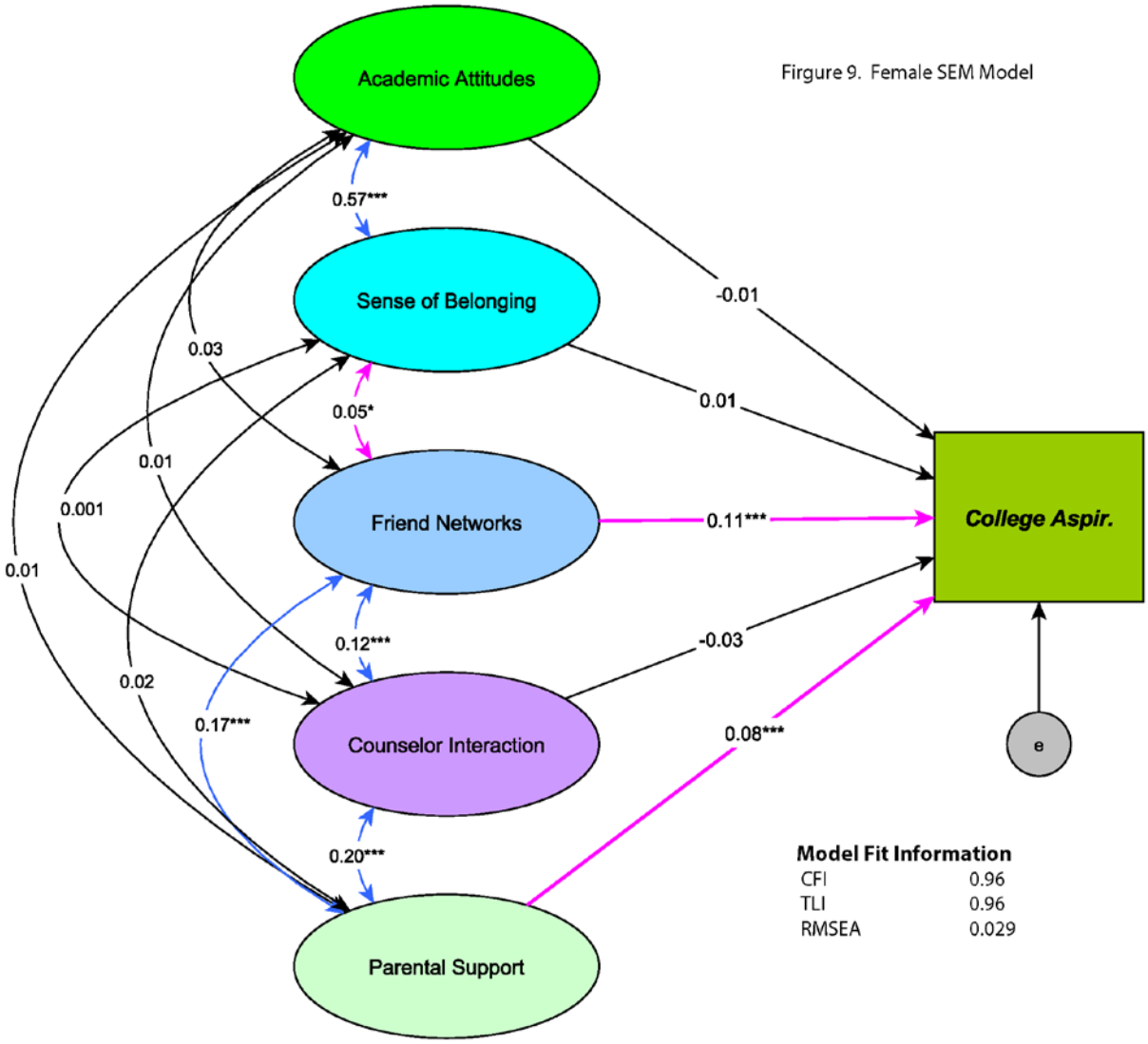
student results reflect those of the overall SEM Latino model. For Latina female students, having positive friend networks and strong parental support are positively related to their college aspirations.

Table 3

CFA Factor Loadings For Male and Female Baseline Models				
			Male	Female
Sense of Belonging		q20a	0.7	0.69
		q20c	0.54	0.53
		q20e	0.78	0.78
		q20f	0.7	0.69
Friend Networks		q22q	0.711	0.7
		q22b	0.741	0.73
		q22c	0.725	0.72
		q22d	0.62	0.61
Counselor Interaction		q25a	0.55	0.5
		q25c	0.73	0.69
		q25d	0.73	0.69
		q26a	0.28	0.25
		q26e	0.49	0.51
Parental Support		q30a	0.41	0.39
		q30c	0.37	0.33
		q30d	0.59	0.56
		q30e	0.82	0.83
		q30f	0.72	0.73
Academic Attitudes		q40b	0.44	0.44
		q40c	0.6	0.59
		q40d	0.66	0.65
		q40e	0.67	0.66



Firgure 8. Male SEM Model



Firgure 9. Female SEM Model

Chapter 5

Discussion and Conclusions

This study expands on the growing body of research addressing the gender gap and educational attainment among Latinos. This study is unique in the way that it treats Latino men and women as two heterogeneous groups, by modeling their unique differences and contrasting their unique models. First, the data revealed significant differences between male and female students in the relationships between factors that positively influence college aspirations. Second, the overall model revealed results that were consistent with previous research in how college factor relationships influence college aspirations.

The variation in the relationships between latent factor models representing Latino males and females in the final SEM model supports existing research that there are indeed differences in how Latino males and Latina females perceive and digest their educational experiences (Pérez & McDonough, 2008; Sy & Romero, 2008). This study found that Latina students' college aspirations were highly influenced by parental support characteristics. Indeed, research has revealed the uniqueness of how Latina female students are highly positively influenced and motivated by their parents' experiences (Miguel Ceja, 2004; Estela Zarate & Gallimore, 2005). Zarate et al. (2005) found differences in the predictability of parental aspirations and the effect of involvement on the aspirations of Latina female and male students. Their major finding included varying levels of association between parental influences between male and female students as they navigated the educational pipeline (K-12). In their study, both male and female

students were significantly influenced by their parents; however, it was unclear how the differences between them at different times signified an explanation for the divergent enrollment patterns between male and female students. When one takes into consideration the complete model that includes all Latino (both male and female students), parental factors are significant and greatly predict students college aspirations. This latter finding is consistent with the literature, which has historically shown this positive relationship (M. Ceja, 2004; Fisher, 1999; Kim & Schneider, 2005).

Latino male students, on the other hand, might not share the same reliance on their parent's aspirations as their female counterparts in this study. The lack of a statistically significant relationship between parental support and collegiate aspirations for Latino males was unexpected, but not completely surprising. This can be due to a number of factors; the relationship between Latino males and 'Machismo' for example, might be interacting in a unique way with the male participants. First, Latino males in the presence of Machismo, internalize the responsibility to help their families at an early age (Saunders & Serna, 2004). This makes these students somewhat more independent in their pursuit of their academic goals (Zell, 2010). Second, an alternative explanation can be extrapolated from the actual data and modeling. To begin with, the data reveals no significant relationship between parental factors and college aspirations for males. However, the absence of significance does not mean that it does not exist, but that in this model, Latino male college aspiration is better defined by their friend networks. Third, although family is an important cultural value for Latinos, the provider role Latino males are expected to undertake does not necessarily require a college education. In fact, the pressure to start working after high school may supersede their desire to go to college. In

the case of this study, Latino males with increased parental support may feel a stronger loyalty to their family, and therefore decide to work immediately after high school.

For both Latino males and females, peer networks are a statistically significant factor that positively contributes to their college aspirations. Other studies have found this unique relationship between Latinos and their friend networks (Holland, 2011; Rodriguez et al., 2003). Even with the availability of other sources of social capital, associating with other peers that plan to attend college is a consistent positive predictor. In short, peer networks at the school are invaluable in the pursuit of a postsecondary education because they provide a reliable and knowledgeable college navigation resource (M. Ceja, 2004; Stanton-Salazar, 2012). In many instances these friend networks potentially hold greater knowledge about the educational system then most recent Latino immigrant parents (Hurtado & Gauvain, 1997; Stanton-salazar, 2012).

It is also possible that these same friend networks can act as negative influences on a student's college decisions. Hovart and Lewis (2003) reexamine Fordham and Ogbu (1986) work about the influence of peer groups on a students academic success, and reveal that there exists a large variation (in terms of positive or negative influence) between the types of peer groups black students decide to engage with. In short, it was found that, low academic performance was associated with negative peer pressure stemming from the peer group (Horvat & Lewis, 2003). This current study does not attempt to sort through the complexities associated with the racial make-up of a students peer group. Furthermore, Hernandez (2012) revealed that, successful Latino students connected with other successful students in their high school. These students were also aware of the students that did not see their education as a priority.

Study Limitations

The purpose of this study was to highlight the potential heterogeneity of Latinos as a whole, when gender is taken into consideration. Generalizability was not of primary concern, however it should be noted that this study is not generalizable to Latinos as a population as a whole due to the fact that the data consist of high school students in the state of Texas. This data do not provide a way to operationalize quantitatively everything that could contribute to students college aspirations. The models that have been provided in this study represent a possible way of representing the actual processes that contribute to a students college aspirations, however different model specifications are possible. Furthermore, there is a possibility that other latent factor could be specified using other variables from the THEOP data set. Future SEM studies utilizing this analytical approach can be tested and compared to this current study.

The present study provides a good look into what factors might contribute to Latino students college aspirations and how Latinos as a whole should not be considered as a homogeneous group. This study however, is not causal in nature but correlational. Alternative model specifications could be tested and could potentially provide new evidence about what shapes Latino college aspirations. For example, it could be that the proposed latent factors act as causal indicators of college aspirations. Furthermore, some of the proposed latent factors could also act as potential mediators of college aspirations. Future studies could test these models and eliminate ones that the data does not support.

The findings in these types of correlational studies can inform qualitative studies that aim to answer similar phenomena. For example, a qualitative design could include

components that aim at answering “why” there exist different relationships between hypothesized latent factors between male and female Latino students. A mixed method design for example, where a qualitative component explores differences between the factors associated with Latino students’ decision to apply to college can inform the creation of a Structural Equation model. Furthermore, smaller qualitative case studies can further determine whether there might exists other possible factors, not modeled in this study that lead to a positive or negative relationship with a students college aspirations during high school.

As the Latino population continues to grow, it is imperative that we do our best to understand and address the educational issues they experience. It is not only important to explore the low educational participation the Latino community, but also examine the gender disparities regarding educational participation. Latino males lag behind Latina females in education, and if not addressed, the already wide educational gap will only continue to grow.

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