Assessing the Impact of Academic Preparation, Finances and Social Capital on Postsecondary Education Enrollment

by

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Dedication

To Gabriel,

This journey started because of you.

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Abstract

This dissertation formulates and tests a theory about factors affecting postsecondary education (PSE) enrollment. Enrollment outcome is hypothesized to be affected by academic preparation, finances, and social capital factors. Special focus is placed on relevant social capital constructs: access to information, attainment norms, and support; social network effects are also analyzed. Data come from the National Education Longitudinal Study – 8th grade 1988-cohort (NELS:88). The main analytical method used is the multinomial logit model (MNLM), which is a proper analytical technique for estimating choice models in which the outcome variable is categorical or only partially ordered. The MNLM estimates simultaneously binary logits for all possible comparisons among the outcome categories, allowing estimation of different effects of predictors in each outcome category. MNLM analyses confirm that dynamics affecting enrollment in postsecondary education vary for two-year and four-year institutions. Variables measuring the four social capital constructs—attainment norms enforcement, access to information, support, and social networks—were significant for both enrollment in two-year and four-year institutions. The MNLM results indicate that social networks and peers greatly impact enrollment in two-year institutions. Largest effects on enrollment in two-year institutions are from volunteering, feeling involved in the neighborhood, friends to attend college (two-year or four-year), and family income. Results indicate that all social capital constructs—information, attainment norms, and support—as well as social networks variables effect enrollment in a four-year institution. Both *parents' and students' sources of information on financial aid* show positive effects on enrollment in a four-year institution as do variables measuring attainment norms and *high school help in college application process*. Variables measuring community involvement and social networks are among the strongest predictors

of enrollment in both two-year and four-year institutions. PSE institutions may use these results for planning and implementing informational outreach and enrollment management strategies. The model has potential for informing public policies aimed at increasing PSE enrollment rates for disadvantaged students.

Chapter I. Introduction

1. Problem Statement

Inequality in access to postsecondary education is one of the most crucial issues in education public policy today. Consensus exists about the importance of addressing this problem and the need for progressing toward equitable access opportunities for students from all socioeconomic backgrounds.

Postsecondary education access inequalities have been researched through several approaches, each focusing on different aspects of the problem. Mainstream research has framed these inequalities as either academic or financial challenges, and researchers often overlook competing explanations (Fitzgerald & Delaney, 2002; Heller, 2001; St. John, 2002; St. John, 2004). Academic access refers to students' qualifications and ability to meet standards for admission to a four-year postsecondary institution, while financial access refers to the ability to afford enrollment in any postsecondary institution (St. John, 2002).

According to data gleaned from the National Education Longitudinal Study 1988-2000, more than three-fourths of U.S. 8th graders aspire to some sort of postsecondary education, and there are no significant differences in aspirations among students from different income groups. Nonetheless, participation in higher education is unequal across segments. The overall gap in participation

rates between the highest and the lowest income quintiles is roughly 40% for the high school class of 1992. Also, among 1992 high school graduates, 97% of the individuals in the highest income quartile whose parents held a terminal degree enrolled in postsecondary education within 20 months of high school graduation. Conversely, only 52% of individuals in the lowest income quartile whose parents were high school dropouts enrolled in some sort of postsecondary education (Baum & Payea, 2004).

Since the early 1990s, no notable progress has been observed in postsecondary education enrollment in the United States. The likelihood of a 9th grader enrolling in college four years later is less than 40% (Callan & Ewell, 2006). Furthermore, participation in postsecondary education still varies by ethnicity and family income. Gaps in college participation between high and low income students widened between 1994 and 2004 (Measuring Up, 2004) and still persist today. For instance, in Virginia, 58% of high income and 14% of low income young adults (18- to 24-year-olds) are enrolled in college; in Connecticut, the gap is 58% to 16%; in Ohio, 61% to 20%; in New Jersey, 51% to 20%; and in Illinois, 52% to 23% (Callan & Ewell, 2006). Low income students are almost twice as likely to begin postsecondary education in a public two-year institution (40%) as in a private four-year college (21%), while high income students are almost as likely to begin postsecondary education in a private four-year college (38%) as in public four-year college (41%), and are less likely to enroll in two-year public colleges (21%) (Baum & Payea, 2004). Gaps between ethnic groups in college enrollment rates also persist. For instance, the enrollment rate for white 18-to-24

year-olds in Colorado is 40% and 17% for non-whites; in New Jersey, 47% for whites and 27% for non-whites; in Pennsylvania, 39% for whites and 21% for non-whites (Callan & Ewell, 2006).

Lack of resources to pay for tuition and other expenses has been identified as the biggest obstacle to postsecondary education enrollment (Hossler, Schmit, & Vesper, 1999; Hu & Hossler, 2000; Hu, 2003). Affording the costs of attending postsecondary education is obviously more challenging for low income students. By 1999, the cost of attending a four-year postsecondary education institution represented 5% of the income of an upper class family, 17% of the income of a middle class family, and 62% of the income of a lower class family (Gladieux, 2002). The effect of family income on ability to pay is unquestionable, though policy researchers argue about the effectiveness of financial aid policies to mitigate the unequal starting point and increase access equity (Becker, 2004; DesJardins, McCall, Ahlburg, & Moye, 2002; Heller, 2004; Lee, 2002; Paulsen & St. John, 2002; St. John, Chung, Musoba, & Simmons, 2004; Terenzini, Cabrera, & Bernal, 2001).

One way such inequities are mitigated is through the use of federal financial aid policies. However, in 2003-04, the average Pell Grant covered only 23% of the total charges at the average four-year public institution, down from 35% in 1980-81 (Baum & Payea, 2004). During the same period, the declining trend in the purchasing power of Pell Grants was mirrored by college participation gaps both for marginalized ethnic groups compared to Whites and for low-income students

compared to their high-income counterparts (St. John, 2002). These trends indicate that inadequate financial aid yielding growing unmet need is increasingly constraining postsecondary education access for low-income students (Fitzgerald & Delaney, 2002; Lee, 2002; St. John, 2002).

Middle income students also have unmet need for covering postsecondary education costs. Indeed, the expected family contribution (EFC) does not take into account payments for mortgages, insurance, and other loans, therefore yielding an overestimation of middle class families' disposable income. Such complaints have influenced politicians' and policymakers' decisions to switch financial aid provisions from need-based grants toward subsidized loans and merit-based grants that tend to benefit middle income students (Gladieux, 2002; Lee, 2002). Consequently, substituting merit-based grants for need-based financial aid is a growing trend at the state level.

Some researchers and policy advocates argue that states' merit aid programs do little to equalize opportunities for access to postsecondary education, since such grants tend to be awarded to upper-middle and high-income students rather than low- and low-middle income students (Donald Heller, 2002). Thus, many scholars argue that financial aid policies in the late 1990s and early 2000s have been ineffective with respect to reaching the goal of social equity in postsecondary education access (McPherson & Schapiro, 2002).

Paradoxically, low-income students receive less information about the availability of financial aid than middle- and upper-income students (Fitzgerald & Delaney,

2002). Many low- and middle-income students eligible for need-based financial aid fail to apply for college admission and for financial aid, apparently because they did not receive adequate school counseling (Fitzgerald & Delaney, 2002; L. Horn & Chen, 1998). Such lack of information may also discourage low income students from taking college preparatory courses and preparing for college entrance examinations (Fitzgerald & Delaney, 2002; St. John, 2002). Investing in academic preparation may be considered futile by low-income students, who are not aware of financial aid opportunities that could make postsecondary education affordable for them.

Data collected by the American Council of Education indicates that low-income families tend to overestimate postsecondary education costs (Gladieux, 2002). Research demonstrates that low-income high school students are more concerned about postsecondary education costs than they are about any other factor affecting college choice. Indeed, low-income students show greater price-sensitivity than other income groups (Fitzgerald & Delaney, 2002; Terenzini, Cabrera, & Bernal, 2001). Overestimation of college costs has a major affect on postsecondary education access for low income students (Fitzgerald & Delaney, 2002; Gladieux, 2002; Hu & Hossler, 2000; Paulsen & St. John, 2002).

Alternatively, the U.S. Department of Education-sponsored research claims that differences regarding academic resources—as opposed to financial issues—largely explain differences in postsecondary education enrollment. This line of research has operationalized academic resources by using either the College

Qualification Index (Berkner, & Chávez, 1997) or the Academic Resources Index (Adelman, 1999). The College Qualification Index includes high school GPA, senior class school rank, ACT or SAT scores, NELS 1992 aptitude test, and high school coursework, while the Academic Resources Index includes the highest level of math taken in high school, non-remedial math and English courses, AP courses, core science labs, foreign language courses, computer courses, high school GPA quintiles, high school rank, and NCES test scores. Not surprisingly, both indices and most of these academic variables by themselves are positive predictors of enrollment in postsecondary institutions (C. Adelman, 1999; Cabrera, La Nasa, & Burkum, 2001) since they are generally part of the criteria used when granting admission to postsecondary education institutions. Moreover, students who score high on these measures are often encouraged to pursue postsecondary education, while those who score lower may be discouraged.

Research also indicates that differences in academic preparation may be due to high schools' lack of quality teaching, inadequate counseling, and lack of capacity to offer college preparatory courses. Because college enrollment rates have been found to be higher for students who participate in academic or college preparatory curricular tracks in high school (Hossler, Braxton, & Coopersmith, 1989), lack of availability of such coursework to many students clearly undermines their postsecondary education opportunities. Low-income students in urban and rural schools—especially if they are also from a marginalized ethnic groups—are more likely to select non-academic courses even when academic

courses are available and less likely to prepare for college entrance examinations (L. Horn & Chen, 1998; Terenzini, et al., 2001); these students may be self-selecting out of the postsecondary education pipeline due to family and personal perceptions of inability to afford college costs (Fitzgerald & Delaney, 2002; St. John, 2002; Terenzini, Cabrera, & Bernal, 2001).

Nonetheless, requiring the taking of standardized tests, making high quality and high intensity curriculum mandatory, or increasing high school graduation requirements seem to be counterproductive. St. John et al. (2004) found that such state policies have no significant effect on college enrollment rates; however, such policies negatively affect high school graduation rates (St. John, Musoba, & Chung, 2004), thereby diminishing chances of entering postsecondary education for low income students and marginalized ethnic groups (Paulsen & St. John, 1997, 2002; St. John, Paulsen, & Starkey, 1996; St. John, 2002; St. John, Hu, Simmons, Carter, & Weber, 2004).

These claims about academic preparation and financial effects on educational access will be taken into consideration to build a comprehensive framework for postsecondary education enrollment that will be analyzed in this dissertation research.

2. Study Purpose

The purpose of this dissertation is to formulate and test a theory about academic preparation, finances, and social capital effects on postsecondary education enrollment choices. Special focus is placed on the relevant social capital

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constructs (e.g., information, bridges, and support networks) that appear to be related to postsecondary education enrollment. The conceptual framework builds on critical theories of social capital as embedded in relationships shaped by the social structure, but modifiable by individual's interactions.

Postsecondary education enrollment is defined as a set of choices including no enrollment in postsecondary education, enrollment in a two-year institution, and enrollment in a four-year institution. The proposed analytical model allows assessing social capital effects on enrollment decisions directly and as an intervening variable affecting high school academic preparation and postsecondary education finances and planning. The research design controls for students' socioeconomic status as defined by family income and parental education. The specific hypotheses tested will be stated after discussing the conceptual framework.

3. Significance of the Study

The study will contribute to the postsecondary education research literature by expanding the knowledge base on postsecondary education access and offering a comprehensive framework for studying access and enrollment. Known effects of academic preparation and financial conditions on postsecondary education will be integrated in a holistic conceptual framework, which will facilitate understanding relationships between personal background characteristics and the postsecondary education access pipeline. The study will shed light on the

intervening factors that shape academic preparation, including ability and willingness to pay college costs.

Furthermore, it will offer a reliable operationalization of social capital theory applied to educational attainment outcomes and thereby help to fill the gaps in this stream of empirical research gaining prominence among policymakers. One of the major weaknesses in the literature linking social capital theory with postsecondary education enrollment is the disjointed way in which the constructs are introduced (e.g., focusing on the impact of information without relating it to norms or networks, or focusing on peers effects without conceptualizing the value added by networks). This study will explain how all these concepts are related. Additionally, the study will include variables that capture more appropriate measures of the constructs being tested than the ones used in most prior studies.

The final model of college choice could be used by postsecondary education institutions for planning and implementing informational outreach, K-16 partnerships, and enrollment management strategies. It will allow a deeper understanding of relationships among actionable variables such as information on financial aid, information on required coursework, mentorship, guidelines for selecting institutions to which to apply, and so on. Additionally, further model extensions may help enhance prediction of the enrollment likelihood for individual students based upon their set of academic, financial, and social capital measures.

From a policy perspective, the model also has potential for informing more effective public policies aimed at increasing postsecondary education enrollment rates—and eventually college degree completion—for disadvantaged students. Findings may contribute to the knowledge base informing the design and implementation of public policies for overcoming the effects of economic and social inequalities on educational attainment.

Equity in postsecondary education access is highly consequential for individuals because such inequalities carry economic and social effects. Economic benefits include increased earning capability and greater employability. For instance, the income gap between high school graduates and college graduates has increased significantly over time; Bachelor's degree recipients earn on average 75% more annually than high school graduates (Bureau of Labor Statistics, 2004). According to U.S. Census data, median annual earnings for college graduates in 2004 was nearly $50,000, while for high school graduates roughly $30,000 (Baum & Payea, 2004). Some scholars argue that this earnings premium is due to greater productivity after having taken advantage of opportunities for developing skills and acquiring knowledge (Becker, 1993; Kingston, Hubbard, Lapp, Schroeder, & Wilson, 2003; Langelett, 2002). Another clear advantage comes is that unemployment rates are consistently lower among more educated individuals (Baum & Payea, 2004). Other researchers propose that a postsecondary education credential itself is an advantage in the labor market (Kingston, et al., 2003), while others point out that attending postsecondary education enhances personal social networks, which will also boost one's ability

to mobilize resources in order to get a better job (Lin, 1999). Whatever the reasons, the greater earning capacity associated with postsecondary education is clearly an advantage for individuals.

Additionally, there are social benefits associated with postsecondary education. Research suggests that postsecondary education changes people's attitudes from accepting the *status quo* toward taking the initiative to build a more prosperous and equitable society (Langelett, 2002; Pascarella, & Terenzini, 1991). Such attitude changes may result in postsecondary education graduates generally displaying higher levels of civic participation and volunteering (Baum & Payea, 2004; Kingston, et al., 2003; Langelett, 2002). Crime rates also decline when educational attainment increases (Hossler, Braxton, & Coopersmith, 1989).

4. Project Overview

In this first chapter, I depicted the problem of postsecondary education enrollment, introduced my research questions, and argued for the importance of this study. In the second chapter, I review the relevant literature for devising the proposed conceptual framework. Chapter II begins with a brief overview of the major theories addressing postsecondary education access: rational choice, social reproduction, and status attainment. Subsequently, I review approaches to social capital often used in the sociology of education literature, focusing on the contributions of Bourdieu, Coleman, and Lin. Then, I synthesize the major concepts in social capital theory that are relevant for explaining inequalities in access to postsecondary education. Next, I review empirical research on

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postsecondary education access in which social capital constructs have been incorporated into explanatory models. I analyze and critique these empirical works' conceptual frameworks, measures of social capital included, and the modeling approaches applied. Finally, I summarize relevant findings on social capital effects on postsecondary education access and point out some of their limitations. I conclude this section by identifying three ways in which social capital may generate returns to an individual and, then, presenting a comprehensive framework for analyzing educational outcomes.

In Chapter III, I delve into the limitations found in the reviewed postsecondary education literature, especially focusing on the sub-set of the literature dealing with social capital effects. I propose a research design that will help develop testable postulates and obtain reliable measures for testing the proposed conceptual model of postsecondary education enrollment. Chapter III describes data collection processes, presents the model specification, discusses the selection of the analytical techniques to be used, and addresses the research limitations faced.

Chapter IV will present the descriptive statistics of the study data and explain the data transformation that will be required. This chapter will comprise the results of the analyses conducted to test the proposed model of postsecondary education enrollment using multinomial regression. Finally, Chapter V will discuss institutional and public policies implications of the research findings, and present directions for further research.

Chapter II. Conceptual Framework

1. Major Postsecondary Education Enrollment Theories

Scholars studying inequalities in postsecondary education enrollment have employed a wide array of theoretical frameworks and methodological approaches. Mainstream research in postsecondary education access is commonly grounded in the disciplines of economics, sociology, and psychology. Most researchers use as framework one of the following theories: rational choice, social reproduction, or status attainment.

a. Rational Choice Theory: No Information Asymmetries?

Rational choice theory states that individuals make their choices based on the analysis of both the expected utility and the expected costs of the alternatives available to them (Becker, 1993; Cohn & Geske, 1990; Schultz, 1961). The basic assumption is that individuals seek the maximization of their well-being or utility (Schultz, 1961; Coleman, 1990; Becker, 1993). Accordingly, a student will assess the expected benefits and the expected costs of enrolling in a postsecondary education institution, and then, if the expected benefits outweigh the expected costs, s/he will decide to apply and to enroll (Becker, 1993; Beekhoven, De Jong, & Van Hout, 2002; DesJardins & Toutkoushian, 2005; Hossler, Braxton, & Coopersmith, 1989).

Most of the research applying rational choice theory to postsecondary education enrollment actually focuses on the analysis of how economic factors—such as tuition, financial aid, and family income—affect student enrollment choices (Beekhoven, De Jong, & Van Hout, 2002; Cohn, & Geske, 1990; DesJardins & Toutkoushian, 2005; Hossler, Braxton, & Coopersmith, 1989; Hossler, Schmit, & Vesper, 1999). There is also a stream of research analyzing return on educational investment focused on life-long earnings and other economic payoffs from a postsecondary education (Becker, 1993; Cohn, & Geske, 1990; Langelett, 2002; Manski & Wise, 1983; Schultz, 1961).

Fewer studies attempt to analyze students' preferences and the actual alternatives available to them (Cohn, & Geske, 1990), partly because such data are typically not readily available. Thus, many researchers are limited to examining the actual choices made by individual students, after controlling for their socioeconomic background. Based upon patterns found among individuals grouped by demographic or socioeconomic characteristics, scholars make broad inferences about why group differences (e.g., differences by income, race, or parental education) are consistently found (Beekhoven, De Jong, & Van Hout, 2002; Cabrera, La Nasa, & Burkum, 2001; Hossler, Schmit, & Vesper, 1999; Perna, 2000; Terenzini, Cabrera, La Nasa, & al., 2000).

There are few studies on postsecondary education choice that consider non-pecuniary issues affecting students' preferences (e.g., available majors, closeness to family and friends), evaluation of expected utility (e.g., college life,

academic reputation), and self-assessment of the probability of success (e.g., institution selectivity, self-assessment of academic ability) (Hossler, Braxton, & Coopersmith, 1989; Cohn, & Geske, 1990; Perna, 2000; DesJardins, & Toutkoushian, 2005).

The most important limitation of most of the empirical research grounded in rational choice theory is the failure to control for information asymmetries among students from different socio-economic groups. Much of the current research overlooks the fact that many students may not have accurate information about either the cost of attending a postsecondary education institution or potential future earnings from a postsecondary degree (DesJardins & Toutkoushian, 2005). Information asymmetries among students from different socioeconomic backgrounds may be critical for explaining inequalities in access to postsecondary education. Some researchers control for sources of information available to students during their choice processes (Cabrera, La Nasa, & al., 2000; Cabrera, et al., 2001; Hossler, Schmit, & Vesper, 1999); however, measures of actual usage of such information are seldom (if at all) found in empirical research on postsecondary education access inequalities. Theoretical frameworks and analytical models that incorporate these sorts of measures are required to explain inequalities in access to postsecondary education. Collecting data about actual use of information is still a task to be accomplished for advancing the knowledge in this topic. Such data will allow us to examine the interplay among social settings, social capital, and rational choice as a part of the research agenda on social capital and postsecondary education enrollment.

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b. Social Reproduction Theory: No Room for Upward Mobility?

Social reproduction theory states that educational institutions and policies are instrumental in maintaining and reinforcing class-based social and economic stratification (Paulsen & St. John, 2002). Within this framework, educational alternatives are constrained by social class, and, at the same time, an individual's preferences are shaped by ascribed status (St. John, Hu, Simmons, Carter, & Weber, 2004). Scholars using this theoretical lens claim that students' postsecondary education choices are highly context dependent (Paulsen & St. John, 2002). Accordingly, students' predispositions toward educational attainment may also depend on social class.

Some researchers emphasize that the stratified structure of the United States educational system acts as another device supporting social class reproduction (McDonough, 1997; Paulsen & St. John, 2002). Some recent research using this approach has incorporated the notions of cultural capital and habitus (Bourdieu, 1977a, 1977b; Bourdieu, & Passeron, 1990) in order to explain differences in educational attainment norms or aspirations that seem to be related to social class (Karen, 2002; McDonough, 1997; Paulsen & St. John, 2002).

However, there are two major limitations when using social reproduction theory as a theoretical lens. First, it portrays individuals as powerless in making choices based upon their preferences and interests. Second, but no less important, this theory does not provide much latitude for explaining upward social mobility,

although evidence of such mobility based on educational attainment obviously exists.

Social reproduction theory brings to the scholarly discussion the key issue of social structure influences on individuals' preferences and their actual postsecondary education alternatives. Nonetheless, this theory has little heuristic value for understanding why some individuals are able to overcome their socioeconomic status origin while others are not. This theory also leaves unanswered an even more puzzling question: Why do some individuals from privileged socioeconomic status origin fail to achieve the postsecondary education success that the social structure allegedly grants to them?

c. Status Attainment Theory: No Extra-Familial Resources?

Status attainment theory states that family socioeconomic background and student academic ability interact to configure educational aspirations and eventually to determine postsecondary education enrollment. Blau and Duncan (1967) assert that considerable upward mobility exists in contemporary U.S. society. Moreover, they suggest that rates of upward mobility will continue steady or increase in future years (Knottnerus, & Guan, 1997).

According to status attainment theory, parental education and occupational status influence the next generation's educational outcomes by shaping aspirations and expectations (Hossler, Braxton, & Coopersmith, 1989; St. John et al., 2004). Social-psychological variables measuring individual motivations and encouragement from significant others have often been added to status

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attainment models (Hossler, Braxton, & Coopersmith, 1989; Xie & Goyette, 2003). Additionally, some status attainment models include measures related to contextual variables such as high school norms and peer culture effects (Hossler, Braxton, & Coopersmith, 1989).

The main limitation found in works grounded in status attainment theory is the tendency to overlook the effects of financial factors—such as tuition, financial aid, and unmet need—on postsecondary education enrollment. A second important limitation is the theory's narrow focus on familial resources, while disregarding effects from community and school resources. In this study, a greater emphasis will be placed on the student's community networks and resources. The study will emphasize the impact of what belongs to the student's social capital beyond her/his family financial or educational status background.

2. Incorporating Social Capital Theory into Postsecondary Education Enrollment Research

Social capital theory provides an appropriate conceptual framework for understanding how contextual differences affect students' academic and financial decisions in the path to postsecondary education, pondering both effects from individuals' actions and from the social structure. This theory presents avenues for filling the gaps identified in most mainstream research: little analysis of information asymmetries, weak explanations for both upward and downward mobility in the social structure, and overlooking the effects of extra-familial resources. Differences in social capital may account for differences in students'

understanding of alternatives available to them, their preferences when making choices, their subjective valuation of the utility derived from each step in the path to college, and their self-evaluation of the probability of success.

The French sociologist Pierre Bourdieu has often been credited as the first to attempt to systematize the concept of social capital (Adam & Roncevic, 2003; Baron, Field, & Schuller, 2000; Dika & Singh, 2002). In his influential article *The Forms of Capital*, Bourdieu (1986) states that:

> *Social capital is the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition–or in other words, to membership in a group--which provides each of its members with the backing of the collectivity-owned capital, a "credential" which entitles them to credit, in the various senses of the word. These relationships may exist only in the practical state, in material and/or symbolic exchanges which help to maintain them (pp. 248-249).*

In simpler terms, the social capital possessed by a given agent depends on the economic and cultural capital possessed by those to whom s/he is connected and her/his actual ability to mobilize such capital effectively (Bourdieu, 1986). Hence, Bourdieu's notion of social capital entails two components: first, the relationships that allow an individual to claim resources possessed by her/his social group; and, second, the quantity and quality of such resources (Dika &

Singh, 2002; Siisiäinen, 2000). Bourdieu indicates a few ways for institutionalizing social capital, including titles of nobility, elite schools' alumni associations, selective club memberships, and so on. Such connections allow privileged individuals to obtain returns from economic or cultural capital greater than those obtained by individuals who lack similar connections (Siisiäinen, 2000).

One caveat is that Bourdieu's concept of social capital should be operationalized to include both *field* and *habitus*, the two central concepts in his work (Dika & Singh, 2002; Siisiäinen, 2000). *Field* is defined as the space in the social structure in which individuals strive to achieve their ends while adjusting to tacit rules of action; for instance, in the academic field there is a set rules of action to which scholars must conform in order to gain their reputations and ascend the professional ladder. Bourdieu uses the term *habitus* to amalgamate a set of dispositions, responses, and behavior patterns that people have acquired through acting in the different positions they hold in social settings (e.g., family, schools, neighborhoods, clubs, volunteer groups, churches, political parties) (Bourdieu, 1977a,1977b; Bourdieu, & Passeron, 1977). The habitus creates a stable generative principle that guides the individual in making choices between alternatives (Siisiäinen, 2000).

However, the concept of social capital does not enter into the educational research tradition in the United States directly from Bourdieu, but through sociologist James Coleman. According to Coleman (1990), social capital is an

intangible sort of capital—similar to human capital—embedded into relationships, and having the forms of *trust* (obligations and expectations), *norms*, and *information*. Focusing on how social capital relates to educational attainment, Coleman (1988, 1990) defines it as a set of resources embedded in family and community useful for the cognitive and/or social development of children and adolescents.

In Coleman's view, the most important of the intervening factors in the formation of such social capital is *closure* among individuals belonging to the same community. *Closure* allows establishing and reinforcing norms, helping overcome power imbalance and building trust (Coleman, 1990). Moreover, intergenerational closure helps to pass norms, information, and trust from adults to children (Coleman, 1988). Thus, stability among members of the collective (e.g., few residential moves) and a common ideology (e.g., same religion) are regarded as contributing factors for the maintenance of social capital (Coleman, 1990). The idea that intergenerational closure helps to institutionalize positive norms has been influential in educational research and has bolstered policies promoting parental involvement and cohesive communities (Dika & Singh, 2002).

Lin (2001a) defines social capital as "resources embedded in a social structure that are accessed and/or mobilized in purposive actions" (p. 58). There are three main points in his conceptualization: 1) Social capital is structurally embedded in society, community, and groups; 2) it can be mobilized by individuals; and 3) individuals' goals drive such mobilization. Furthermore, Lin (2001c) argues that

social capital enhances individual social action outcomes because it: 1) facilitates the flow of information, 2) helps to exert influence on decision makers, 3) certifies an individual's social credentials, and 4) reinforces identity and group recognition.

Figure 1 depicts Lin's (2001a) model of social capital theory. The social structure and the individual's position are preconditions and precursors which facilitate or constrain the investment in social capital. Positional elements and structural elements (e.g., ideology, culture, level of industrialization, technological development, aggregated educational level, physical resources, productivity, and so on) affect opportunities to build and maintain social capital. Thus, inequalities shaping the distribution of collective assets embedded in an individual's network lead to inequalities in resource mobilization, and, consequently, to inequalities in returns. However, individuals are not powerless. A person's ability to mobilize embedded resources (e.g., money, power, and prestige) in order to achieve her/his goals (e.g., enrolling in postsecondary education) increases or diminishes as a result of an individual's choices and actions.

Lin's (1978, 1999) studies suggest that access to hierarchical positions is a critical factor in the process of status attainment. Provision of access to higher hierarchical positions may be the reason why weak ties to others in one's network yield greater returns than strong ties (Granovetter, 1973; Burt, 2001). Contrary to Coleman's (1988) *closure* hypothesis, Lin (1978, 1999) indicates that when trying to obtain new resources, large networks—those incorporating numerous unrelated individuals—have greater returns than constrained

networks—those incorporating a moderate number of individuals most of them interrelated. Lin (1999, 2001c) hypothesizes that closure may be important for maintaining resources already possessed by the individual, but a network having numerous bridges may be more suitable for obtaining additional resources.

Figure 1 Lin's Model of Social Capital Theory
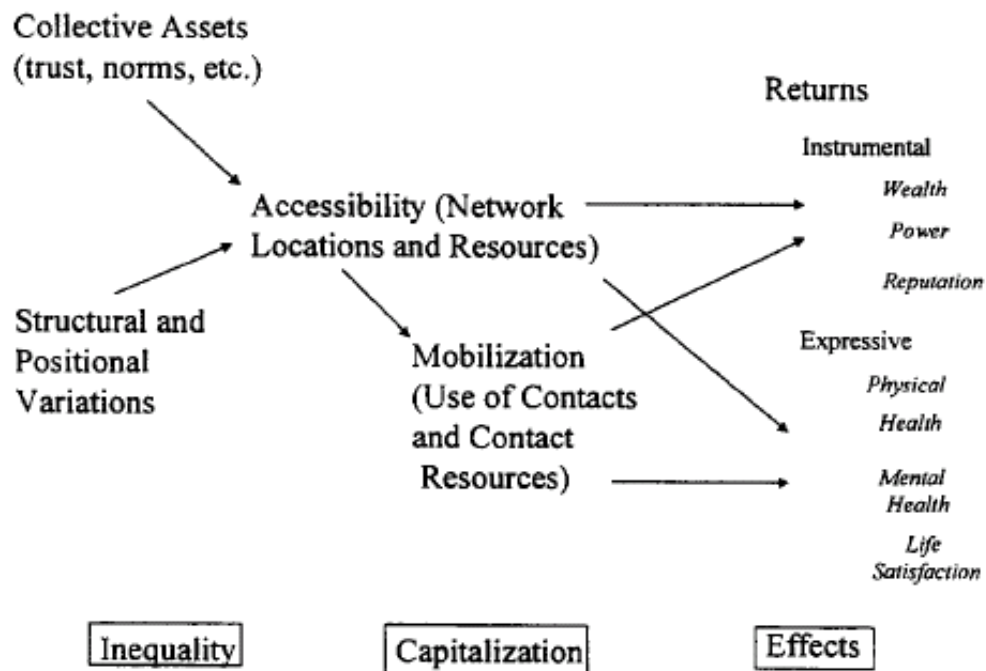
a. Research on Social Capital Effects on Postsecondary Education Enrollment

Most of the empirical research linking social capital to educational outcomes is grounded in Coleman's seminal work (1988). A majority of the literature reviewed for this manuscript refers to Coleman's definition of social capital as resources embedded in the family's social networks that facilitate children's educational

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attainment (Carbonaro, 1999; Hofferth, Boisjoly, & Duncan, 1998; Stanton-Salazar, & Urso Spina, 2000; Yan, 1999). Although Coleman (1990) postulates that social capital is one among several resources available to pursue rational goals, most of the reviewed studies fail to encompass social capital effects within a comprehensive theory of rational action.

In his 1988 study, Coleman tested hypotheses about the effects of social capital factors such as network closure and intergenerational closure on educational outcomes. He defines network closure as the ability of several actors to combine their resources to monitor and either sanction or reward others' behaviors. Intergenerational closure is operationalized as a measure of whether parents befriend their children's friends' parents. Coleman hypothesizes that such relationships would make it easier for them all to establish norms and to control behavior adjusted to such norms.

Coleman also tested hypotheses about "intra-familial social capital", which refers to the quantity and quality of family interactions related to educational activities. Although Coleman acknowledges that "intra-familial social capital" should interact with parental education as well as with family income, his study does not control and test for such interactions. This pitfall weakens his claims that family structure and parental involvement affect educational outcomes. Nonetheless, parental involvement indices are pervasive in the postsecondary education access literature (Ainsworth, 2002; Cabrera, & LaNasa, 2000; Cabrera, LaNasa, & Brukum, 2001; Furstenberg. & Hughes, 1995; Glick, & White, 2004; Horn, &

Chen, 1998; Mullis, Rathe, & Mullis, 2003; Perna, 2000; Tierney & Jun, 2001; Yan, 1999; Zaff, Romano, & Williams, 2003), although the empirical findings are inconsistent.

Coleman (1988) uses the High School and Beyond (HS&B) 1980 data to test his hypotheses about "intra-familial social capital", network closure and intergenerational closure. HS&B 1980 collects detailed socioeconomic status and personal characteristics data from a stratified random sample of 14,799 sophomores in United States high schools. Follow-up interviews were conducted in 1982, 1984, 1986, and 1992 in order to obtain information about students' cognitive test scores, college enrollment and course taking, the type of institution attended, and labor force participation (Source: http://nces.ed.gov). There are no direct social capital measures in the HS&B dataset, so Coleman drew on some proximal variables to bring to light the theoretical constructs in his conceptual framework, especially closure measures which are hypothesized to enhance the social capital available to the family.

Number of residential moves between 5th grade and 10th grade was used by Coleman (1988) as a proxy for lack of intergenerational closure. His rationale was that families that move often would not have had the opportunity to build relationships with other people in the community. Residential moves during school years (Coleman, 1988; Furstenberg, & Hughes, 1995; Hofferth, Biosjoly, & Duncan, 1998) or residential stability (Ainsworth, 2002) have continued to be used as proxies for community closure.

Another proxy for intergenerational closure used by Coleman (1988) is enrollment in a Catholic high school.[i] Coleman makes a case for considering religious high schools as a basis for multiplex relationships—individuals are linked in several ways according to their different social roles (e.g., neighbors, colleagues, friends, fellows in faith, and so on). The existence of such multiplex relationships among most students attending religious schools—not just Catholic ones—increases the available social capital for all students regardless of their individual religious observance. Intergenerational closure indicators as key measures of a student's networks have continued to be used in postsecondary education access research. Among the most commonly included of these indicators are frequency of student contact with adults other than parents and time a student spends with adults other than parents (Ainsworth, 2002; Carbonaro, 1999; Furstenberg & Hughes, 1995).

Mullis, Rathge and Mullis (2003) assert that social capital can be measured by the quality and quantity of the networks that connect children and adolescents with the resources of their parents. They assert that a similar process allows children to gain access to schools' and community's resources. Mullis, Rathge and Mullis add parental expectations as a mediator between familial social capital and adolescents' academic achievement. They also hypothesize that familial social capital and community social capital interact to shape children's and adolescents' behavior and positive valuation of educational attainment. Measures of extracurricular activities (Zaff, Moore, Romano, & Williams, 2003) and participation in community organizations are included in their model as

proxies for access to community social capital. Reliability tests indicate that participation in community organizations is a stronger indicator of students' social networks than participation in school-based extracurricular activities, probably because the latter interact with school structural features and climate.

Sandra Hofferth has continued to advance empirical research in extra-familial social capital and educational attainment. Scholars in this stream of research claim that families holding tight social networks are better able to encourage children's educational attainment (Hofferth, Boisjoly, & Duncan, 1998). They pose two reasons for why this is the case: 1) linkages among families create a functional community with clear norms and effective sanctions (and rewards) that shape children's achievement norms for supporting school success; and 2) parental networks may provide information on postsecondary education opportunities.

Hofferth and associates also emphasize that family social networks interact with family structural characteristics, such as income, parental education and household composition. They hypothesize that being connected to people who are not able to reciprocate resources is an additional hindrance to low-income students' educational attainment. According to their analyses, a network linking mostly to low-resource contacts may be a burden rather than an asset. Such a network would generate obligations but not assets, taking away resources that would otherwise be invested in children's education. The Panel Study of Income Dynamics includes variables that capture the family support networks construct

by measuring whether a person has offered help in the way of time or money to a friend or neighbor and whether a person has received help in the way of time or money from a friend or neighbor (Duncan, 1994; Hofferth, Boisjoly, & Duncan, 1998; Plotnick, & Hoffman, 1999). Measures of the support network to which the family can turn for assistance in case of disruptive life events (e.g., unemployment, divorce, severe illness, family member' death, childbirth, etc.) seem to be reliable indicators of family social capital (Hofferth, Boisjoly, & Duncan, 1998; Mullis, Rathge, & Mullis, 2003). In contrast, parental involvement in school activities is a weak indicator of family networks according to a study that uses structural equation modeling to test interrelations among variables related to this construct (Mullis, et al., 2003).

Laura Perna (2000) presents a more complete conceptual framework, drawing from both Coleman (1988) and Bourdieu (1986; Bourdieu, & Passeron, 1977). According to Perna, social and cultural capital both are sources of resources that may be invested to facilitate upward mobility. She gives emphasis to information-sharing as a way in which social capital is invested and its profits accrued. Perna also builds upon McDonough's (1997) in-depth qualitative study of California female high school students' college choice processes which attempted to expand the understanding of the college choice process by adding together economic and psychological aspects of the decision-making process, as well as the cultural facets shaped by colleges, high schools, parents, friends, and mass media.

In her extended econometric model of college choice, Perna (2000) includes constructs that reflect differences in expectations, preferences, tastes, and certainty about higher education investment decisions based upon habitus and social capital. Perna (2000) also incorporates high school control as a proxy for achievement expectations, which relates somewhat to Coleman's (1988) conceptualization of school closure as a mechanism for infusing academic achievement norms. Perna's model also includes a composite of importance of education among friends that attempts to measure the effects of students' peer networks. Indicators of availability of school counseling or college choice advising services are also hypothesized to affect postsecondary education enrollment. Perna´s model includes encouraging interactions with a favorite teacher or school counselor, as well as assistance from school personnel with college admissions requirements (e.g., recommendation letters and help preparing personal statements). However, Perna does not discuss in detail how the habitus developed by her African American sample and the field in which such decisions are made—the social structure--interact to bind their educational choices.

Karen (2002) also incorporates the notion of habitus into his conceptual framework, which for the most part is grounded in status attainment theory. Karen examines how high school graduates become linked to colleges with particular selectivity levels. Following Bourdieu and Passeron (1977), Karen points out that institutionalized processes match an individual educational destination with her/his social origin. The development of realistic expectations of educational success and the mapping of potentially reachable destinations is

shaped by the habitus. Thus, students beginning to think about their postsecondary education opportunities will adjust their aspirations to those usually ascribed to their class. In spite of the sociological roots of the notion of habitus as the link between social class and rules of action, Karen portrays this process in a rather individualistic way, without undertaking a thorough analysis of how institutional and economic barriers interact with students' dispositions.

Despite their limitations, both Perna (2000) and Karen (2002) make contributions to integrating cultural and social capital notions into the rational choice and status attainment conceptual frameworks, respectively. Perna (2000) hypothesizes that individuals who lack the required cultural capital may lower their educational aspirations or self-select out of particular situations (e.g., not apply to a four-year institution) because they do not know the particular cultural norms, or they may receive fewer rewards for their educational investment (e.g., lower grades, failure to obtain strong recommendation letters). Likewise, Karen (2002) hypothesizes that students whose parents do not have a college education are more likely to apply for and enroll in less selective or open admissions institutions, whereas students whose parents have advanced degrees would be more likely to aspire, apply to and attend highly selective institutions.

Paulsen and St. John (2002) examine the influence of school and family environments on postsecondary enrollment choice and the importance of acknowledging differences in financial means, mobility, opportunities and choice sets. They examine the question of how increasing college costs and switching

financial aid from grants to loans may affect the opportunities of students in different income groups to attain a higher education. Grounding their research within the social reproduction theory tradition, Paulsen and St. John propose a nexus model that links financial factors to students' choices across social classes, emphasizing the influence of school and family environments on educational choice. They stress the notion of habitus, but they barely refer to the notion of field (Bourdieu, 1977a, 1977b). According to the authors, "each student's habitus serves to 'situate' or 'contextualize' their choices, and it represents a set of relatively stable predispositions with respect to what the student will see and value regarding the financial aspects of choice and persistence decisions" (Paulsen, & St. John, 2002; p. 196). A greater focus on the notion of *field* would have been appropriate since Paulsen and St. John's research focuses on inequalities in resources and opportunities due to social class. Including the notion of *field*, as well as specific measures of social capital, would have enhanced the nexus model's capability for investigating structural constraints that foster class inequalities in resources and opportunities.

Neighborhood effects models provide another conceptual approach for analyzing social capital effects on educational attainment (Ainsworth, 2002; Duncan, 1994; Sampson, Morenoff, & Earls, 1999; Sampson & Raudenbush, 1999; Wilson 1987, 1996). Wilson (1996) describes five interrelated mechanisms through which neighborhood characteristics affect educational achievement: collective socialization, social control, social capital, differential occupational opportunity, and institutional (i.e., school) characteristics. He argues that individuals'

involvement in social networks may either facilitate or prevent access to resources that are instrumental for successful transition into adulthood through educational opportunities and links to occupations. According to Wilson, the quality and amount of resources embedded in social networks within a given community influence educational outcomes and occupational opportunities. Wilson claims that children who live in affluent neighborhoods are more likely to be connected to valuable social networks and to have access to adults who can provide resources, information, and opportunities that may be educationally advantageous, while children living in impoverished neighborhoods are less likely to connect to valuable networks and resources such as these.

Ainsworth (2002) further develops this conceptualization by analyzing the effects of neighborhood structural and social capital variables such as intergenerational closure and peer networks in academic achievement. Ainsworth hypothesizes that ties to individuals with few resources are detrimental because those ties represent obligations rather than resources.

Duncan (1994) also examines neighborhood effects using the lenses of epidemic, collective socialization, institutional resources, competition for resources, and relative deprivation theories. Among the five, collective socialization and epidemic theories are relevant for this literature review because of their relatedness to social capital theory. Collective socialization emphasizes the beneficial effects of positive role models and well-monitored neighborhoods, whereas epidemic theory calls attention to peer-induced disruptive behavior.

However, collective socialization and epidemic theories may be illuminating only one side of the picture. Alternatively, social capital theory illuminates both sides simultaneously by assisting a scholar in differentiating between relationships that provide resources for maintaining current status or elevating it, and relationships that subtract resources from a person without the possibility of recompense.

Postsecondary education researchers examining social capital effects occasionally include in their models variables related to institutional networks, such as outreach and/or college preparation programs (Horn & Chen, 1998; Musoba, 2004; Tierney & Jun, 2001; Trent, Gong, & Owens-Nicholson, 2004). Other school resources, as well as high school structural features and climate, are also often included in models used to examine social capital effects in postsecondary education enrollment (Perna, 2000). School structural features include percent minority students (Musoba, 2004; St. John et al., 2004) and percent poverty—usually measured by the proxy percentage of students entitled to a free school lunch (Ainsworth, 2002; Musoba, 2004; St. John et al., 2004). School climate is usually a factor or index composed by indicators such as student and teacher morale, students' priorities on learning and other activities, behavior management and discipline policies, classroom control, and teachers' ability to motivate students (Ainsworth, 2002).

In contrast, community resources are seldom included in explanatory models of postsecondary education enrollment, probably because of the lack of proper measures. Exceptions are studies that test hypotheses on how collective

socialization and differentials in institutional resource availability affect educational attainment (Ainsworth, 2002; Duncan, 1994). Community demographic variables are typically included in models of neighborhood effects; such variables include percentage of low income families, percentage of high income families, percentage of persons from racially disadvantaged groups, percentage of single mother households, unemployment rate, and high status adult residents, usually a standardized composite of proportion of college graduates among adults over 24 years old and the proportion of employed persons with professional or managerial occupations (Ainsworth, 2002; Duncan, 1994; Hofferth, Boisjoly, & Duncan, 1998; Perna, 2000).

Lack of proper measures diminishes the explanatory power of well-conceptualized models for examining social capital effects in postsecondary education enrollment. For instance, Perna (2000) hypothesizes that the most important way in which social capital influences expectations, preferences, and evaluation of the return from postsecondary education is through the provision of relevant information. However, Perna's model does not include direct measures of information, but instead it incorporates proxies such as percentage of the high school graduates enrolling in college and high school desegregation. These may be appropriate proxies for students´ peer networks, but they are clearly indirect measures of available information. The study also includes region and location as proxies for information availability, but these measures are even more indirect and less plausible. In my model, I will include variables that measure information

in a more reliable way such as actual number of sources of information about financial aid looked at by both parents and students.

b. Findings on Social Capital Effects on Postsecondary Education Enrollment

Empirical research findings relate social capital to the ability to take advantage of resources available to families, communities and social classes rather than specifically to the individual. Overall, the accumulated evidence supports hypotheses of social capital effects on individuals' educational postsecondary education enrollment decisions.

By and large, a strong support network positively affects postsecondary education enrollment (Furstenberg & Hughes, 1995), but the effects of giving and receiving help appear to be moderated by income (Hofferth, et al., 1998). The extent of high income families' social networks increases their children's likelihood of attending college. On the contrary, the extent of low income families' social networks negatively affects children's years of schooling. These findings may be revealing network constraints, such as low hierarchy contacts or excessive density. According to Burt (2001), the positive effects of belonging to a network may be weakened or even disappear if the network is made up of contacts who do not have resources to share, or if most people in the network are interrelated and few or no contacts have access to different fields.

In general, intergenerational closure—opportunities for interacting with adults other than close relatives—has a positive effect on educational attainment

(Carbonaro, 1999; Coleman, 1988; Furstenberg, & Hughes, 1995). Several researchers have found that residential moves during middle school or high school reduce the likelihood of pursuing postsecondary education, especially for low-income students (Furstenberg & Hughes, 1995; Glick & White, 2004; Hofferth, et al., 1998). This finding remains consistent in studies controlling for variables that may be confounding this relationship, such as parents occupation, immigration status, and language spoken at home (Glick & White, 2004). This finding is also consistent with Coleman's (1988) hypothesis that residential moving is disruptive of family networks, having a negative effect on social capital available to children and hampering educational attainment.

Results regarding the effects of parental involvement are also different for different groups of students (Yan, 1999). Perna (2000) finds positive effects of parental involvement for White students, but not for Latino/as and African-Americans. Additionally, measures included in composites and factors that attempt to capture this construct in some cases may act in different directions and cancel each other out. For instance, Glick and White (2004) found that when parental involvement was motivated by behavioral concerns, the likelihood of college enrollment dropped, whereas other types of involvement unrelated to behavioral concerns significantly increased the likelihood of postsecondary education enrollment. Nonetheless, the interaction between parental involvement and inequality of resources due to income or race cannot be ruled out.

Percentage of previous cohorts of high school graduates attending a four-year institution increases the likelihood of college enrollment for students of all ethnic groups, which may be because of role model effects, although it also may be a result of differences in school academic quality. In any case, students who reported that most of their high school friends had plans for enrolling in a four-year institution were far more likely to enroll in a four-year institution themselves (L. Horn & Chen, 1998). Overall, high school climate has been found to have effects on postsecondary education enrollment (Ainsworth, 2002; Zaff, Moore, Romano, & Williams, 2003). However, interactions between school resources and student background apparently exist. In general, attending a school with a high poverty level decreases the odds of college enrollment for all students (St. John et al., 2004), but effects are substantially larger for White than for Black students (G. D. Musoba, 2004).

Findings regarding effects of extracurricular activities are also mixed. Inconsistent results may be due to differences in the procedures for aggregating data. Apparently, some activities that foster leadership and intellectual development—such as participation in student government and school newspapers—have greater positive influence in postsecondary education outcomes than less intellectually demanding activities (Karen, 2002). Indications of nonlinear effects from some activities, such as participation in varsity sports, also appear in empirical research (Zaff, Moore, Romano, & Williams, 2003).

Participation in outreach or encouragement programs have also been found to be positively related to postsecondary education enrollment (Horn & Chen, 1998; Musoba, 2004; Tierney & Jun, 2001; Trent, Gong, & Owens-Nicholson, 2004), but specific program features that make the difference have not been clearly identified. In order to do so, it would be necessary to compare the effects of programs having different features regarding support for academic preparation, encouragement, life skills development, access to information, availability of financial aid, the time a student participates in the program and the school grade in which the intervention begins.

A great deal of evidence on the effects of access to postsecondary education information has also been found. Lack of assistance with the college application process reduces the likelihood of postsecondary education enrollment for Latino/as and Whites (Perna, 2002). Gathering information about financial aid and talking to individuals about aid increase the odds of enrolling in any postsecondary education (L. Horn & Chen, 1998). Getting help with preparation for entrance exams and the college application process increases the odds of enrolling in a four-year institution for all students (L. Horn & Chen, 1998). The use of test preparation services increases the likelihood of postsecondary education for Whites and African-Americans (Perna, 2002), but not for Latino/as. However, interactions between information and family income should not be ruled out. Encouragement to pursue a college education from teachers and school counselors increases the likelihood of enrolling in a four-year institution for

Whites, but there are no significant effects for Latino/as and African-Americans (L. W. Perna, 2000).

Neighborhood characteristics also have different effects depending on gender, race, and income. Living in a low-income neighborhood has a negative effect on years of schooling for White females, while living in a high-income neighborhood has a positive effect on years of schooling for all groups except Black males, who only benefit when there are also a high proportion of Black high status individuals in the community (Duncan, 1994). Also, the percentage of women-headed households and percentage of working women negatively affect Black females college going (Duncan, 1994).

This study will build on these findings in order to relate social capital constructs to educational outcomes and to indentify variables for measuring these constructs in an appropriate way.

3. Comprehensive Conceptual Framework for Analyzing Postsecondary Education Enrollment

This dissertation proposes a comprehensive conceptual framework for analyzing postsecondary education enrollment decisions. The framework explores the interplay between community and school structural features, and family and personal characteristics related to students´ choices. It also attempts to acknowledge the multi-causality of postsecondary education inequalities, originated by inequalities in financial resources, academic preparation opportunities, and access to information.

Figure 2 is a graphic representation of the conceptual framework that will guide this study. The individual educational attainment outcome (high school dropout, high school graduation but no postsecondary enrollment, job preparation training after high school, enrollment in a two-year institution, and enrollment in a four-year institution) is hypothesized to be affected directly by three sets of factors: academic preparation, finances, and social capital.

The framework is consistent with research findings confirming that academic preparation indicators (e.g., college preparatory curriculum, high school GPA, and scores on college entrance examinations) have positive effects on postsecondary education access. It is also consistent with counterbalancing research findings indicating that the single most influential factor affecting enrollment is unmet need, which occurs when the combination of family contribution and available financial aid is insufficient to offset postsecondary education costs. Students' academic preparation—measured by high school GPA, high school rank, standardized test scores, and high school coursework—determine college admissions (C. Adelman, 1999; Cabrera, La Nasa, & Burkum, 2000; Cabrera, et al., 2001) and may affect ability to pay by means of merit aid. Research indicates that differences in academic preparation may not be attributable solely to student choices, but to the quality of the middle and high schools the student attended. For instance, capacity to offer college preparatory courses, quality teaching, and adequate counseling depend on school structural features, such as instructional expenditures per student, school control, urbanicity, and student body demographics.

Figure 2 Comprehensive Framework for Educational Outcomes

School Structural Features

Instructional Expenditures
Control
Localization
_____
Poverty Level
Minority Proportion

School Capacity

Course Offerings
Teaching Quality
_____
Counselling

Academic Preparation

GPA
Test Scores
High Standards Curriculum

Admission

Community
Tax Base
Value of Education

Social Capital

Merit Aid

Educational Outcome

HS Dropout

Post-secondary education

* None
* Job Preparation
* **2 years college**
* **4 years college**

Personal Background

Gender
Race
_____
Parental Education
_____
Income

Finances

College Costs /
Family Contribution + Financial Aid
(Amount and Types)

Enrollment

The comprehensive model also provides links between personal background characteristics and the characteristics of the school a student attends. Family income—along with religion—clearly affects attendance in private schools. Moreover, family income determines the place in which a family can afford to live and—given the funding system of most school districts in the United States—the resources available in the public schools that a student must attend. Those resources are a result of local taxes which depend on aggregate income level and approved millage for school funding.

Parental education—especially mother's education—has been associated with academic preparation and college enrollment (Terenzini, et al., 2001). The hypothesis is that mothers provide guidance for selecting high school coursework, preparing for tests, and for seeking college and financial aid information.

While admission depends mostly on academic preparation, actual enrollment depends more on ability to pay for college costs. Ability to pay is a ratio of college costs to expected family contribution and financial aid (both merit and need based aid) (DesJardins, McCall, Ahlburg, & Moye, 2002; Hu & Hossler, 2000; Paulsen & St. John, 2002; E. P. St. John, C. G. Chung, G. D. Musoba, & A. Simmons, 2004). The effect of family income on the ability to pay for college costs is unquestionable, but policy researchers argue about the effectiveness of financial aid policies in mitigating unequal starting points (Becker, 1993; DesJardins, et al., 2002; D. (2004). Heller, 2004; Paulsen & St. John, 2002; E. St. John & Hu, 2007; E. P. St. John, C.-G. Chung, G. Musoba, & A. Simmons, 2004; Terenzini, et al., 2001).

Two complementary factors—both related to social capital—are deemed to be important for equalizing opportunities: access to information and increasing attainment aspirations (Cabrera, La Nasa, & Burkum, 2000; L. Horn & Chen, 1998; L. Perna, 2000). Interventions pursuing those objectives include parental involvement, enriching the school environment by providing extracurricular activities, informational outreach, and academic preparation encouragement.

Indeed, those interventions increase enrollment probabilities for low-income and other socially disadvantaged students (L. Horn & Chen, 1998; Terenzini, et al., 2001; Tierney & Jun, 2001), but the size of their effect is often minor. One drawback that may be undermining positive effects of those interventions is that they are frequently disjointed. Extracurricular activities, informational outreach, academic preparation encouragement, peers' encouragement, and parental involvement programs are not usually axes of a cohesive plan for addressing inequalities of resources, access to information, attainment expectations, and reliance on the system. Furthermore, outreach programs usually do not contain provisions for assuring quality of school academic offerings and availability of financial aid.

The literature demonstrates there is a gap regarding effects on enrollment due to inequalities in access to social resources that do not belong to an individual and her/his family but are rather owned by other influential persons in the community. To fill such a gap, my framework incorporates social capital as a critical intervening variable affecting postsecondary education enrollment.

Figure 3 displays a path diagram representing social capital effects on postsecondary education enrollment. The path diagram provides three measurable dimensions of the underlying concept of social capital: information, bridges, and support. These dimensions are related to the three effects paths from social capital to postsecondary education enrollment identified in the literature review: 1) access to relevant information, 2) bridges to individuals who

may help to enforce attainment norms, and 3) support for navigating the postsecondary education admission system.

Relevant information is hypothesized to have effects on postsecondary education enrollment through institutional choice and the application process. It also may be associated with choosing a course leading to academic preparation and applying for financial aid. Bridges are hypothesized to have effects on postsecondary education enrollment through recommendations and certification of positive personal attributes, as well as contacts with decision-makers. Support is hypothesized to have effects on postsecondary education enrollment through both admission and financial aid applications.

a) Social Capital Effects on Access to Relevant Information

The most important way in which social capital affects postsecondary education enrollment is through inequalities in access to relevant information. As stated by Lin (2001c), social capital facilitates the flow of information, and consequently it enhances an individual's ability to attain her/his goals. Indeed, a student needs to receive relevant information in order to make opportune decisions that increase her/his likelihood of enrolling in postsecondary education (e.g., take algebra by 9th grade or earlier, fill out applications for financial aid, and so on).

Figure 3: Social Capital Paths Effects on Postsecondary Education Enrollment
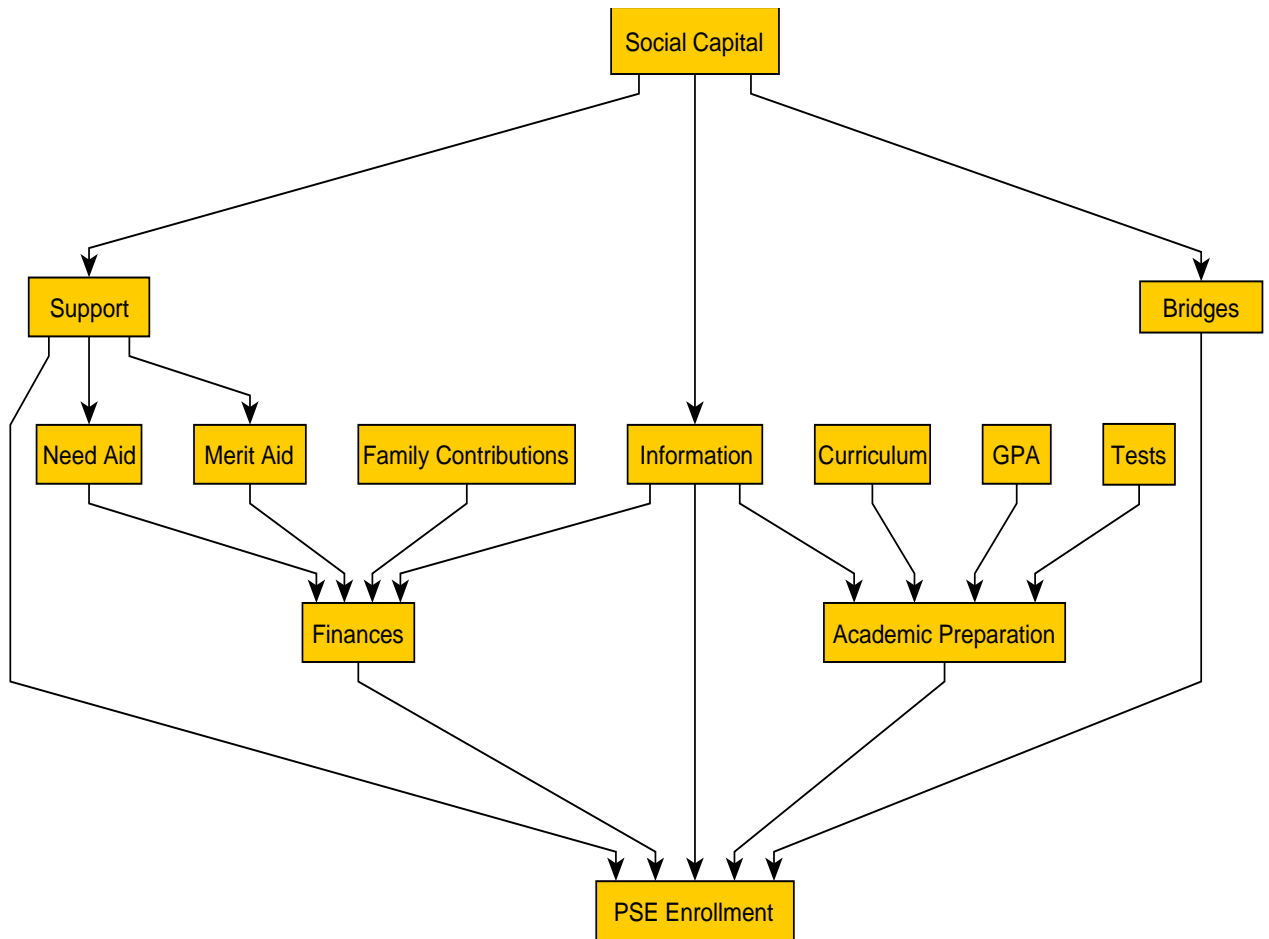
Social capital helps individuals deal with problems of asymmetric information and to enhance efficiency in decision-making by allowing the use of social interaction mechanisms such as copying and pooling (Collier, 2002) to facilitate the gathering of information about alternative courses of action. *Copying* is a somewhat simple mechanism based upon observation of those higher in a given hierarchy. For example, sophomore high school student Paul may learn what courses he should take to prepare for college by observing what his basketball teammate Barry—a senior—took. *Pooling* is a more interactive process requiring a purposeful exchange of information. For instance, Norma may identify an opportunity to obtain a scholarship to attend a small liberal arts college after

discussing her goals with Susan, who has the information but is not interested in such a scholarship because she wants to attend a larger institution.

Opportunities for productive copying and pooling may not be available for low-income students and students from deprived areas. If high school junior Robert does not have any friends or acquaintances who have applied to college, he has no one to copy. Instead, he will need to put more effort into gathering information on how to apply for college than will other students who have college-going acquaintances. Likewise, pooling resources on postsecondary education opportunities may be a straightforward process for middle- and high-income students with college-educated parents, but be more difficult for poor kids whose parents have not attained any postsecondary education and therefore do not understand the process.

Thus, access to relevant information may depend on a student's social networks. According to Granovetter (1973), ties to individuals from different social circles may facilitate access to useful information that otherwise would not be available. Social networks linking an individual to others who possess more suitable resources is required in order to bring in a progressive flow of information. The effect of social networks in providing access to information may explain why extracurricular activities and community involvement are correlated with educational attainment. Indeed, those activities provide a large network from which an individual can draw information about resources that help her/him to successfully complete college preparatory coursework in high school and obtain

guidance on how to apply for postsecondary education. On the other hand, constrained networks—having few links to other circles—may limit access to opportunities, resources, and valuable information (Burt, 2001). Such limitations in access to resources and information constitute a tough barrier for teenagers living in deprived areas or those attending segregated schools.

b. Social Capital Effects on Attainment Norms Enforcement

The second most important way in which social capital affects postsecondary education access is through differences in norms supportive of educational attainment (normative support). General consensus about the desirability of educational attainment may exist; however, various social groups differentially value behaviors and attitudes instrumental for achieving educational success.

Norms are externally defined and usually imposed by authority figures (e.g., parents, teachers, priests) (Coleman, 1988, 1990). Hence, an individual's exposure to norms supportive of educational attainment will depend on her/his relationships with persons holding such norm-enforcing roles. Youngsters who live in somewhat dysfunctional households, attend schools staffed by uncaring teachers, and/or lack other links to nurturing norms-enforcing groups may be greatly disadvantaged.

Norms enforcement largely depends on the existence of a trustworthy system of rewards and sanctions. If perceptions of inequity or unfairness—either a real issue or a misperception—exist, there is little incentive to follow the norms. Indeed, youngsters living in high-poverty neighborhoods, who perceive inequity

and unfairness ruling their lives, have few incentives to behave in ways conducive to educational attainment.

The confluence of several reinforcing rules may facilitate individuals' adoption of educational attainment norms, while conflicting norms may hamper their adoption. For instance, conflicting norms may affect educational outcomes of a teenager who aspires to a college education, but has several friends who belong to gangs. Failing to account for conflicting norms may explain why different groups of students experience unequal outcomes even though they are exposed to the same formally-enacted norms.

Coleman (1988, 1990) argues that positive norms are better enforced when an individual lives in a community with network closure—that is where people know each other well, share values and religious beliefs, and so on. Lin (2001a) also refers to strong social network effects on reinforcing identity and enhancing group recognition, both factors that may boost positive educational attainment norms. However, both Lin (2001c) and Burt (2001) demonstrate that closure seems detrimental for accessing new information. Since limited access to new information is damaging for those in the bottom of the social hierarchy, policies that emphasize network closure—e.g., high parental control and zero-tolerance schools—may not be beneficial for students coming from low socioeconomic status families. As Lin (2001a) claims, mobility opportunities are better achieved by gaining access to other groups' resources, and moving away from one's original group. Thus, for low-income students to gain access to the resources

required to stay within the educational system, they need to use contacts beyond their strongest ties (Burt, 2001; Lin, 1999; Portes, 1998; Stanton-Salazar, & Dornbusch, 1995; Stanton-Salazar, 1997; Stanton-Salazar, & Urso Spina, 2000).

c. Social Capital Effects on Support for Navigating the System

The third way in which social capital affects postsecondary education enrollment is by providing support for navigating the educational system (instrumental support). The pipeline to postsecondary education enrollment involves a series of interwoven decisions that may not be obvious for teenagers who lack beneficial social capital. Those sequential decisions include taking college preparatory courses in high school, cultivating relationships that will provide recommendation letters later on, preparing for standardized tests, assessing one's aptitudes in order to chose a future career, taking college entrance examinations, searching for appropriate institutions, writing personal statements, filing admission applications, and applying for financial aid.

Students from different socioeconomic backgrounds have very unequal support networks for navigating this process and taking all the required steps in a timely manner. Differences in availability of guidance along all those steps may influence inequalities in access to postsecondary education. Social networks connecting low-income students with either institutional counselors or informal mentors are instrumental for guiding these students in navigating such processes.

d. Main Hypotheses

This dissertation will test the following theoretical hypotheses:

1. Social capital affects individuals' educational postsecondary education enrollment decisions.

2. Information asymmetries among students from different socioeconomic backgrounds are related to inequalities in access to postsecondary education.

3. Resources available through social networks increase the probability of enrollment in postsecondary education beyond what would be expected given a student's socioeconomic background.

4. Students' preferences and actual postsecondary education alternatives are constrained by socioeconomic background.

5. Enforcement of high attainment norms increases the probability of enrollment in postsecondary education beyond what would be expected given a student's socioeconomic background.

6. Support for navigating the admission system increases the probability of enrollment in postsecondary education beyond what would be expected given a student academic preparation.

7. Students' self-assessment of their probability of college enrollment affects postsecondary education enrollment outcomes regardless of academic credentials.

To test these hypotheses I use inferential techniques grounded in the conceptual model explained above. In the next section, I detail my research design, describing measures for the conceptual variables proposed and analytical techniques used.

Chapter III. Research Design

The purpose of this dissertation is to determine the effects of social capital on postsecondary education enrollment, while controlling for effects of academic preparation and financial conditions. The dissertation is supported by a non-experimental study based upon survey data and multivariate statistical analyses. The study entails conceptualizing a model for understanding postsecondary education enrollment in which social capital, academic preparation, and financial factors are measured and their interplay is examined.

1. Data

The data used are from the National Education Longitudinal Study – 1988 (NELS:88) survey and its follow ups. This dataset includes a nationally representative sample of eighth-graders first surveyed in the spring of 1988. The initial sample (plus some refreshing of the sample) of respondents were resurveyed through four follow-ups in 1990, 1992, 1994, and 2000.

The surveys were conducted on students, school administrators and teachers, and the student's parents. The student surveys comprise questions about an extensive range of topics: school, work, and home experiences; educational resources and support; relationships with parents and peers; neighborhood characteristics; educational and occupational aspirations; other student perceptions; risky behaviors; and extracurricular activities. In the 1988, 1990, and 1992 waves of data collection, achievement tests in reading, social studies,

mathematics and science were administered in addition to the student questionnaire. Coursework and grade data from high schools taken from transcripts are also part of the NELS dataset. NELS also includes data from postsecondary transcripts of college attendees (when available), allowing the consideration of postsecondary access and choice, the consequences of dropping out of college, and transition to the workforce. Therefore, data from this wave are especially valuable for studying postsecondary education access, the focus of this dissertation (Source: http://nces.ed.gov).

Using the NELS presents several advantages for studying postsecondary education enrollment. First, it is a nationally representative sample. Second, it collects data longitudinally from 8th grade to 8 years after expected high school graduation, increasing the feasibility of examining the underlying relationships among variables related to postsecondary education enrollment. Third, it includes student, parent, and school (teachers and school administrators) data, allowing triangulation of data sources.

Nonetheless, using the NELS also has its shortcomings; the more important one being that some concepts that should be used to study social capital effects on postsecondary enrollment are not included in the dataset, which requires adjusting theoretical constructs to available variables and measurement scales. Extensive data transformation is necessary for creating variables that correspond to the conceptual framework. In the following sections, I describe the data transformation procedures performed for this dissertation.

a. Treatment of Variables with a High Percentage of Missing Values

A large number of missing values is an issue for several variables required by the conceptual model: father's education, mother's education, school help in making a postsecondary education choice and in completing the application process, outreach, volunteering, friends belonging to gangs, residential moves while in high school, high school student body characteristics, teacher attrition, high school course offerings, parents' information about financial aid, and amount of savings for postsecondary education (See Table 1 for details about the extent of missing data). A high proportion of missing data for some conceptually relevant variables might affect the predictive power of the proposed model, since doing analysis using listwise deletion will reduce the sample to 1,216 cases from 11,705 cases in the original dataset. Thus, procedures to remedy the missing data problem were employed. After the imputation was performed, the final sample includes 9,261 cases.

The imputation of missing values was performed using a sequential regression imputation method (Raghunathan, Lepkowski, Van Hoewyk and Solenberger, 2001). The procedure begins by undertaking a thorough exploration of the variables with a large proportion of missing data. Such examination of large missing data variables attempts to rule out that missing data may be associated with any of the possible values of the variable. That may be the case for variables in which some of the responses may be socially undesirable so that, to avoid being profiled negatively, individuals prefer not to respond (e.g., a question

asking a high school student whether s/he belongs to a gang). Exploration of the variables—through a detailed analysis of frequencies and correlations with other variables—helps to identify patterns that may suggest relationships between missing values and other key predictor variables.

After reviewing the data, I decided against using *outreach* as a predictor variable because the number of missing values is extremely high. The multiple imputation procedure performed by IVEware produced five imputed datasets which generate stable estimates when the percentage of missing values is under 50%. However, when the percentage of missing values is above 50%, standard error may be 2.5 larger than when an infinite number of datasets is used (Allison, 2001; Raghunathan, 2001; Rubin, 1987).

Although the percentage of missing values is moderate for the variable *friends belonging to gangs*, I did not use it because nonresponse is more likely to be associated with students with friends who belong to gangs than with students who do not have friends in gangs. Thus, it cannot be asserted that values are missing at random, and, therefore, imputation of missing values may lead to biased estimates (Allison, 2001; Raghunathan, 2001).

Table 1 High Percentage Missing Value Variables

Variable	Percentage of Missing Value
Father education	14%
Mother education	11%
School help for PSE choice and application (a)	3 ~ 18%
Outreach (b)	90%
Volunteering (c)	13%
Friends belonging to gangs	11 %
Residential moves while in high school	11%
High school body characteristics (d)	4 ~ 15 %
Teacher stability (e)	1 ~ 20 %
High school courses offerings (f)	14 ~ 21 %
Parents information on financial aid (g)	20 ~ 46%
Savings for postsecondary education (h)	3 ~ 10 %
Means for affording postsecondary education (i)	4 ~ 12%

(a) Several questions asked for specific sorts of help that the school may provide (recommendation letters, application essay preparation, permission to skip classes for visiting colleges, and so on).
(b) According to NCES officers this question was not asked of 90% of the respondents.
(c) According to NCES officers this question was not asked of 40% of the respondents.
(d) Several questions ask about specific student body characteristics (e.g., gender composition, ethnic composition, limited English proficient, etc.)
(e) Several questions ask about different aspects affecting teacher stability (e.g., average numbers of years at the school, number of substitute teachers, etc.)
(f) Several questions ask about specific courses being offered (e.g., advanced math, foreign languages, AP courses, etc.)
(g) Several questions ask for information on specific types of funding opportunities

(h) Several questions ask about specific sources of savings (e.g., educational trusts, personal savings, etc.)

(i) Several questions ask about specific sources of funds available to pay tuition (e.g., scholarships, federal financial aid, personal savings, students' jobs, family contributions, etc.)

After having ruled out that missing values in the other variables of interest were dependent of the possible values for the given variable, I performed missing values imputation. A missing indicator was generated by using the Imputation and Variance Estimation Software.[ii] Afterwards, a logistic regression with all the variables in the dataset is automatically run. The resulting model is used by IVEware for predicting and assigning a value for each outcome that has the missing indicator.

2. Variables

In this study, the outcome variable is enrollment by institutional type. There are three possible values for this outcome: Not enrolled in any postsecondary institution, enrolled in a two-year institution, and enrolled in a four-year institution. Enrollment in a less than two-year institution is a possible value, but the number of cases is small and it has 0 cases for some of the variables of interest; thus, this choice was excluded from the analyses. The outcome variable was generated by recoding a NELS item in which students were asked about their enrollment status in the months between August 1992 and June 1993, the first year after the 1988 8th grade cohort was supposed to graduate from high school. (Table 2 shows frequencies for the original outcome variable and Table 3 displays frequencies for the outcome variable after imputation.)

Table 2: Enrollment in Fall 1992- Winter 1993

Enrollment Status	Frequency	%
Not enrolled	4,805	39.6
Enrolled in two-year institution	2,205	18.2
Enrolled in four-year institution	4,440	36.6
Missing	694	5,7
Total	11,705	100

Table 3 Enrollment in Fall 1992- Winter 1993
(after imputation of missing values)

Enrolment Status	Frequency	%
Not enrolled	5,000	42.7
Enrolled in two-year institution	2,306	19.7
Enrolled in four-year institution	4,399	37.6
Total	11,705	100

Data transformation was also performed to generate some explanatory variables required by the model. In this sub-section, I indicate what variables in the original dataset I selected, which data transformation procedures were performed, and describe the resulting variables incorporated into my final analytical model.

Personal background characteristics and school characteristics are used as control variables (Table 4). Personal background variables include gender, changing high school due to family moves, and the educational attainment of one's parents.

School variables include high school control (public or private), high school course-level (measured by proxy variable percentage AP courses), high school poverty (measured by proxy variable percentage of students receiving free or reduced lunch), number of full time high school counselors, and postsecondary education PSE destinations of the 1989 graduating class (percentage going to two-year and four-year institutions).

Predictor variables in the model include academic preparation, finances, postsecondary education preferences, self-assessment of one's probability of academic success, and social capital factors (Tables 5 and 6). Academic resource variables include middle school GPA, whether the student planned to take college entrance examinations in 10th grade, and compliance with National Assessment of Educational Progress (NAEP) New Basics curriculum. NAEP curriculum includes 4 English courses, 3 Social Sciences courses, 3 Natural Sciences courses, 3 Math courses, 2 Foreign Language courses, and 1 Computer Lab.

Table 4 Frequencies of Control Variables

Variable	Description	Statistics	
Father Education (Baseline 1988)	1 = D i d n o t F i n i s h H S	1,680	17.3%
	2=HS diploma	3,078	31.8%
	3= Attended PSE	1,905	19.7%
	4= Attended Graduate School	3.024	31.2%
Mother Education (Baseline 1988)	1=Did not Finish HS	1,686	16.7%
	2=HS diploma	3,698	36.7%
	3= Attended PSE	2,136	21.2%
	4= Attended Graduate School	2,547	25.3%
Changing high school due to Family Moves (Second Follow-Up 1992)	1= None	7,072	74.6%
	2=Once	2,084	22.2%
	3=Twice or more	330	3.5%
Gender (Baseline 1988)	1 = Male	4431	46.7%
	2= Female	5055	53.3%

Financial variables include family income and family savings for covering postsecondary education expenses. The income scale has 4 levels: low (students in this group are eligible for Pell Grants), medium low (students in this group may be eligible for state financial aid or subsidized loans), medium high (students may not be eligible for need based financial aid), and high (students in this group perhaps do not need financial aid to afford postsecondary education enrollment)[iii].

Table 5 Frequencies of Financial and Academic Variables

Variable	Description	Statistics	
Income (Baseline 1988)	Low: Below $19,000 Middle Low: $20,000-$34,999 Middle High: $35,000-$74,999 High: Above $75,000	2,724 3,045 3,632 947	26.3% 29.4% 5.1% 9.2%
Family Planned Savings for PSE enrollment (Baseline 1988)	1= None 2= LESS THAN $1,000 3=$1,000 TO $3,000 4=$3,001 TO $6,000 5=$6,001 TO $10,000 6= $10,001 TO $15,000 7= MORE THAN $15,000	238 777 2,688 1,112 1,118 939 2,624	2.5% 8.2% 28.1% 11.7% 11.9% 9,9% 27,7%
Middle School Grades Quartiles (Baseline 1988)	1=Low 2=Middle Low 3=Middle High 4=High	2,370 2,377 2,863 3,678	21.0% 21.1% 25.4% 32.6%
Planning College Entrance Tests in 10th grade (First Follow-Up 1990)	No thoughts Do not plan to take Plan to take in 11th/12th Plan to take this year	4,477 833 3,938 238	47.2% 8.8 % 41.5 % 2.5 %
HS - NAEP Curriculum (Second Follow-Up 1992)	No Yes	8,249 2,061	80.0% 20.0%
High School Control (First Follow-Up 1990)	Public Private	10,227 1,512	71.0% 29.0%

Table 6 Descriptive Statistics of Social Capital Variables

Variable	Description	Statistics	
Significant others aspirations (Number of significant others who aspire the student will attend college) (First Follow-Up 1990)	0	1,509	12.4%
	1	832	6.9%
	2	1,244	10.3%
	3	1,512	12.5%
	4	1,614	13.3%
	5	1,733	14.3%
	6	1,856	15.3%
	7	1,832	15.1%
Number of sources of information on financial aid used by the student (Second Follow-Up 1992)	0	2,505	20.6%
	1	1,711	14.1%
	2	1,915	15.8%
	3	2,085	17.2%
	4	2,005	16.5%
	5	1,304	10.7%
	6	494	4,1%
	7	113	0.9%
Number of sources of information on financial aid used by parents (Second Follow-Up 1992)	0	348	3.7%
	1	873	9.2%
	2	1,570	16.6%
	3	2,136	22.5%
	4	2,012	21.2%
	5	1,638	17.3%
	6	715	7.5%
	7	194	2.0%
Participation in extracurricular activities (First Follow-Up 1990)	0 = No Participation	8,488	70.0%
	1 = Moderate Participation	3,076	25.4%
	2 = High Participation	568	4.7%
Volunteering (Second Follow-Up 1992)	1 = NO	4,968	52.4%
	2 = YES	4,518	47.6%
Neighborhood involvement (Second Follow-Up 1992)	1 = NO	1784	18.8%
	2 = YES	7702	81.2%
Friends who dropped out high school (Second Follow-Up 1992)	1= None	7,209	59.4%
	2 = A few	4,109	33.9%
	3 = Some	626	5.2%
	4 = Most	157	1.3%
	5 = All	31	0.3%
Friends going to a two-year institution (Second Follow-Up 1992)	1= None	2,224	18.3%
	2 = A few	3,701	30.5%
	3 = Some	4,432	36.5%
	4 = Most	1,578	13.0%
	5 = All	197	1.6%
Friends going to a two-year institution (Second Follow-Up 1992)	1= None	605	5.0%
	2 = A few	1,813	14.9%
	3 = Some	3,352	27.6%
	4 = Most	4,894	40.3%
	5 = All	1,468	12.1%
School help in the PSE application process	0 = None	2,533	26.7%
	1 = Basic help	2,237	23.6%

(Second Follow-Up 1992)	2 = Two types of support services	2,012	21.2%
	3 = Three types of support services	1,716	18.1%
	4 = All the way support	988	10.4%

3. Factor Analysis

In order to capture each student's postsecondary education choice process, the model incorporates life values, self-evaluation of one's probability of success in postsecondary education, and reasons for selecting the college the student would like to attend.

Variables measuring life values were created by running a factor analysis. Items were taken from answers to questions on what students consider important outcomes for their future lives. This set of questions was asked in the first NELS follow-up round when students were in 10th grade. A principal component factoring extraction was used to create the factors, and Kaiser normalization was applied. Varimax was used as the rotation method, in order to maximize variances among factors, since the conceptual model hypothesizes differences regarding life's values for different groups of students.

Rotation converged in 5 iterations. Bartlett's Test of Sphericity was significant, with a Chi=Square of 13056.436. It indicates that the null hypotheses that all the correlations among the included variables are not statistically different from 0 can be rejected. Thus, according Bartlett's Test, this correlation matrix may be appropriate for factor analysis. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was .777, which indicates that the partial correlations among variables are small enough for factor analysis to be an appropriate technique (threshold

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KMO above .5). Cronbach's Alpha reliability index, a measure of internal consistency among the items in the scale, was .701, which is above the threshold usually employed in educational research (>.70).

Three factors resulted from this analysis: relationships-oriented, social-oriented, and career-oriented. The factor *relationships-oriented* loaded the variables importance of childbearing, importance of finding a person to marry, give my children better opportunities, and strong friendships. The factor *social-oriented* loaded the variables correcting economic inequalities, helping others in the community, and living close to relatives and friends. The factor *career-oriented* loaded the variables stable job, being successful at work, and making money (Table 7).

Table 7 Life Value Factors' statistics

Life Values	Factor loading	Eigenvalue	% Variation	Cronbach Alpha
Relationships-oriented		1.940	19.40	.648
Important having children	.827			
Important finding right person to marry	.807			
Give my children better opportunities	.489			
Important to have strong friendships	.427			
Social-oriented		1.633	16.33	.518
Working to correct economic inequalities	.804			
Important to help others in community	.770			
Important living close parents, relatives	.404			
Career-oriented		1.536	15.36	.445
Important to be able to find steady work	.687			
Important being successful in line work	.672			

Important having lots of money	.623	

An additional factor analysis was conducted in order to capture the construct preferences shaping college choice. Items were taken from answers to 16 questions on what students consider important when selecting a postsecondary education institution. Those questions were asked in the NELS second follow-up round when students were beginning 12th grade.

A principal components factoring extraction was used and Kaiser normalization was applied to create these factors. Varimax was used as the rotation method, in order to maximize variances among factors, since the conceptual model hypothesizes differences among different groups of students regarding preferences to be considered when selecting a postsecondary education.

Rotation converged in 6 iterations. Bartlett's Test of Sphericity was significant, with a Chi=Square of 28885.67. It indicates that the null hypotheses that all the correlations among the included variables are not statistically different from 0 can be rejected. Thus, according Bartlett's Test this correlation matrix may be appropriate for factor analysis. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was .780, which indicates that the partial correlations among variables are small enough for factor analysis to be an appropriate technique (threshold KMO above .5). The scale Cronbach's Alpha reliability index was .752, which is a measure of internal consistency among the items in the scale above the threshold usually employed in educational research (>.70).

The five resulting factors were labeled academic reputation, access, institutional type, college life, and heritage. The factor *academic reputation* loaded the variables institution prestige, job placement record, graduate school placement record, course offerings, and degree requirements for desired professional field. The factor *access* loaded the variables college expenses, availability of financial aid, and easy admission standards. The factor *type* loaded the variables institution's size and location. The factor *college life* loaded the variables traveling away from home, athletic program, and college social life. The factor *heritage* loaded variables religious affiliation, ethnic composition of student body, and parents being alumnae (Table 8).

Table 8 PSE Preferences Factors' statistics

Preferences Shaping PSE institutional choice	Factor loading	Eigenvalue	% Variation	Cronbach Alpha
Academic reputation		3.522	22.01	.763
How important is college job placement	.765			
How important is reputation of college	.735			
How important is grad school placement	.717			
How important degree to get job in chosen field	.694			
How important are specific courses	.572			
Access		1.909	11.93	.593
How important is college expenses	.836			
How important is financial	.757			
How important admission standards	.523			
Institutional type		1.575	9.84	.613
How important location of school	.780			
How important size of school	.770			
College Life		1.131	7.07	.552
How important is social life at school	.786			
How important is college athletic program	.723			
How important not live at home	.567			
Heritage		1.027	6.42	.451
How important to attend same school as parents	.682			
How important is a religious environment	.620			

How important ethnic comp of school	.543	

To capture self-assessment of potential educational success, one item from the first NELS follow-up round—when students were in 10th grade—was taken. The item asks about student self-assessment of her/his probability of attending college. (Table 9 displays descriptive statistics).

Table 9 Self-Evaluation of Probability of Attending College

Value	Frequency	%
Very low	291	3,1
Low	383	4.0
Fifty-fifty	1154	12.2
High	2167	22.8
Very high	5491	57.9

4. Analytical Methods

The study incorporates a series of statistical analyses to test the theoretical hypotheses about enrollment choices. Researchers interested in examining both enrollment in two-year institutions and enrollment in four-year institutions usually specify separate models for each outcome and run two separate logistic

regressions (Cabrera, La Nasa, & al., 2000; Cabrera, et al., 2001). Nonetheless, it can be argued that each one of these outcomes competes with the other, and they must be estimated in the same equation to account for this structural feature. Therefore, selecting an analytical technique that allows for the simultaneous estimation of distinct outcome categories in the dependent variable is advisable.

Multinomial logit model is one of the most common models within the family of choice models that attempts to capture the underlying rational decision process by which individuals choose among different options. The multinomial logit model (MNLM) is a proper analytical technique for estimating choice models in which the outcome variable is categorical or only partially ordered. The MNLM is a non-linear regression technique, and it allows effects of the independent variables to differ for each category of the outcome variable. Equation 1 formalizes the model where J represents the case, y_i is the observed outcome, X_i is a vector of explanatory variables and β_j are the unknown parameters to be estimated. The MNLM simultaneously estimates binary logits for all possible comparisons among the outcome categories using maximum likelihood estimation (Long, 1997). In our case, there are simultaneously logits for enrolling in a 2-year institution and enrolling in a 4-year institution, while not enrolling in postsecondary education will be the base category against which the other two outcomes will be compared. Indeed, a MNLM allows estimating different effects of predictors in each distinct outcome category (Raundenbush, & Bryk, 2002). Thus, comparisons between enrolling in a 2-year institution and enrolling in a 4-year institution will be reported

when they may illuminate differences between variables affecting enrollment in the two sets of institutions.

Equation 1 Multinomial logit model equation

$$Pr(y_i = j) = \frac{\exp(X_i \beta_j)}{1 + \sum_j^J \exp(X_i \beta_j)'}$$

The estimates resulting from a MNLM can be interpreted by reporting factor changes in the odds of a given outcome category compared to the reference outcome, or by discrete changes in the probabilities of a given outcome category (Long, 1997). These two methods of interpretation are similar to those used when reporting results from a binary logistic regression, so, those already familiar with binary logit models should have no difficulties understanding the MNLM results.

A major assumption of the multinomial logit model is the independence of irrelevant alternatives (IIA). According to this assumption the odds for any outcome are independent of the other categories. Often there is statistical evidence of violation of the IAA when using MNLM for analyzing postsecondary enrollment issues. Indeed, a violation of the IAA assumption is fairly common, but there are alternatives if this is the case (e.g., multinomial probit) and several experts actually advise to overlook tests that indicate violations of the IIA assumption because of the lack of power of the tests available, especially if one's model is conceptually sound (Long, 1997).

Nested logit is another choice model suitable for analyzing postsecondary education enrollment issues. Theoretically, a nested logit model may be a more suitable analytic technique for analyzing postsecondary education enrollment if the outcome actually has a two-level structure in which an individual first decides whether to pursue postsecondary education, and if so then chooses to enroll in either a two-year or a four-year institution (Cameron & Trivedi, 2009; Long & Freese, 2006).

Figure 4: Outcome Category structure for Postsecondary Enrollment status

```
┌─────────────────────────────────┐
│  Postsecondary   education      │
│  enrollment                     │
│  choice                         │
└─────────────────────────────────┘
        │
   ┌────┴────────────────┐
┌──────────────┐    ┌──────────────┐
│ Will not     │    │ Will pursue  │
│ pursue  PSE  │    │ PSE          │
└──────────────┘    └──────────────┘
                          │
                    ┌─────┴──────┐
              ┌──────────────┐  ┌──────────────┐
              │ Enroll in    │  │ Enroll in    │
              │ 2-year       │  │ 4-year       │
              │ institution  │  │ institution  │
              └──────────────┘  └──────────────┘
```
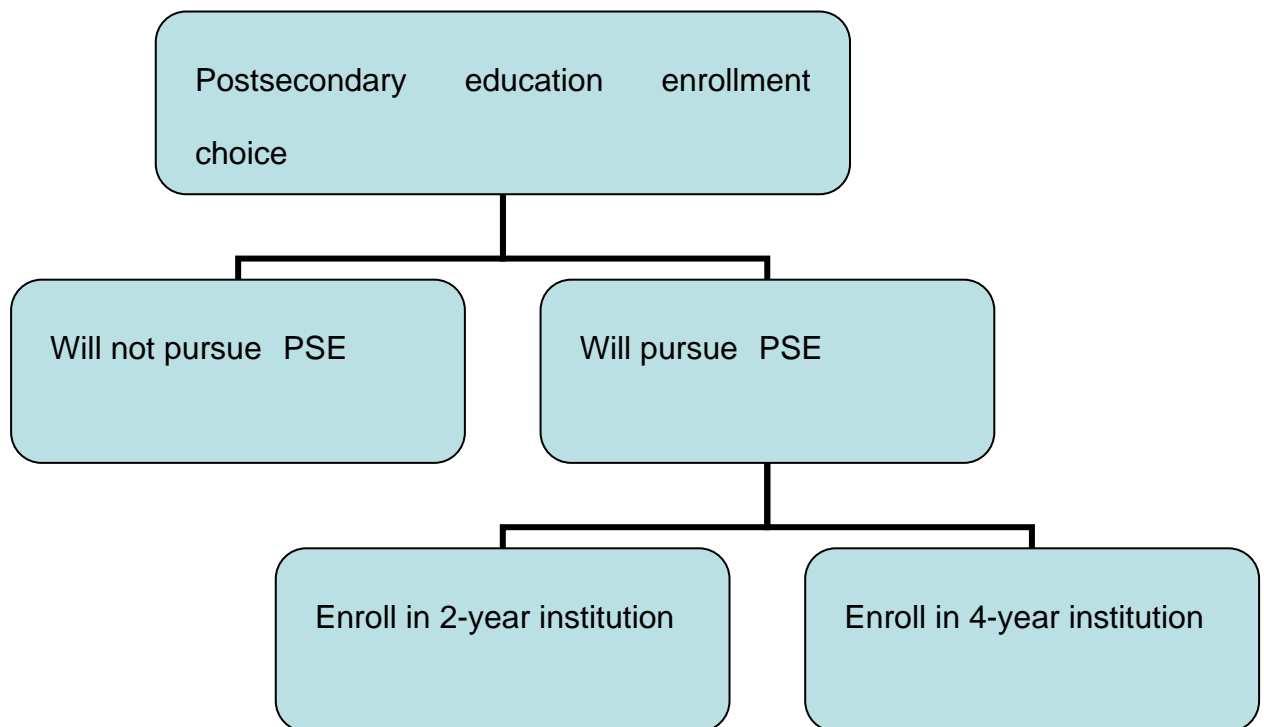
The nested logit model is based on the same assumptions as the MNL model except that the former allows for the correlation of the error terms among the predefined group of alternatives and also accounts for possible dependence between the utilities of pairwise alternatives (McFadden, 1978; Koppelman, &

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Sethi, 2001). The nested logit model can be explained as the product of a series of MNL choice models defining each level in a tree structure (Koppelman, & Sethi, 2001). Therefore, although the underlying statistical calculations are different, interpretation of the results is similar to those used to describe the MNLM results.

5. Model Estimation

The outcome variable used has three possible values: Not enrolled in any postsecondary education institution, enrolled in a two-year institution, and enrolled in a four-year institution. A multinomial logit model was fitted using maximum likelihood estimation. The maximum likelihood function estimates the values of the parameters that have the greatest likelihood of generating the observed data if the model assumptions hold (Scott Long & Freese, 2006). Not enrolling in a postsecondary education institution will be the base category for comparison purposes; thus, the resulting coefficients will compare the likelihood of enrolling in a two-year institution to not enrolling in any postsecondary education institution, and enrolling in a four-year institution compared to not enrolling in any postsecondary education institution.

The NELS:88 has a complex sample design in which the probability of each observation being included in the sample varies for each individual case depending on group characteristics. To adjust for potential bias due to different selection probabilities, as well as to compensate for non-response across waves, The NELS:88 includes a series of sample weights. In my study, the fourth follow-

up complete panel weight (F4TRSCWT) is incorporated to adjust for the complex sample design. This weight applies to the fourth follow-up respondents who were also respondents in each of the previous rounds (i.e., 1988, 1990, 1992, and 1994) (Curtin, Ingels, Wu, & Heuer, 2002). Thus, the resulting estimated parameters describe the population of spring 1988 8th-graders.

In this study, the multinomial model is fitted using the survey data specification in Stata. This procedure allows straightforward inclusion of the sample design features—primary sample unit, weights, and strata—when fitting the model. Therefore, the resulting estimates take into account the complex design effects and represent more accurately the population behavior.

Indicators and scale measures are used to evaluate the model overall fit to the data. These measures include improvement of the log likelihood when comparing with the intercept model and the McFadden pseudo R^2, which may be interpreted as rough indicators of the model predictive ability. Additionally, LR chi^2 and F tests provides statistical measures of the model fit.

In addition, Wald tests are conducted to test the null hypothesis that the selected predictors do not affect the outcome, under the conditions of a nonlinear probability model. Furthermore, a Hausman test is used to test for violations of the Independence of Irrelevant Alternatives Assumption, which presupposes that the odds for any outcome are independent of the other outcomes categories.

The regression results provide standardized coefficients of the predictor variables effects on the outcome variable that can be reported as odds ratios, probabilities,

percent change in probabilities, changes in the odds, and marginal effects. Estimates that are useful for supporting or rejecting the study hypotheses will be reported in the next chapter

Chapter IV. Results

In this chapter, the results of the model described above are reported. The chapter includes a formal description of the models' specification, measures of goodness of fit, post estimation tests, and results for significant variables for a baseline multinomial logit model and a multinomial logit regression that controls for the complex survey design in the data. The coefficients are only reported and discussed in detail for the final multinomial logit that accounts for the complex survey design.

1. Base Multinomial Logit Model

As an initial analysis, a multinomial logit model was specified and estimated that includes all the dependent and independent variables described above, but does not account for the complex survey design. This was done to test the model fit and to check variables effects on the null hypothesis without the complexities added by the survey design.

In this base model, the "no post-secondary enrollment" category was set as the base outcome category. The analysis includes 9,261 cases for which there were no missing data in any of the variables. The model log likelihood is -7084.2102, indicating an improvement of 2670.3908 when compared to the log likelihood when only the intercept is included in the model -9754.601. The McFadden R^2 is 0.2738, and the LR chi^2$_{(68)}$= 5340.78 (Prob > chi^2 = 0.0000), which indicates the model fits the data better than an intercept only model.

Wald tests for each of the independent variables were calculated in order to test the null hypothesis that the selected predictors do not affect the outcome (Table 10). Results reject the null hypothesis that the selected predictors do not affect the outcome for most variables in the model. The Wald test indicates that the null hypothesis cannot be rejected for the control variables *percentage of students receiving free lunch* and *high school control*.

Table 10 Wald Tests for Independent Variables in the Multinomial Logit Model

Variables	Chi^2	$P>chi^2$
Gender	12.039	0.002
Father education	33.445	0.000
Mother education	21.872	0.000
Changing high school	17.654	0.000
High school control	6.134	0.047
% Students receiving free lunch	3.420	0.181
% Advanced Placement courses	6.008	0.050
% Graduating class going to a four-year institution	47.278	0.000
% Graduating class going to a two-year institution	53.492	0.000
Full-time counselors	9.452	0.009
Planning to take college entrance tests	4.799	0.091
Taking NAEP curriculum	100.263	0.000
Middle school grades	229.702	0.000
Family savings for PSE enrollment	7.283	0.026
Family income	21.761	0.000
Student sources of information on financial aid	24.745	0.000
Parents sources of information on financial aid	61.773	0.000
Significant others aspirations	38.637	0.000
Friends dropping out high school	20.813	0.000
Friends going to attend a four-year institution	198.705	0.000
Friends going to attend a two-year institution	173.504	0.000
High school help in college application process	46.476	0.000
Participation in extracurricular activities	4.950	0.084
Volunteering	34.036	0.000
Neighborhood involvement	5.968	0.051
Career-oriented life values	2.699	0.259
Social-oriented life values	10.453	0.005
Relationships-oriented life values	9.449	0.009
Academic reputation / PSE preferences	17.887	0.000
Access / PSE preferences	89.646	0.000

Type / PSE preferences	75.301	0.000
Heritage / PSE preferences	45.732	0.000
College Life / PSE preferences	40.193	0.000
Self-assessment of probability of career success	175.029	0.000

Ho: All coefficients associated with given variable(s) are 0.

There were five variables of interest for which the Wald test could not reject the null hypotheses that their effect on the outcome was zero: percentage of the advanced placement courses offered by the high school, planning to take college entrance tests while in 10th grade, participation in extracurricular activities, neighborhood involvement, and career-oriented life values. The likelihood ratio test provides similar results for all variables, except for the advanced placement courses for which LR chi2(2) = 6.01 Prob > chi2 = 0.0494. The variables planning to take college entrance tests while in 10th grade, participation in extracurricular activities, neighborhood involvement, and career-oriented life values were kept in the final model based on conceptual grounds that justify their importance in postsecondary education enrollment choices.

2. Measures of Fit

In order to test whether or not adding social capital variables—as well as personal values, preferences, and one's self-assessment of the probability of success—results in models that provide better estimation of postsecondary education enrollment than traditional models including personal background, academic and finances variables, I ran a set of six different models in which each group of variables is incorporated sequentially. I estimate Model A (personal background variables only), Model B (adding school control variables), Model C

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(adding academics variables), Model D (adding finances variables), Model E (adding social capital variables), and Model F (adding self-evaluation of probability of success and preferences when selecting a postsecondary education institution to all the previously added independent variables).

In order to compare the fit of these six models, scalar measures of fit were obtained after estimating each model (Scott Long, & Freese, 2003). The first measure of fit used is the McFadden R^2, a likelihood-ratio test that compares the intercept model only to a model with all independent variables. Since this pseudo R^2 always increases as new variables are added into a model, the adjusted McFadden R^2 that corrects for the number of parameters is also reported. Additionally, I report Count R^2 as well as the adjusted Count R^2, both of which provide an indication of the number of correct predictions for a categorical outcome, but the latter takes into account the proportion of correct predictions beyond the number that would be expected by guessing the outcome with the largest marginal. Based upon all these four measures of fit, Model F, the model that incorporates values, preferences, and self-assessment of probability of success as well as social capital variables is the one that fits the data best (Table 11).

Additionally, a likelihood ratio test was run to test the hypotheses that Model E (social capital model) is a significant improvement over Model D (academic and finances model). The result is LR $chi^2_{(20)}$ = 1315.56 Prob > chi^2 = 0.0000 which supports the hypothesis that the social capital model is significantly more

appropriate for estimating postsecondary education enrollment than the more traditional personal background, academic and finances model. Likewise, a likelihood ratio test was run to test the hypotheses that Model F (the full social capital & rational choice model) is a significant improvement over Model E (social capital model). The result is LR $chi^2_{(18)}$ = 477.15 Prob > chi^2 = 0.0000 which supports the hypothesis that the social capital and rational choice model is a significantly better fit to the data and therefore is more appropriate for estimating postsecondary education enrollment than the social capital, academic and finances model.

Table 11 Sequential Models Measures of Fit

Model	McFadden's R^2	Adj. McFadden's R^2	Count R^2	Adj. Count R^2
A	0.079	0.078	0.542	0.156
B	0.104	0.102	0.560	0.189
C	0.179	0.176	0.618	0.297
D	0.182	0.179	0.618	0.295
E	0.249	0.244	0.659	0.371
F	0.274	0.267	0.669	0.390

3. Adding race to the model

Even though measures of race are widespread in the postsecondary education enrollment literature (Clifford Adelman, 1999; Beattie, 2002; Berkner & Chávez, 1997; Cabrera, La Nasa, & al., 2000; Hagy & Staniec, 2002; Teranishi, 2003; Xie & Goyette, 2003; Yan, 1999), the conceptual framework for this dissertation does not include race. The rationale for not including race is that such a construct—measured either as ethnicity, ancestor's national origin, language spoken by

parents, or skin color—could not explain differences on educational attainment for any reason other than racial discrimination (Farkas, 2003; Mickelson, 2003). Measures of racial discrimination should be included in any model including race. Without controlling for racial discrimination, it would be difficult to interpret any estimates of race effects on postsecondary education enrollment. Since actual measures of racial discrimination are not available in the NELS:88, controlling for it is not feasible when working with this dataset. Including race without controlling for racial discrimination may only introduce noise into the model by diminishing the effects of other socio-economic variables such as household income and mother's education with which race is usually correlated in the United States.

Nevertheless, in order to avoid risks of misspecification of the model from omitting a relevant variable, a model including race was estimated. The additional model estimated using multinomial logit adds race (Table 12) to the full social capital & rational choice model.

The race model was compared to the full social capital and rational choice model by using a likelihood ratio test and the relevant scalar measures of fit. The Likelihood-ratio test results LR $chi^2(_2)$ =) 8.00 Prob > chi^2 = 0.018, which indicates that the null hypothesis that the effect of race on the outcome of postsecondary education enrollment is equal to zero cannot be rejected at the 95% confidence interval. Indeed, the variable race is not significant (0.005) for either enrollment in a four-year institution or for enrollment in a two-year

institution (0.308). None of the other socioeconomic or school variables became non-significant after adding race.

Table 12 Frequencies of Race

Value	Frequency	Percent
Non White	2,892	30.5%
White	6,594	69.5%

The log likelihood improves to 2674.392 when adding race compared to 2670.391 without race. However, the log likelihood improvement must be taken with caution because models almost always improve by adding variables. McFadden's adjusted R^2 is 0.267 for both models. Nevertheless, the adjusted Count $R^{2,}$ based upon the number of correct predictions of the outcomes by the estimation model, for the full social capital & rational choice model is 0.390 which is slightly superior to the adjusted Count R^2 for the race model which is 0.389. Finally, the BIC measure reported by Stata—recommended for comparing across models when all variables in one model are included in the other model—is 14811.284 for the full social capital and rational choice model and 14818.036 after adding race which indicates a better fit without race.

The variable race was not included in the final model because including it without a measure of racism is not compatible with the proposed conceptual model and there is not strong evidence that adding race will substantially improve the

model's explanatory power. On the contrary, relevant scalar measures of fit indicate that adding race will diminish the model's predicting power as well as it overall fit to the data.

4. Multinomial Model with Survey Design Controls

The final multinomial logit model was specified using the survey design and including all the described dependent and independent variables. The inclusion of the sample design features—primary sample unit and sampling weights— when fitting the model produces estimates that take into account the design effects, thus representing more accurately the population behavior. The number of primary sample units in this study is 652 and the number of cases is 9,289, while the population size is 2,220,358. The model was significant $F_{(68, 584)} = 19.97$, Prob > F = 0.0000.

Multinomial model analyses confirm the dynamics of variables affecting enrollment in postsecondary education vary for enrollment in two-year and four-year institutions. The estimated model captures more variables affecting enrollment in four-year institutions than in two-year institutions (Table 13).

For enrollment in two-year institutions compared to no postsecondary education enrollment, the multinomial logit provides evidence that the largest effects— according to the standardized coefficients—are from significant others aspirations, friends to attend a two-year institution, friends to attend a four-year institution, self-assessment of probability of college enrollment by 10th grade, and volunteering (Table 14 presents coefficients for variables with significant effects

on enrollment in two-year institutions compared to no postsecondary education enrollment). These results indicate that social networks and peer's effects greatly impact enrollment in two-year institutions.

Table 13 Social capital & rational choice model for PSE enrollment

Variable	Enroll 2 year compared to No enrollment		Enroll 4 year compared to No enrollment		Enroll 4 year compared to Enroll 2 year	
	b	P>|t|	b	P>|t|	b	P>|t|
Gender	.100	.483	.102	.413	.002	.990
Father Education	.066	.354	.093	.223	.027	.684
Mother Education	.103	.160	.256	.000	.153	.034
Changing HS	-.055	.731	-.430	.007	-.375	010
School Control	.281	.069	.036	.806	-.245	.153
% Free Lunch	-.055	.125	-.001	.718	.004	.301
% AP	.005	.402	-.002	.702	-.007	.182
% Graduating Class Going 4 year	.001	.738	.015	.000	.014	.000
% Graduating Class Going 2 year	.010	.046	-.009	.076	-.019	.000
# HS Counselors	.167	.198	.004	.971	-.163	.161
Planning for taking college entrance tests	.080	.202	.126	.027	.046	.455
NAEP Curriculum	.054	.758	.637	.000	.582	.000
Middle School Grades	.013	.820	.540	.000	.527	.000
Savings	-.040	.329	-.004	.912	.035	.356
Family income	.209	.014	.235	.002	.026	.767
Students' sources of information on aid	.073	.041	.063	.048	-.010	.781
Parents' sources of information on aid	.052	.187	.203	.000	.151	.000
Significant others aspirations	.117	.000	.075	.011	-.042	.134
HS Dropout Friends	-.000	1.000	-.062	.573	-.062	.570
Friends Going to a 2 year	.261	.000	-.293	.000	-.553	.000
Friends Going to a 4 year	.215	.001	.541	.000	.326	.000
HS School Help	.041	.434	.207	.000	.166	.004
Participation in Extracurricular Act.	.052	.605	-.041	.673	-.094	.317
Volunteering	.358	.005	.499	.000	.141	.251
Neighborhood involvement	.349	.034	.448	.004	.099	.566

Variable					
Career-oriented life values	.048	.403	.007	.900	-.041	.446
Social-oriented life values	-.062	.335	-.217	.000	-.156	.010
Relationship-oriented life values	.053	.395	-.073	.290	-.126	.076
Self-assessment of probability of college enrollment in 10th grade	.210	.002	.514	.000	.304	.000
Academic reputation / PSE preferences	.072	.277	.045	.478	.118	.065
College life / PSE preferences	-.154	.017	.105	.089	.259	.000
Access / PSE preferences	.160	.013	-.198	.005	-.358	.000
Type / PSE preferences	.015	.816	.263	.000	.248	.000
Heritage / PSE preferences	-.115	.064	-.145	.020	-.030	.665

Among school control variables, only percentage of graduating class going to a two-year institution has a significant effect on enrollment in two-year institutions. The odds of enrolling in a two-year institution (compared to not enrolling in postsecondary education) increase by 1.19 for each standard deviation increase in family income, holding other variables constant. None of the academic variables is a significant predictor of enrollment in a two-year institution compared to not enrolling in postsecondary education.

Students' source of information on financial aid is a significant predictor of enrollment in a two-year postsecondary institution, but parents' source of information on financial aid is not. All variables measuring attainment norms are, however, significant; friends going to attend both four-year and two-year institution, as well as significant others aspirations, increase the probability of attending a two-year postsecondary institution.

Table 14 Enrollment in two-year institution (No enrollment)

Variable	b	Std. Error	z-score	e^b	e^bStdX

% Graduating class going to a 2-year institution	.010	.005	2.00	1.01	1.15
Family income	.209	.085	2.46	1.23	1.19
Significant others aspirations	.117	.027	4.39	1.12	1.31
Students' sources of information on financial aid	.073	036	2.04	1.08	1.14
Friends going to attend a 4-year institution	.215	.067	3.21	1.24	1.25
Friends going to attend a 2-year institution	.261	.062	4.22	1.30	1.29
Volunteering	.358	.127	2.81	1.43	1.20
Neighborhood	.349	.164	2.12	1.42	1.15
Self-assessment of probability of college enrollment by 10th grade	.210	.066	3.18	1.23	1.24
College Life / PSE preferences	-.154	.065	-2.39	0.86	0.86
Access / PSE preferences	.160	.064	2.49	1.17	1.69
Constant	-6.470577	.8636069			

Significant p<0.05

Considering college life when selecting a potential postsecondary education institution is negatively related to enrollment in a two-year institution. Otherwise, considering the factor of access—college costs, availability of financial aid, and admission standards—increases the odds of enrollment in a two-year institution. The odds of enrollment in postsecondary education also increase according to self-assessment of probability of college enrollment.

For enrollment in four-year institutions (compared to no postsecondary education enrollment), the multinomial logit results indicate that the largest effects are from friends to attend a four-year institution, middle school grades, self-assessment of

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the probability of college enrollment by 10th grade, parents' sources of information on financial aid, and postsecondary education preferences based upon type of institution. (Table 15 displays the coefficients for variables with significant effects on enrollment in four-year institutions compared to no postsecondary education enrollment).

Table 15 Enrollment in a four-year institution (No enrollment)

Variable	b	Std. Error	z-score	e^b	e^bStdX
Mother education	.256	.072	3.68	1.29	1.28
Changing high school	-.430	.158	-2.74	0.65	0.78
% Graduating class going to a four-year institution	.015	.004	3.86	1.02	1.40
Planning to take college entrance tests	.126	.057	2.24	1.13	1.13
Taking NAEP curriculum	.637	.141	4.59	1.89	1.31
Middle school grades	.540	.063	8.75	1.72	1.81
Family income	.235	.075	3.11	1.26	1.22
Parents' sources of information on aid	.203	.036	5.87	1.23	1.39
Students' sources of information on financial aid	.063	.032	1.98	1.07	1.12
Significant others aspirations	.075	.029	2.72	1.08	1.19
Friends going to attend a 4-year institution	.541	.064	8.23	1.72	1.74
Friends going to attend a two-year institution	-.293	.065	-4.67	0.75	0.75
High school help in college application	.207	.049	4.27	1.23	1.32
Volunteering	.499	.109	4.36	1.65	1.28
Neighborhood	.448	.155	2.84	1.56	1.19

Social-oriented life values	-.217	.056	-3.74	0.80	0.80
Self-assessment of probability of college enrollment by 10th grade	.514	.071	6.97	1.67	1.69
Access / PSE preferences	-.198	.070	-2.97	0.82	0.82
Heritage / PSE preferences	-.145	.062	-2.38	0.87	0.86
Type / PSE preferences	.263	.056	4.59	1.30	1.29
Constant	-9.534263	.7543234			

* Significant $p < 0.05$

Among personal background variables, mother's education and changing high school because of family moves affect enrollment in a four-year institution, although the former has a positive effect while the latter has a negative effect. The only school control variable that has a significant effect on enrollment in four-year institutions is percentage of graduating class going to a four-year institution. Each one standard deviation increase in family income increases the odds of enrolling in a four-year institution (compared to not enrolling in postsecondary education) by a factor of 1.22. All academic variables included in the model—middle school grades, rigorous high school curriculum, and plans for taking college entrance examinations—are positive predictors of enrollment in a four-year institution compared to not enrolling in postsecondary education. Academic variables are also positive predictors of enrollment in a four-year institution compared to a two-year institution.

Results indicate that all social capital constructs—information, attainment norms, and support—as well as social networks variables are significantly related to enrollment in a four-year institution. *Parents' source of information on financial*

aid is positively related to enrollment in a four-year institution. Variables measuring attainment norms also are significantly related to enrollment in four-year institutions. Significant others aspirations, and friends to attend a four-year institution increase the likelihood of attending a four-year postsecondary institution, while having friends to attend a two-year institution negatively affects enrollment in a four-year institution. High school help in the college application process is also significant for enrollment in a four-year institution. The variables measuring social networks—volunteering and feeling involved in the neighborhood—have significant positive effects on enrollment in a four-year institution.

The multinomial logit results also indicate that students' preferences, values, and self-assessment of their probability of college enrollment affect enrollment in a four-year institution. Social-oriented life values has a negative effect on enrollment in a four-year institution. However, self-assessment of probability of college enrollment by 10th grade has a positive effect on enrollment in a four-year institution. Considering access, heritage, and type factors when selecting a potential postsecondary education institution are also significantly related to enrollment in a four-year institution. However, students concerned with access and heritage are less likely to enroll in a four-year institution while students concerned with type of institution are more like to enroll in a four-year institution.

5. Nested Logit Model

For this dissertation research [iv], I estimated a nested logit model to test whether postsecondary education enrollment is really a nested choice process with a two-level structure (first, enrolling or not; second, enrolling in two-year institution and enrolling in a four-year institution). Using a Stata software procedure, initially I generated a tree from the options in my original dependent variable (ENROLLMENT = 0 No Postsecondary Education Enrollment, 1 Enrollment in a Two-year institution, 2 Enrollment in a four-year institution). The newly generated variable has the two-level structure in which level 1 has two choices, either No Postsecondary Education Enrollment or Postsecondary Education Enrollment, and level 2 also has two choices, either Enrollment in a Two-year institution or Enrollment in a four-year institution (Figure 5 displays the resulting outcome variable structure and its frequencies).

Then, I estimated a two-level nested logit model using as regressors the variables in the multinomial logit model. The results indicate that enrollment behavior is a non-nested choice. That means that the appropriate choice model in this case is the multinomial logit model already estimated. This finding is consistent with evidence from qualitative research revealing that students making postsecondary education choices do not decide first whether they are going to enroll in any kind of postsecondary education and then what type of institution fits best to their situation. Contrarily, they consider not enrolling as one of their enrollment alternatives (McDonough, 1997).

Figure 5 Tree structure for the outcome variable enrollment options
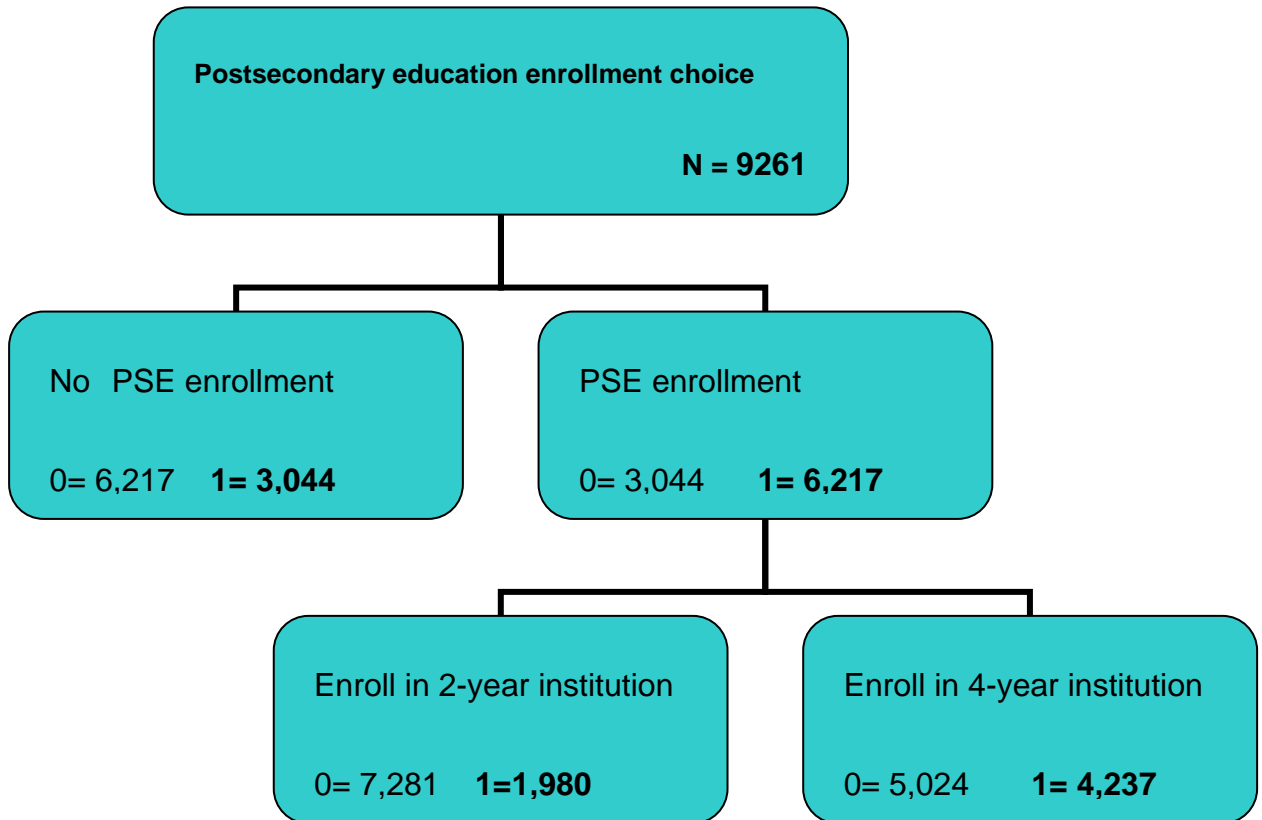
6. Interpretation of Multinomial Logit Model with Survey Design Specification

In this sub-section, I employ several post-estimation techniques to underscore how the results from the multinomial logit model can be used to shed light on the major hypotheses proposed in Chapter II.

a. Social capital affects individuals' postsecondary education enrollment decisions

There is evidence to support the hypothesis that postsecondary education enrollment is affected by one's social capital. Variables measuring the four social capital constructs—attainment norms enforcement, access to information, support, and social networks—were significant for both outcomes, enrollment in a two-year institution and enrollment in a four-year institution (compared to no enrollment). Detailed results about the effects of important regressors are provided below.

For each standard deviation increase in volunteering—a proxy variable measuring social networks strength of resources—the enrollment odds in a two-year institution increase by a factor of 1.20. This variable's effect on enrollment in a four-year institution is also noteworthy: it increases the enrollment odds by a factor of 1.28 for each standard deviation increase.

Feeling involved in the neighborhood—the other proxy variable for social networks—also increases the likelihood of enrollment in both two-year (odds ratio = 1.42) and four-year institutions (odds ratio = 1.56). These results confirm the hypothesis that students whose families are involved in the community benefit from greater access to resources that tend to foster their educational attainment goals.

Compared to not enrolling, the variables measuring attainment norms enforcement are significantly related to enrollment in both two- and four-year

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institutions. The variable significant others' aspirations has a positive effect for enrollment in both two-year (odds ratio = 1.12) and four-year institutions (odds ratio = 1.08). Enrollment in a two-year institution is positively affected by peers' postsecondary education enrollment. For each standard deviation in friends to attend a four-year institution the odds of enrolling in a two-year institution (compared to not enrolling in postsecondary education) increases by 1.24, whereas for each standard deviation in friends to attend a two-year institution the odds of enrolling in a two-year institution increases by 1.30. Similarly, for each standard deviation in friends to attend a four-year institution the odds of enrolling in a four-year institution (compared to not enrolling in postsecondary education) increase by 1.74. On the contrary, for each standard deviation in friends to attend a two-year institution the odds of enrolling in a four-year institution (compared to not enrolling in postsecondary education) decrease by 25 percent. These results indicate that higher aspirations and peers' attainment boost high school students' own aspirations and attainment.

Students' sources of information on financial aid positively affect enrollment in both two-year (odds ratio = 1.08) and four-year institutions (odds ratio = 1.07), while parents' number of sources of information about financial aid only significantly affect enrollment in four-year institutions, increasing enrollment likelihood by 39 percent.

Finally, the analysis confirms that having help during the college application process has a positive effect (odds ratio = 1.23) on enrollment in a four-year

institution (compared to not enrolling in postsecondary education). However, such help has no significant effect on enrollment in a two-year institution. These results may indicate that the support mechanisms for postsecondary education application already in place are aligned with the requirements for enrolling in a four-year institution and provide no help for students on the path toward a two-year institution.

b. Information asymmetries among students from different socioeconomic backgrounds are related to inequalities in access to postsecondary education

The results do not provide enough evidence to support the claim that information asymmetries constraining postsecondary education access are related to socioeconomic status as measured by family income. An interaction between income and parents' sources of information about financial aid was not significant. However, an interaction between parents' number of sources of information about financial aid and mother's education was significant ($p = 0.004$). The effect on enrollment from the number of sources of information about financial aid decreases as mother's education increases. This may be due to the fact that more educated people are more efficient in seeking relevant information and, therefore, need to check fewer sources in order to make appropriate decisions.

In order to verify that parents' sources of information about financial aid helps students overcome access inequalities based on income, I calculated predicted

probabilities of enrollment for each income group (low, middle low, middle high, and high income students) based upon their number of information sources (1, 3, and 7) while holding all other variables constant (Table 16). Results indicate that the number of information sources about financial aid consulted by parents consistently increases the probability of enrollment in a four-year institution across all four income groups. For instance, low income students' predicted probability of enrolling in a four-year institution goes from .27 to .53 when their parents' number of information sources about financial aid goes from 1 to 7.

Table 16 Predicted probability of enrollment based on information sources by income groups

	One information source	Three information sources	Seven information sources
Low income	.27	.35	.53
Low-Middle Income	.30	.38	.56
High-Middle Income	.33	.42	.59
High income	.37	.45	.62

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c. Resources available through social networks will increase the probability of enrollment in postsecondary education beyond what would be expected given a student's socioeconomic background

The results support the hypothesis that postsecondary education enrollment is affected by students' social networks. The model includes three proxy variables for strength of social networks that were significant. The first is changing high schools due to family moves which is a proximal measure of familial networks—*closure* in Coleman's (1988, 1990) research—. The second is volunteering, a proxy for the student's own network of high reputation adults in the community, and peers outside school settings. Third, feeling involved in the neighborhood serves to measure community networks. The rationale is that through their networks contacts students will be able to reach resources that may boost their access to postsecondary education opportunities.

In order to verify that volunteering helps students to overcome access inequalities based on income, I calculated predicted probabilities of enrollment for each income group (low, middle low, middle high, and high income students) based upon whether they volunteer during high school while holding all other variables constant. (Table 17 displays these conditional predicted probabilities of enrollment). Results indicate that doing voluntary community work while in high school increases the probability of enrollment in a four-year institution across all four income groups compared to the probabilities when a student does not volunteer. For instance, working class students' predicted probability of enrolling

in a four-year institution goes from .28 to .36 depending on whether or not the student did volunteer work (while holding all other variables constant). Otherwise, the probability of enrolling in a two-year institution does not change much due to volunteering. These results indicate that the kind of resources (e.g., recommendation letters, leadership experiences, scholarship opportunities) that volunteering provides to students is more useful for navigating the path toward four-year institutions than toward two-year institutions.

Table 17 Predicted probability of enrollment based on volunteering by income groups

Student Profile		Four-year Institution Enrollment Probability	Two-year Institution Enrollment Probability
Low income	No volunteering	.25	.20
	Volunteering	.33	.23
Middle-low income	No volunteering	.28	.22
	Volunteering	.36	.24
Middle-high income	No volunteering	.32	.24
	Volunteering	.40	.26
High income	No volunteering	.35	.26
	Volunteering	.43	.28

The multinomial logit model also indicates that changing high school due to family moves has a negative effect on enrollment in a four-year institution. I conducted post-estimation analysis in order to verify whether or not the negative effect from family moves—and resulting disruption in familial social networks—

holds across income groups. (Table 18 displays these conditional predicted probabilities). Results indicate that changing school due to family moves decreases the probability of enrollment in a four-year institution across all four income groups. For instance, holding all other variables constant, low income students' predicted probability of enrolling in a four-year institution goes from .38 when they attend the same school during high school years to .29 when they are forced to change school due to family moves.

Table 18 Predicted probability of enrollment based on changing school by income groups

Student Profile		Four-year institutions Enrollment Probability
Low income	No changes	.38
	Two or more moves	.29
Middle-low income	No changes	.42
	Two or more moves	.33
Middle-high income	No changes	.45
	Two or more moves	.36
High income	No changes	.49
	Two or more moves	.39

d. Students' preferences and actual postsecondary education alternatives are constrained by socioeconomic background

Results from the multinomial logit model indicate that students' preferences are more relevant for enrollment in a four-year institution than a two-year institution.

For students that assign importance to college life (social life, athletic program, and being away from family home) when selecting a postsecondary education institution the odds of enrollment in a two-year institution decrease by 14 percent when holding all other variables constant.

A student's preferences about *type* (size and location) when selecting a postsecondary education institution is a significant predictor of enrollment in a four-year but not a two-year institution. Students may be using a choice set with several types of institutions when deciding their enrollment in a four-year institution, whereas when they are considering enrolling in a two-year institution their choice set may be restricted to only one or two institutions in the local area between which there is not much variability. Analyses indicate the increases in probability of enrolling in a four-year institution due to the institution type varies slightly by income group.

Preferences based upon the factor *access (*college expenses, availability of financial aid, and admission standards*)* are a significant predictor for enrollment in both a two-year and a four-year institution compared to not enrolling in postsecondary education. However, the direction of the effect is negative for four-year institutions but positive for two-year institutions. Odds of enrollment in a four-year institution (compared to non-enrollment in postsecondary education) decreases by 18 percent for each standard deviation in considering *access* when making decisions regarding postsecondary education. On the contrary, for each standard deviation in considering *access,* the odds of enrollment in a two-year

institution (compared to non-enrollment in postsecondary education) increases by a factor of 1.17.

A low-income student who considers access (which includes taking into account college expenses, availability of financial aid, and admission standards) when deciding whether to enroll in postsecondary education has a predicted probability of .37 of enrolling in a two-year and a probability of only .23 of enrolling in a four-year institution. A similar student who only differs because she/he is not considering issues of access when making her/his decision will have a probability of .13 of enrolling in a two-year and a probability of .53 in a four-year institution (Table 19). These results support the hypothesis that concerns regarding access prevent some students from choosing to enroll in a four-year institution and make it more likely they will choose a two-year institution.

Table 19 Predicted probability of enrollment according preferences based on access by income

Student Profile		Four-year Institutions Enrollment Probability	Two-year Institutions Enrollment Probability
Low income	No Preferences Access	.53	.13
	Preferences Access	.23	.37
Middle-low income	No Preferences Access	.57	.14
	Preferences Access	.25	.40
Middle-high income	No Preferences Access	.61	.14
	Preferences Access	.27	.42
High income	No Preferences Access	.65	.15
	Preferences Access	.29	.44

Preferences based upon *heritage* (attending the same school as their parents, religious environment, and ethnic composition of the school) also discourage students from enrolling in a four-year institution compared to not enrolling in postsecondary education. Thus, emphasis on these characteristics in enrollment marketing strategies may discourage students from pursuing postsecondary education.

Preferences based upon *reputation* are not a significant predictor of enrollment in a two-year or a four-year institution compared to no enrollment or enrollment in a four-year compared to a two-year institution.

e. Enforcement of high attainment norms will increase the probability of enrollment in postsecondary education beyond what should be expected given a student's socioeconomic background

Positive effects on postsecondary education enrollment from enforcement of educational attainment norms were also hypothesized. All variables measuring this construct—significant others' aspirations and friends' educational plans—are significant predictors of enrolling in both two-year and four-year institutions compared to not enrolling in postsecondary education. The odds of enrolling in a two-year institution (compared to not enrolling) are 1.31 higher for each standard deviation increase in significant others' aspirations. Similarly, for each standard deviation increase in significant others' aspirations, the odds of enrolling in a four-year institution (relative to not enrolling) are 1.19 times higher.

Further analysis was conducted in order to verify that significant others' aspirations effects were not confounded by family income (Table 20). The results indicate that the effect of significant others' aspirations is constant across income groups. *Significant others' aspirations* increase the probability of enrollment beyond what would be expected due to family income. However, significant others' aspirations are not enough to overcome income-related inequalities. A low-income student encouraged by significant others' aspirations has a probability of enrolling in a four-year institution of .38, which is below the probability of enrolling in a four-year institution for a high–income, low-aspirations student (.45), and just slightly higher than the predicted probability of enrollment in a four-year institution for all low-income students (.37).

Analyses also reveal that students' enrollment is positively affected by having peers with the same or higher levels of educational aspiration. Both friends to attend a four-year institution and friends to attend a two-year institution have a positive effect on enrollment in a two-year institution. Likewise, the number of friends to attend a four-year institution increases by 1.74 the odds of enrollment in a four-year institution. On the contrary, the odds of enrollment decrease by 25 percent for each standard deviation increase in the number of friends to attend a two-year institution. Results also demonstrate that previous high school cohorts' postsecondary destinations affect a student's own postsecondary destination. The percentage of the graduating class in the year in which a student enters high school that goes to a four-year institution is a significant positive predictor of enrollment in a four-year institution.

Table 20 Predicted probability of enrollment based on significant others aspirations by income

Student Profile		Four-year institutions Enrollment Probability	Two-year institutions Enrollment Probability
Low income	Low aspirations	.32	.18
	Moderate aspirations	.37	.24
	High aspirations	.38	.28
Middle-low income	Low aspirations	.37	.20
	Moderate aspirations	.40	.25
	High aspirations	.42	.30
Middle-high income	Low aspirations	.41	.21
	Moderate aspirations	.44	.27
	High aspirations	.45	.31
High income	Low aspirations	.45	.23
	Moderate aspirations	.47	.28
	High aspirations	.47	.32

This finding may be related to the school's academic quality or courses offerings, but we cannot rule out that it may be related to the enforcement of high educational aspirations in such a high school, especially because the multinomial logit results indicate there is no significant effect on postsecondary education enrollment from school variables such as control (public or private) or quality of course offerings, measured by the proxy variable percentage of Advancement Placement courses.

f. Support for navigating the postsecondary admission system will increase the probability of enrollment in postsecondary education beyond what should be expected given a student academic preparation

Positive effects from having support for navigating the postsecondary education application and admission system were hypothesized. The results support that hypothesis for enrollment in a four-year institution but was not a significant predictor of enrollment in a two-year institution. These results suggest that high school counselors may be focusing on helping students who want to apply for selective four-year colleges, while overlooking the support needs of students looking for postsecondary education opportunities in two-year institutions.

Further analysis was conducted in order to verify that positive effects on enrollment in a four-year institution from school help in the college application process was constant regardless of academic preparation (as measured by middle school grades and taking NAEP curriculum while in high school). Results indicate that school help in the application process may boost the probability of enrollment in a four-year institution but it is not enough to overcome the negative effects of deficient academic preparation (Table 21). The negative effect of not having taken a rigorous college preparatory curriculum may be reduced by the positive effect of high school support, but such support is not enough to overcome the detrimental effects of low grades.

Table 21 Predicted probability of enrollment based on school help by academic preparation

Student Profile	Four-year institutions Enrollment Probability
Low grades No NAEP Low help	.15
Low grades NAEP Low help	.43
High grades No NAEP Low help	.46
Low school help (everything else mean)	.34
Moderate school help (everything else mean)	.43
High school help (everything else mean)	.53
Low grades NAEP High help	.40
High grades No NAEP High help	.64
High grades NAEP High help	.77

g. Students' self-assessment of their probability of college enrollment will affect postsecondary education enrollment outcomes regardless of academic credentials

The multinomial logit results indicate that the self-assessment of the probability of college enrollment made by students when they are in the 10th grade is among the strongest positive predictors of enrollment in both two-year (odds ratio = 1.23) and four-year institutions (odds ratio = 1.67). I then tested whether this positive effect held across different levels of academic preparation (as measured by middle school grades and taking NAEP curriculum while in high school).

The analyses support the hypothesis that self-assessment of probability of college enrollment increases the probability of enrollment in a four-year institution for both students with low- and high-level of academic preparation. Likewise, it increases the probability of enrollment in a two-year institution for students with low-levels of academic preparation (Table 22).

Table 22 Predicted probability of enrollment based on self-assessment of probability of college enrollment by academic preparation

Student Profile	Four-year Institutions Enrollment Probability	Two-year Institutions Enrollment Probability
Low grades No NAEP Low self-rated probability	.05	.26
Low grades No NAEP	.20	.31

High self-rated probability		
High grades NAEP Low self-rated probability	.34	.20
High grades NAEP High self-rated probability	.55	.18

7. Summary of Findings

In this sub-section, the most important findings from this dissertation work are listed:

a) Analyses support the hypothesis that postsecondary education enrollment is affected by social capital. Variables measuring the four social capital constructs—attainment norms enforcement, access to information, support, and social networks—were significant for both outcomes, enrollment in a two-year institution and enrollment in a four-year institution.

b) Multinomial logit analyses confirm that the dynamics of variables affecting enrollment in postsecondary education vary for enrollment in two-year and four-year institutions. The proposed model captures more variables affecting enrollment in four-year institutions than in two-year institutions.

c) The multinomial logit results indicate that social networks and peer effects greatly impact enrollment in two-year institutions. The largest effects on enrollment in two-year institutions (compared to no postsecondary education enrollment) captured by the model are from significant others' aspirations, friends

to attend a two-year institution, friends to attend a four-year institution, self-assessment of probability of college enrollment by 10th grade, and volunteering.

d) None of the academic variables is a significant predictor of enrollment in a two-year institution compared to not enrolling in postsecondary education.

e) None of the variables measuring access to information shows significant effects on enrollment in two-year institutions.

f) All variables measuring attainment norms show significant effects: significant others' aspirations (1.13), friends to attend a four-year institution (1.24), and friends to attend a two-year institution (1.29) increase likelihood of attending a two-year postsecondary institution.

g) Considering the factor college life (.86) when selecting a potential postsecondary education institution shows a negative effect on enrollment in a two-year institution, while considering access (1.16) increases the odds of enrollment in a two-year institution.

h) Self-assessment of probability of college enrollment by 10th grade positively affects the odds of enrollment in a two-year institution (1.25).

i) Among school control variables, only percentage of graduating class going to a two-year institution (1.01) has a significant effect on enrollment in two-year institutions.

j) Largest effects on enrollment in four-year institutions (compared to no postsecondary education enrollment) found in the multinomial logit analysis are

from significant others' aspirations, friends to attend a two-year institution, friends to attend a four-year institution, self-assessment of probability of college enrollment by 10th grade, and volunteering.

k) Among household status variables, mother's education (1.29) and family income (1.27) both positively affect enrollment in a four-year institution.

l) The community variable changing high school due to family moves has a negative effect on enrollment (.65).

m) The only school control variable that has a significant effect on enrollment in four-year institutions is percentage of graduating class going to a four-year institution (1.02).

n) All academic variables included in the model—middle school grades (1.72), rigorous high school curriculum (1.88), and plans for taking college entrance examinations (1.13)—are positive predictors of enrollment in a four-year institution compared to not enrolling in postsecondary education. Academic variables are also positive predictors of enrollment in a four-year compared to a two-year institution.

o) Results indicate that all social capital constructs—information, attainment norms, and support—as well as social networks variables have effects on enrollment in a four-year institution. Parents' sources of information on financial aid (1.23) positively affects enrollment in a four-year institution. Variables measuring attainment norms also show significant effects on enrollment in four-

year institutions, including significant others' aspirations (1.08), friends to attend a four-year institution (1.72), and friends to attend a two-year institution (.75). High school help in college application process (1.23) is also significant for enrollment in a four-year institution.

p) Analyses support the hypothesis that postsecondary education enrollment is affected by students' social networks. All five variables measuring this construct are significant predictors of postsecondary education enrollment. Variables measuring community involvement (changing school due to family moves while in high school and feeling involved in the neighborhood) and social networks (volunteering, friends to attend a two-year institution, and friends to attend a four-year institution) are among the strongest predictors for enrollment in both two-year and four-year institutions.

q) Doing volunteer community work while in high school consistently increases probability of enrollment in a four-year institution across all four income groups; the probability of enrolling in a two-year institution only increases slightly due to volunteering.

r) Students' preferences, values, and self-assessment are more likely to affect enrollment in a four-year rather than a two-year institution. The factor social-oriented life values (.81) has a negative effect on enrollment in a four-year institution. Considering the factors access (.82), heritage (.86), and type (1.30) when selecting a potential postsecondary education institution also effects enrollment in a four-year institution. Self-assessment of probability of college

enrollment by 10th grade positively affects the odds of enrollment in a four-year institution (1.67).

s) The analysis does not provide enough evidence to support the claim that information asymmetries constraining postsecondary education access are related to socioeconomic status as measured by income. Positive effects from parents' number of information sources about financial aid hold consistently across all four income groups, but the effect decreases as mother' education increases. That result adds evidence to support the claim that information asymmetries regarding postsecondary education are related to parental education rather than household income.

t) Students' preferences are more relevant for enrollment in a four-year institution than for a two-year institution. Preferences based upon the factor *access* (college expenses, availability of financial aid, and admission standards) are a significant predictor for enrollment in both two-year and four-year institutions compared to not enrolling in postsecondary education; however, the direction of the effect is opposite--negative for four-year institutions and positive for two-year institutions. These results support the hypothesis that concerns regarding access prevent students from choosing to enroll in a four-year institution and redirect them toward two-year institutions.

u) All variables measuring the construct enforcement of educational attainment norms—significant others' aspirations and friends' educational plans—are significant predictors of enrolling in both two-year and four-year institutions

compared to not enrolling in postsecondary education. Significant others' aspirations increases the likelihood of enrollment beyond what should be expected based on family income, although not enough to overcome inequalities.

v) The results support the hypothesis that having support for navigating the postsecondary education application and admission system positively affects enrollment in a four-year institution; however, it was not a significant predictor of enrollment in a two-year institution. These results may underscore the focus on application for selective four-year colleges in support services provided by high school counselors to students looking for postsecondary education opportunities.

w) School help in the application process boosts the probability of enrollment in a four-year institution, but it is not enough to overcome the negative effects of deficient academic preparation. High school support may lessen the negative effect of not having taken a rigorous college preparatory curriculum, but it would not be enough to overcome the hurdles of low grades.

Chapter V. Discussion

According to the postsecondary education literature, educational outcomes are the result of the interplay between individual, household, and school variables. Nevertheless, community and societal variables that also affect educational outcomes are often overlooked. This dissertation aims to uncover empirical evidence to support a social capital theory of postsecondary education enrollment. Using social capital theory for interpreting the results from the multinomial logit analysis of the NELS:88 data, I reshape my initial framework (presented in Chapter 2 and displayed in Figure 2). Then, I discuss the final model emerging from the analysis and point out its implications for higher education research and policy-making on issues of access to postsecondary education.

When conceptualizing this model, the individual, the household or family, and the high school are observed as interrelated nodes (See Figure 6, social capital linkages to postsecondary education enrollment). Such interrelation comes from the fact that these entities are part of the same social structure or *field* (Bourdieu, 1986), and, therefore, are shaped by the same ideology, culture, life-styles, technological development, aggregated educational attainment, resources, and productivity standards. Heritage (religion, ethnicity, etc.) and background (family values and history of family members' accomplishments) are the lines through with the social structure is transmitted into the household. Likewise, structural

features and expenditures are the streams coming from the social field to shape

the school system as well as specific high schools.

Figure 6 Social Capital Linkages to Postsecondary Education Enrollment
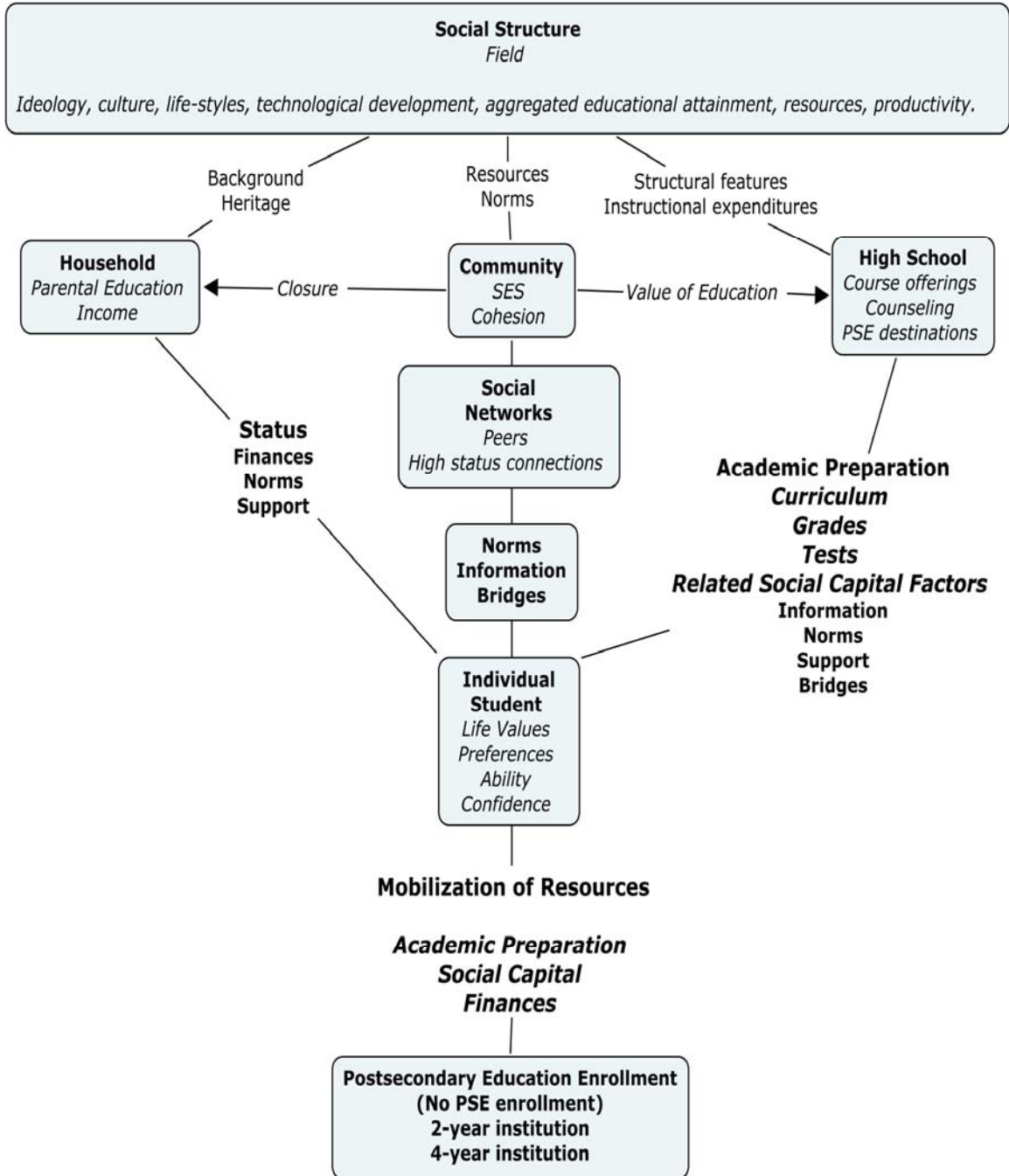
Moreover, the model proposes that both resources and social norms are the ways in which the social structure reproduces itself (with minor reshaping differences) into each community. These three entities affect individual students by defining her/his status (through the household), academic preparation (through the high school), and social networks and largely social capital (through the community). There are also direct connections between community and household (through what Coleman (1990) labeled "closure", which is closely related to social cohesion) as well as between community and high school (through the value of education[v], which is closely related to the average socioeconomic status).

Within the household, there are two variables clearly related to educational outcomes: parental education (Hofferth, et al., 1998; L. Horn & Núñez, 2000; G. Musoba, 2004; Terenzini, et al., 2001) and family income (L. Horn & Núñez, 2000; Paulsen & St. John, 2002; L. W. Perna, 2000). Within the high school, this study focuses on three sets of variables: course offerings (Cabrera, La Nasa, & al., 2000; E. St. John & Hu, 2007; Trent, 2004), counseling (L. W. Perna, 2000), and students' destinations after high school (Ainsworth, 2002; L. Horn & Chen, 1998).

Additionally, students' social capital is shaped by their social networks, especially the influence of peers (Ainsworth, 2002; L. W. Perna, 2000; Zaff, Moore, Romano, & Williams, 2003) and high status adults (Ainsworth, 2002; Duncan, 1994). The students' socioeconomic status, academic preparation and accrued

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social capital interact to shape life values, preferences (regarding postsecondary education), and self-confidence (Ainsworth, 2002; Cohn & Gosk, 1990; Coleman, 1988; Fitzgerald & Delaney, 2002; Hofferth, et al., 1998; L. Horn & Chen, 1998; L. W. Perna, 2000; E. St. John & Hu, 2007; E. P. St. John, 2002). According to my theoretical framework, all of these variables affect the student postsecondary education enrollment outcome (Figure 7).

The multinomial logit model results provide further evidence of the effect of family income on enrollment in both two-year (increases enrollment likelihood by a factor of 1.23) and four-year institutions (increases enrollment likelihood by a factor of 1.26). The results also provide further evidence of the effect of mothers' education on enrollment in a four-year institution (increases enrollment likelihood by a factor of 1.29). The results do not support the claim that family provisions for covering postsecondary education expenses depends on either household income or parental education. Moreover, results contest the claim that such savings increase enrollment probability because that variable was not significant for any of the enrollment outcomes.

Contrary to previous findings reported in the literature, high school structural variables—such as control, percentage of students below poverty line, advanced placement courses, Math and English remedial courses, teacher attrition, and the number of counselors per student—are not significant when estimating a multinomial logit model for predicting postsecondary education enrollment probability. The variables associated with schools found to have significant

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effects on postsecondary education enrollment are those that measure actual

academic performance, actual support, and roles model or norms enforcement.

Figure 7 Variables for testing social capital linkages to postsecondary education enrollment
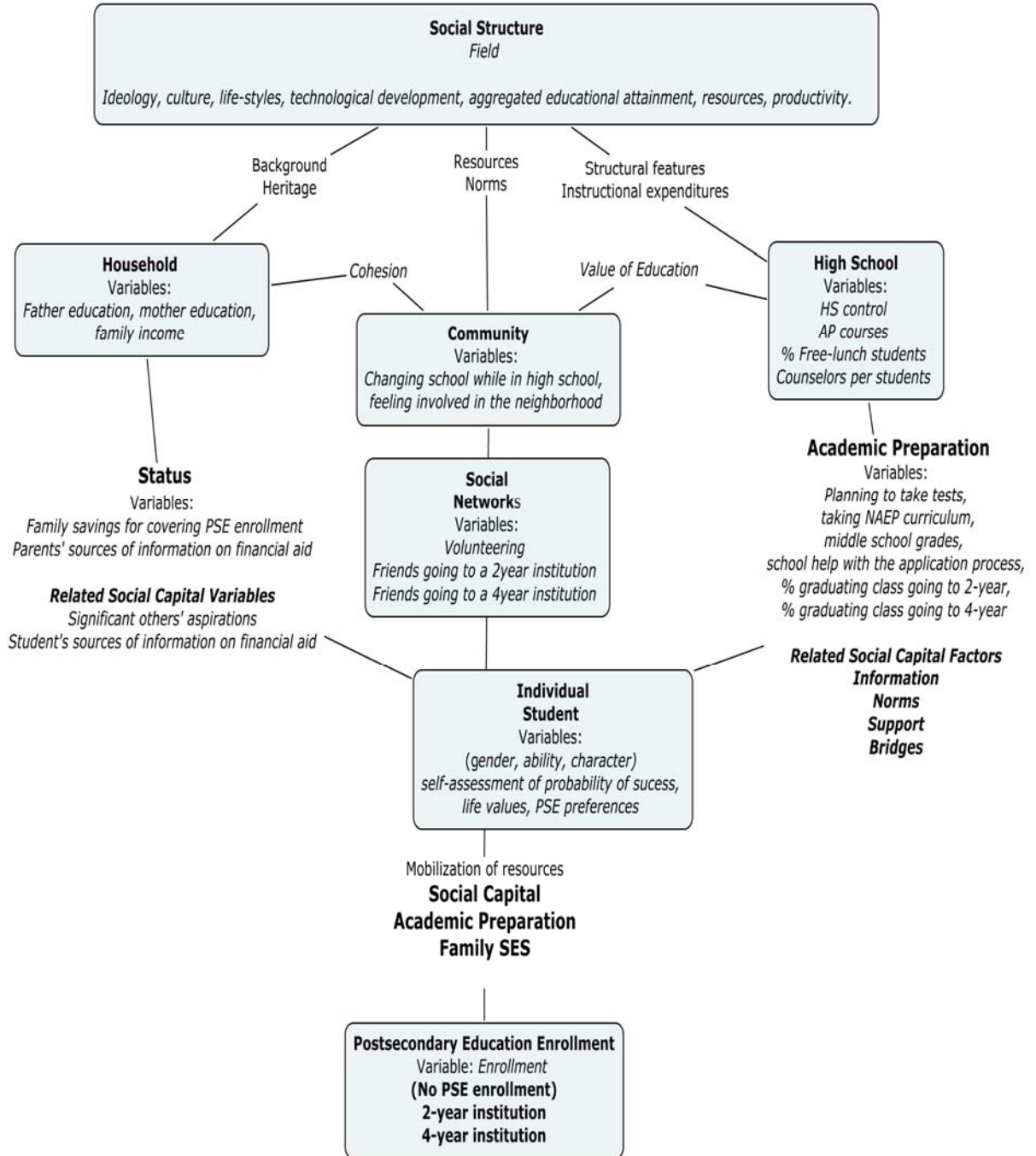
Middle school grades and having taken the NAEP recommended curriculum are among the strongest predictors of enrollment in a four-year institution. Taking the NAEP recommended curriculum increases the likelihood of enrolling in a four-year institution by 1.88. Students who do not take the NAEP recommended curriculum—either because the high school does not offer all the required courses or because the student decided not to enroll in such courses—are less likely to enroll in postsecondary education. Nonetheless, some students can lessen the negative effect of not having taken a rigorous college preparatory curriculum if they get effective high school support services that help them to apply for less selective four-year institutions. On the contrary, students with low grades in middle school—which suggests poor preparation for high school—are less likely to enroll in a four-year institution even if they receive extensive support from their counselors. Additionally, students who have plans for taking college examination tests—either ACT or SAT—when they are in the 10th grade are more likely to enroll in a four-year institution than those who did not think about doing so. All those findings indicate that interventions for fostering academic preparation for postsecondary education should be initiated as early as 7th grade. Students who are not on the path to postsecondary education by 10th grade have very low probabilities of enrollment.

Results also reveal the importance of role models for enforcing educational attainment norms and encouraging students' aspirations. My analyses demonstrate that previous high school cohorts' postsecondary destinations affect a student's own postsecondary destination. The percentage of the graduating

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class in the year in which a student enters high school that goes to either a two-year or a four-year institution is a significant and positive predictor of enrollment in the same type of institution. These results suggest that high school attainment norms increase students' aspirations as well as their enrollment likelihood.

The study's model proposes that attainment norms enforcement, support for navigating the system, and access to valuable resources—especially information—come not only from school and family influence but also from the community and the social network. Social capital theory states that strong social networks reinforce identity and enhance group recognition, both factors that may boost positive educational attainment norms (Lin, 1999). The theory also establishes that upward mobility opportunities are better achieved by gaining access to other groups' resources and moving away from one's original lower status group (Burt, 2001; Lin, 1999; Portes, 1998; Stanton-Salazar & Dornbusch, 1995; Stanton-Salazar, 1997; Stanton-Salazar, & Urso Spina, 2000).

The model includes five proxy variables for strength of social networks. The first is changing high schools due to family moves, which is a proximal measure of familial networks—*closure* in Coleman's research (1988, 1990). The second is volunteering, a proxy for the student's own network of high reputation adults and peers outside school settings. The third is feeling involved in the neighborhood, which is a proximal variable for community networks. Finally, the model incorporates peers effects through the variables friends to attend a two-year institution, and friends to attend a four-year institution.

Analyses support the hypothesis that postsecondary education enrollment is affected by students' social networks. All five variables measuring this construct are significant predictors of postsecondary education enrollment. Indeed, the variables measuring community involvement (changing school due to family moves while in high school and feeling involved in the neighborhood) and social networks (volunteering, friends to attend a two-year institution, and friends to attend a four-year institution) are among the strongest predictors for enrollment in a two-year institution (except for changing school due to family moves while in high school, which was not significant for this outcome) and in a four-year institution (along with middle school grades and taking NAEP recommended curriculum). The rationale is that through networks contacts, students will be able to utilize resources that may boost their access to postsecondary education opportunities.

The multinomial logit results confirm the hypothesis that students whose families are involved in the community benefit from greater access to resources that foster their educational attainment goals. Feeling involved in the neighborhood—the proxy variable for social networks in the community—increases the likelihood of enrollment in both two-year and four-year institutions. Changing high school due to family moves—therefore suffering a disruption in familial social networks—has a negative effect on enrollment in a four-year institution. These findings are consistent with Coleman's postulates (1988, 1990) of positive norms being better enforced when an individual lives in a community with network

closure—that is where people know each other well, share values and beliefs, and so on.

The conceptual model poses that volunteering helps high school students expand their social networks, and therefore to reach resources (information, credentials, recommendations, life-skills, experiences, scholarships) that allow them to be better prepared to navigate the system toward postsecondary education admission and enrollment. My study results indicate that doing volunteer community work while in high school consistently increases the probability of enrollment in a four-year institution across all four income groups. The effect of social networks in providing access to information may explain why doing volunteer work in the community is correlated with educational attainment. Indeed, these activities provide a large network from which the student can draw information about resources that help her/him successfully complete college preparatory coursework in high school and obtain guidance on how to apply for college. Effects of volunteering are larger for enrollment in a four-year institution than for enrollment in a two-year institution. These results suggest that the kind of resources (e.g., recommendation letters, leadership experiences, scholarship opportunities) that volunteering provide to students are more useful for navigating the path toward a four-year institution than toward a two-year institution.

In addition, enrollment in both two-year and four-year institutions is positively affected by peers' postsecondary education enrollment. My research indicates that students' enrollment is positively affected by having peers with the same or a

higher level of educational aspirations. Both friends to attend a four-year institution and friends to attend a two-year institution have positive effects on enrollment in a two-year institution. Likewise, the number of friends to attend a four-year institution increases the likelihood of enrollment in a four-year institution. On the contrary, the number of friends to attend a two-year institution decreases the likelihood of enrollment in a four-year institution. The rationale for this result is that higher aspirations and peers' attainment boost high school students' own aspirations and attainment, while friends with lower attainment aspirations may lessen a student's aspirations.

My model proposes that effects from household, school, community and personal social networks interact to shape student life values, self-assessment of probability of career success and preferences (in this case, preferences regarding postsecondary education). Obviously, individual characteristics such as gender, ability and character may also affect life values, self-assessment of probability of success, and postsecondary education preferences. However, the model tested in this study did not include measures for character and ability (besides academic performance), and the results indicate that gender does not have a significant effect on postsecondary education enrollment.

The conceptual framework proposes that social capital facilitates the flow of information, and consequently it enhances an individual's ability to attain her/his goals (Lin, 2001b). Indeed, a student needs to receive relevant information in order to make opportune decisions that increase her/his likelihood of enrolling in

postsecondary education (e.g., taking the NAEP recommended curriculum which implies to take algebra by 9th grade or earlier). It is hypothesized that ties to individuals from different social circles may facilitate access to useful resources required in order to bring in a progressive flow of information (Granovetter, 1973).

Both students' and parents' number of sources of information about financial aid increase enrollment likelihood in four-year institutions. Furthermore, positive effects from the number of information sources about financial aid searched by parents hold consistently across all four income groups. The effect on enrollment from the number of sources of information about financial aid decreases as mother's education increases which adds evidence to the claim that information asymmetries regarding postsecondary education are related to parental education rather than household income.

The conceptual framework in this study proposes that access to relevant information may depend on a student's social network. My findings support the claim that social capital helps individuals deal with problems of asymmetric information and enhance efficiency in decision-making by using copying and pooling mechanisms to gather information about alternative courses of action (Collier, 2002). The multinomial logit results indicate that students are able to benefit from using the *copying* mechanism by observing the path taken from other students that graduated from high school in a previous high school cohort. Significant and positive effects from the postsecondary destinations of previous cohorts support this claim. Students may also be able to benefit from using the

pooling mechanism when exchanging information with their friends—either purposefully seeking information about postsecondary education opportunities or chatting informally. That may be the reason why students' owns postsecondary education destination is significantly related to their friends postsecondary education destination.

The results indicate significant others' aspirations increases the likelihood of enrollment beyond what should be expected based on family income, although increasing aspirations are not enough to overcome income-related inequalities. A low-income student encouraged by significant others' aspirations has a probability of enrolling in a four-year institution below that of a high-income and low-aspirations student, but a higher than predicted probability of enrollment in a four-year institution for all low-income students. Nonetheless, the probability of enrolling in a two-year institution is higher for a low-income and high-aspiration student than for a high-income and low-aspirations student.

Overall, the empirical findings provide evidence to support a social capital theory of postsecondary education enrollment. Adding social capital variables (information, norms, and support) and social networks variables (community involvement and peers) helps explain why some students reach educational goals that are not predictable using only variables that account for academic preparation and family socio-economic status.

1. Implications for Postsecondary Education Public Policy

The interpretation of the multinomial logit model results has potential for informing more effective public policies aimed at increasing postsecondary education enrollment rates for all social groups, especially disadvantaged students. Findings may contribute to the knowledge base informing the design and implementation of public policies for overcoming the effects of economic and social inequalities on educational attainment.

To design public policies that impact the accumulation of social capital may be a difficult task, since it clearly depends on personal interactions, networking processes and community resources that take time to develop. However, public policies that boost opportunities for social capital accumulation may be achievable. Since the analyses demonstrate that variables have different effects on enrollment in two-year and four-year institutions, policies intending to positively affect enrollment should be tailored to specific institution type.

Middle school grades, role models at the beginning of high school, planning to take college entrance examinations in 10th grade or earlier, and taking NAEP recommended curriculum—which implies taking college preparatory Math starting in 9th grade—are all critical for enrolling in a four-year institution. Therefore, policies aimed to increase enrollment in a four-year institution must target middle school students. All programs intended to inform about postsecondary education opportunities, to boost academic preparation, and to

facilitate access to financial aid should be directed to students in grades 7th through 9th.

High schools, local community colleges and state universities should work on partnerships in order to set mentoring programs for 9th grade students. High school student might be paired with students from a similar socioeconomic status who are in their first postsecondary education term. This sort of mentoring program can be linked to college service-learning programs.

Additionally, high school teachers, coaches and counselors should actively encourage students to pursue postsecondary education by emphasizing the available opportunities and pointing out ways to overcome financial and academic barriers. Even under the current budget constraints, opportunities exist for taking advantage of low-tuition community college courses that can be transferred to four-year institutions.

District and state level educational policies should aim to increase opportunities for community involvement and volunteer work for middle school and high school students. Special programs should target students that are new in their neighborhoods, students who face family disruption—due to death, divorce, or unemployment—and students of immigrant families.

Community colleges should improve their informational outreach toward high school counselors, students and their parents. Specific information about academic opportunities provided by two-year institutions and financial aid available for students taking such a path is needed. That will help increase

enrollment in two-year institutions, especially among students who either do not have the grades required for entering selective four-year institutions or cannot afford tothe expenses of attending a four-year institution. Nonetheless, informational outreach should also make clear to students the career opportunities unique to two-year institutions (e.g., allied health professions). High school counselors should provide support for students on the path to a two-year institution as they already do for students on the path to a four-year postsecondary education institution. Additionally, special efforts should be placed on conveying information about postsecondary education opportunities and available financial aid to parents who are not college educated.

Postsecondary education institutions may need to deemphasize race and religion as features characterizing campus life and diminish the weight of a parent being an alumnae in their admission policies, since the results indicate that concerns about these variables decrease the probability of enrollment in a four-year institution.

2. Further Research

The major limitation faced when undertaking this dissertation work was the impossibility—due to financial and time constraints--of collecting data from high school students using instruments purposefully designed for measuring the constructs in the proposed conceptual framework. This forced me to use the NELS:88, which has several advantages such as being a nationally representative longitudinal sample well suited for studying transitions from high

school to postsecondary education, but also has its shortcomings. The most important limitation is that some concepts that should be used to study social capital effects on postsecondary enrollment are not included in the dataset. Therefore, using NELS entails adjusting theoretical constructs to available variables and measurement scales. Extensive data transformation procedures— as well as imputation of missing values—were necessary for creating variables corresponding to the conceptual framework. The extensive data transformation work was rewarding because the findings support the majority of the hypotheses tested.

Nonetheless, some lacunas remain regarding the effects of variables for which the measures were only proximal (e.g., family moves as a proxy for familial networks), as well as for those variables in which the available measures were unreliable and had to be excluded from the model (e.g., participation in outreach programs). Thus, further research must be undertaken in which quality measures are collected using instruments purposefully designed for capturing all constructs in the proposed conceptual framework.

The continuity of this research agenda will entail gathering original data from a sample of middle school and high school students. The data collection should comprise at least three waves (7th grade, 10th grade, and a year after scheduled high school completion). A district level or a state level sample—rather than a national one—may be the best option in order to make such a project financially feasible. Having the data collected at the district or state level will facilitate the

incorporation of *field* or social structure—such as aggregated educational attainment, resources, and productivity measures—to the dataset by linking to district level Census data.

The goal is to develop instruments useful for collecting valid and reliable measures of the social capital constructs that can be used for modeling postsecondary education enrollment and estimating access inequalities among groups. Having valid and reliable measures would allow researchers to more accurately test hypotheses of social capital effects on postsecondary education. Thus, empirical studies would add evidence to support our current hypotheses on social capital effects on postsecondary access inequalities or to contradict such hypotheses.

The first instrument which needs to be developed is a *student's social network position generator,* which is an adaptation of the position generator technique developed by Lin and Dumin (1986). In that technique, the respondent is asked to indicate if s/he knows anyone having a position with identified valued resources (Lin, 2001a). From a list of ten occupations related to postsecondary education access, respondents would be asked to identify whether any of their relatives, friends, or acquaintances has such an occupation. Results will map the access structure by focusing on the student's linkages to those resource-enabling persons. The strength of these social ties will be measured by the relationship type (family member, friend or peer, school personnel, and other adult in the community), as well as length of the relationship, closeness (as felt

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by the respondent), and connectedness (as result of intertwining with other relationships) (Breiger, Carley, & Pattison, 2001). Second, a questionnaire is needed to measure the range of valued resources, upper hierarchy resources, heterogeneity of resources, and average or typical resource (Lin, 2001b) in order to get proper measures of actual social capita available to students rather than the proximal measures used in this study. An instrument for obtaining measures of requests for using resources, help obtained, and returns from such help should also be developed as a part of this research agenda.

Responses can be used to estimate factors for each social capital dimension: information, support, and bridges. Both construct validity and reliability measures should be analyzed using confirmatory factor analysis (Bagozzi, 1994; Kline, 2005; Long, 1983). Confirmatory factor analysis should be used to test the hypothesized social capital factors' convergent validity. After verifying the conceptual constructs are accurately represented by the factor patterns found in the data, further tests should be conducted in order to verify whether the factors are invariant among the different income groups (upper, upper-middle, low-middle, and lower). Analysis will test equality of factors patterns, equality of factor loadings, equality of error variances, and equality of covariances. These analyses will determine whether social capital affects students from different income groups similarly or whether the effects vary between groups (Bagozzi, 1994; Byrne, 2001; Kline, 2005; Long, 1997)

Additionally, cluster analysis may be used to explore patterns of relationships between students' postsecondary education choice and the social capital in their networks. Cluster analysis (Aldenderfer & Blashfield, 1984) will result in individual cases being grouped in nearly homogenous groups, according to resources available in the student's social network and the effects on postsecondary education enrollment status from help obtained by the student from her/his network. This procedure will allow straightforward comparisons between groups.

In the third wave of data collection, conducted after expected high school graduation, a short survey should be administered to capture variables related to the outcome choice (two-year, four-year, and no enrollment) as well as measures related to the characteristics of the individual student—such as those used in the present study. The measures related to the outcome choice will be used for estimating a conditional logit model, while the measures related to the characteristics of the individual student will be used in a multinomial logit model like the one in this study. In the conditional logit model[vi]—also known as the McFadden's or the alternative specific conditional logit[vii]—outcome choices are expressed as functions of the characteristics of the alternatives themselves as well as functions of characteristics of the choosers (which occurs in the multinomial logit model) (Cameron & Trivedi, 2009; Long, 1997; McFadden, 1981). Thus, there are two types of independent variables: alternative-specific variables and case-specific variables.

A combination of both multinomial and alternative specific conditional logit models can be estimated by adjusting the regressors according to whether they depend on the choice or the chooser. The combined use of both multinomial and alternative specific conditional logit models will help higher education researchers to understand in depth how the postsecondary education choice process works.

By using this kind of method, researchers will be able to interpret both individual characteristic variables and institutional characteristic variables in the choice process. That knowledge may help in designing public policies more closely tailored to the specificities of different types of institutions (e.g., two-year or four-year institutions) and different types of individuals (e.g., low-income and high-income; community-connected or community-isolated).

3. Conclusions

In this research, I found evidence to support the effects of social capital on postsecondary education enrollment. Variables measuring the four social capital constructs—attainment norms enforcement, access to information, support, and social networks—were significant for both enrollment in a two-year and a four-year institution. The multinomial logit model results indicate that social networks and peer's effects greatly impact enrollment in both two-year and four-year postsecondary education institutions. Both parents' and students' sources of information on financial aid show positive effects on enrollment in a four-year institution, whereas for enrollment in two-year institution positive effects from students' sources of information on financial aid were found. Variables measuring

attainment norms also show significant effects on enrollment in four-year institutions as does high school help in the college application process. Variables measuring community involvement and social networks are among the strongest predictors for enrollment in both two-year and four-year institutions.

To summarize, my research demonstrates that:

1. Social capital affects individuals' educational postsecondary education enrollment.

2. Information asymmetries are related to inequalities in access to postsecondary education, even after controlling for income groups.

3. Resources available through social networks increase the probability of enrollment in postsecondary education beyond what would be expected given a student's socioeconomic background as measured by family income and parents' education.

4. Concerns about variables that may restrict access to postsecondary education (which include taking into account college expenses, availability of financial aid, and admission standards) prevent some students from choosing to enroll in a four-year institution, and make it more likely they will choose a two-year institution.

5. Enforcement of high attainment norms—by high school peer models and significant others' aspirations--increases the probability of enrollment in

postsecondary education beyond what would be expected given a student's socioeconomic background.

6. Support for navigating the admission system—as provided by high school counseling services--increases the probability of enrollment in postsecondary education, but it is not enough to overcome inadequate academic preparation.

7. Students' positive self-assessment of their probability of college enrollment when they are in 10th grade positively effects postsecondary education enrollment regardless of academic credentials (as measured by middle school grades, having taken NAEP recommended curriculum and planning early in high school to take college entrance examinations).

NOTES

[i] Coleman (1988) alleges that his analyses focus on Catholic schools due to sample size restrictions, but his hypotheses held for any denomination including non-Christian religious schools.

[ii] Acknowledgment: This procedure was conducted thanks to the help provided by Brady West, statistical consultant at the Center for Statistical Consultation and Research at the University of Michigan.

[iii] Income brackets should be actualized in order to conduct analyses on current data.

[iv] In a preliminary study also using the NELS dataset, using listwise deletion of missing values which yields a smaller sample and without the rational choice variables, I estimated an ordinal logit model for the outcome of postsecondary education enrollment with the three outcome categories (no enrollment, enrollment in a two-year institution, and enrollment in a four-year institution). Then, I used the Brand test for testing the parallel regression assumption that holds for ordinal models. The results indicated that the model violates such an assumption, thus the appropriate model should be a multinomial logit model, a conditional logit model or a nested logit model.

[v] I am playing here with two meanings of the word "value"-- utility or importance and monetary worth or market-price. That is, how important is education regarded within a community and how much more money the community is able to invest in its public high schools through taxes and other contributions.

[vi] The conditional model command in Stata estimates a fixed-effects model or Luce conditional model. In Stata, the McFadden conditional model is called alternative specific conditional model, and it is fitted by using the command asclogit. Survey specification is not available for this

command. However, weights can be added as a variable to get the right beta coefficients, although standard errors may be misestimated.

[vii] In Stata, a combined multinomial and alternative specific conditional logit can be estimated by using the add-on for the Generalized Linear Latent and Mixed Models (GLLAMM). The procedure allows the usage of weights.

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