Examining Social Capital as a Predictor of Enrollment in Postsecondary Education for Low SES Students: A Multilevel Analysis

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Abstract

This study examined whether measures of social capital were significant predictors of enrollment in postsecondary education for students from a low SES background. Results take the form of two articles. The first article addresses enrollment in four-year institutions of postsecondary education, and the second article addresses enrollment in two-year institutions of postsecondary education. The research questions for this study were:

1. Does probability of enrollment in a four-year postsecondary institution or a two-year postsecondary institution for low SES students differ by mean school SES?

2. Does probability of enrollment in a four-year postsecondary institution or a two-year postsecondary institution for low SES students differ by school locale?

3. When controlling for contextual or environmental variables and student background characteristics, are low SES students with higher levels of social capital more likely to enroll in a four-year postsecondary institution or a two-year postsecondary institution than low SES students with lower levels of social capital?

4. When controlling for contextual or environmental variables, background characteristics, and level of social capital does probability of enrollment in a four-year institution of postsecondary education or a two-year postsecondary institution vary by race for low SES students?

When controlling for school level variables, academic achievement and preparation, and select background characteristics, low SES students with higher levels of social capital are more likely to enroll in a four-year college. Students whose parents expected them to obtain more education and those students who obtained more information about attending college were more likely to enroll in a four-year university. In the analysis of enrollment in four-year institutions of postsecondary education, African American low SES students were three times more likely to enroll in a four-year college or university than low SES Caucasian students.

Only one measure of social capital, information acquisition, was significantly related to enrollment in a two-year institution of postsecondary education. No significant variability in probability of enrollment in a two-year institution of postsecondary education was observed by either of the school level variables used. Race was not a significant factor when controlling for background characteristics and the measures of social capital used in this study.

Dedication

I would like to dedicate my dissertation to my father, Sanford S. Stimpson. I wish he could be here.

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I have to start by thanking my advisor Steve Janosik. Steve supported me in a number of ways during my doctoral program. He taught me how to shift my thinking and viewpoints from that of an administrator to that of a scholar. He always challenged my thoughts and ideas, helping me to refine my research and improve its quality. I also have to thank my co-chair, Yasuo Miyazaki. Yasuo worked diligently with me on conducting the analysis for my dissertation. I could not have completed this study without his assistance. I also must thank the other two members of my committee, Joan Hirt and Cynthia Bonner. Joan was a tremendous source of support through my doctoral program and through the writing of this dissertation. Cynthia was always willing to assist me during my doctoral career in any way that I needed.

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Chapter 1

Introduction

In 2006, members of the Secretary of Education's Commission on the Future of Higher Education released their final report detailing findings from a year-long study on the status of higher education in the United States. The report identified several key areas that are in need of improvement if America's postsecondary education system is to retain world prominence. Access to postsecondary education was one of the areas identified in the report as needing improvement (*A Test of Leadership*, 2006). It is easy to understand the concern about access to higher education given current national postsecondary education participation rates. Today's participation rates compared with national postsecondary education participation rates of the 1990s show no improvement in participation. In fact participation rates in several states have declined. Since the 1990s, the odds of ninth graders enrolling in postsecondary education in six states (i.e., Hawaii, Vermont, New York, Nebraska, Illinois, and Oregon) have decreased and persons with low-income backgrounds participate at lower rates than persons with higher income backgrounds in these states (The National Center for Public Policy and Higher Education, 2006).

The low participation rate of students from low-income families is highlighted by examining current enrollment trends. In the 2003-2004 academic year, more than 12 million students were enrolled as undergraduates in the United States. Of that 12 million, approximately 1.3 million were from families making less than $30,000 a year, which equates to approximately 10.8% of the total undergraduate population (U.S. Department of Education, n.d.). Research on the demographics of undergraduates from the graduating high school class of 1992 confirms that low-income students are less likely to participate in higher education.

By 1994, 36% of students from a low-income background from the graduating high school class of 1992 had not enrolled in postsecondary education (Berkner & Chavez, 1997). Additional work using socioeconomic status (SES) (a composite of parent education, parents' occupational prestige, and income) showed that six years after high school graduation students from a low SES background were less likely to have enrolled in postsecondary education than students from a higher SES (Rowan-Kenyon, 2007).

Given the history of higher education in the United States, that higher education was a privilege reserved for the elite (Rudolph, 1990), it should not come as a surprise that students from low-income and low SES backgrounds are substantially underrepresented on college campuses. While strides have been made in increasing access for all groups, access to postsecondary education for low-income and low SES students continues to be a major issue for higher education officials.

Today, low-income and low SES students encounter significant hurdles in gaining access to postsecondary education, in part because higher education is still substantially stratified by socioeconomic status (Astin & Oseguera, 2004). Students from low-income backgrounds are more sensitive to tuition changes and availability of financial aid (Paulsen & St. John, 2002; Heller, 1997; St. John, 1990; Leslie & Brinkman, 1987), are typically less academically prepared, and are less likely to complete the steps necessary to enroll in college (e.g. college entrance exams, apply to college) (Berkner & Chavez, 1997). These barriers to enrollment in postsecondary education have resulted in low enrollment rates for students from low-income and low SES backgrounds.

Access to postsecondary education is important because with increased education comes increased social mobility, especially earning potential (Institute for Higher Education Policy and Scholarship America, 2004). In addition, it has long been believed that learned individuals contribute more substantially to society (Bowen, Kurzweil, & Tobin, 2005). Income levels, broken down by education level, support the notion of increased social mobility as a result of increased education. The average high school graduate earned approximately $26,000 per year in 2005. This number is half that of a college graduate who earned approximately $52,000 per year in 2005 (U.S. Census Bureau, 2006). Since the end of World War II, several initiatives to increase access have occurred. The G.I. Bill enabled scores of veterans returning from the war to pay for college. Passage of the Higher Education Act of 1965 allowed for the financing of higher education. The community college movement of the 1970s allowed students who were not academically prepared to access higher education. Finally, affirmative action sought to increase the racial diversity of postsecondary education. Each initiative sought to increase access to higher education. The degree to which access increased for low SES students varies.

The G.I. Bill

At the conclusion of World War II Americans were faced with a large number of veterans who had placed their lives on hold to fight a war. Several programs were created to assist veterans in reintegrating into American society. The G.I. Bill was one such program and had a profound influence on American higher education. Passed in 1944, the G.I. Bill allowed veterans unprecedented access to higher education. Prior to this point in American history the privilege of higher education was reserved for only a select portion of the populace (Mettler, 2005).

Due to the G.I. Bill, by 1947 more than one million veterans had enrolled in college (Mettler, 2005). That one million accounted for more than 49% of all college students in the United States. By the time eligibility for the G.I. Bill had expired for World War II veterans, 7.8 million veterans (51% of those eligible) had used the G.I. Bill to obtain some form of postsecondary education or training. Of that 7.8 million, 2.2 million attended a four-year institution and 5.6 million had attended some form of vocational training or other type of postsecondary education opportunity (Mettler).

The net result of the G.I. Bill is significant. That single piece of legislation drove many of the reforms seen in education, housing, and employment in the decades following Word War II (Humes, 2006). Perhaps more important is the effect the G.I. Bill had on those veterans who obtained postwar training and education. The ability to obtain training and education in the postwar time period resulted in increased social mobility, job opportunities, and income and reduced unemployment thus saving the economy. In addition, many of the individuals who were able to obtain access to postsecondary education were from a low-SES background (Mettler, 2005). The G.I. Bill served as one of the first attempts to increase access to postsecondary education and would pave the way for passage of the Higher Education Act of 1965.

Higher Education Act of 1965

The Higher Education Act (HEA) of 1965 was a collection of federal programs designed to make college affordable for all students (Archibald, 2002). As a result of the HEA, individuals who did not have the financial means to pay for higher education were eligible for loans and grants to help pay costs associated with attending a college or university (Eaton, 1997). In its initial inception, Title IV of the HEA had four components; grants, loans, work study, and the

National Defense Student Loan Program. Of these programs grants were the most hotly

contested (Archibald).

Initially, grants were funded by the federal government and were managed by college and

university administrators. However, as higher education became viewed as more of a private

good as opposed to a public good, grants lost favor to loans (Archibald, 2002; Slaughter &

Rhoades, 2004). Today's federal financial aid programs include grants based on need (Pell

Grants), subsidized and unsubsidized loans, and work-study opportunities (U.S. Department of

Education, 2005). Significant amounts of money are made available to students through these

programs. In fiscal year 2004 approximately $70 billion in loans and grants were distributed to

students through Title IV. Of that $70 billion, roughly $14 billion were grants and $56 billion

were loans (Government Accountability Office, 2005). For many, the current financial aid

system is a viewed as a successful government program that has resulted in booming enrollments

(Eaton, 1997).

Several studies have demonstrated that as financial aid awards increase, the probability of

a student enrolling increases (Braunstein, Less, McGrath, & Pescatrice, 1998; Buss, Parker, &

Rivenburg, 2004). The number of undergraduate students attending two-year or four-year

institutions who received some form of federal aid is substantial. In the 2003-04 academic year

46.1% of all students attending a two-year or four-year institution received some form of federal

financial aid (NCES, 2005a). The correlation that can be drawn between the rising levels of

postsecondary education and passage of the HEA is difficult to deny. The number of individuals

who have accessed some level of higher education has increased 432% between the years 1965

and 2005 (U.S. Census Bureau, n.d.). However, there is substantial criticism of the current financial aid system.

One criticism of the financial aid system is that even after aid is awarded, students still have a substantial amount of unmet need (Archibald, 2002). The average total federal aid award for the 2003-04 academic year for students attending a two-year or four-year institution was $6,100 (NCES, 2005b). However, the average cost of attendance for all two-year and four-year institutions is $11,300 (NCES, 2005c), a difference of $5,200. The discrepancy between average award and average price of attendance has led some critics to conclude that the financial aid system does not adequately assist students in covering the cost of higher education (Archibald). The discrepancy between aid awarded and average price of attendance, arguably, negatively influences low SES students the most.

Despite all of the federal programs (not to mention state, institutional, and private programs) that assist students in paying for postsecondary education, low SES students still face significant burdens in financing their college education (Fitzgerald & Delaney, 2002). Low SES students are faced with the burden of repaying large loans taken out to finance their higher education. The average federal aid amount awarded to dependent students from families with incomes of $20,000 or less for the 2003-2004 academic year was $6,200. Of this $6,200, the average total amount of aid accounted for by loans was $4,300 (NCES, 2005b). The average cost of attendance was $11,300 (NCES, 2005c), a difference of $5,100. Note that the average discrepancy between what students from the lower income bracket must pay out of pocket for postsecondary education and the average discrepancy between what the average student must pay out of pocket is only $100. This is but one piece of evidence that indicates that the original

purpose of the federal financial aid program has shifted from helping financially strapped students who do not possess the means to pay for college to helping middle class students pay for college. This shift in purpose has left low SES students with fewer choices to fund a college education (Lee, 2002).

In spite of the criticisms of the current system of providing federal financial aid for postsecondary education, the current system has enabled countless individuals to pursue postsecondary education regardless of cost. Passage of the HEA marked a major step forward in ensuring access for everyone. Beginning in the 1970s an additional movement in access emerged. Starting in the 1970s, emphasis was placed on ensuring that students who were under prepared academically would not be shut out of higher education. Community colleges took center stage (Eaton, 1997).

<div align="center">Community Colleges</div>

Community colleges have played an important role in increasing access to postsecondary education (Rosenbaum, Deil-amen, & Person, 2006). First emerging at the start of the 20th century, community colleges immediately provided an alternative entry to higher education (Levinson, 2005). Much of the success of community colleges in promoting access to higher education has come as a result of open admissions policies and a strong emphasis on remediation (Ratcliff, 1994). While enrollment at four-year institutions doubled from the 1960s to the 1990s, community college enrollment increased fivefold (Bueschel, 2004). That increase has resulted in community college enrollment accounting for a significant portion of the postsecondary students enrolled in the United States. Some suggest that the rise of articulation agreements between

community colleges and four-year institutions has led to a more affordable pathway to a four-year degree (Anderson, Alfonso, & Sun, 2006).

In the 2003-04 academic year, approximately 40% of students enrolled in postsecondary education were enrolled in a community college, which translates to 7.6 million students (Horn & Nevill, 2006). Compared to students enrolled in four-year postsecondary institutions, students enrolled in community colleges are more likely to be older, from an underrepresented minority/ethnic group, female, and come from a financially disadvantaged family (Horn & Nevill).

While increasing access to higher education for academically underprepared students was significantly effected during the 1970s by community colleges, enrollments were still substantially stratified by race (Eaton, 1997). The fourth initiative that has focused on access revolves around increasing access for underrepresented students.

Affirmative Action

While passage of the G.I. Bill and the HEA of 1965 allowed many students to fund a college education and the open door access policies of community colleges provided entry to postsecondary education, many argue that none of the previously mentioned components assisted in diversifying the college going populace. The first affirmative action program in postsecondary education admissions began in 1966 and focused on increasing access for minority students (Laird, 2005).

Minority student enrollment has increased substantially since the mid-1960s, just prior to the boom in affirmative action programs. In 2005, approximately 450,000 African Americans, age 18 and 19, were enrolled in college. In 1967 approximately 141,000 African Americans age

18 and 19 were enrolled in college (U.S. Census Bureau, 2007). Education for minority groups has played a key role in overcoming oppression (Marble, 2003) and so access to higher education is extremely important. However, almost from the very start, affirmative action programs were criticized as being unconstitutional.

In *Regents v. Bakke* (1978) the United States Supreme Court established that the use of quotas was an unconstitutional admission practice. *Regents* was the first blow to affirmative action programs and remained the dominate law for more than a decade. However, in 1992 supporters of affirmative action received a boost when the United States Supreme Court ruled that diversity was an appropriate policy goal for states (*Fordice v. U.S.*, 1992). For many individuals *Fordice* was a green light for affirmative action programs. Yet the 5th Circuit Court of Appeals felt otherwise and in 1996 added confusion to the debate by ruling that diversity was not an appropriate policy goal (*Hopwood v. Texas*, 1996). The confusion generated by the *Fordice* and *Hopwood* cases left many administrators scrambling to understand what role, if any, race could play in admissions. The confusion also spread to state officials and the Virginia Attorney General at the time encouraged administrators at state supported institutions to end race conscious admission policies of any kind (*A setback for affirmative action at Virginia's state-charted colleges and universities*, 2002). Finally, in 2003, the Supreme Court decided two cases concerning the use of race as a preference in admission decisions. Both cases concerned admission to the University of Michigan, one for admission to the undergraduate program (*Gratz v. Bollinger*, 2003) and the other concerned admission to the law school (*Grutter v. Bollinger*, 2003). Collectively these decisions reaffirmed that race could be used as one of many factors

taken into consideration in the admission process. However, two issues remain in the debate over affirmative action.

The first concern is the opinion in *Grutter* (2003) where Justice O'Conner, writing for the majority, stated that in 25 years the use of race in admission decisions would no longer be needed (p. 343). Second is the backlash witnessed in some states as result of the decisions in *Gratz* (2003) and *Grutter*. In Michigan, voters passed Proposition 2 that prohibited the use of race in admission decisions (Schmidt, 2006). The attack on racial affirmative action during the last three decades have left many wondering if efforts directed toward increasing the socio-economic diversity of postsecondary enrollments would serve a better purpose. Some argue that by focusing on increasing access for students from low SES backgrounds, and broadening the concept of diversity, postsecondary institutions would become more diverse in a multitude of ways (Kahlenberg, 2004).

Statement of the Problem

In summary, low SES students face significant hurdles in gaining access to postsecondary education (Astin & Oseguera, 2004). Fewer numbers of students from low-income and low-SES families have enrolled in postsecondary education than from higher income families (Berkener & Chavez, 1997). Lagging postsecondary education enrollment rates for low SES students is of concern because individuals who have taken advantage of higher education opportunities tend to have increased earning potential, contribute more to society, and have greater levels of social mobility (Bowen et al., 2005; U.S. Census Bureu, 2006). During the past 60 years several initiatives have focused on increasing access to postsecondary education (Eaton, 1997).

The G. I. Bill was the first major initiative to increase access and resulted in an enrollment boom that fueled the postwar economy (Humes, 2006). Following the G.I. Bill, the HEA of 1965 was designed to serve as a way for all individuals, regardless of income, to pay for college (Eaton, 1997). However, the initial grant programs gave way to loans (Archibald, 2002; Slaughter & Rhoades, 2004) and currently students from low SES backgrounds face difficultly in financing their education (Fitzgerald & Delaney, 2002). The problem of low SES students financing their education is exacerbated by the shift in federal financial aid programs from focusing on financially disadvantaged students to focusing on students from middle-income families (Lee, 2002).

Meanwhile, the community college system has provided an entry path for many students to postsecondary education (Anderson et al., 2006). As a result, enrollment rates in community colleges ballooned between the 1960s and 1990s (Bueschel, 2004) and these community college students are more likely to be from a low SES background (Horn & Nevill, 2006). Finally, affirmative action programs emerged in the 1960s (Laird, 2005) as a way to increase minority enrollment, but have come under substantial legal attacks and may not be legally defensible in the future. Focusing on increasing economic diversity in postsecondary education, however, may be one way to achieve diversity goals (Kahlenberg, 2004).

While access has garnered attention in recent years, additional work is needed in the area of access for low SES students. Enrollment rates for low SES students still lag significantly behind the enrollment rates of students from higher SES brackets (Berkener & Chavez, 1997). If low SES student enrollment rates are to increase, additional research is needed that focuses on the habits and qualities of those students who enroll. More specific focus must be placed on

examining the distinctions between those low SES students who enrolled in postsecondary education versus those students who did not enroll in higher education. Research that focuses on the predictors of enrollment in postsecondary education for low SES students is crucial to those individuals concerned with increasing enrollment of students from low SES backgrounds. Previous research has focused on measures of social capital and student background characteristics associated with enrollment in postsecondary education. However, most authors have focused research on all students, regardless of socio-economic background. Extending this work to students from low SES backgrounds will aid researchers, policy-makers, and administrators in better understanding the college enrollment process for students from low SES backgrounds. Of particular interest for this study was whether social relationships and the exchange of information, conceptualized through the theory of social capital, figure prominently in the enrollment process for students from low SES backgrounds.

<center>Conceptual Framework</center>

The conceptual framework for this study is comprised of elements of social capital, student background characteristics that previous research has indentified as being related to enrollment in postsecondary education, and the education production function. The conceptual framework for this study is informed through the work of Perna (2000), Perna & Titus (2005), and Rowan-Kenyon (2007) who all used measures of social capital to study enrollment in higher education.

Social Capital

In the last 20 years the concept of social capital has garnered increasing attention from researchers in a variety of settings. It is the wealth of uses and applications of social capital that

has resulted in some difficulty in crafting an exact definition (Grootaert & Van Bastelaer, 2002). Grootaert and Van Bastelaer suggest that social capital refers to those "…institutions, relationships, attitudes, and values that govern interactions among people and contribute to economic and social development" (p. 2). Still another view of social capital is simply that "…relationships matter" (Field, 2003, p. 1). It is these relationships, both simple peer-based relationships and more complex societal relationships that encourage individuals to achieve goals (Field; Grootaert & Van Bastelaer). The achievement of goals is a critical component of social capital; social capital facilitates individual action. The origins of social capital are rooted in an attempt to combine the sociological and economic views of drivers of individual action (Coleman, 1988).

Social capital was originally developed as a "…conceptual tool…" proposed by Coleman (1988, p. S96) that combined two classical approaches to human behavior. One view was the sociological view of individual action, where people pursued actions based on social systems and the norms that developed around them. Another approach was the economic model that held that individual action was based on benefit maximization and goals were developed largely independent of social systems. Pulling elements from both of these traditions, Coleman's conception of social capital is based around three forms; "…obligations and expectations…" (p. S119), the exchange of information, and social norms.

When discussing obligations and expectations, Coleman (1988) is referring to the obligations that one individual owes to another or an expectation that one person has of another. Trust figures prominently in this process and in social systems where trust is absent, the concept of obligations and expectations tend to erode. The second form of social capital, the exchange of

information, focuses on the role social relationships play in acquiring information. Coleman argues that relationships with others allow for the collection of information and for individuals to be better informed. Since holding information is a significant variable in individual action, the exchange of information from one party to another allows this form of social capital to facilitate action. The final form of social capital, normative behavior, refers to what is considered acceptable by others. These norms have the ability to influence behavior in one direction or another (Coleman).

Each of these three forms of social capital not only encourages specific action, but "…constrains others" (Coleman, 1988, p. S105). Lin (2001) suggests that social capital works because social capital enables information exchange, because social capital is normative (and normative culture exerts pressure on individuals to make certain decisions), because social capital reflects status and the ability to obtain information, and because social capital "reinforces" certain behavior (p. 7). Social capital has been used in a variety of disciplines including education to explain educational outcomes (Dika & Singh, 2002); including investigations into enrollment in postsecondary education.

Perna (2000) employed social and cultural capital as two pieces of a conceptual framework that also utilized a traditional econometric approach to predict the likelihood of enrolling in postsecondary education. The inclusion of both social and cultural capital variables improved the explanatory power of the model. Rowan-Kenyon (2007) examined the predictive power of measures of social capital, human capital, cultural capital, financial resources, and background characteristics as predictors of delayed college enrollment. The measures of social capital that proved significant included parental involvement in education and high school

support. Rowan-Kenyon's finding that parental involvement influenced enrollment in postsecondary education supported the findings of Perna and Titus (2005) who found parental involvement, a form of social capital, played a significant role in the decision to attend postsecondary education.

Ceja (2006) extended measures of social capital to include the involvement of siblings as well as parents. Results of the study indicate that having a sibling who attended college increased the level of information a student was able to obtain about the college going process. For my study, social capital was defined as parents' expectations regarding postsecondary education, involvement of parents in their students' education, and sources of information accessed about attending postsecondary education.

While the influence of social capital on the decision to enroll in postsecondary education was the focus of this study, previous research has shown that other variables are related to the postsecondary education enrollment behavior of students. To create a conceptual framework that was as comprehensive as possible, student background characteristics associated with the college going process were included.

Student Background Characteristics

Previous research examining enrollment in higher education has concluded that a number of student background characteristics are related to a student's decision to enroll in a college or university. Of importance for the current study were a student's academic achievement and preparation, parents' education level, gender, and race.

For example, Perna and Titus (2005) and Rowan-Kenyon (2007) measured academic achievement and academic preparation by using a standardized score of math and reading ability,

and the highest level of math a student had taken in high school. Each of those authors concluded that higher levels of academic ability and achievement are positively related to enrollment in postsecondary education.

In terms of parents' education level, several studies have found that students whose parents attended or completed college are more likely to pursue an education after high school (Hossler & Vesper, 1993; Kim & Schneider, 2005; Stage & Hossler, 1989; Perna, 2000; Perna & Titus, 2005). Similarly, gender and race are also associated with likelihood of attending a college; women and Caucasian students are the most likely to enroll in postsecondary education when other factors are not taken into account (Perna, 2000).

Education Production Function

The educational production function is one way to examine the influence of educational inputs on educational outputs (Cohen & Geske, 1990; Hanushek; 1987). The concept of the educational production function is similar to other production functions in that outputs are theorized as being influenced by inputs (Cohn & Geske). The outputs in the educational production function are normally student-level indicators of performance. For instance, two common outputs used in educational production functions are scores on standardized tests and the employability of students (Hanushek). Inputs can take the form of both individual and school level variables.

Inputs in educational production functions can be conceptualized as being comprised of school and nonschool inputs. School inputs include such items as level of school funding, teacher education, and teacher pay. Nonschool inputs include community characteristic, peer influence, and student socioeconomic status (Cohn & Geske, 1990). Most research tends to use regression

analysis in testing educational production functions (Hanushek, 1987). For my study the inputs in the educational production function were defined as two conceptual or environmental variables: mean school SES and school locale. The output of the educational production function was defined as enrollment in postsecondary education.

<center>Purpose Statement</center>

The purpose of this study was to examine if measures of social capital are related to enrollment in postsecondary education for low SES students from the sophomore high school class of 2002, when controlling for contextual or environmental variables and student background characteristics. Data for this study came from the Education Longitudinal Survey (ELS) of 2002 second follow-up conducted by the National Center for Education Statistics (NCES). A low SES student was defined as a student coming from a family with an SES in the lowest quartile of the sample. Social capital was defined as parents' expectations regarding postsecondary education, involvement of parents in their students' education, and sources of information accessed about attending postsecondary education. I used two contextual or environmental variables: mean school SES and school locale. Mean school SES was defined as the mean student socioeconomic status of a school. School locale was defined as the locale of the school and will take the form of either a rural, suburban, or urban environment. Student background characteristics were defined as the academic preparation (operationalized as highest level of math taken), academic achievement (operationalized as the student's score on math and reading standardized tests), parents' education level, gender, and race. Enrollment in postsecondary education was defined as enrollment in at least one institution of postsecondary education. The research questions for this study were:

1. Does probability of enrollment in a four-year postsecondary institution for low SES students differ by mean school SES?

2. Does probability of enrollment in a four-year postsecondary institution for low SES students differ by school locale?

3. When controlling for contextual or environmental variables and student background characteristics, are low SES students with higher levels of social capital more likely to enroll in a four-year postsecondary institution than low SES students with lower levels of social capital?

4. When controlling for contextual or environmental variables, background characteristics, and level of social capital, does probability of enrollment in a four-year institution of postsecondary education vary by race for low SES students?

5. Does probability of enrollment in a two-year postsecondary institution for low SES students differ by mean school SES?

6. Does probability of enrollment in a two-year postsecondary institution for low SES students differ by school locale?

7. When controlling for contextual or environmental variables and student background characteristics, are low SES students with higher levels of social capital more likely to enroll in a two-year postsecondary institution than low SES students with lower levels of social capital?

8. When controlling for contextual or environmental variables, background characteristics, and level of social capital, does probability of enrollment in a two-year institution of postsecondary education vary by race for low SES students?

This study was unique from previous studies in three important ways. First, I used new data, released in the fall of 2007, on the high school sophomore class of 2002. These data were drawn from the most recent nationally representative dataset that could be used to examine enrollment in postsecondary education. Second, my study examined enrollment in postsecondary education for only low SES students. Most previous studies have focused on all students, regardless of socioeconomic background. Third, my study used multilevel analysis that will include contextual or environmental variables. This is significant because most previous studies have used a single level of analysis. The use of a multilevel analysis allowed for an understanding of whether contextual or environmental variables influence the enrollment decision of low SES students.

Significance

This research has significance for practice, policy, and research. First, school administrators will be able to use this information to determine if mean school SES or school locale influences enrollment in postsecondary education for students from low SES backgrounds. Better understanding how school-level variables may influence students from low SES backgrounds can assist administrators in either capitalizing on the effect or mitigating the effect of these school-level variables.

Second, high school guidance counselors and others concerned with assisting students in enrolling in postsecondary education institutions will be able to use the information from this

study to assist low SES students. Having an understanding of how social capital predicts enrollment for students from low SES backgrounds will enable high school guidance counselors to more effectively reach the low SES population.

Third, individuals working with pre-college initiatives will also benefit from this study. This study examined social capital as a predictor of enrollment in post-secondary education. Pre-college initiatives, such as Gear Up and Upward Bound, focus on students from low SES backgrounds. As a result of this study administrators of pre-college programs will be able to determine if social relationships influence enrollment decisions.

This study also informs policy. Policy-makers who are concerned with access to post-secondary education will be able to use the results of this study to create new policy. While previous research has demonstrated that higher levels of social capital result in a higher likelihood of enrollment in postsecondary education (Perna, 2000; Perna & Titus, 2005; Rowan-Kenyon, 2007), the influence of social capital for students from low SES backgrounds is not completely understood. Identifying the strength of relationship between measures of social capital and enrollment in postsecondary education for students from low SES backgrounds will aid in creating policy directed toward boosting enrollment in postsecondary education.

Second, policy-makers concerned with achieving a broader socioeconomic representation in post-secondary education institutions will also find this research useful. With the favor of affirmative action declining in American society, accomplishing socioeconomic diversity in postsecondary education may be an effective way of reaching racial diversity among enrolled students.

Third, policy-makers concerned with improving economic upward mobility of low SES students will find this research useful. It is well established that as education level increases so does social and economic mobility. This study reports the relationship between social capital and enrollment of low SES students; increasing low SES students' access to postsecondary education is the first step in increasing education levels of low SES students.

This study has significance for future research studies as well. First, this study examined social capital as a predictor of enrollment in postsecondary education for low SES students. Other future studies may look at other measures of social capital. Social capital takes a number of forms. Operationalizing social capital in other manners will provide additional insight into the role that social capital, in all its forms, has in the enrollment process. For instance, future research may focus on the influence of peer groups on a low SES student's decision to enroll in postsecondary education.

Second, this study examined social capital as a predictor of enrollment in postsecondary education for low SES students, when controlling for contextual or environmental variables and student background characteristics. A future study may replicate this study and look at all students, not just students from a low SES background.

Third, this study was based on quantitative analysis. A future study may employ a qualitative paradigm. Qualitative inquiry may yield results that are not easily attained through quantitative procedures

<div align="center">Delimitations</div>

This study used a national dataset. As a result, there were several delimitations. First, in some instances data were imputed. NCES staff members who manage the ELS database impute

data and perturb the data for a variety of reasons. While care was taken to ensure the imputed and perturbed data do not disrupt the data, this is still a limitation.

Second, the measure of income was not always reported by the parent. In some cases the student may have been relied upon to supply income information. Some students may not have an accurate understanding of their parents' income. Since income is one component of computing a student's SES, an inaccurate reporting of a parents' income may result in an inaccurate representation of a student's SES.

Third, the measures used in this study are proxies for social capital. Using different measures or different forms of the same measures for these constructs may result in different findings.

<div align="center">Organization of the Study</div>

This study is organized around five chapters. Chapter One provides a description of the study. Chapter Two provides a review of the literature that concerns the study. Chapter Three outlines the methodology used for the study. Chapters Four and Five are each one article. The first article (Chapter Four) was submitted to *Research in Higher Education* and addresses the research questions:

1. Does probability of enrollment in a four-year postsecondary institution for low SES students differ by mean school SES?

2. Does probability of enrollment in a four-year postsecondary institution for low SES students differ by school locale?

3. When controlling for contextual or environmental variables and student background characteristics, are low SES students with higher levels of social

capital more likely to enroll in a four-year postsecondary institution than low SES students with lower levels of social capital?

4. When controlling for contextual or environmental variables, background characteristics, and level of social capital does probability of enrollment in a four-year institution of postsecondary education vary by race for low SES students?

The second article (Chapter Five) was submitted to the *Journal of Applied Research in the Community College* and addresses the research questions:

1. Does probability of enrollment in a two-year postsecondary institution for low SES students differ by mean school SES?

2. Does probability of enrollment in a two-year postsecondary institution for low SES students differ by school locale?

3. When controlling for contextual or environmental variables and student background characteristics, are low SES students with higher levels of social capital more likely to enroll in a two-year postsecondary institution than low SES students with lower levels of social capital?

4. When controlling for contextual or environmental variables, background characteristics, and level of social capital does probability of enrollment in a two-year institution of postsecondary education vary by race for low SES students?

Chapter 2

Review of the Literature

This chapter reviews the literature relevant to my study and is organized around the variables used in the study. First, I review literature that examines social capital and enrollment in postsecondary education. Second, I review literature that focuses on the contextual or environmental variables I will be using in this study. Third, I review literature related to the student background characteristics used in this study and enrollment in higher education. Fourth, I review literature on low SES students and enrollment in colleges and universities. I conclude this chapter by discussing how my study is different from previous research studies.

Social Capital

For this study, social capital was defined as parents' expectations regarding postsecondary education, involvement of parents in their students' education, and sources of information accessed about attending postsecondary education. Social capital has been used to examine a variety of issues in education (Dika & Singh, 2002) including issues pertaining to enrollment in higher education. Some have suggested that social capital theory should be incorporated in models predicting enrollment in a college or university (Perna, 2000). Several studies have shown that parental involvement, parents' expectations regarding education, and access to information influence the enrollment decision of students (Ceja, 2006; Conklin & Dailey, 1981; Hossler & Stage 1992; Kim & Schneider, 2005; King, 1996; Perna, 2000; Perna & Titus, 2005; Plank & Jordan, 2001; Rowan-Kenyon, 2007; Stage & Hossler, 1989). A number of these studies' findings are based on the National Educational Longitudinal Survey (NELS), which is a precursor to the Educational Longitudinal Study.

The amount of information and guidance a student receives seems to influence a student's likelihood of enrolling in postsecondary education. Results of one study indicate that when parents and school officials discuss higher education plans with students, the influence of SES on enrollment is mitigated. Further, students who obtain information about and take admission tests (i.e. SAT/ACT) increase their likelihood of enrolling in a college or university (Plank & Jordan, 2001).

Similarly, there is a relationship between parental involvement in a student's education and enrollment in postsecondary education. Analysis of the NELS data set showed that after accounting for the influence of economic measures and forms of cultural and human capital, parental involvement figured prominently in the decision to enroll in higher education (Perna & Titus, 2005).

Other research using the NELS dataset concluded that measures of social and cultural capital increase the explanatory power of a traditional econometric model. While the measures of social and cultural capital were not delineated from each other, the measures of social and cultural capital included variables addressing the quality and characteristics of a student's high school, parent involvement in a student's education, parent education, parent encouragement, peer encouragement, and information and tools used to prepare for college entrance exams (Perna, 2000).

An additional investigation into the relationship between parental expectations and enrollment in a college or university, found parent education was not significant in determining enrollment in two-year versus four-year institutions. Alignment between parents' and students' higher education expectations was also examined in this study, and it was found that alignment

of parent and student education expectations was important to the enrollment process (Kim & Schneider, 2005).

While all of the previously mentioned studies using the NELS dataset have demonstrated the connection between measures of social capital and enrollment in postsecondary education, an additional study found contradictory results. Rowan-Kenyon (2007) examined the influence of background characteristics, financial capital, human capital, cultural capital, and social capital on delayed enrollment (enrolling immediately after graduation versus later or not at all) in postsecondary education using the NELS dataset. Rowan-Kenyon used several measures of social capital including: number of financial aid contacts, parent involvement in student's education, the number of other parents with whom parents talk, student-teacher relations, support from high school, high school control, and high school participation in free or reduced lunch. Of these measures of social capital, only the number of financial aid contacts and parent involvement were related to enrollment timing when other variables in the study were held constant. While a number of studies have used the NELS dataset to investigate enrollment in postsecondary education, additional work has been completed using other sources of information.

In a study examining the influence of a variety of family characteristics (such as family income, parents' education, and parent expectations regarding higher education) on ninth grader's plans for postsecondary education, parents' expectations had the largest influence on a student's education plans post high school (Stage & Hossler, 1989). These findings were confirmed by at least one additional study (Hossler & Stage, 1992).

A study involving 1,686 participants found that consistency in regard to parent expectations toward higher education matters. Students whose parents consistently communicated their expectations regarding higher education were more likely to enroll in a four-year institution. In addition, students with a higher parental expectation score in the 12th grade year were more likely to pursue higher education (Conklin & Daily, 1981).

Previous research has also found a relationship between access to information and enrollment in postsecondary education. In a study of 300 low-income students the availability of information was an important component of the college going process for the students studied. School counselors were found to be a vital source of information for low-income students, and 70% of the low-income students found their parents to be helpful in making decisions concerning their educational plans after high school (King, 1996).

Research employing qualitative techniques has also found a relationship between amount of social capital and enrollment in higher education. In a study of 20 Chicana students, it was discovered that both parents and siblings can assist a student in the decision to attend postsecondary education. Individuals who had attended postsecondary education provided valuable information to their siblings about the college enrollment process (Ceja, 2006).

<center>Contextual or Environmental Variables</center>

I defined contextual or environmental variables as mean school SES and school locale. Mean school SES was defined as the mean student socioeconomic status of a school. School locale was defined as the locale of the school and takes the form of either a rural, suburban, or urban environment.

School Mean SES

From a search of the literature on school effects it seems that since the 1970s few studies have examined the relationship between mean school SES and enrollment in postsecondary education. Studies that have examined mean school SES and enrollment arrive at contrary conclusions, and most suffer from methodological problems in the treatment of school level variables.

A review of the literature on school effects concluded that mean school SES has almost no effect on enrollment in postsecondary education (Mayer & Jencks, 1989). However, several authors have concluded that enrollment in postsecondary education does vary by mean school SES. For instance, data from 1966 showed that mean school SES did influence postsecondary education plans of students. Data from 6,000 students were analyzed and results showed that school SES was closely related to both intent to enroll in postsecondary education and actually enrolling in postsecondary education (Hansen, Gold, & Labovitz, 1972).

A similar finding was reached in an analysis of data from 6,294 students, also from San Diego. Results of this study showed that high school SES slightly influences college aspirations and enrollment (Labovitz, 1974). Data from the National Longitudinal Study of the High School Class of 1972 were used to examine the effect of school SES on the college going behavior of African Americans and Caucasians. Results of this study showed that attending a high SES school had a larger positive effect on an African American student's likelihood to enroll in postsecondary education than a Caucasian student (Thorton & Eckland, 1980).

There are two complications that come with the previously mentioned findings. First, a relationship exists between the SES of a student's neighborhood and their propensity to enroll in

postsecondary education (Datcher, 1982). One author concluded that significant amounts of variance in earnings and education were accounted for by the SES of the neighborhood in which an individual grew up (Datcher). Since school enrollments tend to mirror neighborhood compositions it is difficult to separate differences due to neighborhood characteristics from differences due to school characteristics (Alexander, Fennessey, McDill, & D'Amico 1979). Second, there is also a relationship between mean school SES and the academic characteristics that make one likely to enroll in postsecondary education (Jones, Vanfossen, & Ensminger, 1995; Labovitz, 1974).

For example, high school SES influences other variables (like GPA and IQ) which significantly influence college enrollment (Labovitz, 1974). Additionally, a school's mean SES influences academic track and academic track influences educational attainment (Jones et al., 1995).

As mentioned previously, there is support in the literature for the claim that the influence of a school's mean SES on postsecondary education enrollment is negligible. In a study of approximately 3,050 students from 18 schools, school SES did not influence educational plans of students (Alexander et al., 1979). The most compelling aspect of this study, for which all previously mentioned studies do not account, was the use of multilevel analysis techniques. Multilevel analysis techniques allow for the proper treatment of school level variables (Raudenbush & Bryk, 2002). The findings of the Alexander and colleagues study confirmed the findings of Neilson (1972). In Neilson's study of more than 17,000 students in Minnesota, school SES had little influence on educational aspirations.

School Locale

Rural students still lag behind their urban and suburban counterparts in terms of enrollment in postsecondary education. In part this lag may be due to rural students being less academically prepared to enroll in college than students from more urban areas (Gibbs, 2000). However, in recent years achievement scores for students from rural areas have increased substantially (Gibbs), so the trend may begin to wane. Nonetheless, a lower percentage of students from rural areas hold undergraduate degrees.

An analysis of 9,000 students, initially sampled in 1979 when the students were age 14 to 21, showed that by the time the respondents were 25, 48% of the rural students had enrolled in college. This compared to 56% of students from an urban setting (Gibbs, 1998, p. 63). One explanation for lower postsecondary education enrollment among rural students is due to less rigorous course offerings in high school. Less rigorous classes in high school result in less preparation for college-level work.

Using the 1987-88 Schools and Staffing Survey, Ballou and Podgursky (1998) showed that fewer advanced classes were offered in rural schools and fewer students enrolled in college preparatory programs than students in more urban areas. Ballou and Podgursky's findings have been supported by other researchers as well (Greenberg & Teixeiara, 1998).

While enrollment rates of rural students lag behind the enrollment rates of students from more urban areas, completion rates of those students who do enroll are consistent regardless of high school locale (Gibbs, 1998). Therefore, the lagging postsecondary attainment rates for the rural populace have more to do with enrollment as opposed to persistence (Gibbs). Some

researchers have examined the educational aspirations of students in an attempt to understand the lagging enrollment rate.

For instance, an examination of the postsecondary education plans of 491 rural 10th and 12th grade Ohio students found that 36% of them "…definitely would attend college" (p. 19) and 26% "…thought college attendance would be likely" (Odell, 1988, p. 19). Meanwhile, rural female students were more likely to aspire to higher education than rural male students (Odell, 1989).

Other researchers have examined the difference in postsecondary education plans of rural students compared to their more urban counterparts. Cobb, McIntire, and Pratt (1989) used the High School and Beyond (HSB) 1980 dataset to examine the educational aspirations of rural youth compared to suburban and urban youth. Results showed that youth from rural areas value their jobs more than school (p. 12). At the same time, youth from rural areas did not desire to go to college as frequently as youth from suburban and urban areas (p. 13). There also was a difference in confidence level observed where youth from rural areas were not as confident in their ability to complete college as suburban and urban youth (p. 13). Finally, youth from rural areas report more frequently than youth from suburban and urban areas that their guidance counselors and teachers did not believe they should go to college (p. 13). Additional work using the HSB dataset found that rural students indicated they would be more satisfied with lower levels of education than students from suburban or urban settings (Hansen & McIntire, 1986).

While the previously mentioned studies based on data collected in 1980 demonstrated a significant difference in educational aspirations of rural youth compared to suburban or urban youth, an additional study reports a conflicting finding. In this study the NELS dataset was

examined and evidence pointed to no significant difference in the educational aspirations of rural, suburban, and urban youth (Paasch & Swaim, 1998).

<div align="center">Student Background Characteristics</div>

I defined student background characteristics in this study as the academic preparation (operationalized as highest math taken in high school), academic achievement (operationalized as a student's score on standardized math and reading tests), parents' education level, gender, and race. Several researchers have demonstrated a link between academic preparation, academic achievement, and enrollment in postsecondary education. Most recently, a study found that academic achievement and highest level of math taken were related to enrolling in higher education (Rowan-Kenyon, 2007). These findings are consistent with a large body of research that has demonstrated across time that academic achievement matters when it comes to enrollment in a college or university.

For instance, one study found that academic aptitude is an important determinant of educational achievement. Using a sample drawn from the sophomore class of 1955, researchers discovered that academic achievement accounted for more than 12% of the variance in educational attainment (Alexander, Eckland, & Griffin, 1975). Similarly, in a study of 2,000 males who had attended one of 87 high schools, academic achievement was found to be a large and significant predictor of educational attainment (Wilson & Portes, 1975). The findings of these two studies are repeated in other research conducted through the 1980s, 1990s, and early 2000s.

In a study using a national dataset to study enrollment in college, academic achievement, measured by both standardized test scores and grade point average, was a significant predictor of

college enrollment (Jackson, 1990). Analysis of a nationally representative dataset of the high school class of 1972 and 1980 discovered that academic preparation and achievement were significant factors associated with enrollment in postsecondary education (Alexander, Pallas, & Holupka, 1987). Another study examining data from the high school class of 1972 found that SAT scores were related to college attendance (Kane & Spizman, 1994). The higher the SAT score the more likely the student was to enroll in college. Additional work using data from the high school class of 1972 demonstrated that academic preparation and achievement account for as much as 21% of the variance in enrollment in postsecondary education (Thomas, Alexander, & Eckland, 1979).

Analysis of the NELS dataset concluded that more academically prepared students had enrolled in higher education two years after high school graduation at a higher rate than those students who were not as academically prepared (Berkner & Chavez, 1997). It has also been found that high achieving students were more likely to apply to more competitive institutions than lower achieving students (Hurtado, Inkelas, Briggs, & Rhee, 1997).

A study of 300 low-income students found that academic preparation and academic confidence were related to enrollment in college (King, 1996). A separate study discovered that standardized test scores and academic preparation were related to increased odds of enrolling in four-year institutions for Caucasian, African American, and Hispanic students (Perna, 2000). A multilevel modeling analysis found that highest level of math and academic achievement were significant predictors of both enrollment in two-year and four-year institutions (Perna & Titus, 2005). In an analysis of timing of enrollment, academic achievement and preparation were tied to enrollment timing (Rowan-Kenyon, 2007). Students with lower test scores had higher odds of

not enrolling in postsecondary education. Students who had completed higher levels of math were more likely to have enrolled in a college or university than those students who had not completed higher levels of math (Rowan-Kenyon, 2007).

In addition to the relationship between highest math taken and enrollment in higher education, a number of studies have concluded that parents' education level is related to enrollment in postsecondary education. For instance, a study of the NELS dataset found that parents' education level was tied to college enrollment. The higher the level of parents' education the more likely the student is to enroll (Kim & Schneider, 2005).

Separate research found that both the father's and mother's education level had a significant influence on a student's postsecondary education plans. This study consisted of 1,421 students and parents, and while the educational level of both parents proved to be significant predictors of enrollment, the educational level of fathers had a stronger positive influence on a student's educational plans after high school than mothers' education level (Stage & Hossler, 1989). Another researcher concluded that parents' education level, while important, is less important for Hispanics than African American and Caucasian students in predicting enrollment in college (Perna, 2000). Furthermore, in a multilevel analysis of the NELS dataset, higher parent education levels were positively related to enrollment in postsecondary education (Perna & Titus, 2005).

<div align="center">Low SES Students</div>

Several studies examining models of enrollment have included SES, or in some cases income level, as predictors of enrollment. These studies have found, over time that SES and income are significant predictors of enrollment in postsecondary education. For instance, in a

sample drawn from the National Longitudinal Study of the High School Class of 1972 examining enrollment trends, income was a significant predictor of enrollment in postsecondary education for African American students. It was suggested that the gap in enrollment patterns between African Americans and Caucasian students was due in part to a lack of parent income (Kane & Spizman, 1994). Other research found that while income is a significant predictor of enrollment in college, once cost, perceived benefits of higher education, and parent income were accounted for there was no statistically significant difference in likelihood of enrollment between African American and Caucasian students (Perna, 2000). Additional work found that once race and gender were accounted for, SES proved to be a significant predictor of enrollment in postsecondary education (Rowan-Kenyon, 2007). A separate study found family income to be a significant predictor of enrollment in both two and four-year institutions (Perna & Titus, 2005).

Moreover, students from low SES backgrounds are more likely to have characteristics associated with declining likelihood of enrolling in postsecondary education (Cabrera & La Nasa, 2001). Eighth graders from the lowest SES were 35% "…less likely to develop postsecondary plans than their upper…SES counterparts" (Cabrera & La Nasa, p. 136). It has also been demonstrated that regardless of academic achievement, students from a lower SES were less likely to enroll in postsecondary education than students from a higher SES (Plank & Jordan, 2001).

Low-income and low SES students, even those that are sufficiently academically prepared, enroll in postsecondary education at rates lower than students from higher incomes (Fitzgerald & Delaney, 2002; Lee, 2002). Low-income students are more likely to enroll in two-year institutions than higher income students (Berkner & Chavez, 1997), and low-income and

low SES students tend to enroll in less selective institutions (Astin & Oseguera, 2004; Hearn, 1991; Karen, 2002; Lee, 2002).

The majority of studies on low-income students and enrollment in postsecondary education focus on the financial issues associated with attending higher education. These studies have demonstrated, across time that low-income students are more susceptible to changes in tuition and financial aid than students from higher income groups (Heller, 1997; Leslie & Brinkman, 1987).

One of the most oft cited works is by Leslie and Brinkman (1987) who reviewed 25 works focusing on price response in higher education. Synthesizing the findings and standardizing the results, Leslie and Brinkman concluded that each of the studies determined that as price increases enrollment demand decreases. They concluded that for every $100 increase in tuition, enrollment would decrease three-fourths of a percentage point. Furthermore, the studies reviewed across time demonstrated that low-income students tended to be more sensitive to price changes than higher income students. In 1997, Heller provided an update to Leslie and Brinkman by reviewing 20 works published after Leslie and Brinkman's review. Heller concluded that these studies continue to support the finding that low-income students are more responsive to changes in price.

The susceptibility of low-income students to changes in tuition and financial aid might be due in part to the characteristics of low-income families. One study examining low-income student enrollment found that low-income students were more likely to come from single parent families that have more children, and have limited financial resources (Lee, 2002).

Summary

In summary, measures of social capital influence the postsecondary education enrollment decision of students. As parents discuss expectations regarding postsecondary education, as parents become more involved in their child's education, and as students gain access to sources of information about postsecondary education their probability of enrolling increases (Ceja, 2006; Conklin & Dailey, 1981; Hossler & Stage 1992; Kim & Schneider, 2005; King, 1996; Perna, 2000; Perna & Titus, 2005; Plank & Jordan, 2001; Rowan-Kenyon, 2007; Stage & Hossler, 1989).

There seems to be significant disagreement concerning the influence of mean school SES on a student's likelihood to enroll in postsecondary education. Some authors have concluded that mean school SES does influence a student's likelihood to enroll in postsecondary education (Hansen et al., 1972; Labovitz, 1974; Thorton & Eckland, 1980). Meanwhile, other authors have concluded that mean school SES has little influence on a student's likelihood to enroll in postsecondary education (Alexander et al., 1979; Mayer & Jencks, 1989; Neilson, 1972).

Postsecondary education enrollment rates vary by locale (Gibbs, 2000). Students from rural areas are less likely to enroll in postsecondary education (Gibbs, 1998). This may be due in part to fewer advanced class offerings in rural schools (Ballou & Podgursky, 1998; Greenberg & Teixeiara, 1998). In addition, the lagging postsecondary education enrollment rates may also be due to rural students having lower expectations regarding higher education (Cobb et al., 1989; Hansen & McIntire, 1986)

Academic achievement and preparation are significant components of postsecondary education enrollment models. More academically prepared and higher achieving students are

more likely to enroll in postsecondary education (Alexander et al., 1987; Alexander et. al, 1975; Berkner & Chavez, 1997; Jackson, 1990; King, 1996; Perna, 2000; Perna & Titus, 2005; Thomas et al., 1979; Rowan-Kenyon, 2007; Wilson & Portes, 1975). Furthermore, parent education is positively related to enrollment in postsecondary education (Hossler & Vesper, 1993; Kim & Schneider, 2005; Perna, 2000; Perna & Titus, 2005; Stage & Hossler, 1989). Finally, low-income and low SES students are less likely to enroll in postsecondary education than students from families with higher incomes and SES (Cabrera & La Nasa, 2001; Fitzgerald & Delany, 2002; Kane & Spizman, 1994; Lee, 2002; Perna, 2000; Perna & Titus, 2005, Plank & Jordan, 2001; Rowan-Kenyon, 2007). No studies I identified investigated measures of social capital as a predictor of enrollment in postsecondary education for low SES students when contextual or environmental variables and student background characteristics are controlled. This study was unique from previous studies in this and several other ways.

My study focused on only low SES students. Most previous studies examining measures of social capital in enrollment in postsecondary education have focused on all students. My study also controlled for environmental contextual variables, defined as mean school SES and school locale, which previous studies using measures of social capital have not done. In addition, previous studies examining the influence of mean school SES on enrollment in postsecondary education and school locale suffer methodological problems by using only a single level of analysis. My study accounted for this by employing hierarchical linear modeling. In addition, I was unable to identify any study that looked at school locale in any meaningful way. Rather, the studies I identified employed a primarily descriptive methodology. Finally, the data I used for

my study came from the ELS 2002 second follow-up. The ELS 2002 second follow-up is a new

dataset, released in the fall of 2007 and has not yet been studied.

Chapter 3

Methodology

The purpose of this study was to examine whether measures of social capital are related to enrollment in postsecondary education for low SES students from the sophomore high school class of 2002, when controlling for contextual or environmental variables and student background characteristics. Data for this study came from the Education Longitudinal Survey (ELS) of 2002 second follow-up conducted by the National Center for Education Statistics (NCES). A low SES student was defined as a student coming from a family with an SES in the lowest quartile of the sample. Social capital was defined as parents' expectations regarding postsecondary education, involvement of parents in their students' education, and sources of information accessed about attending postsecondary education. I used two contextual or environmental variables: mean school SES and school locale. Mean school SES was defined as the mean student socioeconomic status of a school. School locale was defined as the locale of the school and took the form of either a rural, suburban, or urban environment. Student background characteristics were defined as academic preparation (operationalized as highest level of math taken), academic achievement (operationalized as the student's score on math and reading standardized tests), parents' education level, gender, and race. Enrollment in postsecondary education was defined as enrollment in at least one institution of postsecondary education. The research questions for this study were:

1. Does probability of enrollment in a four-year postsecondary institution for low SES students differ by mean school SES?

2. Does probability of enrollment in a four-year postsecondary institution for low SES students differ by school locale?

3. When controlling for contextual or environmental variables and student background characteristics, are low SES students with higher levels of social capital more likely to enroll in a four-year postsecondary institution than low SES students with lower levels of social capital?

4. When controlling for contextual or environmental variables, background characteristics, and level of social capital does probability of enrollment in a four-year institution of postsecondary education vary by race for low SES students?

5. Does probability of enrollment in a two-year postsecondary institution for low SES students differ by mean school SES?

6. Does probability of enrollment in a two-year postsecondary institution for low SES students differ by school locale?

7. When controlling for contextual or environmental variables and student background characteristics, are low SES students with higher levels of social capital more likely to enroll in a two-year postsecondary institution than low SES students with lower levels of social capital?

8. When controlling for contextual or environmental variables, background characteristics, and level of social capital does probability of enrollment in a two-year institution of postsecondary education vary by race for low SES students?

This chapter describes the data analysis plan for this study. First. I provide a description of the dataset used for this study. Second, I discuss the variables used in this study. Third, I

discuss the data analysis plan. In Chapter One I indicated that the results of this study take the form of two articles. The first article addressed research questions one, two, three, and four. The second article addressed research questions five, six, seven, and eight. I conclude this chapter by discussing the journals to which I submitted each article.

Educational Longitudinal Study of 2002

The data for this study came from the ELS 2002 second follow-up. ELS 2002 is coordinated by staff members at the National Center for Educational Statistics (NCES). NCES staff members manage a variety of datasets that focus on education at all levels in the United States. ELS 2002 is the fourth survey program in a group of surveys that began in 1972. All four surveys are longitudinal, tracking a cohort of students through their high school career and as they enter the workforce or postsecondary education (Ingels et al., 2007).

The initial ELS 2002 base-year sample was comprised of high school sophomores in 2002. Students, parents, teachers, librarians, and school administrators were surveyed. Follow-up surveys were administered to students every two years. The first follow-up occurred in 2004, when students in the sample were graduating from high school, and the second follow-up occurred in 2006. During the second follow-up, students who had graduated from high school were asked questions about their entry into work or postsecondary education. Thus far, data have been released in three stages: base-year, first follow-up, and second follow-up. The base-year release contains responses from students in their 10th grade year as well as responses from parents, teachers, librarians, and administrators. Survey responses capture information on family, money, school activities, and future educational plans. The first follow-up release is comprised of all information contained in the base-year release, plus survey responses during the 12th grade

year and academic transcripts. The second follow-up contains all information released during the

base and first year follow-up plus information pertaining to high school graduation (for students

who had not graduated at the time of the first follow-up), postsecondary education activities or

plans, work plans, and involvement in the community (Ingels et al., 2007).

Sampling

To obtain participants for ELS 2002 base-year survey a two-stage stratified cluster

sampling procedure was used. A two-stage sampling procedure involves sampling schools first,

and then sampling students from those schools. Seven-hundred-and-fifty-two schools agreed to

participate in the study. Approximately 26 students from each school were identified to

participate in ELS 2002. Hispanic and Asian American students were oversampled in ELS 2002.

Approximately 17,591 students were eligible to participate. Of them, approximately 15,362

participated, which corresponds to a weighted response rate of 87% (Ingels et al., 2007, p. 50).

For the first follow-up all students from the base year were included. In addition, staff

"freshened" (Ingels et al., 2007, p. 53) the sample by including some 12th grade students who

were not enrolled in the 10th grade in the United States when the base-year surveys were

administered. The approximate sample size of the first follow-up was 16,515. The approximate

number of respondents for the first follow-up was 14,989, which correlates to a weighted

response rate of 88.7% (p. 53). The second follow-up was comprised of participants in the 10th

and 12th grade cohorts. There were approximately 17, 900 eligible students for the second

follow-up (p. 54).

Sampling Issues

When creating the sample for ELS 2002, staff members did not use a simple random sample design (Ingels, et al., 2007). A simple random sample means that every person in the population being sampled has a known, equal, non-zero chance of being selected (Howell, 2002). For ELS 2002 certain populations are oversampled (Ingles, et al.). Oversampling occurs so that a sufficient number of participants, with a given set of background characteristics, will be included in the sample so that inferences for those in minority groups who have small proportions in the target population are reliable (Thomas, Heck, & Bauer, 2005). Due to the use of oversampling and a two-stage stratified cluster random sample technique one methodological issue arises. The methodological issue is correcting for the oversampling of certain populations (Ingles et al.; Thomas et al.). Correcting for the over sampling of certain populations is correctable through the use of raw weights. NCES staff members provide raw weights that, when applied, estimate the sample up to the population. This process allows for means to be weighted so that conclusions can be generalized to the population (Thomas et al., 2005). For this study, the dataset will be weighted by the NCES longitudinal variable F2F1WT restricted to the G10COHORT. F2F1WT is the second follow-up, first follow-up weight (Ingles et al., p. L-125) and is an appropriate choice because I will be using data collected during the base-year, first-year, and second follow-up (J. Wirt, personal communication, September 23,2008) .

Sample Selection

The purpose of this study was to examine whether measures of social capital are related to enrollment in postsecondary education for low SES students from the sophomore high school class of 2002, when controlling for contextual or environmental variables and student

background characteristics. Because this study investigated students from only a low SES

background, I needed to filter out those students who were not from a low SES background. A

low SES student was defined as a student whose SES was in the lowest 25th percentile of the

sample. This sampling plan was used for the first article that addresses enrollment in four-year

institutions. For the second article, addressing enrollment in community colleges, an additional

filtering step was taken.

Variable F2PS1LVL identified the type of institution in which a student enrolled. Using

this variable I filtered out those students who enrolled in a four-year postsecondary institution.

The remaining students comprised the sample for the second article addressing enrollment in

two-year institutions.

Variable Selection

Dependent Variable

The results of this study were presented in two articles. The first article examined

enrollment in four-year institutions. The second article examined enrollment in two-year

institutions. Because of this, two different dependent variables were used. For the first article

addressing enrollment in four-year institutions, the dependent variable was DEP4YR, which I

constructed from the NCES variables F2PS1LVL and F2EVRATT. F2PS1LVL identifies the

type of institution in which the student enrolled, and F2EVRATT identifies if a student enrolled

in postsecondary education (Ingles et al., 2007). DEP4YR was coded "1" if the student enrolled

in a four-year institution and "0" if the student enrolled in another type of institution or did not

enroll in any postsecondary education institution.

For the second article addressing enrollment in two-year institutions, the dependent variable was DEP2YRPSE, which I constructed using the NCES variable F2PS1LVL and F2EVRATT. F2PS1LVL identifies the type of institution in which the student enrolled, and F2EVRATT identifies if a student enrolled in postsecondary education (Ingles et al., 2007). DEP2YRPSE was coded "1" if the student enrolled in a two-year institution and "0" if the student enrolled in an institution less than two-years or did not enroll in any postsecondary education institution. If a student enrolled in a four-year institution then they were removed from the sample since this article only focused on enrollment in two-year institutions.

Independent Variables

The independent variables for both articles were the same. Independent variables were measures of social capital, a student background characteristic, or a contextual or environmental variable.

Measures of social capital.

Social capital was defined as parents' expectation for their student regarding postsecondary education, involvement of parents in their student's education, and sources of information accessed about attending postsecondary education. Parents' expectation regarding postsecondary education is measured by the ELS 2002 composite variable BYPARASP. This variable reports how far in school parents want their 10th grade student to go.

While NCES staff members constructed a composite variable to measure parents' expectations regarding postsecondary education, there was no composite variable that addresses involvement of parents in their student's education. Because of this I constructed a variable to represent parent involvement in a student's education. Table 3.1 lists the variables addressing

parent involvement. A comprehensive discussion of how the parent involvement variable was constructed is presented in chapters four and five.

A variable was also constructed to measure the sources of information accessed about attending postsecondary education. There were 13 different sources of information a student may have accessed to obtain information about enrolling in postsecondary education (Ingles et al., 2007). Table 3.2 lists each variable name and variable description. For every source of information accessed a student received one point. If a student accessed all 13 sources of information then their score was 13. If they accessed none of these sources of information then their score was zero. Scores were recorded by the variable SRCACC.

Table 3.1

Variables Addressing Parent Involvement in s Student's Education

_____

Variable Name   Variable Description

_____

BYP53A   Parent contacted school about poor performance

BYP53B   Parent contacted school about school program for year

BYP53C   Parent contacted school about plans after high school

BYP53D   Parent contacted school about course selection

BYP53E   Parent contacted school about poor attendance

BYP53F   Parent contacted school about problem behavior

BYP53G   Parent contacted school about positive/good behavior

BYP53H   Parent contacted school about fundraising/volunteer work

BYP53I   Parent contacted school about helping with homework

BYP53J   Parent contacted school to provide information for records

BYP54A   Belong to parent-teacher organization

BYP54B   Attend parent-teacher organization meetings

BYP54C   Take part in parent-teach organization activities

BYP54D   Act as a volunteer at the school

BYP54E   Belong to other organization with parents from school

BYP55A   How often check that homework completed

BYP55B   How often discuss report card

BYP55C   How often know whereabouts

BYP55D	How often make/enforce school night curfews

Table 3.1 (continued)

Variables Addressing Parent Involvement in s Student's Education

Variable Name	Variable Description
BYP56A	Provide advice about selecting courses or programs
BYP56B	Provide advice about plans for college entrance exams
BYP56C	Provide advice about applying to college/school after hs
BYP56D	Provide advice about jobs to apply for after high school
BYP56E	Provide information about community/national/world events
BYP56F	Provide advice about things troubling 10th grader
BYP57A	Attended school activities with 10th grader
BYP57B	Worked on homework/school projects with 10th grader

Table 3.2

Variables Addressing Sources of Information Accessed about Attending Postsecondary

Education

Variable Name	Variable Description
F1S48A	Has gone to counselor for college entrance information
F1S48B	Has gone to teacher for college entrance information
F1S48C	Has gone to coach for college entrance information
F1S48D	Has gone to parent for college entrance information
F1S48E	Has gone to sibling for college entrance information
F1S48F	Has gone to other relative for college entrance information
F1S48G	Has gone to friend for college entrance information
F1S48H	Has gone to college representatives for entrance information
F1S48I	Has gone to college publications/websites for entrance information
F1S48J	Has gone to college search guides for entrance information
F1S48K	Has gone to school library for college entrance information
F1S48L	Has gone to public library for college entrance information
F1S48M	Has gone to college library for college entrance information

Contextual or environmental variables.

Two contextual or environmental variables were used, school mean SES and school locale. School mean SES was computed by aggregating the SES of each student in a school. ELS 2002 variable BYSES1 is composite variable measuring student SES. Using the aggregate function in SPSS I created the variable SCHOOLSES, which recorded the mean SES for each school. This variable was constructed prior to selecting the sample. By including the entire sample in the construction of the variable SCHOOLSES, I ensured an accurate representation of the school's mean SES.

The second contextual or environmental variable, school locale, defined the locale of the school. A series of dummy variables was constructed from the variable CPO1LOC to identify school locale. Schools were either located in an urban, suburban, or rural environment. The first dummy variable will be DURBAN and the second will be DRURAL.

Student background characteristics.

Student background characteristics were defined as academic preparation (operationalized as the highest level of math taken) academic achievement (operationalized as the student's score on math and reading standardized tests), parents' education level, gender, and race. It is not an uncommon practice to use the highest level of math taken as a proxy for academic preparation (Perna & Titus, 2005). The sequence of math courses tends to be lockstep and serves as a strong reflection of a student's academic preparation: the higher the math taken the better the academic preparation (Adelman, 1999). The ELS 2002 variable F1HIMATH measures the highest math the student has taken for at least a half year or longer. Using F1HIMATH I constructed a series of dummy variables to represent the highest math a student

has taken. To measure academic ability in mathematics and reading, participants were administered a standardized test (Ingels et al. 2007). The score of this standardized test will be used to measure math and reading proficiency.

The mathematics test focuses on areas including probability, algebra, and geometry. The test was designed to give an accurate reflection of a student's math ability in as short a time as possible. Tests were given to students in both the 10th and 12th grade year. Both the 10th and 12th grade math tests were field tested in 2001 and the math test administered in the 12th grade year was field tested a second time in 2003. A "…two stage test…" process was used to administer the math test (Ingels et al., 2007, p. 26). This process involved students taking a short math test in the 10th grade year that was immediately graded upon completion. Based on the student's score, the student was then administered a second test of low, medium, or high difficulty. In the 12th grade year the student was again administered a test of low, medium, or high difficulty based on the student's score from the 10th grade year (Ingels et al.).

The reading test was conducted only in the 10th grade year. Items covered on the reading test cover "…four content areas (biographical, literary, scientific, and social studies)" and "…three cognitive process areas: reproduction of detail, comprehension of thought…, and inference/evaluative judgment…" (Ingels et al., 2007, p. 30).

Scores on the math and reading tests are provided as norm and criterion referenced. The norm referenced scores are useful for comparing scores over time among the different longitudinal surveys conducted by NCES staff members. Criterion reference scores come in both an item response theory (IRT)-estimated number-right score and probability of proficiency score. The probability of proficiency score provides levels of mastery for the reading test and the math

test. The proficiency score indicates what level of mastery a student has obtained. The IRT-estimated number- right score is useful for "…identifying cross-sectional differences among subgroups…" in regard to overall achievement (Ingels et al., 2007, p. 33). I used the IRT-estimated number-right scores to measure math and reading ability. F1TXM1IR, which is the 12th grade math cross-sectional IRT-estimated number-right score, and BYTXRIRR, which is the 10th grade reading cross-sectional IRT-estimated number-right score, was used to measure math and reading proficiency.

Parents education level is represented by a series of dummy variables constructed from the composite variable BYPARED, which reports the parents' combined highest education level. Gender was reflected through a dummy variable as was race.

Data Analysis

The dataset for this study, ELS 2002, can be conceptualized as being comprised of nested data or data that have a hierarchical structure. For the purposes of this research, the nested data take the form of students nested in schools. The research questions for this study focused on the influence of both individual level variables and school level variables on the outcome variable, enrollment in postsecondary education. Consequently, the unit of analysis shifts in this study between schools and individual students. Historically, the study of hierarchical data using normal regression techniques has led to many methodological problems including: "…concerns about aggregation bias, misestimated precision, and the 'unit of analysis' problem" (Raudenbush & Bryk, 2002, p. 5). To remedy this concern, I used hierarchical linear modeling (HLM).

HLM is an advanced regression procedure where there are at least two levels of units of analysis (Raudenbush & Bryk, 2002). For this study, two units will be formulated where the

level-1 units are students and the level-2 units are schools. Then, the level-1 model is formulated as a regression model within each school to describe the association between the student's outcome variable and the individual level variables. In the HLM framework, each school is conceptualized as having its own regression equation and regression coefficients vary from school to school. At level-2, those regression coefficients become outcome variables that are regressed on the school's contextual or environmental variables. Additionally, because the dependent variable for this study is dichotomous; the hierarchical generalized linear model (HGLM) was used. Using the standard HLM procedure with a dichotomous dependent variable did not allow for the assumptions of HLM to be met. Specifically, the assumption of normality of the data and homogeneity of variance are violated when using a dichotomously coded dependent variable. Moreover, using the HLM procedure with a dichotomously coded dependent variable can result in predicted values greater than one and less than zero, impossibilities given the dichotomous nature of the dependent variable (Raudenbush & Bryk, 2002).

The output of HGLM takes three forms: the identity link, unit-specific model, and the population-average model. For my study the identity link represents a linear model on the probability scale, where every corresponding increase in a coefficient results in a corresponding increase in probability of enrolling in postsecondary education. However, reliance on this linear model is problematic; because it would be expected that "…as predicted probability moves toward zero…" then "…the benefits of additional units of a favorable covariate" become less (Raudenbush & Bryk, 2002, p. 300). However, because of the linear nature of the identity link this is not the case. The addition of other "…favorable covariates…" results in continued linear

increases in probability (Raudenbush & Bryk, p. 300). The use of the unit-specific or population-average models accounts for this concern.

The unit-specific and population-average models result from the nonlinear nature of the outcome variable (Raudenbush & Bryk, 2002). For my study the unit-specific and population-average models are consequences of considering log-odds of enrolling in postsecondary education (Raudenbush & Bryk). Log-odds (η) is defined as the natural logarithm of odds, i.e.,

$$\text{Odds} = \frac{p}{1-p},$$

which is the ratio of probability of success (p) to that of failure ($1-p$). That is, it is

$$\eta = \log_e(\frac{p}{1-p}).$$

Therefore, log-odds can be converted back to odds using the formula:

$$\frac{p}{1-p} = e^{\eta}$$

or

$$\text{Odds} = e^{\log odds}.$$

Odds ratios can then be converted to probabilities using the formula:

$$p = \frac{1}{(1+odds)}$$

When computing probabilities using the unit-specific or population-average model; the addition of otherwise "…favorable covariates…" (Raudenbush & Bryk, p. 300) does not result in strictly linear increases in probability.

While both the unit specific and population-average model coefficients are similar, there is an important distinction between the two. The unit specific model coefficient is the "…expected difference in the log-odds of repetition…" with a one unit increase in the independent variable while all other independent variables and random effects are held constant (Raudenbush & Bryk, 2002, p. 303). Conversely, the population-average model coefficient is "…the expected difference in the log-odds of repetition…" with a one unit increase in the independent variable while all other independent variables are held constant and random effects are not held constant (Raudenbush & Bryk, p. 303). This difference in treatment of random effects does influence the value of the coefficient and the population-average model coefficient is "…shrunk towards zero…" (Raudenbush & Bryk, p. 303). In practice this difference results in using the unit specific model for examining "…school specific estimates…" and the population-average model for examining cross-sectional difference among the sample. Because the research questions for this study did not address school specific estimates, the population average model was used to answer the research questions.

The HGLM Model

The level-1 model, or the student level model, for this study is:

$$\eta_{ij} = \beta_{0j} + \beta_{1j}(PAREXPECT_{ij}) + \beta_{2j}(PARINV_{ij}) + \beta_{3j}(SRCACC_{ij}) + \beta_{4j}(HIMATH_{ij}) + \beta_{5j}(F1TXM1IR_{ij}) + \beta_{6j}(BYTXRIRR_{ij}) + \beta_{7j}(PARED_{ij})$$

where *i* denotes the person and *j* denotes the school. The level-2 model, or the school model, is:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(SCHOOLSES_j) + \gamma_{02}(DURBAN_j) + \gamma_{03}(DRURAL_j) + u_{0j},$$

$$\beta_{pj} = \gamma_{p0} \text{ for } p > 0$$

In the school level model β_{0j} is a function of the level two predictors; in this case school mean

SES and school locale. Meanwhile, the other level one coefficients are treated as fixed

(Raudenbush & Bryk, 2002, p. 299).

<div align="center">Articles</div>

The findings of this study were presented in two articles.

Research in Higher Education

The first article addressed the following four research questions:

1. Does probability of enrollment in a four-year postsecondary institution for low
   SES students differ by mean school SES?

2. Does probability of enrollment in a four-year postsecondary institution for low
   SES students differ by school locale?

3. When controlling for contextual or environmental variables and student
   background characteristics are low SES students with higher levels of social
   capital more likely to enroll in a four-year postsecondary institution that low SES
   students with lower levels of social capital?

4. When controlling for contextual or environmental variables, background
   characteristics, and level of social capital does probability of enrollment in a four-
   year institution of postsecondary education vary by race for low SES students?

I submitted this article to the peer reviewed journal, *Research in Higher Education.*

Research in Higher Education is the official journal of the Association for Institutional

Research. Articles published in *Research of Higher Education* tend to be empirically based

research pieces focusing on two and four-year institutions of higher education. The acceptance

rate for this journal is between 10% and 15%. Manuscripts should be prepared in accordance

with *APA Publication Manual*, 5th edition (Association for Institutional Research, n.d.).

Journal of Applied Research in the Community College

The second article will address the following four esearch question:

1. Does probability of enrollment in a two-year postsecondary institution for low

   SES students differ by mean school SES?

2. Does probability of enrollment in a two-year postsecondary institution for low

   SES students differ by school locale?

3. When controlling for contextual or environmental variables and student

   background characteristics, are low SES students with higher levels of social

   capital more likely to enroll in a two-year postsecondary institution than low SES

   students with lower levels of social capital?

4. When controlling for contextual or environmental variables, background

   characteristics, and level of social capital does probability of enrollment in a two-

   year institution of postsecondary education vary by race for low SES students?

I submitted this article to the peer reviewed journal, *Journal of Applied Research in the*

Community College. The *Journal of Applied Research in the Community College* is published by

the National Council of Research Planning (a council of the American Association of

Community Colleges) twice a year. Manuscripts should be prepared in accordance with the *APA*

Publication Manual, 5th edition (National Council for Research and Planning, n.d.).

Chapter Four: Social Capital as a Predictor of Enrollment in Four-Year Institutions of

Postsecondary Education for Low SES Students

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Abstract

Using multilevel analysis, I examined the influence of measures of social capital on a low SES student's likelihood of enrolling in a four-year college or university. Results indicate that when controlling for school level variables, academic achievement and preparation, and selected background characteristics, low SES students with higher levels of social capital are more likely to enroll in a four-year college or university.

Chapter Four: Social Capital as a Predictor of Enrollment in a Four-Year Institution of

Postsecondary Education for Low SES Students

While there is a wealth of research examining determinants of access to postsecondary education, most authors have focused on all students, regardless of SES background. Extending this work to students from low SES backgrounds will aid researchers, policy-makers, and administrators in better understanding the college enrollment process for students from low SES backgrounds. Of particular interest for this study is whether social relationships and the exchange of information, conceptualized through the theory of social capital, figure prominently in the enrollment process at four-year institutions for students from low SES backgrounds.

The purpose of this study was to examine whether measures of social capital are related to enrollment in a four-year institution of postsecondary education for low SES students, when controlling for contextual or environmental variables and select student background characteristics. The research questions for this study were:

1. Does probability of enrollment in a four-year postsecondary institution for low SES students differ by mean high school SES?

2. Does probability of enrollment in a four-year postsecondary institution for low SES students differ by high school locale?

3. When controlling for contextual or environmental variables and select student background characteristics, are low SES students with higher levels of social capital more likely to enroll in a four-year postsecondary institution than low SES students with lower levels of social capital?

4. When controlling for contextual or environmental variables, background
characteristics, and level of social capital does probability of enrollment in a four-
year institution of postsecondary education vary by race for low SES students?

Conceptual Framework

To develop the conceptual framework for this study, I drew on elements of the education production function, social capital theory, and the background characteristics of students that extant research has identified as being determinants of enrollment in postsecondary education. The conceptual framework for this study was also informed through the works of Perna (2000), Perna & Titus (2005), and Rowan-Kenyon (2007) who all used measures of social capital to study enrollment in postsecondary education.

The Education Production Function

The educational production function is one way to examine the influence of educational inputs on educational outputs (Cohen & Geske, 1990; Hanushek; 1987). The outputs in the educational production function are normally student level indicators of performance. Inputs can take the form of both individual and school level variables. Of particular interest for the current study is the conceptualization of school level variables.

From a search of the literature on school effects it seems that since the 1970s few studies have examined the relationship between mean school SES and enrollment in postsecondary education. Researchers that have examined mean school SES and enrollment arrive at contrary conclusions, and most studies suffer from methodological problems in the treatment of school level variables.

For instance, in a study of approximately 3,050 students from 18 schools, school SES did not influence educational plans of students (Alexander, Fennessey, McDill, & D'Amico, 1979).

The findings of Alexander et al. confirmed the findings of Nelson (1972). In Nelson's study of more than 17,000 students in Minnesota, school SES had little influence on educational aspirations. While the two aforementioned studies concluded that school SES does not influence educational plans, other studies have concluded the opposite: enrollment in postsecondary education does vary by mean school SES (Hansen, Gold, & Labovitz, 1972; Labovitz, 1974).

Variance in postsecondary education enrollment patterns is also observed by school locale, with students from rural areas being the least likely to pursue educational opportunities post-high-school (Gibbs, 2000). For instance, an analysis of 9,000 students, initially sampled in 1979 when the students were age 14 to 21, showed that by the time the respondents were 25, 48% of the rural students had enrolled in college. This compared to 56% of students from an urban setting (Gibbs, 1998, p. 63).

Social Capital Theory

Social capital was originally developed as a "…conceptual tool…" proposed by Coleman (1988, p. S96) that combined two classical approaches to human behavior. One was the sociological view of individual action, where people pursue actions based on social systems and the norms that develop around them. Another approach was the economic model that held that individual action is based on benefit maximization and goals are developed largely independent of social systems. Coleman's conception of social capital is based around three forms; "…obligations and expectations…" (p. S119), the exchange of information, and social norms.

When discussing obligations and expectations, Coleman (1988) is referring to the obligations that one individual owes to another or an expectation that one person has of another. The second form of social capital, the exchange of information, focuses on the role social relationships play in acquiring information. Since holding information is a significant variable in

individual action, the exchange of information from one party to another allows this form of social capital to facilitate action. The final form of social capital, normative behavior, refers to what is considered acceptable by others. These norms have the ability to influence behavior in one direction or another (Coleman).

These three forms of social capital not only encourage specific action, but "…constrain others" (Coleman, 1988, p. S105). Lin (2001) suggests that social capital works because social capital enables information exchange, because social capital is normative (and normative culture exerts pressure on individuals to make certain decisions), because social capital reflects status and the ability to obtain information, and because social capital "reinforces" certain behavior (p. 7).

Perna (2000) used social and cultural capital as two pieces of a conceptual framework that also used a traditional econometric approach to predict the likelihood of enrolling in postsecondary education. The inclusion of both social and culture capital variables improved the explanatory power of the model. Rowan-Kenyon (2007) examined the predictive power of measures of social capital, human capital, cultural capital, financial resources, and background characteristics as predictors of delayed college enrollment. The measures of social capital that proved significant included parental involvement in education and high school support. Rowan-Kenyon's finding that parental involvement influenced enrollment in postsecondary education supported the findings of Perna and Titus (2005) who found parental involvement, a form of social capital, played a significant role in the decision to attend postsecondary education.

Ceja (2006) extended measures of social capital to include the involvement of siblings as well as parents. Ceja discovered that having a sibling that attended college increased the level of information a student was able to obtain about the college going process. For this study, social

capital was defined as parents' expectations regarding postsecondary education, involvement of parents in their students' education, and sources of information accessed about attending postsecondary education.

Characteristics of College Going Students

College going students have a number of common characteristics. For instance, several researchers have demonstrated a link between academic preparation (for which highest math class completed is a proxy) and academic achievement and enrollment in postsecondary education. Most recently, Rowan-Kenyon (2007) found that academic achievement and highest level of math taken were related to enrolling in postsecondary education. Rowan-Kenyon's findings are consistent with a large body of research that has demonstrated across time that academic preparation (Alexander, Pallas, & Holupka, 1987; Berkner & Chavez, 1997; King, 1996; Perna, 2000; Perna & Titus, 2005; Thomas, Alexander, & Eckland, 1979) and academic achievement (Alexander, Eckland, & Griffin, 1975; Alexander et al., 1987; Jackson, 1990; Kane & Spizman, 1994; Perna; Perna & Titus; Thomas et al., 1979; Wilson & Portes, 1975) influence a student's decision to enroll in postsecondary education.

Postsecondary education enrollment is also influenced by parents' educational background. Kim and Schneider (2005) found the higher the level of parents' education the more likely the student is to enroll in postsecondary education. Hossler and Stage (1992) found that both the father's and mother's education level had a significant influence on a student's postsecondary education plans. Perna (2000) demonstrated that parents' education level, while important, is less important for Hispanics than African American and Caucasian students in predicting enrollment in college. Furthermore, in a multilevel analysis of the NELS dataset,

Perna and Titus (2005) found that higher parent education levels were positively related to enrollment in postsecondary education.

There is also a high degree of heterogeneity in the college going populace based on race and gender. Caucasian students enroll in greater numbers than individuals from minority groups, and women make up a larger percentage of the undergraduate populace than men. Research focusing on race and gender as a factor in enrollment model indicates that race and gender are significant components (Perna, 2000; Perna & Titus, 2005).

<center>Methods</center>

To answer the research questions for this study, I employed a multilevel analysis. The multilevel analysis allowed me to examine whether probability of enrollment in a four-year institution of postsecondary education differs by level of social capital when controlling for school level variables and background characteristics. The data for this study came from the Educational Longitudinal Survey 2002 second follow-up. The initial ELS 2002 base-year sample is comprised of high school sophomores in 2002. Students, parents, teachers, librarians, and school administrators were surveyed. Follow-up surveys were administered to students every two years. Thus far, data have been released in three stages: base-year, first follow-up, and second follow-up. The second follow-up contains all information released during the base and first year follow-up in addition to information pertaining to high school graduation (for students who had not graduated at the time of the first follow-up), postsecondary education activities or plans, work plans, and involvement in the community (Ingels et al., 2007).

To obtain participants for ELS 2002 base-year survey, a two-stage stratified cluster sample was used. A two-stage sampling procedure involves sampling schools first, and then sampling students from those schools. Hispanic and Asian American students were oversampled

in ELS 2002. Since the research questions for this study focus on students from the low SES backgrounds, only students from the lowest SES quartile were included in the analysis. SES was a composite variable constructed from parent's education level, occupational prestige, and annual income (Ingels, et al., 2007).

One of the advantages to using ELS 2002 is that weights can be used so that conclusions can be generalized to the entire population of students in the United States. However, the use of weights results in serious complications that must be adjusted for. When using raw weights that are included in the original datasets, standard statistical packages (like SPSS) are tricked into believing the sample size is the size of the population. If standard errors are calculated using this artificially large sample size, then the standard errors will be smaller than in actuality. In addition, the standard error is further underestimated if the nested data structure (i.e. students are nested within schools) is ignored.

To adjust for these short comings, I employed normalized weights (also known as relative weights) and hierarchical linear modeling (HLM) to obtain appropriate standard errors. A normalized weight was used in all statistical analyses (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004; Thomas, Heck, & Bauer, 2005) and can be obtained by dividing the original weight by the average weight. To take into account the nested data structure that results from the complex sampling plan HLM was used (Raudenbush & Bryk, 2002).

Dependent Variable

The dependent variable for this study was college enrollment. This variable was dichotomously coded as "1"if the student enrolled in a four-year institution, and as "0" if the student did not enroll in a four-year institution.

School Level Independent Variables

Two school level variables were used as controls. The first school level variable was mean school SES. Mean school SES is the mean student SES level for each school, and mean school SES represents the average social class of students in a school and the extent to which the is school is affluent (Raudenbush & Bryk, 2002). Thus, the mean school SES may be interpreted as a proxy for school resources. The mean school SES variable (SCHOOLSES) was created by aggregating the SES level of each student attending a school in the sample. To obtain an accurate representation of the mean school SES, SCHOOLSES was created using all available cases in ELS 2002, not just cases extracted in the present study. The second school level independent variable was school locale, from which two dummy variables (DRURAL and DURBAN) were created. The category of suburban was used as the reference group.

Individual Level Independent Variables

There were five student background characteristics: (a) high school academic preparation, (b) high school academic performance, (c) parents' education level, (d) gender, and (e), race, which were used as student level control variables. High school academic preparation was defined as highest math taken in high school. It is not an uncommon practice to use the highest level of math taken as a proxy for academic preparation (Perna & Titus, 2005). The sequence of math courses tends to be lockstep and serves as a strong reflection of a student's academic preparation; the higher the math taken, the better the academic preparation (Adelman, 1999). Two dummy variables were created to indicate the highest math taken by a student. Low math (DLOWMATH) indicated that a student completed no math or pre-algebra. Intermediate math (DMEDMATH) indicated that a student completed algebra I or geometry. The category of

high math indicated that a student completed algebra II or a more advanced math and was used as the reference category.

High school academic achievement was measured by three standardized test scores. Two of the tests record a student's 10th grade ability in regard to reading (BYTXRSTD) and math (BYTXMSTD). The third test records a student's 12th grade math ability (F1TXMSTD).

Parents' education level was also reflected through a series of dummy variables. Two dummy variables were constructed: (a) some postsecondary education (DSOPAPSE), and (b) at least a four-year degree (D4YRPSE). The reference category reflected that a parent had no higher education experience. For gender, DFEMALE is a dummy variable for gender and takes a value of 1 if the student was a woman and 0 if the student was a man. Race was classified into one of five categories with four dummy variables: (a) African-American (DAFAM), (b) Asian-American (DASAM), (c) Hispanic (DHISP), (d) other (DOTHER)(such as Native American or Native Pacific Islander). Caucasian served as the reference group.

Since one of the research questions for this study focused on measures of social capital as a predictor of enrollment in a four-year college or university, I specified three measures of social capital. The first form of social capital was parents' expectation regarding how far in school they want their student to go. This variable was an NCES composite variable and was recoded into two dummy variables: (a) does not expect student to enroll in postsecondary education (DNOPSE), (b) expects student to enroll in some postsecondary education (DSOPSE). The reference group reflected that parents expected their student to graduate with at least a four-year degree.

The second measure of social capital was sources of information a student accessed about attending postsecondary education (SRCACC). There were 13 possible avenues a student could

have accessed to obtain information about attending postsecondary education. These ranged from speaking with an athletics coach, to going to the library, to speaking with a guidance counselor. A student received one point for every source of information they accessed about attending postsecondary education. However, only students who indicated they were planning on attending postsecondary education were asked these questions. Since this variable was one of the key independent variables of interest that was included in the model and since there was no way of knowing this information for those who were not asked to respond, students who were not asked these questions were eliminated from the sample. This certainly limits the generalizability of study results, which will be discussed later.

The third and final measure of social capital was parent involvement in a student's education (PARINV). This variable was constructed from 27 different items addressing parent involvement. Each item response was coded yes (1) or no (0). When constructing PARINV, it was decided to include only those students who had valid responses for a minimum number of the 27 items focusing on parent involvement. In determining the minimum number of valid responses, the concern for the influence of non-response bias was balanced against retaining a large enough sample size to retain the qualities of the original sample. Ultimately, it was decided that 17 (approximately 63%) was the minimum number of valid responses needed to be retained. In addition, when computing the PARINV variable, each item score was summed and the average was obtained by dividing the sum by the number of available item responses. Then the average was multiplied by 27 so that the possible range of this variable would be from 0 to 27 for all the subjects. The reliability coefficient for this constructed variable was .83, which is considered to be an adequate level.

Procedures

HLM is an advanced regression-type procedure where there are at least two levels of units of analysis, and the units of different levels reflect the hierarchical structure such that the lower level of units are nested within the higher level of units (Raudenbush & Bryk, 2002). For this study, two levels were conceptualized where the level-1 units are students and the level-2 units are schools. Then, the level-1 model is formulated as a regression model within each school to describe the association between the student's outcome variable and the individual level variables. In the HLM framework, each school is conceptualized as having its own regression equation and the regression coefficients vary from school to school. At level-2, those regression coefficients become outcome variables that are regressed on the school's contextual or environmental variables. Additionally, because the dependent variable for this study is dichotomous, the hierarchical generalized linear model (HGLM) was used. Using the standard HLM procedure with a dichotomous dependent variable was not appropriate because the assumptions of HLM could not be met. Specifically, the assumption of normality of the data and homogeneity of variance are violated when using a dichotomously coded dependent variable (Raudenbush & Bryk, 2002).

The level-1 model, or the student level model that I fit, for this study is:

$$\eta_{ij} = \beta_{0j} + \beta_{1j}(DLOWMATH_{ij}) + \beta_{2j}(DMEDMATH_{ij}) + \beta_{3j}(BYTXRSTD_{ij}) + \beta_{4j}(BYTXMSTD_{ij}) +$$
$$\beta_{5j}(F1TXMSTD_{ij}) + \beta_{6j}(DFEMALE_{ij}) + \beta_{7j}(DAFAM_{ij}) + \beta_{8j}(DASAM_{ij}) + \beta_{9j}(DHISP_{ij}) +$$
$$\beta_{10}(DOTHER_{ij}) + \beta_{11}(DSOPAPSE_{ij}) + \beta_{12}(D4YRPAPSE_{ij}) + \beta_{13j}(DNOPSE) + \beta_{14j}(DSOPSE_{ij}) +$$
$$\beta_{15j}(SRCACC_{ij}) + \beta_{16j}(PARINV_{ij})$$

where *i* denotes the person and *j* denotes the school. The level-2 model, or the school model, is:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(SCHOOLSES_{j}) + \gamma_{02}(DRURAL_{j}) + \gamma_{03}(DURBAN_{j}) + u_{0j},$$

$$\beta_{pj} = \gamma_{p0} \text{ for } p = 1,...,16.$$

In the school level model, β_{0j} is a function of the level two predictors; in this case, school mean

SES and school locale plus random error u_{0j}, where u_{0j}s are assumed to be independent and

identically (i.i.d.) distributed with a normal distribution with a mean of 0 and variance τ, i.e.

$u_{0j} \overset{i.i.d.}{\approx} N(0,\tau)$. The other level one coefficients are treated as fixed because the small number of

students per school in the present data do not have a capacity to support a more complex model

that has random slopes. In fact, in some cases there was only one student in each school. I

conducted three different HGLM analyses. The first analysis was the unconditional model, which

contained no level-1 or level-2 predictors. The results of this analysis indicate whether

significant variability in enrollment exists at the school level. If it does, which turns out to be the

case in this present study, it justifies the choice of HGLM over the single level logistic

regression. The second analysis contains only level-1 predictors. This analysis is synonymous

with a weighted logistic regression. The coefficients produced based only on level-1 predictors

provide estimates on the variability in probability of enrollment based only on individual level

variables. The third analysis was the final model which includes all level-1 and level-2

predictors. The results of this final analysis are used to answer the research questions.

Limitations

There are several limitations to this study. The first is the way in which the variable

concerning the number of sources of information a student accessed about attending

postsecondary education (SRCACC) was constructed. The questions that make up SRCACC

were only asked of students who indicated they planned on attending postsecondary education,

and therefore only students who expressed the intention of enrolling in postsecondary education

at the sophomore year were included in the analysis. This limits the generalizability of this

study's findings to this specific group of students.

Second, the measures of social capital are proxies. Social capital can be defined and measured in a number of ways. Defining and measuring social capital in different ways may result in different findings concerning the influence of social capital on a student's decision to enroll in a four-year college or university.

Third, the reported results were computed without a school level weight. Neither the unconditional or full model would converge when using both school and individual weights. The analysis without school weights but with student weights, however, produced no statistically significant school level variables. The analysis will not require the level-2 weighting since the student weights were applied and the unweighted analysis showed no statistically significant level two variables which led me to decide that I will not make any inferences with respect to the impacts of school level characteristics, reporting the findings of the analysis without school level weights was considered to be acceptable.

Results

All reported sample sizes are effective sample sizes, and have been calculated as the sum of the normalized weights. Thus, the effective sample size is equal to the current available sample size. The sample for this study was 1176 students nested in 419 schools, an average of 2.81 students per school. The mean of the SCHOOL SES variable was -0.9 ($SD = 0.22$). In terms of school locale, 34.1% of the students attended a school in an urban locale, 40.4% attended a school in a suburban locale, and 25.5% attended a school in a rural locale.

Tables 4.1 and 4.2 present the descriptive statistics of the sample by level-1 categorical variable and continuous variable respectively.

Insert Table 4.1 About Here

Insert Table 4.2 About Here

In regard to the number of low SES students who enrolled in a four-year institution of postsecondary education, 30.7% ($n = 361$) did so; meanwhile, 69.3% ($n = 815$) of low SES students did not enroll in a four-year institution of postsecondary education. Of those students who enrolled in a four-year college or university, 38.8% were Caucasian, 27.7% were Hispanic, 22.2% were African American, 6.1% were Asian American, and 5.3% were categorized as Other. The majority of students who enrolled in a four-year college or university were women (63.7%) compared to men (36.3%), and the majority who enrolled in a four-year college or university were classified as having taken a high math (92.5%) compared to those who had taken a moderate (5.0%) or low math (2.5%).

Additionally, the parents of 69.5% of those students who enrolled in a four-year college or university never enrolled in any postsecondary education. Meanwhile, of the students who enrolled in a four-year college or university, 27.4% had parents who enrolled in some postsecondary education, and only 3.1% had parents who possessed at least a four-year degree. The vast majority of students (92.8%) who enrolled in a four-year college or university had parents who expected them to complete at least a four-year degree. Frequencies and percentages of all categorical variables broken down by enrollment status are presented in Table 4.3. Table 4.2 presents the descriptive statistics of the continuous variables for the entire sample, as well as broken down by a student's college enrollment status.

<center>Insert Table 4.3 About Here</center>

Low SES students who enrolled in a four-year college or university had higher scores on the 10th grade math test, 10th grade reading test, and 12th grade math test consistently ($M = 51.68$, $SD = 8.45$; $M = 51.87$, $SD = 8.67$; $M = 51.54$, $SD = 8.52$; respectively) compared to students who had not enrolled ($M = 45.22$, $SD = 8.75$; $M = 45.38$, $SD = 8.69$; $M = 43.75$, $SD = 8.37$;

respectively). Readers may wonder why the 12th grade math average is lower than the 10th grade mean. However, this can happen because test scores were standardized within each administration so that the average would be 50 for each grade (see Chapter 3 for more detailed explanation for the test scoring procedure). This does not allow us to infer student's growth in math ability, but preserves the rank ordering, which suffice the purposes of the current study that examines the association between college enrollment behaviors and three types of social capital controlling for other factors that include academic ability. Meanwhile, students who enrolled in a four-year college or university had, on average, slightly higher levels of parent involvement in their education ($M = 8.49$, $SD = 2.70$) than students who had not enrolled in a four-year college or university ($M = 8.39$, $SD = 2.60$), and had accessed more sources of information about attending postsecondary education ($M = 5.50$, $SD = 2.35$) than students who had not enrolled in four-year college or university ($M = 4.21$, $SD = 2.57$).

Table 4.4 presents the results of the HGLM analyses for the three models considered in the present study.

Insert Table 4.4 About Here

Results of the unconditional model in the HGLM analyses indicates the overall mean college enrollment for population average model ($\hat{\gamma}_{00}$) was -.79 in logit scale, which can be translated to

.3122($\dfrac{1}{1 + e^{-(0.79)}}$) or 31.2% in percentage, which closely matches to the observed percentage of enrollment in college in the sample 30.7% (see Table 4.1). Interestingly, the overall mean estimate for unit specific model produced the closer estimate, -.81 in logit and 30.79% in probability. It was observed, however, that school mean enrollment probability significantly varies across high schools ($\hat{\tau} = .51$, $\chi^2 (df = 418) = 539.95$, $p < .001$). Constructing a 95% plausible values interval on the school average enrollment revealed that the percentage of

students who enrolled in a four-year institution of postsecondary education ranged from a low of 9.89% to a high of 64.3%, which is a rather wide range[1]. Note that all reports and interpretations were based on the results from the population average model. Although the school mean enrollment rate for four-year institution of post secondary education significantly varied across schools, neither of the two school level variables, mean school SES and school locale, which were considered to explain some portion of this variability, were significant in the final model.

In regard to the measures of social capital, students whose parents expected them to complete only some postsecondary education (DSOPSE) were less likely to enroll in a four-year college or university than students whose parents expected them to complete at least a four-year degree, $\hat{\gamma}_{140} = -0.64$, $t(1156) = -2.11$, $p = .04$, which was statistically significant at the .05 level. Sources of information accessed (SRCACC) about attending postsecondary education was also positively related to enrollment in a four-year college or university, $\hat{\gamma}_{150} = 0.08$, $t(1156) = 2.38$, $p = .02$. However, the final measure of social capital, parent involvement in student's education (PARINV), was not significantly related to enrollment in a four-year college or university $\hat{\gamma}_{160} = 0.05$, $t = 1.41$, $p = .16$. As for the level of academic preparation measured by two dummy variables for the indicators of the highest math taken (DLOWMATH, DMEDMATH), the results revealed a clear tendency that the higher the academic preparation the more likely enrollment in a four-year college, where one of the dummy variables was statistically significant and the other was marginally non-significant ($\hat{\gamma}_{20} = -0.69, t(1156) = -2.91, p = .004$ for DMEDMATH, and $\hat{\gamma}_{10} = -0.91, t(1156) = -1.85, p = .06$ for DLOWMATH).

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[1] These values were obtained by first constructing a 95% interval in logit, i.e., $-0.81 \pm 1.96\sqrt{.51} = (-2.209, .5897)$, and then converting them into probability, i.e., $\left(\dfrac{1}{1+e^{2.209}}, \dfrac{1}{1+e^{-.5897}} \right) = (0.0989, 0.643)$.

In terms of parents' education level, though there was a slight overall tendency that the higher the parents' education level the more enrollment in a four-year college, two of the coefficients were not statistically significant at the .05 level ($\hat{\gamma}_{120} = 0.52, t(1156) = 1.06, p = .29$ for D4YRPAPSE and $\hat{\gamma}_{110} = -0.26, t(1156) = -1.28, p = .20$ for DSOPAPSE).

Finally, as for prior academic achievements, the senior year math achievement (F1TXMSTD) and the sophomore year reading achievement (BYTXRSTD) were statistically significant predictors at the .05 level and were positively associated with enrollment in college ($\hat{\gamma}_{50} = .07, t(1156) = 4.00, p < .000$ and $\hat{\gamma}_{30} = .04, t(1156) = 2.91, p = .004$ respectively). The sophomore year math achievement was not statistically significant at the .05 level once the other two achievements were controlled for ($\hat{\gamma}_{40} = -0.01, t(1156) = -0.59, p = .55$). This was somewhat expected.

Variance in school average probability of enrollment in a four-year college or university was still statistically significant even after adjusting for gender, race, highest math taken, scores on the 10th grade reading and math tests, scores on the 12th grade math test, school SES, and school locale ($\hat{\tau} = .90, \chi^2(415) = 587.01, p < .001$).

Discussion

The probability of enrollment in a four-year postsecondary institution for low SES students did not differ by mean school SES or school locale. These findings contradict some previous research (Gibbs, 1998; Gibbs, 2000; Hansen, Gold, & Labovitz, 1972; Labovitz, 1974) and confirm other previous research (Alexander et al., 1979; Nelson 1972).

While the two school level variables used in this study were not significantly related to probability of enrollment, statistically significant variability in probability of enrollment across high schools was found. This is a significant finding that has implications for future research on

colleges and universities. Since variability of enrollment across high schools is found, researchers should continue employing multi-level analyses that examine the influence of high school level factors on a student's likelihood of enrolling in a four-year college or university to obtain more accurate inferences.

A number of studies have concluded that school level factors influence a variety of student outcomes. For instance, school size and academic curriculum influence student high school dropout behavior (Lee & Burkam, 2003), quality of school resources influence math achievement (Lee & Wong, 2004), characteristics of a school's student population influence eighth grade reading and math achievement (Pong, 1997), and a recent study found a relationship between level of high school violence and a student's academic performance in college (Wolniak & Engberg, 2008). Each of these studies illustrates a connection between school level factors and student outcomes. Understanding what relationship exists between school level factors and student enrollment in higher education will further researchers' understanding of the variables related to the college going process.

While there was no variability in probability of enrollment in a four-year college or university explained by mean school SES or school locale, level of social capital was found to be a significant individual level predictor. That is, those students who had accessed more sources of information about attending postsecondary education were more likely to enroll in a four-year college or university. This finding is consistent with the theory of social capital and demonstrates that information facilitates action. Moreover, it is fairly well established that the college going process is a confusing process that involves completing admission applications, completing entrance exams, and applying for financial aid. The more information a low SES student has about these processes the more likely they are to enroll.

Individuals concerned with increasing the college going rate of low SES students can develop a number of strategies based on this research. One avenue to explore would be to increase the amount of information about college that low SES students receive. By developing such avenues that low SES students can explore about the college going process, individuals concerned with increasing economic diversity of the college going populace may be able to affect change in the economic diversity of the college populace.

Similarly, parent expectation was related to enrollment in four-year college or university. However, those students whose parents "expected them to enroll in some postsecondary education" were less likely to enroll than those students whose parents "expected them to complete at least a four-year degree." One possible explanation for finding no statistical difference in probability of enrollment between the highest expectation and the lowest expectation may be due to the low statistical power caused by the rather small sample size for the lowest expectation category ($n = 66$, see Table 4.1) compared to the reference group. However, parent expectation appears to be linked to enrollment in postsecondary education. The more parents develop and communicate high expectations for their student regarding educational attainment, the more likely a student from a low SES background is to enroll in a four-year college or university.

For this information to be the most useful, it must be communicated to parents. Avenues to educate parents of low SES students on what role they can play in encouraging their student to enroll in a four-year institution of postsecondary education should be developed. By helping the parents of low SES students understand the importance of their expectations and how those expectations facilitate action on the part of their student, more low SES students have a higher chance of enrolling in a four-year college or university.

While the first two measures of social capital were significantly related to enrollment in a four-year college or university, the final measure, level of parent involvement in a student's education was not related to enrollment in four-year college or university. This finding in regard to parent involvement is at odds with the findings from previous research examining enrollment for all students (Perna & Titus, 2005; Rowan-Kenyon, 2007). It could be that this measure of parent involvement was an inadequate measure. Future research could be strengthened by finding additional measures of parent involvement.

The findings concerning the relationship between race and enrollment in a four-year college or university were also interesting. When controlling for contextual or environmental variables, level of social capital, and select background characteristics, African American low SES students who indicated they were planning on attending postsecondary education were 3 times (in odds) more likely to enroll than their Caucasian counterparts ($\hat{\gamma}_{70} = 1.16$, $t(1156) =$ 3.46, $p = .001$, odds-ratio ($e^{\hat{\gamma}_{70}}$) = 3.19). Since higher education enrollments remain substantially stratified by race (Snyder, Dillow, & Hoffman, 2007), I was surprised by this finding. Yet, the results of this study indicate that for low SES students, African Americans are more likely to enroll in a four-year college or university than Caucasian students if we compare the two groups of students with other factors equal, and other minority groups were as likely to enroll as Caucasian students. This finding deserves additional attention in future studies that focus on the enrollment habits of students from low SES backgrounds.

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Table 4.1

Frequency and Percentage of Sample for Categorical Variables (N = 1,176)

Variable	*n*	%
Enrolled in College		
Yes	361	30.7
No	815	69.3
Gender (*DFEMALE*)		
Men	488	41.5
Women	688	58.5
Highest Math (*DLOWMATH*, *DMEDMATH*)		
High Math	837	71.2
Medium Math	250	21.3
Low Math	89	7.6
Parent Education (*DSOPAPSE*, *D4YRPAPSE*)		
At Least Four-Year Degree	32	2.7
Some Postsecondary Education	323	27.5
No Postsecondary Education	821	69.8
Parent Expectations (*DNOPSE*, *DSOPSE*)		
At Least a Four-Year Degree	980	83.3
Some Postsecondary Education	130	11.1
No Postsecondary Education	66	5.6

Table 4.1 (continued)

Frequency and Percentage of Sample for Categorical Variable (N = 1,176)

Variable	*n*	%
Race (*DAFAM*, *DASAM*, *DHISP*, *DOTHER*)		
Caucasian	454	38.6
African American	223	19.0
Asian American	46	3.9
Hispanic	397	33.8
Other	56	4.8

Note. n represents the effective sample size.

Table 4.2

Descriptive Statistics of Continuous Variable (N = 1,176)

Variable	n	M	SD	Min	Max
Overall Sample					
10th Grade Math Test (*BYTXMSTD*)	1,176	47.20	9.16	22.33	76.65
10th Grade Reading Test (*BYTXRSTD*)	1,176	47.37	9.18	24.29	73.21
12th Grade Math Test (*F1TXMSTD*)	1,176	46.14	9.18	22.75	74.97
Parent Involvement (*PARINV*)	1,176	8.42	2.63	0.33	17.67
Sources of Information Accessed (*SRCACC*)	1,176	4.60	2.57	0.00	13.00
Enrolled in College					
10th Grade Math test (*BYTXMSTD*)	361	51.68	8.45	27.05	76.65
10th Grade Reading Test (*BYTXRSTD*)	361	51.87	8.67	26.02	73.21
12th Grade Math Test (*F1TXMSTD*)	361	51.54	8.52	27.31	74.97
Parent Involvement (*PARINV*)	361	8.49	2.63	0.33	17.67
Sources of Information Accessed (*SRCACC*)	361	5.50	2.57	0.00	13.00
Did Not Enroll in College					
10th Grade Math test (*BYTXMSTD*	815	45.22	8.75	22.33	73.79
10th Grade Reading Test (*BYTXRSTD*)	815	45.38	8.69	24.29	70.62
12th Grade Math Test (*F1TXMSTD*)	815	43.75	8.37	22.75	68.07
Parent Involvement (*PARINV*)	815	8.39	2.60	0.33	17.67
Sources of Information Accessed (*SRCACC*)	815	4.21	2.57	0.00	12.00

Note. n represents the effective sample size.

Table 4.3

Frequencies and Percentages of Sample for Categorical Variables by Enrollment Status (N = 1176)

Variable	Enrolled (*n* = 361)			Did Not Enroll (*n* = 815)		
	n	% in Variable	% in Enrolled	*n*	% in Variable	% in Did Not Enroll
Gender						
Men	131	26.8	36.3	358	73.2	43.9
Women	230	33.5	63.7	457	66.5	56.1
Total	361	-----	100.0	815	------	100.0
Highest Math						
High Math	334	39.9	92.5	503	60.1	61.7
Medium Math	18	7.2	5.0	232	92.8	28.5
Low Math	9	10.1	2.5	80	89.9	9.8
Total	361	-----	100.0	815	-----	100.0
Parent Education						
At Least a Four-Year Degree	11	34.4	3.1	21	65.6	2.6
Some Postsecondary Education	99	30.7	27.4	224	69.3	27.5
No Postsecondary Education	251	30.6	69.5	570	69.4	69.9
Total	361	-----	100.00	815	-----	100.0
Parent Expectation						
At Least a Four-Year Degree	335	34.3	92.8	645	65.7	79.1

Table 4.3 (continued)

Frequencies and Percentages of Sample for Categorical Variables by Enrollment Status (N = 1176)

	Enrolled (*n* = 361)			Did Not Enroll (*n* = 815)		
Variable	*n*	% in Variable	% in Enrolled	*n*	% in Variable	% in Did Not Enroll
Parent Expectation (continued)						
Some Postsecondary Education	17	13.1	4.7	113	86.9	13.9
No Postsecondary Education	9	13.6	2.5	57	86.4	7.0
Total	361	-----	100.0	815	-----	100.0
Race						
Caucasian	140	30.8	38.8	314	69.2	38.5
African American	80	35.9	22.2	143	64.1	17.6
Asian American	22	47.8	6.1	24	52.2	3.0
Hispanic	100	25.2	27.7	297	74.8	36.4
Other	19	33.9	5.3	37	66.1	4.5
Total	361	-----	100.0	815	-----	100.0

Note. n represents the effective sample size.

Table 4.4

HGLM Results for Three Models

| Variable | Unconditional Model | | Level-1 Predictors Only Model | | Full Model | |
	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)
Fixed Effects						
Intercept, γ_{00}	-0.81*** (0.08)	-0.79*** (0.11)	-0.95*** (0.09)	-0.89*** (0.13)	-0.95*** (0.09)	-0.89*** (0.14)
SCHOOLSES, γ_{01}					0.51 (0.44)	0.50 (0.61)
DURBAN, γ_{02}					0.13 (0.23)	0.13 (0.34)
DRURAL, γ_{03}					0.18 (0.23)	0.17 (0.34)
DLOWMATH, γ_{10}			-0.97 (0.53)	-0.91 (0.47)	-0.97 (0.52)	-0.91 (0.47)
DMEDMATH, γ_{20}			-0.73*** (0.25)	-0.67** (0.22)	-0.75** (0.26)	-0.69** (0.22)
BYTXRSTD, γ_{30}			0.42*** (0.01)	0.04*** (0.01)	0.04*** (0.01)	0.04** (0.01)

Table 4.4 (continued)

HGLM Results for Three Models

	Unconditional Model		Level-1 Predictors Only Model		Full Model	
	Unit	Population	Unit	Population	Unit	Population
	Specific	Average	Specific	Average	Specific	Average
Variable	Coefficient (*SE*)	Coefficient (*SE*)	Coefficient (*SE*)	Coefficient (*SE*)	Coefficient (*SE*)	Coefficient (*SE*)
BYTXMSTD, γ_{40}			-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)
F1TXMSTD, γ_{50}			0.08*** (0.02)	0.07*** (0.02)	0.08*** (0.02)	0.07*** (0.02)
DFEMALE, γ_{60}			0.51* (0.22)	0.48* (0.19)	0.51** (0.21)	0.48* (0.19)
DAFAM, γ_{70}			1.25*** (0.35)	1.15*** (0.33)	1.26*** (0.36)	1.16*** (0.33)
DASAM, γ_{80}			0.72 (0.51)	0.68 (0.54)	0.69 (0.52)	0.66 (0.55)
DHISP, γ_{90}			0.11 (0.34)	0.09 (0.32)	0.11 (0.34)	0.09 (0.33)
DOTHER, γ_{100}			0.65 (0.42)	0.60 (0.43)	0.66 (0.42)	0.61 (0.43)
DSOPAPSE, γ_{110}			-0.29 (0.22)	-0.26 (0.21)	-0.29 (0.22)	-0.26 (0.21)

Table 4.4 (continued)

HGLM Results for Three Models

Variable	Unconditional Model		Level-1 Predictors Only Model		Full Model	
	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)
D4YRPAPSE, γ_{120}			0.54 (0.55)	0.52 (0.49)	0.54 (0.55)	0.52 (0.49)
DNOPSE, γ_{130}			-0.14 (0.38)	-0.13 (0.33)	-0.12 (0.38)	-0.12 (0.33)
DSOPSE, γ_{140}			-0.69* (0.34)	-0.65* (0.31)	-0.69* (0.34)	-0.64* (0.31)
SRCACC, γ_{150}			0.08* (0.40)	0.08* (0.03)	0.08* (0.04)	0.08** (0.03)
PARINV, γ_{160}			0.06 (0.04)	0.05 (0.03)	0.06 (0.04)	0.05 (0.04)
Variance Component						
τ	0.51***		0.89***		0.90***	

*$p < .05$. **$p < .01$. ***$p < .001$.

Running Head: CHAPTER FIVE

Chapter Five: Social Capital as a Predictor of Enrollment in Two-Year Postsecondary Education

for Low SES Students

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Abstract

This study investigated the relationship between social capital and enrollment in a two-year institution of postsecondary education for low SES students. Using multilevel analysis, results of the study indicate that only one of three measures of social capital (i.e., frequency of access to information about attending college) was significantly related to enrollment in a two-year institution of postsecondary education. Moreover, no significant variability in probability of enrollment in a two-year institution of postsecondary education was observed by either of the school level variables used in this study.

Social Capital as a Predictor of Enrollment in Two-Year Postsecondary Education for Low-SES

Students

Community colleges have played an important role in increasing access to postsecondary

education (Rosenbaum, Deil-amen, & Person, 2006). Emerging at the start of the 20th century,

community colleges immediately provided an alternative entry to higher education (Levinson,

2005). Much of the success of community colleges in promoting access to higher education has

come as a result of open admissions policies and a strong emphasis on remediation (Ratcliff,

1994). While enrollment at four-year institutions doubled from the 1960s to the 1990s,

community college enrollment increased fivefold (Bueschel, 2004). That increase has resulted in

community college enrollment accounting for a significant portion of the postsecondary students

enrolled in the United States. In addition, some suggest that the rise of articulation agreements

between community colleges and four-year institutions has led to a more affordable pathway to a

four-year degree (Anderson, Alfonso, & Sun, 2006).

In the 2003-04 academic year, approximately 40% of students enrolled in postsecondary

education were enrolled in a community college, which translates to 7.6 million students (Horn

& Nevill, 2006). Compared to students enrolled in four-year postsecondary institutions, students

enrolled in community colleges are more likely to be older, from an underrepresented

minority/ethnic group, female, and come from an economically disadvantaged background (Horn

& Nevill).

Access to postsecondary education is important because with increased education comes

increased social mobility, especially earning potential (Institute for Higher Education Policy and

Scholarship America, 2004). In addition, many believe that learned individuals contribute more

substantially to society (Bowen, Kurzweil, & Tobin, 2005). Income levels, broken down by

education level, support the notion of increased social mobility as a result of increased education. The average high school graduate earned approximately $26,000 per year in 2005. This number is only half that of a college graduate who earned approximately $52,000 per year in 2005 (U.S. Census Bureau, 2006). One way, then, to help decrease the economic disparity in the United States is to identify ways to increase the number of students enrolling in postsecondary education from low socioeconomic backgrounds (SES). Since students who are economically disadvantaged are more likely to enroll in a community college (Bowen et al.), studying the enrollment patterns of low-SES students in two-year institutions of postsecondary education may provide insight into the enrollment behavior of low-SES students. This study examined measures of social capital as a predictor of enrollment in two-year institutions of postsecondary education. The research questions for this study were:

1. Does probability of enrollment in a two-year postsecondary institution for low SES students differ by mean high school SES?

2. Does probability of enrollment in a two-year postsecondary institution for low SES students differ by high school locale?

3. When controlling for contextual or environmental variables and background characteristics, are low SES students with higher levels of social capital more likely to enroll in a two-year postsecondary institution than low SES students with lower levels of social capital?

4. When controlling for contextual or environmental variables, background characteristics, and level of social capital does probability of enrollment in a two-year institution of postsecondary education vary by race for low SES students?

Social Capital

One way to view individual action is thorough the lens of social capital. Social capital

holds that everyday relationships (both relationships with other persons and with institutions)

facilitate action (Field, 2003; Grootaert & Van Bastelaer, 2002). Initially, social capital was

derived as a way of combining two classical approaches to human behavior: the sociological and

economic views of individual behavior (Coleman, 1988).

The sociological view of human behavior holds that individual action is driven by social

systems and the normative culture of those social systems. Meanwhile, the economic view of

individual action suggests that individuals make decisions in an attempt to maximize benefits;

decisions are largely made void of any consideration of the surrounding social systems. Drawing

on elements from both approaches, social capital is comprised of three distinct aspects:

expectations that individuals have of one another, exchange of information, and normative

culture (Coleman, 1988).

Social capital both encourages and restricts specific behavior. Social capital exerts force

on individual action for two reasons. First, social capital facilitates the exchange of information

and reflects the ability of an individual to obtain information. Information, in turn, allows for

specific actions to be taken. Second, social capital reflects the normative environment. That

normative environment reinforces certain behavior and restricts other behavior (Lin, 2001).

Several researchers have examined the influence of social capital on a student's decision

to enroll in postsecondary education (Ceja, 2006; Perna, 2000; Perna & Titus, 2005; Rowan-

Kenyon, 2007). These studies have concluded that social capital is an important component of

enrollment models. However, additional information is still needed on how social capital

influences the enrollment decision of low SES students.

Factors Related to Enrollment in Postsecondary Education

A number of factors are related to enrollment in postsecondary education. These factors are tied to a student's academic achievement and preparation, the educational background of a student's parents, and the student's gender and race. For instance, a large body of research has demonstrated across time that academic achievement and preparation influence a student's chance of enrolling in postsecondary education. The more academically prepared the student and the higher the student's academic achievement, the more likely the student is to enroll in postsecondary education (Alexander, Eckland, & Griffin, 1975; Alexander, Pallas, & Holupka, 1987; Berkner & Chavez, 1997; Hurtado, Inkelas, Briggs, & Rhee, 1997; Jackson, 1990; Kane & Spitzman, 1994; King, 1996; Perna, 2000, Perna & Titus, 2005; Rowan-Kenyon, 2007; Thomas, Alexander, & Eckland, 1979; Wilson & Portes, 1975)

Moreover, the educational experiences of a student's parents are also linked to enrollment in postsecondary education (Hossler & Vesper, 1993; Kim & Schneider, 2005; Stage & Hossler, 1989; Perna, 2000; Perna & Titus, 2005). In addition, gender and race are also tied to enrollment in postsecondary education. Women and Caucasian students tend to enroll in greater numbers than men and students from minority groups. Furthermore, research using gender and race as components of enrollment models indicate gender and racial inequities (Perna, 2000; Perna & Titus, 2005).

While the previously mentioned individual variables have been shown to be linked to enrollment in postsecondary education, there is also cause to consider the influence of school level variables on a student's postsecondary education decisions. Production functions theorize a relationship between school level inputs and student level outputs. For instance, characteristics of a school (for example level of school funding or teacher pay) can influence student behavior

(Cohen & Geske, 1990; Hanushek; 1987). Of interest for the current study is high school SES and high school locale.

Previous research on the influence of school SES is rife with methodological issues concerning the misspecification of school level variables. Those methodological issues make it difficult to draw any conclusion on the veracity of the relationship between school SES and enrollment in postsecondary education. Compounding the methodological issues are the contrary findings regarding the influence of high school SES on a student's probability of enrolling in postsecondary education. Some studies have concluded that school SES influences probability of enrollment in postsecondary education (Hansen, Gold, & Labovitz, 1972; Labovitz, 1974; Thorton & Eckland, 1980), while other studies have concluded the opposite (Alexander et al., 1979; Mayer & Jencks, 1989; Nelson, 1972).

Findings regarding high school locale and a student's likelihood of enrolling in postsecondary education are more easily understood. From previous research it seems that students from rural areas are less likely to enroll in postsecondary education (Gibb, 1998; 2000). Rural students also seem to be less likely to make future plans that involve attending postsecondary education (Cobb, McIntire, & Pratt, 1989; Odell, 1988).

<center>Methods</center>

I used the Educational Longitudinal Study, 2004/06 (ELS) as the data source for this study. ELS collects information concerning a student's high school educational experience and post-high school work and educational experiences. Initially surveyed as 10th graders in 2002 and subsequently surveyed as 12th graders and 2-years after high school graduation, data from ELS can be used to study entry into the postsecondary education system. Moreover, ELS also collects information from parents, teachers, and administrators (Ingels et al., 2007).

A complex sampling plan was employed when selecting ELS participants. This complex sampling plan involved sampling schools first and then selecting participants from those schools, which is referred to as two-stage sampling. In addition, a cluster sample was used when selecting schools, which results in schools that were in close proximity to one another having a higher probability of selection. Some groups were also oversampled. In ELS, Hispanic and Asian American students were the oversampled groups (Ingels et al., 2007, p. 50).

The complex sampling plan created unequal probabilities of selection. To remedy this concern weights were used. The use of weights allows for conclusions to be generalized to the population; two weights were used for this study: A student level weight (F2F1WT) and a school level weight (BYSCHWT). However, the use of these weights as they are results in reduced estimates of the standard errors (*SE*) for parameter estimates by artificially inflating the sample size leading to an increased likelihood of a Type I error (falsely rejecting a null hypothesis). To adjust for this shortcoming, I employed a normalized weight (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004) (also known as a relative weight (Thomas, Heck, & Bauer, 2005)). The normalized weight can be obtained by dividing the original weight by the average of the original weights.

There is another concern that emerged from the two stage sampling. That is, when data are nested (students are nested within schools in the current data), students in the same schools are more likely to be similar than the student in other schools. This creates dependency of the students in the same schools, which will violate the independence assumption used in standard regression and will lead again to the inflated Type I rates. To remedy this concern I used hierarchical linear modeling (HLM), a multilevel modeling technique.

HLM can be accomplished by using the HLM software, version 6 ((Raudenbush et al., 2004). The HLM 6 program automatically normalizes the original weights. The inaccurate *SE* due to data nesting was also accounted for in the hierarchical linear model. A natural byproduct of HLM is a more accurately estimated *SE*, because variance estimates produced through HLM are a close approximation of the true variance (Raudenbush & Bryk, 2002; Thomas et al., 2005).

Sample Selection

Since the research questions for this study focus on low SES students, I filtered out those who were not low SES students. SES is a composite variable composed of parents' education, occupational prestige, and annual income. A low SES student was defined as a student whose SES level was in the lowest quartile of the sample. In addition, since this analysis focuses only on those students who enrolled in a two-year institution, I removed students who had enrolled in a four-year institution of postsecondary education from the sample.

Dependent Variable

The dependent variable, ENROLL2YR, records whether a student enrolled in a two-year institution of postsecondary education. ENROLL2YR was dichotomously coded "1", enrolled in a two-year institution of postsecondary education and "0", did not enroll in a two-year institution of postsecondary education.

Individual Level Variables

Individual level variables were specified as either a measure of social capital or a background characteristic. There were three measures of social capital: (a) sources of information accessed about attending postsecondary education, (b) level of parent involvement in a student's education, and (c) parents' expectations regarding education.

The variable SRCACC was constructed to measure the sources of information a student accessed about attending postsecondary education. There were 13 possible sources a student could have accessed ranging from going to the library to get information, to speaking with a coach or teacher. A student received one point for every source of information they accessed. However, these questions were asked only of students who indicated they planned on attending postsecondary education. Therefore, only those students who were asked these questions were analyzed in the current study.

The variable PARINV was constructed to measure the level of parent involvement in a student's education. This variable was constructed from 27 items addressing some aspect of parent involvement in a student's education. If the PARINV variable was constructed of all available cases, regardless of missing data, then there is a chance that the PARINV variable would be influenced by non-response. To avoid this issue, a threshold of a minimum number of valid responses to be included in the analysis was established. Ultimately it was deiced that a student had to have valid responses for 17 of the 27 items (approximately 63%) to be included in the analysis. This number was arrived at by balancing the concern over non-response bias with maintaining a sample of sufficient size. Each item score was summed and the average was obtained by dividing the sum by the number of available item responses. Then the average was multiplied by 27 so that the possible range of this variable was from 0 to 27 for all the subjects. The reliability coefficient for the PARINV variable was .83, which is considered acceptable in terms of consistency of the scores.

The final measure of social capital addresses parent expectations regarding their student's education. A series of dummy variables reflects parent expectation level. DNOPSE indicated the parent does not expect their student to enroll in postsecondary education. DSOPSE indicated the

parent expects their student to enroll in some postsecondary education. The category of parent expects their student to obtain at least a four-year degree served as the reference category.

Student background characteristics were comprised of measures of academic achievement and preparation, parent education, race, and gender. Academic achievement was measured using three standardized tests: (a) a 10th grade reading test, (b) a 10th grade math test, and (c) a 12th grade math test. Academic preparation was measured by highest math taken.

Highest math taken is a good indicator of academic preparation due to the sequencing of math. A student taking higher math usually reflects better academic preparation (Adelman, 1999). A series of dummy variables reflects highest math taken. DLOWMATH indicated the student completed an entry level math such as pre-algebra or did not complete any math. DMEDMATH indicated that the student completed geometry or algebra I, which are considered to be of medium difficulty. The reference group for these dummy variables reflected a student having taken pre-calculus or algebra II, which are considered to be the highest level of difficulty in the high school math curriculum.

Parents' education level, also reflected through a series of dummy variables, takes the form of some postsecondary education (DSOPAPSE), or at least a four-year degree (D4YRPAPSE). The reference category reflected the parent having no postsecondary education. Four dummy variables were constructed for race as well: (a) DAFAM (African American), (b) DASAM (Asian American), (c) DHISP (Hispanic), and (d) DOTHER (other). Caucasian students were used as the reference group. The final background characteristic variable DMALE indicates whether a student was a man. Women comprised the reference category.

School Level Variables

I used two school level variables in this study. The first variable, mean school SES (SCHOOLSES) was the average SES of students in a high school. SCHOOLSES was calculated by averaging the SES of the students at each high school. To calculate an accurate mean school SES, SCHOOLSES was constructed using every available case in ELS.

The second school level variable reflects school locale through a series of dummy variables. DRURAL indicated a school was located in a rural environment. DURBAN indicated a school was located in an urban environment, and the reference group reflects that a school was located in a suburban environment.

Procedures

Since the research questions involved both school and individual level variables, I used multilevel modeling (i.e. HLM). HLM is appropriate to use when there are two or more units of analysis, such as the present study. The research questions focus on variables that were distinctly student level variables (measures of social capital, academic achievement and preparation, parent education, race, and gender), and variables that were distinctly school level variables (mean school SES and school locale). Using a single level of analysis, as opposed to a multilevel analysis, would result in inaccurate parameter estimations (Raudenbush & Bryk, 2002).

At the most basic level, HLM is a complex regression analysis where intercepts and slopes at the lower level (such as students) are treated as outcomes at the higher level units, e.g. schools. Through this process, separate intercepts (and possibly slopes) are calculated for each level-2 unit (i.e. schools). Since this analysis involved a dichotomously coded dependent variable (enrolled or did not enroll), I used the hierarchical generalized linear model (HGLM) which is appropriate for outcome variables of a categorical nature. Using the standard HLM procedure

with a dichotomously coded dependent variable will not allow for the assumptions of homogeneity of variance or normality of distribution to be met (Raudenbush & Bryk, 2002).

Like ordinary least squares or weighted regression, the HGLM analysis can be expressed in equation form. The difference between the multilevel model and the standard regression is the number of equations. To express the current analysis in equation form, equations must be specified at each level: One at the student level and one at the school level. In the present study, the student level equation was specified as:

$$\eta_{ij} = \beta_{0j} + \beta_{1j}(DLOWMATH_{ij}) + \beta_{2j}(DMEDMATH_{ij}) + \beta_{3j}(BYTXRSTD_{ij}) + \beta_{4j}(BYTXMSTD_{ij}) +$$
$$\beta_{5j}(F1TXMSTD_{ij}) + \beta_{6j}(DFEMALE_{ij}) + \beta_{7j}(DAFAM_{ij}) + \beta_{8j}(DASAM_{ij}) + \beta_{9j}(DHISP_{ij}) +$$
$$\beta_{10}(DOTHER_{ij}) + \beta_{11}(DSOPAPSE_{ij}) + \beta_{12}(D4YRPAPSE_{ij}) + \beta_{13j}(DNOPSE) + \beta_{14j}(DSOPSE_{ij}) +$$
$$\beta_{15j}(SRCACC_{ij}) + \beta_{16j}(PARINV_{ij})$$

where i denotes the person and j denotes the school. Then the school level equation was specified as:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(SCHOOLSES_j) + \gamma_{02}(DURBAN_j) + \gamma_{03}(DRURAL_j) + u_{0j},$$

$$\beta_{pj} = \gamma_{p0} \ \text{for} \ p = 1,...16.$$

From the equations it is clear that the intercept (β_{0j}) is being specified for each level-2 unit and it was regressed on the mean school SES and locale of school. The portion of β_{0j} that was unexplained by these school level predictors is captured by the residual term, u_{0j}, which was assumed to be independent to each other and normally distributed with a mean of 0 and variance τ. The remaining slopes were treated as fixed in the analysis because of the small number of students per school in the current data.

I conducted three HGLM analyses. The first analysis, the unconditional model, contained no predictor variables at either of the levels. This analysis produced information on the

variability of enrollment behavior across schools. The second analysis, referred to as the level-1 only predictors model, contained only level-1 predictors. The results of this analysis were similar to single level analysis using logistic regression and produced coefficients absent controls for school level variables. The third analysis, the full model, contained all level-1 and level-2 predictors and was used to answer the research questions.

Limitations

There are several limitations to this study that should be taken into account when considering the results of the analyses. First, the population of students being studied was low SES students who indicated they were planning on attending postsecondary education. This limits the generalizability of the findings to only low SES students who indicate they plan on enrolling in postsecondary education.

Second, the three measures of social capital are proxies. It is possible to operationalize social capital in a different manner. Changing the operational definition of social capital may result in significantly different findings regarding the relationship between enrollment in a two-year institution of postsecondary education and social capital.

Results

All reported sample sizes were weighted using the normalized weight. The sample size for this study was 624 students nested in 348 schools; an average of 1.79 students was nested in each school. The mean school SES for all schools in the sample was -0.93 ($SD = 0.23$). In terms of school locale, 26.1% ($n = 91$) of the schools were located in a rural setting, 44.5% ($n = 155$) were located in a suburban setting, and 29.4% ($n = 102$) were located in an urban setting. Descriptive statistics of the sample by continuous variable and categorical variable are presented in Tables 5.1 and 5.2 respectively.

Insert Table 5.1 About Here

Insert Table 5.2 About Here

About half of the students in the sample, 322 (51.6%) enrolled in a two-year institution of

postsecondary education and 56.1% ($n = 350$) of them were female (see Table 5.2).

When examining the background characteristics of students who enrolled in a two-year

institution of postsecondary education, 62.4% ($n = 201$) were female; whereas only 37.6% ($n =$

121) were male. In terms of race, 17.6% ($n = 56$) were African American, 4.0% ($n = 13$) were

Asian American, 38.4% ($n = 124$) were Caucasian, 37.2% ($n = 120$) were Hispanic, and 2.8% (n

$= 9$) were characterized as other. Of those students who enrolled, only 2.2% ($n = 7$) had parents

who held at least a four-year degree; meanwhile, 29.5% ($n = 95$) had parents with some

postsecondary education, and 68.3% ($n = 220$) had parents with no postsecondary education. In

terms of highest math taken, 71.1% *($n = 229$)* were characterized as having taken a high math;

while 22.0% ($n = 71$) and 6.8% ($n = 22$) were characterized as having taken a moderate or low

math respectively.

Students who enrolled in a two-year institution of postsecondary education had, on

average, higher math scores in the 10th grade year ($M = 46.61$, $SD = 7.70$), higher readings scores

in the 10th grade year ($M = 47.00$, $SD = 8.01$), and higher math scores in the 12th grade year ($M =$

45.40, $SD = 7.64$) than students who had not enrolled in a two-year institution of postsecondary

education ($M = 43.73$, $SD = 9.55$; $M = 43.64$, $SD = 9.07$; $M = 42.00$, $SD = 8.76$; respectively).

When examining the measures of social capital, students who enrolled in a two-year

institution of postsecondary education had, on average, accessed more sources of information

about attending postsecondary education ($M = 4.78$, $SD = 2.48$) than those students who had not

enrolled ($M = 3.61$, $SD = 2.52$). In addition, those students who had enrolled in a two-year

institution of postsecondary education had, on average, slightly higher levels of parent

involvement in their education ($M = 8.41$, $SD = 2.57$) compared to students who did not enroll in

a two-year institution of postsecondary education ($M = 8.38$, $SD = 2.64$) (see bottom two-thirds

of Table 5.1). Finally, in terms of parents' expectation regarding education, of the students who

enrolled 82.3% ($n = 265$) had parents who expected them to complete a four-year degree, 11.2%

($n = 36$) had parents who expected them to complete some postsecondary education, and 6.5% (n

$= 21$) had parents who expected them to complete no postsecondary education (see Table 5.3).

Frequencies and percentages of the categorical variables broken by enrollment status are listed in

Table 5.3.

<div align="center">Insert Table 5.3 About Here</div>

After conducting the HGLM analyses, results of the unconditional model (no predictors

entered) showed no significant variability in enrollment in a two-year college or university

across schools, $\hat{\tau} = 0.09$, $\chi^2(345) = 358.24$, $p = .30$ (see "Unconditional Model" column in Table

5.4). However, once predictors were entered variability in the dependent variable across schools

was observed , $\hat{\tau} = 0.38$, $\chi^2(342) = 398.16$, $p = .02$ (see the column of "Level-1 Predictors Only

Model" in Table 5.4). Table 5.4 provides the coefficients and standard errors for each of the

three HGLM analyses.

<div align="center">Insert Table 5.4 About Here</div>

The results of the full model analysis indicate that the only measure of social capital that

would be expected to significantly increase the likelihood of a student enrolling in a two-year

institution of postsecondary education was the sources of information accessed variable,

$\hat{\gamma}_{150} = 0.25, t(767) = 4.35, p < .01$. The only other significant variable in the model was related to

race. Students who were classified as "other" were less likely to enroll in a two-year institution of postsecondary education than Caucasian students, $\hat{\gamma}_{100} = -1.37, t(767) = -2.55, p = .01$.

Discussion and Implications

This study was conducted to examine whether measures of social capital influenced a low-SES student's likelihood of enrolling in a two-year institution of postsecondary education. Only one of three measures of social capital were significant in the final analysis: sources of information accessed. Parent expectations regarding postsecondary education and parent involvement in a student's education were not significantly related to a low-SES student's decision to enroll in two-year institution of postsecondary education.

This analysis indicates that the more sources of information a student accesses the more likely the student is to enroll in a two-year institution of postsecondary education holding other factors constant. This finding is consistent with the theory of social capital in that the acquisition of information or knowledge facilitates individual action. Given the complicated nature of admission processes to institutions of higher education, this finding has significant implications for practice.

The process of applying to postsecondary education can be daunting for students. There are possible admission tests, applications for admission, and applications for financial aid, which can be confusing processes for students, especially first-generation college students. Seventy-percent of the students in the study were classified as first-generation college students (see Table 5.2). Since these students' parents have never attended postsecondary education, first-generation college students already are disadvantaged in terms of the amount of social capital they possess at the start of the admission process. Finding avenues to increase the amount of information low SES students possess about the college going process becomes extremely important.

Individuals concerned with increasing the number of students attending postsecondary education from a low SES background should focus on identifying avenues related to increasing the amount of information a student possesses about attending postsecondary education. These avenues may include information on the admission process, applying for financial aid, and the pathway between enrollment in a two-year institution and a four-year degree. By increasing the amounts of information low SES students possess about attending postsecondary education, the more likely a low SES student is to enroll in a two-year institution.

While one of the three measures of social capital was significant, neither of the other two measures of social capital were significantly tied to enrollment in a two-year institution of postsecondary education. Parent expectations regarding postsecondary education and level of parent involvement were not significant predictors of enrollment behavior in the final model. The variables used to measure parent expectation and parent involvement are proxies for social capital and using different variables may produce different results. In addition, the parent expectation variable did not capture a student's view of how much education their parents want them to attain. Parents of low SES students may have high expectations for their student regarding how much education they want their child to obtain, but they may not be communicating that information effectively to their student. Future studies could be strengthened by using alternative measures of parent involvement and parent expectation regarding postsecondary education.

In terms of race, when controlling for the variables in this study, minority students were no less likely to enroll in a community college than white students. Historically, higher education enrollment patterns have been stratified by race (Snyder, Dillow, & Hoffman, 2007). However, given the information learned from this study, at least as it relates to enrollment in two-year

institutions of postsecondary education, race is not a significant factor in enrollment models when controlling for background characteristics and the measures of social capital used in this study.

When compared to students at four-year colleges, students at community colleges are more likely to be a member of a minority group (Horn & Nevill, 2006). Given this information and the findings of this study, improvements in the pipeline between community colleges and four-year institutions may assist in diversifying the racial composition at colleges and universities. Making it easier for students to transfer from a community college to a four-year institution will assist in diversifying student populations, as well as increase the number of students completing a bachelor's degree.

Also of importance was the lack of variability in enrollment patterns for low SES students across high schools. The unconditional model, which provides a decomposition of overall variability in the data into within-and between-schools, showed that a low SES student's probability of enrolling in postsecondary education did not vary across schools. By constructing a 95% plausibility values range, I evaluated the variability in school average enrollment. The variability in school average enrollment ranged from a low of 36% to a high of 65%. While variability in probability of enrollment is observed after adding predictor variables, neither of the two school level variables in this study was significant.

Overall, the results of this study indicate that, when controlling for the variables in this study, the more information low SES students have about attending a two-year institution of postsecondary education the more likely they are to enroll. Programs and interventions that are designed to provide low SES students with information about the college going process may be effective in increasing the number of students who enroll in a two-year institution of

postsecondary education. Increasing the number of low SES students enrolling in postsecondary education, regardless of institution type, will assist in diversifying the socio-economic characteristics of the college going populace.

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Table 5.1

Descriptive Statistics of Continuous Variables (N = 624)

Variable	n	M	SD	Min	Max
Overall Sample					
10th Grade Math Test (*BYTXMSTD*)	624	45.22	8.75	22.33	73.79
10th Grade Reading Test (*BYTXRSTD*)	624	45.38	8.69	24.29	70.62
12th Grade Math Test (*F1TXMSTD*)	624	43.75	8.39	22.75	68.07
Parent Involvement (*PARINV*)	624	8.39	2.61	0.33	17.67
Sources of Information Accessed (*SRCACC*)	624	4.21	2.57	0.00	12.00
Enrolled in a Two-Year College					
10th Grade Math Test (*BYTXMSTD*)	322	46.61	7.70	24.36	66.32
10th Grade Reading Test (*BYTXRSTD*)	322	47.00	8.01	26.63	70.62
12th Grade Math Test (*F1TXMSTD*)	322	45.40	7.64	26.53	68.07
Parent Involvement (*PARINV*)	322	8.41	2.57	0.33	11.00
Sources of Information Accessed (*SRCACC*)	322	4.78	2.48	0.00	17.67
Did Not Enroll in a Two-Year College					
10th Grade Math Test (*BYTXMSTD*)	302	43.73	9.55	22.22	73.79
10th Grade Reading Test (*BYTXRSTD*)	302	43.64	9.07	24.29	66.07
12th Grade Math Test (*F1TXMSTD*)	302	42.00	8.76	22.75	66.24
Parent Involvement (*PARINV*)	302	8.38	2.64	0.67	17.67
Sources of Information Accessed (*SRCACC*)	302	3.61	2.52	0.00	12.00

Note. n represents the effective sample size.

Table 5.2

Frequency and Percentage of Sample for Categorical Variables (N = 624)

Variable	*n*	%
Enrolled in Two-Year College (*ENROLL2YR*)		
Yes	322	51.6
No	302	48.4
Gender (*DMALE*)		
Men	274	43.9
Women	350	56.1
Highest Math (*DMEDMATH*, *DLOWMATH*)		
High Math	385	61.7
Medium Math	177	28.4
Low Math	62	9.9
Parent Education (*D4YRPSE*, *DSOPAPSE*)		
At Least Four-Year Degree	16	2.6
Some Postsecondary Education	171	27.4
No Postsecondary Education	437	70.0
Parent Expectations (*DSOPSE*, *DNOPSE*)		
At Least a Four-Year Degree	494	79.2
Some Postsecondary Education	86	13.8
No Postsecondary Education	44	7.0

Table 5.2 (continued)

Frequency and Percentage for Categorical Variables (N = 624)

Variable	*n*	%
Race (*DAFAM*, *DASAM*, *DHISP*, *DOTHER*)		
Caucasian	240	38.5
African American	110	17.6
Asian American	18	2.9
Hispanic	228	36.5
Other	28	4.5

Note. n represents the effective sample size.

Table 5.3

Frequencies and Percentages of Sample for Categorical Variables by Enrollment Status (N = 624)

	Enrolled (*n* = 322)			Did Not Enroll (*n* = 302)		
Variable	*n*	% in Variable	% in Enrolled	*n*	% in Variable	% in Did Not Enroll
Gender						
Men	121	44.2	37.6	153	55.8	50.7
Women	201	57.4	62.4	149	42.6	49.3
Total	322	-----	100.0	302	-----	100.0
Highest Math						
High Math	229	59.5	71.1	156	40.5	51.7
Medium Math	71	40.1	22.0	106	59.9	35.1
Low Math	22	35.5	6.8	40	64.5	13.2
Total	322	-----	100.0	302	-----	100.0
Parent Education						
At Least a Four-Year Degree	7	43.8	2.2	9	56.3	3.0
Some Postsecondary Education	95	55.6	29.5	76	44.4	25.2
No Postsecondary Education	220	50.3	68.3	217	49.7	71.9
Total	322	-----	100.0	302	-----	100.0
Parent Expectation						
At Least a Four-Year Degree	265	53.6	82.3	229	46.4	75.8

Table 5.3 (continued)

Frequencies and Percentages of Sample for Categorical Variables by Enrollment Status (N = 624)

Variable	Enrolled (*n* = 322)			Did Not Enroll (*n* = 302)		
	n	% in Variable	% Enrolled	*n*	% in Variable	% Did Not Enroll
Parent Expectation (continued)						
Some Postsecondary Education	36	41.9	11.2	50	58.1	16.6
No Postsecondary Education	21	47.7	6.5	23	52.3	7.6
Total	322	-----	100.0	302	-----	100.0
Race						
Caucasian	124	51.7	38.4	116	48.3	38.5
African American	56	51.8	17.6	54	48.2	17.6
Asian American	13	72.2	4.0	5	27.8	1.7
Hispanic	120	52.6	37.2	108	47.4	35.9
Other	9	32.1	2.8	19	67.9	6.3
Total	322	-----	100.0	302	-----	100

Note. n represents the effective sample size.

Table 5.4

HGLM Results for Three Models

Variable	Unconditional Model		Level-1 Predictors Only Model		Full Model	
	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)	Unit Specific Coefficient (*SE*)	Population Average (Coefficient *SE*)
Fixed Effects						
Intercept, γ_{00}	-0.03 (0.10)	-0.03 (0.11)	-0.01 (0.12)	-0.01 (0.15)	0.01 (0.13)	0.00 (0.15)
SCHOOLSES, γ_{01}					0.67 (0.64)	0.67 (0.72)
DURBAN, γ_{02}					-0.05 (0.34)	-0.05 (0.38)
DRURAL, γ_{03}					0.06 (0.31)	0.06 (0.37)
DLOWMATH, γ_{10}			-0.48 (0.60)	-0.47 (0.56)	-0.47 (0.61)	-0.46 (0.57)
DMEDMATH, γ_{20}			-0.80 (0.57)	-0.79 (0.55)	-0.81 (0.57)	-0.80 (0.56)
BYTXRSTD, γ_{30}			-0.02 (0.03)	-0.02 (0.03)	-0.01 (0.03)	-0.02 (0.03)

Table 5.4 (continued)

HGLM Results for Three Models

Variable	Unconditional Model		Level-1 Predictors Only Model		Full Model	
	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)	Unit Specific Coefficient (*SE*)	Population Average (Coefficient *SE*)
BYTXMSTD, γ_{40}			0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)
F1TXMSTD, γ_{50}			0.03 (0.03)	0.03 (0.03)	0.03 (0.03)	0.03 (0.03)
DMALE, γ_{60}			-0.45 (0.49)	-0.44 (0.48)	-0.44 (0.49)	-0.44 (0.48)
DAFAM, γ_{70}			0.08 (0.41)	0.08 (0.40)	0.08 (0.41)	0.08 (0.41)
DASAM, γ_{80}			1.18 (0.66)	1.17 (0.68)	1.10 (0.68)	1.09 (0.70)
DHISP, γ_{90}			0.53 (0.59)	0.53 (0.58)	0.55 (0.60)	0.55 (0.70)
DOTHER, γ_{100}			-1.42 (0.58)	-1.39 (0.56)	-1.40[*] (0.56)	-1.38[*] (0.54)
DSOPAPSE, γ_{110}			0.17 (0.33)	0.16 (0.32)	0.17 (0.32)	0.17 (0.32)

Table 5.4 (continued)

HGLM Results for Three Models

Variable	Unconditional Model		Level-1 Predictors Only Model		Full Model	
	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)	Unit Specific Coefficient (*SE*)	Population Average Coefficient (*SE*)	Unit Specific Coefficient (*SE*)	Population Average (Coefficient *SE*)
D4YRPAPSE, γ_{120}			0.19 (1.12)	0.20 (1.08)	0.20 (1.11)	0.20 (1.07)
DNOPSE, γ_{130}			-0.27 (0.66)	-0.26 (0.65)	-0.27 (0.66)	-0.26 (0.65)
DSOPSE, γ_{140}			-0.30 (0.39)	0.30 (0.39	-0.30 (0.39)	-0.30 (0.39)
SRCACC, γ_{150}			0.25*** (0.06)	0.25*** (0.06)	0.25*** (0.06)	0.25*** (0.06)
PARINV, γ_{160}			-0.01 (0.04)	-0.01 (0.04)	-0.01 (0.05)	-0.01 (0.04)
Variance Component						
τ	0.09		0.38*		0.39*	

*$p < .05$. **$p < .01$. ***$p < .001$.

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APPENDIX A: IRB Approval Letter

DATE: September 19, 2008

MEMORANDUM

TO: Steven M. Janosik
               Matthew Stimpson
               Yasuo Miyazaki

FROM: David M. Moore

Approval date: 9/19/2008
Continuing Review Due Date:9/4/2009
Expiration Date: 9/18/2009

SUBJECT: **IRB Expedited Approval:**   "Examining Social Capital as a Predictor of Enrollment in Postsecondary Education for Low-Income Students" , IRB # 08-527

This memo is regarding the above-mentioned protocol. The proposed research is eligible for expedited review according to the specifications authorized by 45 CFR 46.110 and 21 CFR 56.110. As Chair of the Virginia Tech Institutional Review Board, I have granted approval to the study for a period of 12 months, effective September 19, 2008.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.
3. Report promptly to the IRB of the study's closing (i.e., data collecting and data analysis complete at Virginia Tech). If the study is to continue past the expiration date (listed above), investigators must submit a request for continuing review prior to the continuing review due date (listed above). It is the researcher's responsibility to obtain re-approval from the IRB before the study's expiration date.
4. If re-approval is not obtained (unless the study has been reported to the IRB as closed) prior to the expiration date, all activities involving human subjects and data analysis must cease immediately, except where necessary to eliminate apparent immediate hazards to the subjects.

Important:
If you are conducting **federally funded non-exempt research**, please send the applicable OSP/grant proposal to the IRB office, once available. OSP funds may not be released until the IRB has compared and found consistent the proposal and related IRB applicaton.

cc: File

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