

EXAMINING THE EFFECTS OF ACADEMIC PRESS, SOCIAL SUPPORT, AND
COLLECTIVE EFFICACY IN U.S. HIGH SCHOOLS ON STUDENTS' PREPAREDNESS
FOR COLLEGE: A MULTILEVEL ANALYSIS OF THE
EDUCATION LONGITUDINAL STUDY OF 2002

by

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(Under the Direction of Elizabeth DeBray)

ABSTRACT

The purpose of this study was to explore the differences in students' level of preparation for postsecondary education resulting from various aspects of high school organizational characteristics. Previous research has examined the individual and combined effects of academic press, social support, and collective efficacy on college entrance exams and high school grade point average. However, there have been few contemporary studies that explicitly relate to the interaction effects of school-level factors.

Utilizing data from the Education Longitudinal Study of 2002 (ELS:2002), this study employed a series of hierarchical linear models to examine (1) the variance within and between schools and (2) the relationship between high school organizational characteristics and educational outcomes. The modeling began with the simplest multilevel model and progressed to more complex models: (a) unconditional, (b) means-as-outcomes, (c) random-coefficient, and (d) intercepts as slopes-as-outcomes. The analytic sample was limited to students with documented experiences in a particular school setting ($n=13,358$).

The study found that variance in the outcome measures was better explained at the school level than at the student level. Findings also indicated no significant relationship between academic press and college entrance exams or high school grade point average. Additionally, the main effects of collective efficacy were shown to have a significant and negative association with the outcome measures. When controlling for student-level variables, however, the main effects of mean support showed a positive and statistically significant relationship to the outcome measures. The interactions between three organizational characteristics—math collective efficacy, English collective efficacy, support—and poverty concentration over 50% showed the strongest positive and statistically significant association with student-level predictors.

INDEX WORDS: School Effects, Academic Press, Social Support, Collective Efficacy, College Preparation, College Preparedness, Education Longitudinal Study of 2002, Multilevel Modeling, Hierarchical Linear Modeling

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DEDICATION

This work is dedicated to my son, Dillon.

You are my inspiration and motivation.

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There are no words to adequately thank the individuals who played an integral role in my journey. I realize that this path was predestined. Before I ever conceived of this reality, my steps had already been ordered. For that, I must first acknowledge and give thanks to my Lord and Savior.

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CHAPTER I

INTRODUCTION

Despite efforts to improve readiness for all students, research suggests that there are systematic differences in the extent to which schools contribute to students' preparedness for college (Greene & Forster, 2003; Lee & Kim; 2010). Understanding how students' varied experiences affect future educational outcomes is critical. College preparedness is an important policy and research topic because of its relationship to students' future success (Adelman, 1999; Sum, 1999; Greene & Forster, 2003; Adelman, 2006; Ladson-Billing, 2006). Past research has documented the correlation between academic preparation and postsecondary degree completion (U.S. Department of Education, 2001). In addition to earning potential and economic vitality, degree attainment also has implications for personal and social opportunity as well. Statistics indicate that, on average, college graduates earn more than twice the annual income of high school graduates, have greater access to employer-funded healthcare, have lower incidence of incarceration, and have higher rates of civic involvement (Baum & Payea, 2004; Lumina Foundation, 2009; Planty et al., 2007).

As an increasingly competitive global market continues to threaten America's economic position among other top-performing nations, postsecondary and workforce expectations are continuously evolving. Therefore, it follows logically that demands for higher levels of knowledge and specialized training will steadily increase to meet these demands. President Obama recently echoed this point during an Address to the Joint Session of Congress (2009):

It is our responsibility as lawmakers and educators to make this system work. But it is the responsibility of every citizen to participate in it. And so tonight, I ask every American to commit to at least one year or more of higher education or career training. This can be community college or a four-year school; vocational training or an apprenticeship. But whatever the training may be, every American will need to get more than a high school diploma . . . That is why we will provide the support necessary for you to complete college and meet a new goal: by 2020, America will once again have the highest proportion of college graduates in the world.

According to the National Center for Education Statistics (2009), the proportion of high school students with aspirations to pursue a postsecondary degree has markedly increased in the past two decades. The rise in aspirations has been consistent across income levels, races, and ethnicities. Additionally, the number of high school graduates and college entrants has also increased. Though enrollment for all demographics has grown since 1980, significant gaps remain. For instance, college attendance for students from the lower end of the economic spectrum peaked at 57.1 % while 65.2 % of middle and 81.9 % of high-SES students enrolled in college in 2008. Similarly, only 55.7 % of African American and 63.9 % of Latino high school graduates attended college compared to 71.7 % of White students. While these data illustrate disparities in college enrollment trends, they do not communicate what accounts for differences in college going. That is to say, we are still trying to understand why certain groups of students choose to pursue postsecondary education at higher rates than others.

Some researchers argue that gaps in educational pursuits stem from the intricacies associated with existing financial aid programs (Avery & Hoxby, 2004; De La Rosa & Tierney,

2006; Goodman, 2008; St. John, 1991). In their work on barriers to college, De La Rosa and Tierney (2006) found that low-income students' educational aspirations were often detoured due to perceived financial barriers. Even after being admitted to postsecondary institutions, many students chose to enter the workforce immediately following high school graduation as opposed to enrolling in college. Other researchers point to lack of adequate information as a significant barrier to higher education (Tierney, 1980; Perna, 2006). Not surprisingly, Tierney's (1980) analysis of data from the National Longitudinal Study of the High School Class of 1972 (NLS: 1972) revealed that students from high-income families had substantially greater access to information used to make postsecondary decisions.

Still, other researchers maintain that high school experiences influence students' decisions to pursue postsecondary education (Roderick, Nagaoka, Coca, 2009). That is, after controlling for students' individual characteristics, academic preparation may either strengthen or weaken a student's desire to pursue higher education. This perspective on disparities in college enrollment rates speaks directly to the K-12 education system. In particular, it illuminates the potential inequities within the high school context (i.e. some schools better prepare students for postsecondary education) and with the quality of education students receive. Understanding these differences and their effect on students' preparation for postsecondary education is another step toward ensuring equal educational opportunities for all students.

Grounded in research on school effects and school effectiveness, this dissertation examined the effect of school characteristics on educational outcomes. More specifically, the current study focused on the relationship between three high school organizational characteristics—academic press for achievement, social support structures, and collective

efficacy—and students’ preparedness for college, defined in terms of college entrance exams and high school grade point average.

This chapter provides an introduction to the present study by first defining the problem and the study’s purpose. Next, the chapter provides an overview of the conceptual model and methodological approach used to address the research questions. The chapter concludes with a summary of the significance and limitations of the study, as well as definitions of key terms used throughout the chapters that follow.

Statement of the Problem

School effects literature has well documented the impact of various high school organizational factors on educational outcomes (McDill, Naterille, Pallas, 1986; Lee & Smith, 1999; Lee, Smith, Perry, & Smylie, 1999; Hoy, Smith, & Sweetland, 2002; Lee and Burkam, 2003). However, much of the earlier school effects research was centered on the role of normative and affective environments, and was conducted prior to increased accountability standards. These studies were executed during a time when academic press for achievement and social support structures were the primary climate factors of education policy interest. Particularly since the *No Child Left Behind Act of 2001* was signed into law, scholars have broadened the scope of school effects research to include collective efficacy (Goddard, LoGerfo, & Hoy, 2004). Understanding how these factors impact educational outcomes is essential to ensuring that policies and reform efforts to improve college preparedness are targeted appropriately.

Academic press is a defining characteristic of effective schools’ normative environment (Murphy, Weil, Hallinger, & Mitman, 1982). High academic press drives students’ and teachers’ behaviors toward specific organizational goals (Lee, Smith, & Smylie, 1999). In

general, students are challenged to engage in academically rigorous coursework required for successful transition to college, and teachers are encouraged to perform in a manner consistent with achievement-oriented goals. Researchers also assert that improved student engagement (Klem & Connell, 2004) and teacher performance (Hoy, Sweetland, & Smith, 2002) is linked with achievement outcomes and educational attainment.

While increased academic rigor has been more salient in predicting students' preparedness for college, school effectiveness literature also suggests that social support factors influence—directly or indirectly—educational outcomes (Bryk, Lee, & Holland, 1993; Lee, Smith, Perry, & Smylie, 1999; Murphy, Weil, Hallinger, & Mitman, 1982; Savitz-Romer, Jager-Hyman, & Coles, 2009). For example, a seminal study conducted by Bryk and Driscoll (1988) indicated that supportive interpersonal relationships in schools were positively related to mathematics achievement gains among high school students.

In addition to the academic and social orientation of schools, contemporary studies (Cybulski, Hoy, & Sweetland, 2005; Goodard, Hoy, & Hoy, 2000; Hoy, Sweetland, & Smith, 2002) expand the body of literature on organizational characteristics to include collective efficacy as a predictor of student achievement. Recent school effects research suggests that the influence of press and support on students' educational attainment is either strengthened or weakened by teachers' shared beliefs (Hoy, Sweetland, & Smith, 2002). Stated another way, collective efficacy influences the normative environment and interpersonal relationships at play in high school organizations and, ultimately, academic outcomes. Additionally, the inclusion of collective efficacy brings balance to current school effects conversations, particularly given the policy relevance of teacher quality and effectiveness.

Purpose of the Study

The purpose of this study was to explore the differences in students' level of preparation for postsecondary education resulting from various aspects of high school organizational characteristics. Previous research has examined the individual and combined effects of academic press, social support, and collective efficacy on educational outcomes. However, there have been few contemporary studies that explicitly relate to the interaction effects of school-level factors (Ma, Ma, and Bradley, 2008). According to Bickle (1993), one of the primary aims of schools effects research was to demonstrate success in schools with high concentrations of minority and economically disadvantaged students. As such, this study intends to further our understanding of how organizational characteristics impact outcomes in differing school contexts. More specifically, this present research considers the interaction effects of press, support, and collective efficacy with high-poverty and high-minority schools. Through this exploration, this study provides empirical evidence to address several important policy questions: In what ways do schools contribute to students' preparation for college? What school factors are helping students meet rigorous academic requirements? Are certain types of schools meeting increased academic standards better than others? This study attempts to add to the continuing dialogue on school effects by providing useful recommendations for both policy and practice. With this in mind, findings can be used as a source of insight to further education reform efforts targeted at improving college preparedness in U.S. high schools.

Utilizing data from the Education Longitudinal Study of 2002 (ELS:2002), this study investigated high school organizational effects on students' preparedness for postsecondary education. Broadly, this research intended to address one overarching question: What are the

influences of academic press, social support, and collective efficacy on educational outcomes? In an effort to operationalize this question, I pose three more specific sub-questions:

1. How does college preparedness vary within and across secondary schools?
2. What are the effects of secondary school context on college entrance exams and high school grade point average?
3. What are the main and interaction effects of academic press for achievement, social support, and collective efficacy on college entrance exams and high school grade point average?

Conceptual Model

School effects research suggests that various aspects of high school organizational characteristics influence academic outcomes. Academic press for achievement and social support structures are among the most frequently studied constructs. Prior research has extensively documented the linkage between academic press and students' future success (Murphy, Weil, Hallinger, & Mitman, 1982; Shouse, 1996; Rogers, Terriquez, Valladares, & Oakes, 2006). The rigor associated with students' high school curriculum is a good indicator of future academic success, particularly as it relates to mathematics. Adelman's (2006) work on advanced mathematics coursetaking patterns supports this assertion. He found a strong, positive correlation between advanced mathematics coursetaking and educational attainment. More specifically, students taking Pre-calculus, Calculus, and Trigonometry were more likely to obtain a bachelor's degree than students enrolled in less rigorous mathematics coursework. Adelman's study of mathematics coursetaking illustrates the impact of academic press on educational outcomes, which suggests a relationship between strong normative emphasis and college preparation.

Research on affective and communitarian dimensions of high school organizations surfaced during the 1990s. This line of research responded to challenges associated with increased academic rigor. Following the release of *A Nation at Risk* (1983), education reform efforts focused on standards and accountability. Very few reformers, however, considered the unintended consequences of increased academic rigor. Understanding that academically-oriented reforms would alienate some students and discourage others, researchers began exploring the influence of social support structures in high school organizational practices. In particular, studies centered on the strength of social support in strong academic press school environments (Shouse, 1996). Lee and Smith (1999) found that strong interpersonal relationships between students and teachers were associated with higher levels of student engagement and, in turn, stronger academic outcomes.

Last, recent research has identified another aspect of high school organizations as integral to the learning process. This strand of research suggests that shared organizational norms and beliefs are associated with student achievement. For example, Hoy, Sweetland, and Smith (2002) recently developed a theoretical model to demonstrate the association between collective efficacy and mathematics achievement in schools. The model developed by Hoy, Sweetland, and Smith focused on the one- and two-way effects of school socioeconomic status, academic press, and collective efficacy on schools' mathematics achievement. Guided by Bandura's (1997) social cognitive theory of self-efficacy, Hoy and colleagues posited that student background and academic press influenced the way teachers' view their ability to impact student learning and achievement.

This dissertation acknowledges the importance of collective efficacy to improved educational outcomes, but only when working in concert with other organizational

characteristics. However, little research exists that explores the impact of press, support, and collective efficacy on educational outcomes. This study proposes a model that illustrates the relationship between high school organizational structure and college preparedness. The proposed relationship between academic press for achievement, social support structures, and collective efficacy is illustrated in Figure 1.1.

This model includes two outcome measures: college entrance exams (SAT & ACT) and high school grade point average (GPA). These measures of college preparedness are among those traditionally used in the college admissions process. Although not precise indicators of students' readiness to successfully engage in college-level coursework, research suggests that SAT scores, ACT scores, and GPA are among the most salient predictors of college success (Camara & Echternacht, 2002).

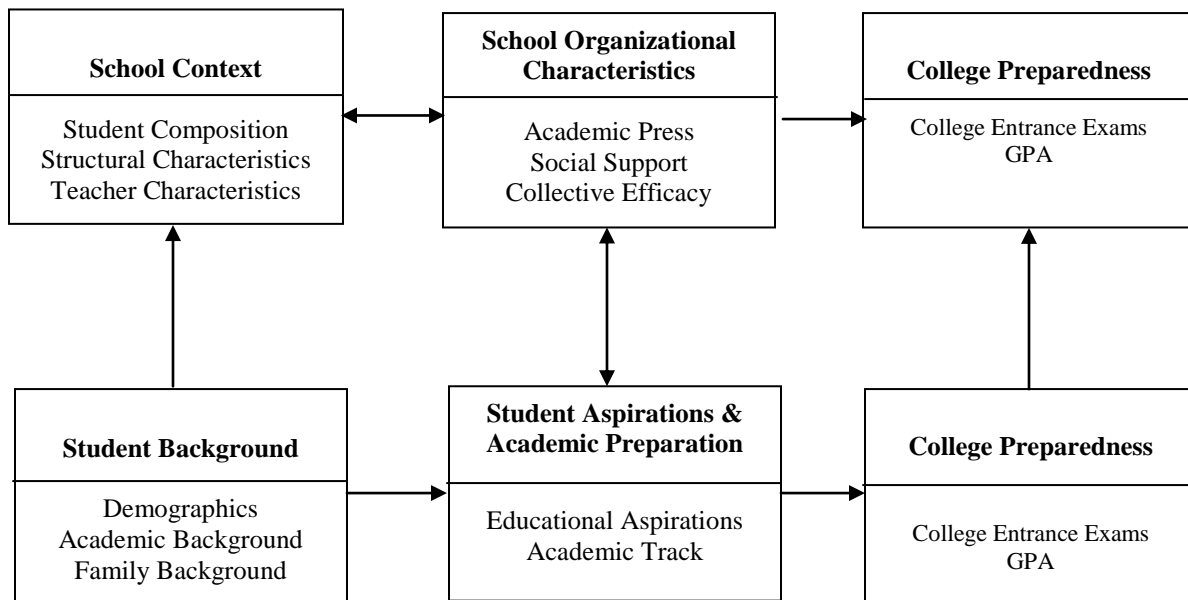


Figure 1.1. Conceptual Model of Multilevel School Effects on College Preparedness
Adapted from: A Multilevel Conceptual Framework for Analyzing School Effectiveness
(Rumberger & Palardy, 2004)

Research Method

The current study uses data reported in the Education Longitudinal Study of 2002 (ELS:2002/04). ELS:2002/04 includes three critical waves of data: (a) the base year survey, (b) the first year follow-up and transcripts, and (c) the second follow-up. Initial data were collected in spring 2002 during students' sophomore year. Subsequent follow-ups were conducted at 2-year intervals, in 2004 and 2006. Base year data are significant as they contain descriptions of students' background characteristics and prior academic achievement, teacher surveys, and school administrator surveys. The first follow-up, conducted during students' senior year, includes information related to school characteristics, coursetaking patterns, and graduation status.

There are four primary reasons why ELS:2002/04 is most appropriate for this study. First, ELS:2002/04 is the most recent longitudinal study released by the National Center for Educational Statistics (NCES). Second, data are nationally representative and constitute a sufficient sampling size. Third, ELS:2002/04 data include responses from various populations vital to the academic process and the study of high school organizations. Last, the longitudinal study tracks students' transition from high school to postsecondary education and/or the labor market. In particular, repeated observations of the same students over a period of time allows for the examination of protracted effects of high school organizational characteristics on later outcomes.

Analysis consisted of student- and school-level independent variables, including gender, race/ethnicity, socioeconomic status, academic background, educational aspirations, urbanicity, sector, teacher experience, and teacher quality. Additionally, exploratory factor analysis was used to collapse select variables into three composite measures: (a) academic press for

achievement, (b) social support structures, and (c) collective efficacy. Academic press was constructed by combining variables related to schools' normative environment; social support included variables describing schools' affective and communal dimensions; and collective efficacy was constructed from data pertaining to shared beliefs about teaching and learning.

Since this dissertation is intended to advance our understanding of the relationship between high school organizations and students' preparedness for postsecondary education, it was important to limit the scope of the study to students who were associated with a particular school (Gamoran, 1996). As such, this study considered only students for whom base-year and first-follow up data were available. Consequently, both homeschooled students and dropouts were both excluded from the analyses.

This study employed two-level hierarchical linear modeling (HLM) to examine school effects. HLM is a type of regression analysis commonly used in educational research because of the hierarchical structure of nested data (e.g. students within classrooms, classrooms within schools, and schools within districts). Prior to HLM, methods used to explore relationships between school factors and student characteristics were conducted at an individual level. Therefore, widely used approaches such as ordinary least squares (OLS) regression analyses "often underestimated the importance of school characteristics as predictors of student achievement," because analyses were limited to the student or school level (Shouse, 1996, p. 57). As a result, findings were often deceptive and frequently resulted in aggregation bias, misestimated standard errors, and heterogeneity of regression slopes (Raudenbush and Bryk, 1986, 2002).

Hierarchical linear models alleviate these problems in several ways. First, HLMs account for the clustered nature of multilevel data. Additionally, variation of outcomes is measured at

both student and school levels, allowing for the use of separate equations. Finally, the HLM approach allows for analysis of within- and between-school variances.

Significance of the Study

Every year thousands of students graduate from high school, yet they are unprepared for successful transition to and matriculation through college. To increase the proportion of students who graduate from high school ready to engage in college-level coursework, policymakers must begin looking at how the interplay of multiple influences affect students' preparation for postsecondary education. This study considers the impact of organizational characteristics in a way that is rarely explored and, therefore, has the potential to contribute to our understanding of how various policies and practices in high schools coalesce to advance or abate educational outcomes, particularly as it relates to students' preparedness for postsecondary education.

First, traditional approaches to understanding the relationship between organizational characteristics and educational outcomes have primarily focused on academic press for achievement and social support structures. Findings within the literature suggest that these two concepts, whether working in tandem or in isolation, significantly impact student learning and achievement. In recent years, however, researchers have begun to explore the effects of collective efficacy—a relatively new concept in school effects literature. This study recognizes the salient role teachers' shared perceptions of how their efforts affect student outcomes plays in furthering our understanding of school organizations. As such, this dissertation examines the impact of not only press and support, but the role of collective efficacy as well.

Second, this study employs a statistical modeling technique that is rarely utilized in school effects research. The present analysis measured the interaction between school context and organizational characteristics. Citing Byrne and Gallagher's work on school improvement, Ma, Ma, and Bradley (2008) note the scarcity of interactive modeling used to examine relationships among

school-level variables. In particular, the authors state that “a good starting point [for exploring school effects] is to examine interactions between school context and school climate, recognizing that the effects of school climate may depend on school context” (p. 70).¹ By focusing solely on main effects, other empirical inquiries may have neglected the potential significance of the how effects of organizational characteristics differ when interacted with other factors.

Finally, this study expands earlier findings by situating school effects research in the current era of heightened standards and accountability. Many of the seminal school effects studies that employ multilevel analysis were conducted during the latter part of the twentieth century, using the National Educational Longitudinal Study of 1988 (NELS:88). Utilizing data from the Education Longitudinal Study of 2002 (ELS:2002), this dissertation relies on the most recently released national dataset to examine the impact of high school organizational characteristics on students’ preparedness for college.

In an era of intensified accountability, the research proposed in this study has implications for the direction of future education policies and reform efforts. By exploring the individual and interaction effects of press, support, and efficacy, this study will offer policymakers a more concise understanding of high school organizational factors that account for school-level variation in students’ preparedness for college. Additionally, although school effects literature is replete with research that explores the relationship between school attributes and educational outcomes, past studies have typically focused on a single performance indicator (Rumberger & Palardy, 2005). This study intends to further school effects research through its use of multilevel modeling to examine the impact of high school organizational characteristics,

¹ In the IPO model that examines school inputs, processes, and outputs, *school climate* refers to the practices within the organization. This study treats those practices as *organizational characteristics*.

as measured by two performance indicators: college entrance exams and high school grade point average.

Limitations of the Study

The dataset utilized for this study was the most appropriate given the purpose and intended significance of this research topic. Despite its usefulness, however, the design of the Education Longitudinal Study of 2002 (ELS:2002/04) posed two significant limitations. First, though ELS:2002/04 provides a wide range of variables related to student background characteristics, student academic preparation, school characteristics, and teacher perceptions, several measures were not included in the survey. In the absence of precise measurements of academic press, social support, collective efficacy, and teacher quality, I used exploratory factor analysis to identify these latent constructs.

A second limitation of the study involved missing data. The absence of data can be treated using deletion or imputation methods. A missing values analysis conducted on the analytic sample revealed that imputation methods were most appropriate for handling missing values in this study. Multiple imputation (MI) is the preferred imputation method, based largely on the process of generating multiply imputed datasets to establish parameter estimates with greater specificity. However, Estimation Maximization (EM) was used due to complications associated with the statistical software package (IBM SPSS 19) used to treat missing data in this study.

The final limitation of this study concerned the proxies used to measure college preparedness. Though college entrance exams and high school grade point average are traditional measures of readiness, I acknowledge that a more precise measure exists. That is to say, traditional measures of readiness miss an important nuance. Current policies assume that

students who meet the necessary requirements for high school graduation and college enrollment are prepared to successfully engage in college-level work. However, high proportions of freshman are routed to remedial courses, which suggests that these high school graduates were unprepared for the demands of credit-bearing coursework. For instance, more than 20% of high school graduates that attend four-year institutions require remediation in at least one course—a problem especially acute among students from traditionally underserved populations (NCES, 2004). According to a report released by Strong American Schools titled *Diploma to Nowhere*, 42% of Black students and 41% of Hispanic students required remediation as compared to 31% of White students. Analysis also indicated that low-SES and first-generation college students were more likely to require remediation. In light of these statistics, enrollment in remedial courses may provide a more accurate snapshot of students' preparedness for college.

Barring these limitations, this research provides a useful step toward furthering the conversation about preparing students to compete for college, the workforce, and beyond. More importantly, as policymakers continue to refine federal education policy, understanding the role of school organizations in advancing or constraining those efforts is critical. This study is intended to illuminate the conditions that contribute to outcomes for certain schools and the impact on college preparation for the students that attend them.

Definition of Key Terms

The following terms are used in this dissertation. This section provides an explanation of the terms.

School Effects. The differences attributed to educational outcomes based on the particular school a student attended (Raudenbush & Willms, 1995).

Underserved Student Populations. Students who receive disproportionately less equitable access to educational resources.

Academic Press for Achievement. The extent to which school organizations drive members' behaviors and expectations toward specific achievement outcomes (Shouse, 1996).

Social Support Structures. Social support refers to interpersonal relationships between students and adults in school (Klem & Connell, 2004).

Collective Efficacy. The shared beliefs held and behaviors demonstrated by a school staff (Bandura, 1997).

College Preparation. At present, there is no single college preparation index. For the purposes of this study, preparation is assessed using academic indicators commonly recognized for college admission: college admissions tests (SAT crosswalk) and high school grade point average.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Prior to the 1980s one may have argued that high school completion was an adequate predictor of college preparedness. Conventional wisdom suggests that students who complete college-preparatory sequenced coursework and graduate from high school are prepared to successfully engage in college-level work. However, this has not been the case. In fact, research shows that high school graduates are enrolling in more remedial courses than in the past (Parsad & Lewis, 2003; Alliance for Excellent Education, 2006).

Over the past several decades, this reality ignited renewed interest in the K-16 pipeline, specifically as it relates to the effectiveness of secondary schools (Adelman, 2006; Ishitani, 2006; Kreysa, 2007). In particular, the issue of whether high schools adequately prepare students for successful transition to postsecondary education once again shifted to the forefront of education policy conversations (Hoyt & Sorensen, 2001; Greene & Forster, 2003). Since high school is viewed as the “mediator” that bridges school experiences with postsecondary opportunities, it is imperative that we understand what high school characteristics (i.e. curriculum, climate, context) have the greatest influence on students’ preparedness for college (Lee & Kim, 2010).

Following the publication of *A Nation at Risk* (1983), researchers cited academic rigor as the most salient predictor of educational outcomes (Adelman, 1999, 2006; Lee & Bryk, 1989,

Trusty & Niles, 2003). Specifically, Adelman's *Answers in the Toolbox: Academic Intensity, Attendance Patterns, and Bachelor's Degree Attainment* (1999) documented the positive relationship between rigorous high school curriculum and postsecondary degree completion. The policy response to mounting empirical evidence on the significance of academic rigor has been the formulation of "policy prescriptions" aimed at strengthening academic pathways to college.²

Educational policies and reforms targeted at increased college preparation are generally developed at the federal or state level. Cuban (1992) describes the origin of federal mandates and the process by which these externally derived efforts percolate to the local level:

First, revelations of terrible school conditions or unacceptable student performance appear. Influential public figures link these undesirable conditions in schools to national problems, suggesting that schools must improve. Then, a crisis is announced. Solutions to end the crisis spill forth. Public expectations soar.

(p. 220)

Although Cuban's observation was made nearly two decades ago, this approach to policy formation still exists today. Realizing the critical need to increase the proportion of American high school graduates that are prepared to successfully transition to college or into the workforce, policymakers have demonstrated their commitment to the issue through the enactment of legislation. In recent decades, these efforts have centered on increased academic rigor. The rationale behind such policies is that higher standards and accountability will lead to increased learning and achievement. This may hold for *some* students; however, it has not

² According to Roderick, Nagaoka, and Allensworth (2006), "the most common policy prescriptions for helping high school students promote college readiness are to align high school curricula and graduation requirements with college readiness standards, move larger numbers of students into more rigorous coursework, and increase the rigor of state exit examinations to meet college requirements" (p. 186).

resulted for *all* students. In certain instances, rigor without support leads to a higher probability of academic failure (Lee & Smith, 1999; Legault, Green-Demers, & Pelletier, 2006).

Like students, schools are also susceptible to failure under the current standards and accountability movement. For example, the *No child Left Behind Act* (2001) mandates that schools make adequate yearly progress. A component of this law requires states to ensure that “high quality” standards were met by teachers of core academic subjects. Though intended as a mechanism to equalize educational opportunities for all students by balancing access to quality educators, the negative unintended consequences of such actions created a new set of challenges for high-needs and hard-to-staff schools. Not unpredictably, research suggests that low-performing schools, with high concentrations of minority and economically disadvantaged students, are less likely to attract and retain quality educators than other school types (Ingersoll, 2002; Clotfelter, Ladd, Vigdor, & Diaz, 2004; Clotfelter, Ladd, Vigdor, & Wheeler, 2007; Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009). For this reason, this dissertation proposes that some schools are disproportionately advantaged with resources shown to positively impact educational outcomes (Huang & Moon, 2009). Thus, a primary aim of this research is to investigate aspects of high school organizational characteristics that attenuate or exacerbate these differences.

The following sections review relevant literature on the nexus of schools characteristics and student achievement. This chapter begins with an introduction to school effects theories and frameworks and discusses their application in this study. The next section synthesizes prior research on the relationship between school organizational characteristics and educational outcomes. What follows is a review of selected preparation strategies used in high schools to

increase students' preparedness for college. The chapter concludes with a summary of commonly recognized indicators used by colleges to determine admission.

School Effects

Examining the factors that impact educational outcomes and the extent of those impacts is the basis of school effects research. Raudenbush and Willms (1995) proposed two distinct theoretical perspectives guiding school effects inquiry. The first theory refers to the influence of policies and practices on outputs. Take for instance a school-wide remediation program targeted at increasing students' reading levels. Documented growth or achievement would be attributed to students' involvement in the program and, thus, associated with a particular school. The second theory suggests that school effects "may be the extent to which attending a particular school modifies a student's outcome" (p. 308). Given that an intended goal of the present study is to assess variances in students preparedness for college based on the characteristics of the high school attended, the latter perspective guides this dissertation.

Using school factors to predict student achievement is the foundation of school effects research. Hence, conceptual frameworks that guide research on school effectiveness are based on the hypothesized relationships between school factors and educational outcomes (Rumberger & Palardy, 2004). Rumberger and Thomas (2002) note that four factors dominate the literature on school effects: (a) student characteristics, (b) school resources, (c) structural characteristics of schools, and (d) school processes. These factors and their relationship to school effects are discussed in the sections that follow.

Student Characteristics

In 1966, findings reported in a landmark study on the relationship between school attributes and student achievement marked a significant shift in the way that education

researchers viewed school inputs and outputs. Commissioned by the United States Department of Health, Education, and Research as an investigation of educational equality and opportunity, the report revealed that student achievement was associated with school social composition (e.g. peer effect) and students' family background, specifically in the case of minority students (Coleman et al., 1966). Essentially, researchers asserted that schools effects were not as independent of individual student attributes as once believed. This point is illustrated by the following conclusion: "The social composition of the student body is more highly related to achievement, independent of the student's own social background, than is any school factor" (p. 325). What sociologist James Coleman and his colleagues proposed challenged traditionally held assumptions regarding the impact of school resources. Subsequently, over four decades after the release of *Equality of Education Opportunity*, we are still searching for an answer to the age-old question: Do schools make a difference?

An economic view of this relationship is generally referred to as an education production function, which refers to the association between school resources and the direction of educational outcomes. While empirical analyses from economists and education scholars have documented the correlation between resource inputs and measurable outputs, the magnitude of this relationship remains highly debated in both academic and policy arenas (Jefferson, 2005).

One perspective suggests that "money does not matter." That is to say, there is an insignificant and inconsistent relationship between educational expenditures and outcomes. Stemming from a meta-analysis of 38 studies that examined "economics of education and schooling," Hanushek (1986) found weak relationships between district spending and outcomes. In a subsequent analysis of extant literature on education production functions, Hanushek (1989)

further noted that when controlling for family characteristics, no systematic relationship existed between school expenditures and student performance.

A differing perspective affirms the existence of a significant relationship between inputs and outputs, supporting the notion that “money does matter.” In particular, Hedges, Laine, and Greenwald (1994) argued that some economist, such as Hanushek, utilized inferior synthesizing methods to arrive at findings. Employing a robust statistical approach to reanalyze studies in Hanushek’s (1986, 1989) meta-analyses, Hedges and colleagues found positive effects—though to varying degrees—of resource inputs on educational outcomes. In particular, researchers noted that “while the pattern of effect sizes is most persuasive for global resource variables (PPE and teacher experience), the median effects are positive for most resource variables, with the clear exception of teacher education” (Hedges, Laine, & Greenwald, p. 13).

Nearly two decades later, the effect of educational expenditures and resource allocation on student achievement remains an unresolved and contentious issue.

School Resources

Krueger’s (1999) study of the Tennessee Student/Teacher Achievement Ratio experiment (Project STAR) is consistent with the inputs-outputs line of research. The Project STAR experiment studied a cohort of students over a four-year period. Beginning during the 1985-1986 academic year, a cohort of students and their teachers were randomly assigned to small classes (13-17 students), regular classes (22-25 students), and regular classes with a teacher’s aide (Kruger, 1999, 2003).

Using regression analysis to investigate class-size effects, Krueger estimated the relationship between student-teacher ratios and academic achievement. Performance on annual assessment batteries revealed that students in smaller classes perform better than students in

regular-size classes. This finding illustrates an example of resource effects and supports the assertion that student-teacher ratios are associated with outcomes. Some students are better advantaged and have access to a greater supply of resources, as measured by student-teacher ratios (Krueger & Whitmore, 2001). Other students, however, attend schools with limited financial and human resources which, in turn, may affect their learning and achievement. While the primary focus of Krueger's randomized experiment was to explore the effect of school resources on student achievement at the elementary level, conclusions about student-teacher ratios have implications for class-size effects at the secondary level as well.

Structural Characteristics of Schools

Research on structural characteristics of schools estimates variances in student performance based on size (larger, smaller), type (public, private, Catholic), and location (urban, suburban, rural). Findings on the relationships between school size and educational outcomes are mixed. Some researchers argue that smaller schools create a climate more conducive to positive outcomes (Cotton, 1996; Lee & Smith, 1997), yet others contend that school-size effects are more closely related to socioeconomic factors. From their review of empirical evidence on school size effects, Howley, Howley, and Shamblen (2001) concluded that students from low-socioeconomic backgrounds perform better in smaller schools than students from more advantaged family backgrounds. Lee and Smith (1997) offer a differing opinion on the achievement of economically disadvantaged students, relative to school size. In their work on student learning in high schools, Lee and Smith found that moderate-size schools (i.e. enrolling 600-900 students) is optimal for maximized learning opportunities. One interesting finding suggests that, even when controlling for student background characteristics, learning and achievement gains are lowest in large high schools.

Duncan and Sandy (2007) used data from the National Longitudinal Survey of Youth to estimate the effects of school type on high school students' performance on achievement tests. Estimates based on respondents' scores on the Armed Services Vocational Aptitude Battery (ASVAB) were consistent with previous research that found higher achievement levels in private schools than public schools. Duncan and Sandy are careful to acknowledge that controlling for individual student characteristics (e.g. prior achievement and family background) weakens the private school effect.

School Processes and Practices

Another line of research focuses on school processes. While public schools are generally less autonomous than private schools and have less flexibility in establishing policies and practices that impact school behavior, there is some control over internal management and organization. Policies and practices relate to the types of learning environments school personnel create and the extent to which those environments advance or abate student performance.

Adelman (1999) illustrated the direct correlation between students' high school coursetaking patterns and college attainment. Trusty & Niles (2003) also point to advanced mathematics as the strongest predictor of educational outcomes. Researchers have also documented the link between Advanced Placement (AP) courses and students' later academic success (Roderick, Nagaoko, & Coca, 2009). The number of all students taking college preparatory and AP courses has significantly increased in the last decade; however, despite increased participation in rigorous high school courses, substantial racial and socioeconomic gaps exist between the number of students who enroll in these courses, who graduate from high school, and who earn college degrees (Adelman, 1999; Greene & Forster, 2003).

For example, low-socioeconomic status (SES) African American students have not fared as well as others in the education pipeline. Studies commissioned by the National Center for Education Statistics (2006) report that African American students earn less academic credits than White students; they are less likely to take advanced placement tests than White students; they are more likely to drop out of high school than White students; and they enroll in post-secondary institutions at a much lower rate than White students. Recent research purports that the factors contributing to the dismal academic situation of some low-SES African American students may be attributed to the school environment (Davis, Ajzen, Saunders, & Williams, 2002; Osher & Fleischman, 2005; Perna, 2000; Pritchard, Morrow, & Marshall, 2005). Because of the demonstrated link between the high school context and educational outcomes, a central problem this research seeks to address is whether or not students who attend certain types of schools are better prepared to pursue postsecondary education.

Key Findings of Schools Effects Research

Underlying educational policy conversations about improving student achievement are two distinct and often competing ideas of reform strategies which have polarized most policymaking along either dimension. The first approach is grounded in the belief that achievement effects are greater when school staff set expectations that *press* students toward high academic performance. The other approach centers on the affective and communitarian domains of education which *support* students' social and developmental needs. There is substantial literature that points to academic rigor as the most salient predictor of educational outcomes, particularly at the secondary level (Adelman, 1999, 2006; Koretz, Madaus, Haertel, & Beaton, 1992; Trusty & Niles, 2003). What is less substantiated, however, is the relationship between high schools' social organizations and student achievement. Researchers and

policymakers often frame the approaches as incongruent and contradictory. Much of the dissonance in current educational policy is indicative of historical tensions that have existed among educational reformers for centuries. From recommendations made by *The Committee of Ten* (1892) and the *Commission on Educational Excellence* (1983) which emphasized increased academic rigor and standards to the *Progressive Education Movement* (1916) and the *Open Education* (1969) approach which championed experiential learning in supportive environments, the tides of education reform ebb and flow from press to support as if the two are competing constructs (Lee, Smith, Perry, & Smylie, 1999).

On the contrary, conceptual and empirical evidence suggests that achievement outcomes are greater when both press for achievement and social support approaches work in tandem (Lee & Smith; 1999; Lee, Smith, Perry, & Smylie, 1999; Shouse, 1996). That is to say, despite philosophical differences surrounding press and support, an analysis of over two decades of research on school characteristics indicates that in optimal learning environments—where students feel supported by school staff to meet rigorous academic demands—these strategies are most effective when viewed as complementary and enacted simultaneously. Researches note that the overall impact of these approaches may be attenuated or enhanced depending on staff members' collective expectations and beliefs about teaching and learning (Hoy, Sweetland, & Smith; 2002; Lee & Smith; 1996; Lee, 2000; Sweetland & Hoy; 2000).

The current era of accountability reinforces the need for closer examination of school factors that influence educational outcomes. Discerning the impact of these conditions provides researchers and policymakers with a channel for identifying strengths and weaknesses of achievement-oriented reform efforts. The following section reviews qualitative and quantitative research on academic press for achievement, social support structures, and collective efficacy.

Of particular interest are studies that utilized data from large-scale national longitudinal surveys to examine these results. These studies are presented in table 2.1 according to the constructs under investigation.

Academic Press for Achievement

Academic press refers to the extent to which school organizations drive members' behaviors and expectations toward specific achievement outcomes (Shouse, 1996). While externally developed policies and accountability measures "do impose pressures to which schools respond by increasing emphasis" on academic goals (Lee & Smith, 1999, p. 914), researchers typically frame academic press as an internally motivated construct (McDill, Naterille, Pallas, 1986). Regardless of the originating source, researchers cite academic press for achievement as a defining characteristic of effective schools (Murphy, Weil, Hallinger, & Mitman, 1982).

The effective school movement began in the late 1960s. Many studies were conducted throughout the first two critical periods of the movement (1966-1976, 1976-1980) that sought to dispel the notion that "schools don't make a difference" (see Mace-Matluck, 1987). Though methods and measures varied across studies, the three-fold aim of school effectiveness research remained consistent: (a) to demonstrate success in low-SES, high minority schools; (b) to prove that achieving effectiveness attainable in all schools; and (c) to highlight common characteristics of effective schools (Bickel, 1983).

This seminal work on school effectiveness had limitations. By the late 1980s, effective schools research was being challenged on the basis of methodological and conceptual deficiencies associated with earlier designs (Lee & Bryk, 1989). A primary criticism centered on the use of single-level analysis to evaluate multilevel data. Despite speculation attributed to

inappropriate statistical methods, a variety of school effectiveness factors have held constant and are common in school effects research that examines relationships between academic environment and outcomes (Sammons, Hillman, & Mortimore, 1995). Press in schools is typified by school members' behaviors or other environmental forces that elicit certain responses from students and teachers (Murphy, Weil, Hallinger, & Mitman, 1982). Some studies on school effects have examined organizational characteristics of schools to explain achievement. Research has also considered the influence of school curriculum on students' academic success. Still, other researchers have explored the relationship between teachers' expectations and educational attainment. Thus, the body of literature on press for achievement continues to evolve as researchers aim to demonstrate the link between rigorous standards and specific academic outcomes.

Organizational characteristics. Later attempts to establish linkages between press and academic outcomes had similar foci yet employed different methods. A significant body of research considers organizational structures as the most critical aspect of academic press. This strand of school effects research focuses on contextual differences between two school sectors: Catholic and public high schools. Positive effects associated with Catholic high schools include equitable distribution of achievement (Lee & Bryk, 1989) and lower dropout rates (Lee & Burkam, 1992). These studies attributed outcomes to the constrained academic organization of Catholic high schools.

Drawing on this body of research, Gamoran (1996) analyzed student achievement among different school sectors. Utilizing the National Educational Longitudinal Study of 1988 (NELS:88), Gamoran sought to examine the association of academic climate, student social bonding, and student coursetaking to performance on 10th grade achievement tests: math,

science, social studies, and English. The study also examined students' propensity to attend certain types of schools: public magnet, Catholic, and nonreligious private. Not surprisingly, multilevel analysis of school-type effects revealed that low-income and minority students were less likely to attend private schools than more affluent and white students. Additionally, findings suggested that academic press was strongest in private schools, while levels of press and support were comparable in magnet in public schools. According to Gamoran, similarities between magnet schools and other types of schools contradict findings in prior research. One explanation for these differences is attributable to statistical modeling. By utilizing unweighted ordinary least squares (OLS) and hierarchical linear modeling (HLM) to test these differences, Gamoran demonstrated that OLS often overestimated magnet school-type effects.

In a study of social distribution of high school achievement, Lee and Bryk (1989) examined sector differences in high school seniors' mathematics achievement scores. The study considered various factors that had been empirically shown to influence educational outcomes. Controlling for academic background, race, and socioeconomic status, researchers sought to understand the effect of school-level factors on outcomes. Included among the school-level predictors was a variable that measured the academic press of the school. The composite reflected student responses to a range of questions included in the High School and Beyond (HS&B) data set which, aside from a school average of hours per week spent on homework, were all based on students' perceptions: (a) reports about the lack of academic press in the school, (b) attitudes toward getting good grades, and (c) interest in academics.

Additional studies on organizational characteristics have focused on school size effects. For instance, Lee and Smith's (1997) research on reading and mathematics achievement gains in public, Catholic, and private elite high schools supports prior recommendations of enrollment

sizes of 600-900 students. That is, researchers found that the normative emphasis demonstrated in moderate-sized schools creates “optimal” learning opportunities for all students.

Curriculum and course offerings. Research on the link between academic rigor and student outcomes at the secondary level suggests that students who engage in a rigorous course of study are better prepared for college-level work (Adelman, 2006). Additionally, other empirical inquiries indicate that cognitive development and achievement is highly correlated with intellectual engagement. Gamoran’s (1987) study of stratified learning opportunities among high school students indicated that enrollment in advanced mathematics and science courses has a positive effect on academic outcomes. Conversely, other studies have explored the potential impact of low academic press on outcomes. Schools that offer limited learning opportunities for students generally report lower achievement rates than schools that provide adequate access to challenging, college preparatory curricular (Rogers, Terriquez, Valladares, & Oakes, 2006).

Tierney and colleagues (2003) postulated five reasons why academically rigorous preparation is critical to high school students’ future success:

- Groups of students who continue to be underrepresented in higher education are also less likely to be prepared for college;
- College enrollment rates and persistence to graduation are higher among students who participate in college prep compared to students enrolled in a vocational program;
- Preparation via academic curriculum is particularly important to the college enrollment decisions of low-SES students;
- Students enrolled in affluent school communities are more likely to participate in a rigorous curricular program; and,

- Students from economically disadvantaged families are more likely to be enrolled in non-academic curricular tracks or academic tracks that are not rigorous. (p. 2)

Adelman (1999) highlighted this point in a study which examined, among other factors, the link between high school curriculum and academic outcomes. Findings indicated that coursework, particularly as it relates to mathematics courses, is a strong predictor of future outcomes. Adelman's conclusion strengthens earlier findings that the proportion of academic mathematics courses a school offers is associated with students' academic success (Lee, Smith, & Croninger, 1997).

Teacher expectations. When teachers are confident in their ability to influence outcomes, it creates an environment where students are expected to succeed. Such schools are characterized by certain conditions wherein “teachers set high but achievable goals, [teachers] believe in the capability of their students to succeed, the school environment is orderly and serious, and students, teachers, and principals all respect academic achievement and work for success” (Hoy, Sweetland, & Smith, 2002, p. 79). Students will often rise to the occasion when expectations are communicated clearly and consistently (McDill, Natriello, & Pallas, 1986). A study conducted by the New York's Office of Performance Review further illustrates this point. A comparison of two urban schools—one high performing and one low performing—indicated that students in less effective schools “failed because they were not expected to succeed” (Edmonds, 1979, p. 17). Nearly two decades later researchers continued to draw similar conclusions. According to Lee and Smith (1994), “when expectations for student learning are embodied in the formal structure of the school and enacted in its daily life, very positive effects can occur for at-risk youth” (p. 7).

Emphasis on specified values and norms help guide school members' behaviors toward higher standards and is expected to enhance achievement in two ways. First, students are challenged and encouraged to meet academic demands by exerting greater effort toward intended outcomes. Research cites greater student effort as a precursor to higher academic outcomes for most high school students (Lee & Smith, 1999; Shouse, 1996). However, while raising academic standards is an integral step toward higher student achievement, it comes at the risk of adversely affecting certain student populations, particularly low achieving, low-SES, and minority students.

Most studies that examine the relationship between press and achievement have generally regarded socioeconomic (SES) status as an individual unit of analysis at the school-level. Shouse (1996) took an alternative approach by also considering the three-way interactive effects of press, SES, and communality on 10th grade mathematics achievement scores. Using data from the first follow-up survey of the National Education Longitudinal Study of 1988 (NELS:88), Shouse illustrated that achievement was greater in middle- and high-SES schools yet students in low-SES schools experienced more benefits from high levels of academic press. As reported by Edmonds (1979), Weber argued that although academic rigor is tantamount to school effectiveness, it does not work in isolation. Many factors contribute to student learning and academic achievement. In particular, social and economic factors greatly influence students' educational experiences. According to Shouse, that explains why "the level of expectation placed on more affluent students by parents and other significant adults is high enough to counter balance any deficit of academic press within the school" (p. 65).

Social Support Structures

In the school reform context, social support refers to interpersonal relationships between students and adults in school (Klem & Connell, 2004). There is growing consensus among researchers that support influences—directly or indirectly—outcomes, particularly in the presence of rigorous academic demands. With few exceptions, discussions of social support focus on opportunities for students to build meaningful connections with individuals who understand the relationships between educational preparation and future goal attainment. The absence of support needed to meet increased standards may have unintended consequences for certain student populations (i.e. students may grow frustrated and dropout before attaining a high school diploma). Research indicates that providing adequate sources of support are imperative to student achievement and academic outcomes, particularly in low-achieving high schools (Lee & Smith, 1999). Research literature on social support also suggests that students often draw support from two sources: affective relationships with teachers or from the communal climate of schools.

Affective connections. Multiple studies have documented the indirect association between supportive interpersonal relationships and academic outcomes (Klem & Connell, 2004; Ma & McIntyre, 2005; Shouse, 1996). This line of research suggests that “students who perceive their teachers as creating a caring, well structured environment” are more engaged in school (Klem & Connell, 2004, p. 34). Conversely, researchers note higher dropout rates among disengaged students (Croninger & Lee, 2001).

Social support from teachers fosters learning opportunities in several ways. Recent studies find, for example, that teacher support influences achievement through its effect on student engagement. Klem and Connell (2004) investigated the interconnectedness of teacher

support, student engagement, and academic outcomes using an adaptation of the Reduced Self-System Process Model. Klem and Connell determined the effectiveness of the model by applying it to an existing education reform initiative. *First Things First* (FTF), developed by the Institute for Research and Reform in Education (IRRE), partners with local school districts to facilitate the development of small learning communities (SLCs). An essential strategy of FTF is to create a supportive learning environment by providing each student with an advocate. Preliminary analyses conducted during the first two years of implementation indicated that outcomes were generally consistent across elementary, middle, and high schools: students' reports of high support levels improved while reports of low support levels declined. Additionally, student engagement—measured by attendance, persistence, and graduation rates—increased in FTF high schools. These findings are tempered with an implication for proper implementation. The authors noted that systems of support foster opportunities for improved student learning and achievement when accompanied by targeted outcomes and adequate human and financial resources. Ultimately, the *First Things First* comprehensive model illuminates the importance of affective connections between school members and the influence of social support structures on various measures of academic outcomes.

Conceptual evidence based on prior applications of FTF examines various levels of teacher support and their effects on engagement and later outcomes. Conducted in an urban school district, the robust sample includes self-reports from 1,846 elementary and 2,430 middle school students. Despite the subjective nature of the survey, alpha coefficients of reliability for the 10-item elementary and 14-item middle school indices were (.80) and (.82), respectively. Survey data collected by the Institute for Research and Reform in Education calculates support based on the sum of three composite measures: (a) teacher involvement, (b) teacher autonomy

support, and (c) teacher structure. Items included in the teacher involvement and teacher autonomy measures appear consistent with the affective domains of social support structures. In contrast, items included in the teacher structure measure are more aligned with indicators of academic press indicators: (a) my teacher is fair with me, (b) the rules in my classroom are clear, (c) my teacher's expectations for me are off base, (d) my teacher isn't fair with me, and (e) my teacher doesn't make clear what he/she expects of me in school.

This study adds empirical evidence to the evolving body of literature on interpersonal relationships in schools by using the student performance and commitment index (SPCI) to identify optimal and risk levels of social support. The distribution indices measured (a) the threshold level (high and low) where the interaction between support and engagement have the greatest impact on students' future academic success and (b) the extent to which these thresholds determine later outcomes.

Additional support for the influence of social relationships and outcomes comes from a study of high school organizations and students' decisions to drop out. Lee and Burkam (2003) acknowledged the absence of a distinct body of literature on social support. For this reason, following a synthesis of quantitative and qualitative work drawn from multiple research strands, Lee and Burkam noted:

The research described in this study is meant to build on, and expand, the small but growing body of research that focuses on how the organization and structure of high schools link students' behaviors and their decision to drop out. Moreover, we recognize that the various structural and organizational features that may influence dropout behavior are likely to act in concert rather than in the independent ways that social researchers typically explore. (p. 364)

Using a large, nationally representative sample of 190 public, Catholic, and independent schools included in the High School Effectiveness Survey supplement of the National Educational Longitudinal Study of 1988 (NELS:88), Lee and Burkam employed multilevel methods to investigate links between school social organization and dropping out after 10th grade. Findings of a weighted 7% dropout rate for all schools were much lower than cited in research literature, and the within-school disparities between Black/Hispanic and White dropout rates disappeared. Lee and Burkam attributed these inconsistencies to dropouts not captured by NELS:88, given that data included in the study range from the end of students' sophomore year to senior year. Therefore, it is probable that a substantial number of dropouts actually occurred prior to the end of 10th grade.

Findings that positive student-teacher relations reduced students' decisions to drop out was statistically significant ($p < .01$), but effects varied by school structure—size and sector. For example, adjusted dropout rates in small or medium size public and Catholic schools with high student-teacher relationships (+1 SD) were lower than rates in similar sized schools with low student-teacher relationships (-1 SD). Low dropouts rates held constant in Independent schools regardless of the “strength” of student-teacher relationships, whereas rates at large and very large public schools were the highest.

Communal school organization. Measuring the impact of social interactions among school members is not a new phenomenon. Researchers have been investigating patterns of school members' social relations for over a century. During the early 1900s John Dewey argued that personal contacts and experiences greatly influenced the extent to which students would evolve into contributing members of a democratic society. Furthermore, Dewey recognized that the social organization of schools greatly influenced students' later development.

Later studies on effective schools evaluated the construct of social support from a communitarian perspective. The concept of communal school organizations emerged in opposition to the bureaucratic theory of school organizations. Bryk and Driscoll (1988) developed three core concepts that are paramount to communal school organizations: (a) a system of shared values which is demonstrated through commonly held beliefs about the institution and its role in the intellectual and social development of students; (b) a common agenda of activities which promotes social interaction between school members and reinforces institutional practices; and (c) a distinguishable pattern of social relations among colleagues, between students and teachers, and among students. The authors created these core concepts from the Administrator and Teacher Survey (ATS) and High Schools and Beyond (HS&B) base year and first follow-up surveys. Authors hypothesized that “certain structural and compositional characteristics of schools facilitate the formation of communal organization and help to sustain it” (p. 10). These aspects of communal school organizations were captured using 23 indicators across three components (e.g. shared values, common agenda, and social interaction) and combined into one composite measure, COMINDEX.

Analyzing teacher and principal questionnaires from 457 schools, Bryk and Driscoll found that variables included in the social engagement measure were higher among students in communally organized schools. Additionally, students’ academic interests strengthened and mathematics achievement from sophomore to senior year increased.

Shouse (1996) examined on the interplay of communality, academic press, and achievement supports assumptions made in prior research. Shouse asserted that the effect of communal schools is highly correlated with schools’ average socioeconomic status (SES). For example, (a) positive achievement effects were reported in low-SES when communality and

academic press were both high; (b) achievement effects in middle-SES schools were relatively consistent with low-SES, but occurred at lower press levels; and (c) negative achievement effects were associated with high communality in high-SES schools. He later concluded that the impact of communality is contingent upon the level of press exerted in the school.

Collective Efficacy

What are the defining characteristics of culture? Are they tangible objects that can be monitored and assessed or elusive concepts that can only be sensed or experienced? A quantitative study conducted by Gruenert (2005) refers to school culture as “a nebulous concept in a world where principals need concrete results in student achievement” (p. 43). Gruenert’s investigation began with surveys administered to faculty members in 81 Indiana schools. Data were collected over the course of one semester and results were measured against each of the reporting school’s test scores. Although the author recognized that positive school culture was not a predictor of higher academic achievement, findings did support Gruenert’s contention that higher student achievement (as indicated by standardized test scores) occurred in schools with collaborative, positive culture.

In *Positive Culture in Urban Schools* (2005), Osher and Fleischman posited that positive school culture may have a direct impact on student achievement. According to the authors, successful urban schools promote caring connections, positive behavior support, and social and emotional skills. Caring connections refers to (a) student-teacher relationships and peer relationships; (b) positive behavior support articulates, monitors, and rewards behavior that is consistent with school norms; (c) and social and emotional skills teaches students how to cope with challenges endemic to urban schools. Although findings were based on experiments conducted in urban school environments, these defining attributes of positive school culture can

be applied across multiple school types and sectors. For example, Smith (2002) found positive associations between healthy school organizations and high school students' mathematics achievement regardless of schools' aggregated socioeconomic and minority status.

The culture and climate of a school influence and are influenced by teachers' behaviors (Diamond, Randolph, & Spillane, 2004). Collective efficacy is part of the school organization and is most effective in the presence of shared beliefs and norms (Kruse, Louis, & Bryk, 1994; Newmann, 1994). Developing collective efficacy within a school means moving beyond biases attributed to students' abilities as learners and establishing high standards for all students. Efficacious school organizations understand the role external forces (e.g. community, family, peers) contribute to students' educational experiences; however, members accept the responsibility and role they play in students' learning. Subsequently, the blame phenomenon is less prevalent in schools with conjoined expectations and performance objectives.

The literature is replete with empirical evidence linking student learning and achievement with the collective efficacy of a school (Bandura, 1993, 1997, 2000; Hoy & Sabo, 1998; Hoy, Sweetland, & Smith, 2002; Lee, 2000; Lee, 2003; Sweetland & Hoy, 2000). Recent school effectiveness research examines the independent and interaction effects of socioeconomic status, academic press, and collective responsibility on mathematic achievement in high schools (Hoy, Sweetland & Smith, 2002). Researchers hypothesized that schools' collective efficacy was associated with educational outcomes. Authors also focused on the reciprocal causality of academic press and collective responsibility. The contention is that academic press leads to greater organizational performance which, in turn, strengthens normative emphasis on achievement oriented goals.

There is empirical evidence that supports the assertion that collective efficacy is a predictor of student learning. In a study of 97 high schools in Ohio (Hoy, Sweetland, & Smith, 2002), collective efficacy was directly related to achievement in mathematics as measured by the 12th grade proficiency test administered by the Ohio Department of Education. Building on prior work on collective efficacy, Goddard, LoGerfo, and Hoy (2004) conducted a study to determine if findings associated with mathematics and reading achievement held constant for other content areas. This study included school contextual variables disregarded in previous studies but necessary to enhance the explanatory model of perceived collective efficacy (for an explanation of this theoretical model of school achievement, see Hoy et al., 2002). Faculty responses were compiled from 97 high schools throughout a large, Midwestern district. Findings indicated positive relationships between perceived collective efficacy and 12th grade achievement in all areas—reading, mathematics, science, social studies, and writing—controlling for measures of school context.

Similar to the communal model of school which heavily emphasize teachers' shared responsibility for organizational goals, collective efficacy focuses on teachers' shared responsibility for learning. As Newmann notes, (1994) teachers' self-efficacy is greater in educational organizations that promote collective responsibility and shared norms. In those situations, teachers feel a sense of responsibility to themselves and to their students and colleagues as well. There is a belief that this collective approach to student learning is more salient than disjointed efforts made by individual teachers.

Goddard, Hoy, and Hoy (2000) assert that teachers' commitment to education is contingent upon three factors: (a) subject, (b) students, and (c) setting. For example, and particularly at the high school level where students have traditionally been tracked relative to

their perceived academic ability, studies have shown that teachers disproportionately advantage students in college preparatory courses over lower tracked students (Gamoran, 1987). In addition to academic biases, research literature on school effectiveness also indicates that lowered expectations are racially and economically motivated. In a study of 12 high schools in San Francisco and surrounding areas, Natriello and Dornbusch (1984) reported that teachers' expectations for African American and Hispanic students were much lower than standards held for other students.

According to Bandura (2000),

Efficacy beliefs influence whether people think erratically or strategically, optimistically or pessimistically; what courses of action they choose to pursue; the goals they set for themselves and their commitment to them; how much effort they put forth in given endeavors; the outcomes they expect their efforts to produce; how long they persevere in the face of obstacles; their resilience to adversity; how much stress and depression they experience in coping with taxing environmental demands; and the accomplishment they realize. (p. 75)

Social cognitive theory maintains that "beliefs in one's capabilities to organize and execute a course of action required to produce a given attainment" is a key ingredient of self-efficacy (Bandura, 1997, p. 3). Taken together, individuals' beliefs and behaviors about the group's conjoint ability to achieve organizational goals is the school's collective efficacy (Goddard, LoGerfo, & Hoy, 2004). There is an understanding that collective actions to achieve the desired effects are greater than individual efforts. There is also a shared belief that the group strengthens collective action and commitment toward student learning and academic outcomes.

The literature on professional communities within schools typically centers on level of engagement between and interpersonal relationships among staff members. For instance, Hayton and Spillane (2005) suggest that “professional community within a school results from the interactions between individuals’ agentic decisions and the ways the formal organizational structure constrains and enables relations” (p. 12). Consequently, researchers contend that the development of professional community in high schools is limited due to: (a) more diverse curricular offerings, (b) compartmentalized teaching, and (c) diverse student population (Kruse, Louis, & Bryk, 1994; Newmann, 1994).

Professional communities are dynamic and largely influenced by organizational behaviors (Kruse, Louis, and Bryk, 1994). In particular, strong professional communities are associated with teachers’ commitment to five actions:

- Reflective dialogue
- De-privatization of practice
- Collective focus on student learning
- Collaboration
- Shared norms (p. 4)

Kruse and colleagues found that each of these behaviors was critical to the development of effective professional communities and their potential impact on educational outcomes.

However, when Lee (2003) investigated the impact of high school organizational characteristics on student learning, findings on the role of professional community were mixed. The author reports that collective responsibility (synonymous with collective efficacy) was the only aspect of professional community shown to have a significantly positive impact on student achievement. Furthermore, Lee posited that intercorrelation likely attributed to the “inconsistent,

small, or statistically insignificant” relationships among other measures of professional community (p. 138).

Table 2.1

Multilevel Studies Reporting Schools Effects on Educational Outcomes				
Study	Data Source	School Attribute(s)	Performance Indicator(s)	Findings
Academic Press				
Lee & Bryk (1989)	HS&B *all Catholic schools and a random subsample of public high schools (n = 83)	Social & academic composition, perceived quality of instruction & teachers' interest in students, disciplinary climate, press, curricular structure	Senior-year IRT mathematics score, measured in either 1980 or 1982	High average achievement is related to school social composition and the school's academic emphasis
Gamoran (1987)	HS&B *private school students, transfers, and early graduates were excluded	School conditions & curricular structure	Performance on mathematics, science, vocabulary, reading, writing, and civics achievement tests	Few between-school effects of school composition on course offerings but important within-in school effects
Lee & Smith (1997)	NELS:88	School size	Achievement gains in reading and mathematics	Ideal high schools enroll between 600 and 900 students; learning effects based on SES are more equitable in small schools
Shouse (1996)	NELS:88 First follow-up data	Social cohesion and academic mission	10 th grade math achievement score	Significant links between academic press and student achievement; achievement effect is greatest among low-SES schools

Social Support

Lee & Burkam (1992)	HS&B *base year and first follow-up	Context	Enrollment status	Measures of risk and truancy predict dropout and transfer behavior in both Catholic and public schools
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Collective Efficacy

Lee & Smith (1996)	NELS:88	Organization of teachers' work	Achievement gains in mathematics, reading, science, and social studies	Gains are higher in schools where teachers take collective responsibility for students' academic success
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Preparing Students in High Schools

Research on students' transition from high school to college is often presented from two distinct theoretical perspectives: K-12 and higher education. The first perspective generally focuses on the influence of students' high school experiences on college readiness. From the higher education perspective, researchers tend to concentrate on factors which increase students' access to postsecondary education. Notably, the two perspectives generally overlap as it relates to one topic: increasing college-going rates among traditionally underserved student populations (Cuban, 1992; Ladson-Billings, 2006; Watt, Powell, & Mendiola, 2004). There are many aspects of the high school experience which impact students' postsecondary decisions. Although research suggests that many students make decisions regarding postsecondary education prior to high school (Snipes, Holton, Doolittle, & Szejnberg, 2006), empirical evidence also suggests that a large proportion of high school students either formulate or alter previously held college aspirations between 9th and 11th grade (Plank & Jordan, 2001). Understanding how students'

high school experiences influence college decision-making remains a key element of education policy discourse, particularly as it relates to traditionally underserved populations.

The Center for the Study of Education Policy at Illinois State University's research (2005), in conjunction with the Illinois Board of Higher education, examined factors related to preparation and access in their article entitled, *Improving Chances for College Success for Low Income and Minority High School Students*. The investigation provided a summary and synthesis of research related to college enrollment trends of high school students. According to the Center for the Study of Education Policy (2005):

Research has shown and logic tells us that majority students from middle and upper income families whose parents have college degrees are more likely than others to take college preparatory curriculum in high school, enter college directly after graduation, and obtain a bachelor's degree. The challenge is to identify success factors for low income and minority students... (p. 1)

This point illustrates the importance of targeted efforts to increase college preparation among all students.

Academic preparation. In the past three decades, increased attention has been devoted to students' preparedness for postsecondary education. Empirical evidence shows that academic preparation, particularly as it relates to mathematics courses, is the strongest predictor of students' future success. Serving as the gateway to postsecondary education, high schools have instituted academic policies aimed at providing all students with equal access to high-quality instruction. In particular, efforts have focused on course offerings, standards, and assessment.

High school curriculum is a critical aspect of college preparation. In a recent study, Adelman (2006) found a strong association between coursetaking and educational attainment.

He noted that this relationship is more pronounced for Black students than White students. The latter finding illuminates the perils of “culturally and racially specific views of intelligence” (Oakes, Wells, Jones, & Datnow, 1997, para. 45). Seemingly, academic policies intended to equalize learning opportunities have increased low-income and minority students’ college readiness. For example, prior to detracking reform efforts, traditionally underserved students were often disproportionately represented in low-track classes (Oakes, 1985). Preconceived notions regarding students’ abilities often translated into lowered expectations and access to college preparatory curricular tracks. Other studies conducted during the 1980s also demonstrated the linkage between course offerings and preparedness. For instance, Lee and Bryk (1989) concluded that curricular offerings in Catholic schools minimized differentiations in learning opportunities. An additional finding from Lee and Bryk’s work indicated that “a curriculum that emphasizes academic pursuits” for all students reduced social differences inherent to tracking structures.

Widening access to academically rigorous curricular, in isolation, does not result in improved college attendance rates. Academic policies must also highlight specific knowledge and skills required for transition to postsecondary education. In 2004, Achieve, Inc. published findings of a two-year study that had been commissioned to identify the skills, knowledge, and traits required for college- and career-readiness. Both qualitative and quantitative research methods were employed for the study. Data sources included national longitudinal data sets and interviews with both university professors and employers (Achieve, 2004). In *Ready or Not: Creating a High School Diploma that Counts* (2004), findings indicated that high school graduates lacked minimum competencies in mathematics and English to successfully transition to postsecondary education or the workforce. A year later, Achieve launched the American

Diploma Project (ADP) Network with the intended purpose of helping states develop curriculum standards in “mathematics and English that all students must acquire in high school if they are to be prepared to meet the challenges that await them on college campuses and in the workplace” (Achieve, 2005, p. 4). Specifically, recommendations included four years of challenging coursework in both mathematics and English.

Though academic policies described above are externally developed, high school organizational behaviors ultimately determine how policies are enacted. For example, the strong academic orientation exemplified in some high schools press students toward high expectations (McDill, Natriello, & Pallas, 1986). Conversely, in the absence of normative emphasis on targeted educational outcomes, curriculum standards may have little to no impact on college-going rates.

School culture. Postsecondary enrollment trends may be attributed to school environment. According to the findings of Perna’s study on college enrollment trends (2000), school culture is thought to play a significant role in African American students’ pursuit of postsecondary education. School culture relates to shared norms, beliefs, and values between all members of the organization. School culture is a powerful concept that has the potential to influence—positively or negatively—school members’ behaviors.

Recent efforts have focused on identifying positive aspects of school culture that (a) encourage students to pursue postsecondary opportunities and (b) prepare students to successfully engage in college-level work. McClafferty, McDonough, and Nuñez (2002), contend that these behaviors are the precursors to the development of college going cultures. In 1997, scholars from the University of California partnered with 24 public schools in a Los Angeles and developed The Cresting College Culture project. The primary aim of the case study

was to help improve college going among low-SES and minority students. Drawing from their experiences in Los Angeles schools, coupled with extensive research in the areas of college preparation and access, McClafferty and colleagues later proposed a framework for the development of college going culture. The framework included nine elements: (a) communicating what it takes to go to college, (b) preparing students for a full range of postsecondary options, (c) providing access to information and resources related to college, (d) ensuring opportunities for college counseling, (e) informing students about relevant tests and impending test dates, (f) encouraging school faculty to be active partners in the development of a college culture, (g) soliciting parent and family involvement, (h) forming college partnerships, and (i) strengthening the K-12 pipeline (pp. 9-25).

Researchers noted that building college-going culture begins with strategic organizational changes. Beginning with school administration and permeating to other school staff (teachers and guidance counselors), organizations must foster a culture where students believe that high academic success is attainable.

College information. In the past, guidance counselors' responsibilities included providing students with college information and admissions materials. In recent years the role of high school counselors has shifted to administrative responsibilities (Perna, Rowan-Kenyon, Tomas, Bell, Anderson, & Li, 2008). As a result, the availability of college-related counseling continues to decline. This problem is most acute in schools with high concentrations of low-SES and/or minority students (McDonough, 2005). These constraints have led to the development of numerous federal and local initiatives to expand students' access to college counseling opportunities.

The federal role in pre-collegiate preparation for traditionally underserved students dates back to the Johnson administration. According to Ward (2006),

Various educational initiatives have been implemented to address the problem of the achievement gap. The federal government has a long-standing history of supporting programs designed to address issues of educational equity and access to higher education specifically for socioeconomically disadvantaged and underrepresented minority groups. (p. 55)

The Economic Opportunity Act (1964) paved the way for the development of several pre-collegiate outreach programs. As part of the TRIO initiative, Upward Bound and Talent Search were created to increase traditionally underserved high school students' access to college-related counseling services. These programs are funded under Title IV of the Higher Education Act. Upward Bound focuses on providing high school students with the academic and social skills required for successful transition to college. In a recent study, Myers and colleagues (2004) found a significant relationship ($p < 0.05$) between students' participation in Upward Bound and enrollment in four-year colleges—participation in the program increased the likelihood that students would attend college by 9%.

Various other external programs are also targeted at improving the educational experiences of low-SES and minority students (e.g. Advancement Via Individualized Determination (AVID), and Project Graduation Really Achieves Dreams). Developed in 1980, AVID targets low-SES, minority, and first-generation students. The goal of the program is to expose students of average academic ability to the rigor of advanced placement and honors courses. Tutors are provided to support students' academic pursuits. Additionally, students receive college counseling, financial aid guidance, and test preparation. Similar to AVID,

Project GRAD is aimed at increasing academic achievement and educational outcomes among low-SES students. Specifically, “the mission of Project GRAD is to ensure a quality public school education for all children in economically disadvantaged communities, so that high school graduation rates increase and students are prepared to enter and graduate from college” (Snipes, Holton, Doolittle, & Szejnberg, 2006, p. 1).

Measures of College Preparedness

College Entrance Tests

College entrance test scores are among the most common indicators used to make college admissions decisions. The Scholastic Aptitude Test (1926) was developed as an alternative to the College Boards. The SAT gained acceptance based on perceived benefits not attributed to other admissions criteria. First, the SAT was comprised of multiple-choice questions as opposed to the written format of previous admissions tests. This made it easier and less expensive to reproduce. Second, the tests were standardized. Unlike grade point averages that were more subjective in nature and too heavily reliant on high school curriculum, the SAT was viewed as an objective measurement of applicants’ intellectual capacity. On the contrary, biases frequently associated with the SAT raised concerns about its negative impact on traditionally underserved student populations. During the late 1950s, another entrance test was developed. The ACT was originally conceived as an assessment the more closely linked to teaching and learning (Atkinson & Geiser, 2009). Proponents of the ACT argue that it is more aligned to high school curricula than the SAT, which has made it a more appealing option for some applicants who may not have performed as well on the SAT.

High School Grade Point Average

Unlike entrance exams that measure a students' performance at a particular moment in time, high school grade point averages are a cumulative representation of students' academic performance. Atkinson and Geiser (2009) contend that "irrespective of the quality or type of school attended, cumulative grade point average (GPA) in academic subjects in high school has proved to be the best overall predictor of student performance in college" (p. 665). This conclusion is supported by Geiser and Santelices' (2007) study on postsecondary achievement. Through multilevel analysis, researchers used five measures to predict GPA and college degree attainment for 80,000 students enrolled at a University of California institution between 1996 and 1999. Findings indicated that high school grade point average was the most salient predictor of later outcomes.

Summary

Despite extant literature on school effects, empirical studies have not fully assessed the high school organizational characteristics that lead to students' preparation for postsecondary education. Research conducted prior to the recent standards and accountability movement centered on the role of academic press for achievement and social support structures. However, given the recent emphasis on teacher quality, understanding the effects of teachers' shared beliefs combined capabilities to affect student achievement is paramount.

CHAPTER III

RESEARCH DESIGN & METHODOLOGY

Introduction

The current study updates research on school effects in three specific ways. First, this dissertation integrated collective efficacy into the existing conversation about the role of high school organizational characteristics on educational outcomes. The role of collective efficacy has been less explored in school effects research, particularly in relationship to the extant literature on academic press for achievement and social support structures (Sweetland & Hoy, 2000; Goodard, Hoy, & Hoy, 2004; Goodard, LoGerfo, & Hoy, 2004). Next, this research expands model building in past studies by analyzing same-level interaction effects between organizational characteristics (press, support, and collective efficacy) and school context factors (high poverty and high minority). This is significant, as recent research notes that the examination of same-level interaction is an underutilized approach in prior school effects studies (Ma, Ma, and Bradley, 2008). Last, this study uses the most current large scale dataset to modernize multilevel investigations that utilized studies released prior to the Education Longitudinal Study of 2002 (ELS:2002).

The nested nature of ELS:2002 makes it appropriate for addressing the questions guiding this study:

1. How does college preparedness vary within and across secondary schools?

2. What are the effects of secondary school context on college entrance exams and high school grade point average?
3. What are the main and interaction effects of academic press for achievement, social support, and collective efficacy on college entrance exams and high school grade point average?

The following sections include a description of the data and techniques employed in this study. I begin with an overview of the ELS:2002 study design and data collection methods. Next, I provide an overview of the methodological processes used to determine the analytic sample, calculate weights, treat missing data, and conduct analyses. Third, I describe the conceptual model and rationale for the variables utilized in this study. Finally, I acknowledge limitations of the study and summarize the research methodology introduced in this chapter.

Data and Sample

The Education Longitudinal Study of 2002 (ELS:2002) is the latest in a series of investigations conducted by the National Center for Education Statistics (NCES). Other longitudinal cohort studies that precede ELS:2002 include the *National Longitudinal Study of the High School Class of 1972* (NLS-72), *High School and Beyond* (HS&B), and the *National Longitudinal Study of 1988* (NELS:88). Each of these studies was useful in furthering effects literature (see for example Tierney, 1980; Lee and Bryk, 1989)³; however, NELS:88 was for many years the preeminent database for school effects research. In particular, this study emanates from a body of research conducted during the mid-1990s, which utilized NELS:88 to examine the impact of academic press and social support on educational outcomes.

³ Tierney's (1980) analysis of data from the National Longitudinal Study of the High School Class of 1972 (NLS:1972) primarily focused on factors that affected students' access to postsecondary education; Lee and Bryk (1989) examined sector differences in high school seniors' mathematics achievement scores to understand the effect of school-level factors on outcomes.

ELS:2002 shares a three key similarities with its historical predecessors: (a) the studies utilize complex survey design to select cases within the target population; (b) the studies are longitudinal in nature and track students' experiences over a period of time; and (c) the studies include multiple contextual factors, compiled from a variety of sources (Cahalan, Ingels, Burns, Planty, & Daniel, 2006).

ELS:2002 employs a complex survey design. The multistage sampling begins with the selection of primary sampling units (PSU). The PSU refer to the geographic areas identified for the study, which is integral to the first stage of the process. In the second stage, strata are selected to ensure a representative sample of schools by region and urbanicity. In ELS:2002, schools were randomly selected to participate in the study using a probability proportional to size (PPS) sampling technique. Of 27,000 high schools initially included on the full-scale frame, 1,268 were selected as the representative sample of all high schools. Of these, only 1,221 public and private high schools were deemed eligible for the sampling frame. That sample was further narrowed to 752 schools that actually participated in the study. Lastly, students within the 752 schools were randomly selected for the sample, with an oversampling of Asian and Hispanic students.⁴ Approximately 26 students were drawn from each of the 752 high schools that provided 10th grade enrollment lists (Ingels, Pratt, Rogers, Siegel, & Strutts, 2004).

As a longitudinal study, ELS:2002 provides trend data on a representative sample of over 15,000 student participants. Specific items are repeatedly measured to “collect policy-relevant data about educational processes and outcomes, especially as such data pertain to student learning, predictors of dropping out, and high school effects on students' access to and success in postsecondary education and the workforce” (Ingels, Pratt, Wilson, Burns, Currivan, Rogers, &

⁴ Oversampling rates were deliberately constructed to make Asian and Hispanic student counts more representative of the population.

Hubbard-Bednasz, 2007, p. B-3). This design is particularly suitable for this study, as a primary aim of this dissertation is to better understand the high school organizational factors that impede or promote students' preparedness for college.

ELS:2002 data were collected at 2-year intervals, beginning in 2002 with a cohort of high school sophomores. These data serve as the baseline for ELS:2002. Base-year data sources included surveys, questionnaires, and achievement scores: (a) student surveys, (b) parent surveys, (c) English teacher surveys, (d) mathematics teacher surveys, (e) administrator questionnaires, (f) facilities checklist, and (g) library questionnaire. The second wave of data was compiled in 2004. First follow-up data sources included questionnaires, achievement scores, and transcript information: (a) student questionnaire, (b) dropout questionnaire, (c) assessment in mathematics, (d) administrator questionnaire, and (e) high school transcripts. The final wave of data was obtained in 2006. Second follow-up data sources included surveys and a post-high school follow-up (Ingels et al., 2004). The triangulation of data collection methods, from multiple respondent populations, makes it particularly useful for the multilevel modeling techniques employed this study.

Data Collection Techniques: ELS:2002/04

Instrument Development & Research Instruments

Because of the longitudinal nature of ELS:2002, considerable effort was made to select trend items that would allow for data collection during the base year of the study with follow-up measurements during subsequent waves. Evidence from other studies in the NCES series of longitudinal studies was used to determine valid data collection methods and to ensure "continuity and consistency" among the four surveys (Ingels et al., 2004). Additionally, cognitive assessments drew from previous NCES surveys and assessments to ensure

standardization of measurements across testing programs. Taken together, these instruments—questionnaires, transcripts, and assessments—provide useful information on students’ experiences through high school and beyond.

Student questionnaire. The majority of students who were sophomores during the spring of 2002 completed 45-minute self-administered surveys in their respective schools. At that time, instruments were only available in English. In some instances, students completed a condensed version of the questionnaire outside the school via computer-assisted telephone interviews (CATI). The shortened survey instrument was available in both English and Spanish formats. Both versions addressed seven distinct topics: (a) locating information, (b) school experiences and activities, (c) plans for the future, (d) non-English language use, (e) money and work, (f) family, and (g) beliefs and opinions about self (Ingels et al., 2004).

Parent questionnaire. During the base year of ELS:2002, the parent or guardian most knowledgeable of the sophomores’ school experiences was asked to complete a survey. Both English and Spanish formats were available to all respondents and offered in both paper-based and electronic versions. Parent questionnaires were divided into five sections: (a) family background; (b) their child’s school life; (c) their child’s family life; (d) their opinions about their child’s school; and (e) their aspirations and plans for their child’s future (Ingels et al., 2004).

Teacher questionnaire. As part of base year data collection, two teachers—English and mathematics—were invited to complete a questionnaire for each student in the ELS:2002 sample. Survey items supply information on teachers’ perceptions of student motivation and performance and how these behaviors may influence later outcomes. Additionally, English and

math teachers were asked an array of questions about their background, educational experience, teaching experience, certification, school climate, and efficacy.

School administrator questionnaire. The school administrator questionnaire offers information on schools in ELS:2002. The questionnaire was administered during the first two waves of the study and designed to elicit information on six topics: (a) school characteristics, (b) student characteristics, (c) teaching staff characteristics, (d) school policies and programs, (e) technology, and (f) school governance and climate (Ingels et al., 2004). Taken together, survey items provide useful information about the context in which students were educated and the varying conditions under which students were expected to succeed academically.

Librarian questionnaire. The ELS:2002 library media center questionnaire is unique to ELS:2002, as it was not included on prior NCES longitudinal studies. This component was added to facilitate the examination of interaction effects of the library media center and classroom on educational outcomes. To this end, the survey provides contextual information on usage, availability of media resources, range of services, and condition of the facility.

Transcript data. Included in the first follow-up section of the restricted-use data files, high school transcripts provide information on students' academic performance between 9th and 12th grades. Data are reported for preliminary scholastic aptitude tests, units in each subject area, and grade point average.

Direct assessments. Math and reading cognitive assessment formats are consistent with the NELS:88 test battery. Specific questions were drawn from several NCES assessments: NELS:88, the National Assessment of Educational Progress (NAEP), and the Program for International Student Assessment (PISA) (Ingels et al., 2004). First, students were administered multiple-choice tests that were later scored by the survey administrators. These scores were used

to arrange students into high, middle, and low proficiency levels. Next, students completed the free response portion of the assessments, with levels of difficulty based on demonstrated mastery of the preceding multiple-choice items. Test items were scored based on the Item Response Theory (IRT), “which uses patterns of correct, incorrect, and omitted answers to obtain ability estimates that are comparable across different test forms within a domain” (Ingels et al., 2004, p. 19).

Of the research instruments included in ELS:2002, I limit my focus to items that provide rich information about specific contextual and compositional factors directly addressed in this study: (a) students’ background and family characteristics, (b) students’ prior academic achievement, (c) students’ perceptions of their high school experience, (d) students’ and teachers’ perceptions of school climate, (e) teachers’ credentials, and (f) administrators’ perceptions of teachers’ performance and behaviors.

These base year data were available on the Education Data Analysis Tool (EDAT), public-use data file, and restricted-use data file. This study relied on the latter primarily because the restricted-use data files included information that were confidential in nature, including high school transcripts, college entrance test scores, and external data sources not available in the other formats. These data were accessible on the ELS:2002/04 CD-ROM and obtained through restricted-use licensure (Strayhorn, 2009).

Methodology

Analytic Sample Selection

A summary of ELS:2002 base-year data reveal that of the 17,591 sophomores selected to participate in the study, approximately 87% percent completed the base-year questionnaire ($n = 15,362$) and 95% participated in the cognitive assessment battery ($n = 14,543$); and the response

rate for parent questionnaires was roughly 87% ($n = 13,488$). Of the 752 schools represented in ELS:2002, school administrator and library media center questionnaires were completed at rates of 99% and 96%, respectively.

Eligibility for ELS:2002 was predicated on completion of the student questionnaire. Based on this criterion, the target sample ($n = 17,591$) was reduced to a final base-year sample of high school sophomores ($n = 15,362$). Between the administration of base-year and first follow-up surveys, students exited from the sample. Consequently, NCES freshened the sample to adjust for these differences and to ensure a representative sample of American high school seniors during 2004.⁵ Additionally, students who were ruled ineligible for the base-year study but met criteria for the second wave were also included in the follow-up study (Ingels et al., 2004). Thus, the restricted-use ELS:2002/04 sample utilized in this study was slightly higher than the original base-year sample ($n = 16,197$), which resulted from the inclusion of freshened and follow-up respondents.

This research was designed to better understand the impact of academic press, social support, and collective efficacy on college preparedness. To fully assess the role of high school organizational characteristics on students' educational experiences, this study focused on segments of the population for which these data were available. I used the ELS:2002/04 universe variable F1UNIV1 to reduce the sample to a target population.⁶ To begin, I restricted the analysis to students who completed surveys during both base-year and first-follow up data collection periods ($n = 14,006$). I further reduced the sample by excluding students (e.g.

⁵ For a full description of the freshening process utilized in NCES longitudinal studies, see Ingels, Pratt, Rogers, Siegel, & Strutts, 2004.

⁶ The F1UNIV1 universe variable provides information on students' status during the second wave of ELS:2002/04. The variable denotes students who completed both base-year and first follow-up surveys. F1UNIV1 status indicators are organized into six categories: (a) in school, in grade; (b) in school, out-of-grade; (c) dropout; (d) early diploma; (f) GED/HS equivalent; and (g) homeschooled (Ingels et al., 2007).

dropouts and homeschooled) who lacked documented involvement in a particular school setting ($n = 13,358$). Minor differences exist between the full ELS:2002/04 sample and the analytic sample, with the largest variation occurring for White students—58.4% to 53.6%.

Characteristics of key student- and school-level variables in the analytic sample are presented in Tables 3.1 and 3.2, respectively.

Table 3.1.

Student Background Characteristics of the Analytic Sample

Student Background Characteristics ($N = 13358$)	Analytic Sample N	Analytic Sample %	NCES Full 2002/04 Sample %
Gender			
Male	6593	49.4	47.2
Female	6765	50.6	47.6
Race/Ethnicity			
Hispanic	1838	13.8	13.6
Black	1697	12.7	12.5
Asian	1305	9.8	9.0
Native American	110	0.8	0.8
Multiracial	603	4.5	4.5
White	7805	58.4	53.6

Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002). Tabulations by the Author.

Table 3.2.

School Characteristics of the Analytic Sample

School Characteristics ($N = 13358$)	Analytic Sample N	Analytic Sample %	NCES Full 2002/04 Sample %
Sector			
Public	10306	77.2	78.8
Catholic	1812	13.6	12.2
Other Private	1240	9.3	9.0
Location			
Urban	4389	32.9	33.9
Suburban	6488	48.6	47.9
Rural	2481	18.6	18.2

Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002). Tabulations by the Author.

Sampling Weights

Like its predecessors, ELS:2002 is assembled through a multistage complex sampling design. Analytical issues associated with these types of design techniques are treated with raw weights. Thus, weighting data increases the representativeness and reduces bias in the sample.

The present study used the first-follow up panel weight variable “F1PNLWT,” which allowed for generalization of findings to the entire population of high school students in 2002 (Ingels et al., 2004; Dalton, Glennie, & Ingles, 2009). Researchers caution that while weighting the data adjusts for complex sampling designs, this scale effect inflates the sample size to the population N (Thomas & Heck, 2001; Hahs-Vaughn, 2005; Stapleton & Thomas, 2008; Bryan, Day-Vines, Holcomb-McCoy, & Moore-Thomas, 2010). One method for restoring the sample size is by applying a normalized weight. The normalized weight is calculated by “dividing the raw weight by its mean” (Thomas, Heck, & Bauer, 2005, p. 61). The following equation provides a full description of the normalized weighting technique employed in the present study.

The final normalized weight was calculated as follows:

$$\text{NEWF1PNLWT} = \text{F1PNLWT} / \text{mean of the F1PNLWT}$$

$$\text{NEWF1PNLWT} = \text{F1PNLWT} / 224.378957$$

Missing data. Missing data pose fundamental challenges to the research process. Therefore, it is necessary to check the nature of missingness and to correct for missing data, using the most appropriate method. There are two types of missing data mechanisms: accessible and inaccessible (Graham & Donaldson, 1993). Accessible data mechanisms can be missing completely at random (MCAR) or missing at random (MAR). There are methods to treat both MCAR and MAR cases. Data are MCAR if the missing observation is not related to the item

itself or to other variables in the dataset (Allison, 2002). Alternatively, MAR describes observations that, after controlling for another variable, do not relate to the value of the item itself (Graham, 2009). Non-accessible data mechanisms are those missing not at random (MNAR). These cases are extremely problematic, as they were never measured. It is possible to disregard this point and conduct analyses without treating missing data, though doing so compromises the reliability of findings. I ran a missing values analysis on the analytic sample, using the Missing Values module in IBM SPSS Statistics 19. The analyses revealed that the MCAR assumption was not met ($\chi^2=187905.159$, $df=92757$, $p<.000$); therefore, I considered the data MAR.

It is important to note the high amount of missing cases in the analytic sample, which is one challenge associated with retaining such a high proportion of the total sample. Because a large amount of missing cases occurred on SAT (34.5%), one alternative would have been to filter the analytic sample by this variable. However, this outcome does not carry the weight of the entire sample. Since missing cases was much lower on GPA (6.6%), no cases were excluded for these measures. Another alternative would have been to exclude variables with excessive missing cases. The exclusion strategy was not used for two reasons. First, the exclusion of variables with large amounts of missing cases would have meant dropping data that were important to the study. Second, exclusion would have dropped more than three percent of cases from the study (Croninger & Douglas, 2005). A full list of values with missing data is provided in Table 3.3.

Table 3.3.

Number and Percentages for Variables with Missing Cases (Pre-Transformations)			
Grouping Variable	Number Complete	Number Missing	Percent Missing
Dependent Variables			
SAT Score	8755	4603	34.5
Grade Point Average	12470	888	6.6
Student Background			
Gender	13358	0	0.0
Race/Ethnicity	13358	0	0.0
Socioeconomic Status	13358	0	0.0
Retention	11152	2206	16.5
Remediation (English)	12383	975	7.3
Remediation (Math)	12412	946	7.1
Student Aspirations & Academic Preparation			
Educational Aspirations	12154	1204	9.0
Academic Program	12553	805	6.0
School Context			
Minority Concentration	13128	230	1.7
Poverty Concentration	9332	4026	30.1
Size	13314	44	0.3
Context	13358	0	0.0
Location	13358	0	0.0
Student-Teacher Ratio	12969	389	2.9
Certified F/T Teachers	12859	499	3.7
High Quality Teachers			
Years of teaching experience (English)	10755	2603	19.5
Years of teaching experience (Math)	11294	2064	15.5
Type of certification (English)	10800	2558	19.1
Type of certification (Math)	11280	2078	15.6
Field of study (English)	9969	3389	25.4
Field of study (Math)	10791	2567	19.2
School Organizational Characteristics			
<i>Academic Press</i>			
Student morale is high	11193	2165	16.2
Teachers press students to achieve	11157	2201	16.5
Teacher morale is high	11205	2153	16.1
Students place priority on learning	11215	2143	16.0
Students expected to do homework	11225	2133	16.0
	12721	637	4.8

<i>Social Support</i>	12775	583	4.4
Students get along with teachers	12645	713	5.3
The teaching is good	12566	792	5.9
Teachers are interested in students	12676	682	5.1
Teachers praise my effort			
Feel "put down" by my teachers			
<i>Collective Efficacy (English)</i>			
Teacher's attention to interests	10812	2546	19.1
Teacher's use of effective methods	10827	2531	18.9
Teacher's enthusiasm	10819	2539	19.0
<i>Collective Efficacy (Math)</i>			
Teacher's attention to interests	11254	2104	15.8
Teacher's use of effective methods	11280	2078	15.6
Teacher's enthusiasm	11279	2079	15.6

Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).

Note: All values are weighted with the normalized F1PNLWT panel weight.

There are several traditional approaches to treating missing data. These methods include listwise deletion (or complete case-analysis), pairwise deletion, mean substitution, regression substitution, and single imputation (Little & Rubin, 1987). These methods are common applications in most statistical software packages, which make them readily accessible and potentially more attractive than other precise methods for handling missing data. However, there are more appropriate approaches to treating missing data, particularly as it relates to the application of listwise or pairwise deletion. Because the data in the analytic sample were assumed to be MAR, employing either deletion technique would have biased the results (Allison, 2002).

Other, more modern, methods for treating missing data are to use variables observed in the dataset to predict missing cases: Expectation Maximization (EM) and Multiple Imputation (MI). Expectation Maximization is appropriate for mechanisms that are MAR. EM is a multi-step process that is based on parameter estimation. By using parameter estimates of the observed data, the procedure uses an iterative process to estimate parameters for missing values until

achieving maximum likelihood. Table 3.4 includes pre- and post-imputation results, which illustrates that the nature of the analytic sample remained relatively constant through the EM process.⁷

The other, and perhaps even more suitable imputation method, is MI (Wayman, 2003). Among researchers employing multilevel techniques to analyze large scale datasets, MI has been shown to produce favorable results (Graham & Hofer, 2000; Schafer & Graham, 2002). For this reason, it is considered the gold standard for treatment of missing data, particularly when data are missing MAR (Allison, 2002). This method of handling missing data is more reliable than other methods because the imputation process is conducted multiple times (Little & Rubin, 1987). The result is *m* imputations for each missing value, which are then used to construct *m* imputed datasets. Generally, 3 to 10 imputed datasets are created and analyzed. Point estimates (e.g. mean and standard error) are used to create a final set of estimates. Despite MI's suitability for treating missing values in the current study, challenges associated with using SPSS 19 to obtain parameter estimates from the multiply imputed datasets deemed EM the more accessible approach. Thus, EM was employed in this study.

Table 3.4.

Descriptive Statistics of Data Pre- and Post-Imputation (Pre-Transformations)^a

Variable	<i>N</i>	Before Imputation		After Imputation ^b	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Student Background					
Retention	11152	0.10	0.30	0.11	0.30
Remediation (English)	12383	0.08	0.28	0.08	0.28
Remediation (Math)	12412	0.10	0.30	0.19	0.30
Student Aspirations & Academic Preparation					
Educational Aspirations	12154	5.30	1.35	5.27	1.35
Academic Program	12553	1.76	0.61	1.76	0.61

⁷ Missing data were not imputed for dependent variables.

School Context					
Minority Concentration	13128	32.79	30.59	32.94	30.57
Poverty Concentration	9332	23.81	18.64	20.62	18.59
School Size	13314	1234.07	815.88	1232.85	816.09
Student-Teacher Ratio	12969	16.48	4.21	16.48	4.20
Certified F/T Teachers	12859	91.88	18.49	91.66	18.65
High Quality Teachers					
Years of teaching experience (English)	10755	14.27	10.84	14.18	10.85
Years of teaching experience (Math)	11294	14.98	10.71	14.89	10.72
Type of certification (English)	10800	1.47	1.12	1.46	1.11
Type of certification (Math)	11280	1.44	1.09	1.44	1.08
Field of study (English)	9969	3.03	2.72	3.04	2.72
Field of study (Math)	10791	3.72	2.42	3.75	2.42
School Organizational Characteristics					
<i>Academic Press</i>					
Student morale is high	11193	4.00	0.75	3.98	0.76
Teachers press students to achieve	11157	4.09	0.82	4.08	0.82
Teacher morale is high	11205	3.81	0.83	3.79	0.83
Students place priority on learning	11215	3.60	0.87	3.58	0.88
Students expected to do homework	11225	4.19	0.89	4.17	0.89
<i>Social Support</i>					
Students get along with teachers	12721	3.15	0.68	3.15	0.68
The teaching is good	12775	2.82	0.58	2.81	0.58
Teachers are interested in students	12645	2.96	0.63	2.96	0.64
Teachers praise my effort	12566	2.90	0.68	2.90	0.68
Feel "put down" by my teachers	12676	2.77	0.75	2.77	0.75
<i>Collective Efficacy (English)</i>					
Teacher's attention to interests	10812	3.27	0.57	3.28	0.57
Teacher's use of effective methods	10827	3.40	0.55	3.41	0.55
Teacher's enthusiasm	10819	3.61	0.50	3.62	0.50
<i>Collective Efficacy (Math)</i>					
Teacher's attention to interests	11254	3.10	0.59	3.10	0.59
Teacher's use of effective methods	11280	3.27	0.55	3.28	0.55
Teacher's enthusiasm	11279	3.48	0.54	3.48	0.54

Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002). Tabulations by the Author.

^a Six grouping variables in the analytic sample contain no missing cases: gender, race/ethnicity, SES, sector, and location

^b*N* = 13358 after multiple imputation.

Data Reduction

In general, factor analysis is the process of combining multiple items to represent a broader construct or underlying dimension (Kim & Mueller, 1978). Factor analysis is used to either confirm preexisting theories or to explore unknown relationships.

Confirmatory factor analysis (CFA) is a technique used to confirm relationships between variables. Relying on prior research and empirical evidence, the researcher has a pre-established knowledge of relationships between observed variables and latent constructs (Bandalos, 1996). Stated another way, confirmatory factor analysis is used to test whether the data supports or deviates from the hypothesized factor structure (i.e. number of common factors and magnitude of factor loadings). In contrast, exploratory factor analysis (EFA) is a statistical technique used to establish relationships between variables (Costello & Osborne, 2005). Prior research is often used to provide a general argument for the selection of variables to be explored. However, EFA allows for the exploration patterns in relationships; there are no preconceived notions about the identity of latent constructs within the data (Kim & Mueller, 1978). Since the number of factors in this research is not known a priori, EFA is the appropriate method of analysis for this study. A review of the literature guided selection of questions used to conduct EFA.

Multilevel Analysis

The research questions guiding this study are most appropriately addressed using multilevel analysis:

1. How does college preparedness vary within and across secondary schools?
2. What are the effects of secondary school context on college entrance exams and high school grade point average?

3. What are the main and interaction effects of academic press for achievement, social support, and collective efficacy on college entrance exams and high school grade point average?

The nested nature of ELS:2002/04 aided the analysis of school effects. Previous research has demonstrated the use of hierarchical linear modeling (HLM) as an appropriate technique for this study, particularly given the hierarchy of data: students nested in schools (Osborne, 2000; Lee, 2000; Hox, 2002). Additionally, the fact that “such a methodology allows direct representation of the influence of school factors on structural relations within schools” is integral to this study (Lee & Bryk, 1989, p. 174). In their seminal work on high school characteristics and student achievement, Lee and Bryk applied HLM to measure within- and between-school effects. The authors cited methodical challenges associated with previous studies that used single-level analysis to investigate hierarchical relationships, and presented several advantages of using HLMs.

Subsequent studies on school effects have also relied on HLMs to address multilevel research questions (Konstantopoulos, 2006; Lee & Burkam, 2003; Rumberger & Thomas, 2000). By employing techniques consistent with the treatment of nested data, researchers reduced exposure to challenges attributed to methods such as ordinary least squares (OLS). Although HLM and OLS serve a similar purpose, HLM extends the single-level modeling techniques of OLS by utilizing multilevel modeling to examine hierarchical relationships. According to Raudenbush and Bryk (1986), multilevel analysis was developed in response to “increasing awareness of the mismatch between multilevel social processes and the traditional statistical models used to study them” (p. 1). That is to say, if applied improperly (i.e. weighting) challenges that arise from using OLS to examine hierarchical relationships include aggregation

bias, misestimated standard errors, and heterogeneity of regression slopes (Lee & Bryk, 1989; Gamoran, 1996; Hofman, 1997).

The dissertation utilized a series of processes proposed by Raudenbush & Bryk (2002) to estimate student- and school-level effects on college preparedness. The HLM modeling in the present analysis included a null model, a student-level model, and a school-level model. The null, or fully unconditional model (FUM), bears statistical similarities to a one-way ANVOA with random effects (O'Connell & McCoach, 2008). The null model consists of an outcome measure and an intercept term, but is void of any independent variable:

$$\text{Level-1 model: } Y_{ij} = \beta_{0j} + r_{ij} \quad (3.1)$$

$$\text{Level-2 model: } \beta_{0j} = \gamma_{00} + u_{0j} \quad (3.2)$$

$$\text{Mixed-effects model: } Y_{ij} = \gamma_{00} + u_{0j} + r_{ij} \quad (3.3)$$

where

Y_{ij} is the outcome for i th student in j th school;

i is students;

j is schools;

β_{0j} is the mean outcome for unit j ;

γ_{00} is the grand-mean outcome in the population;

u_{0j} is the random effect associated with unit j ;

r_{ij} is the level-1 error term.

One function of this model is to estimate the grand mean of the outcome measure while adjusting for nested data within schools and for samples across schools. The second function is to estimate variances at the student- and school-level. The between-school proportion of

variance is known as the intraclass correlation (ICC). The ICC decomposes the total variance in the outcome measures into components at each level (Rumberger & Palardy, 2004). If the ICC is greater than 10% of the total variance, then multilevel methods are appropriate. The variance is calculated by substituting the covariance estimates into the ICC formula:

$$\rho = \tau_{00} / (\tau_{00} + \sigma^2)$$

where

ρ is the proportion of total variance that is between schools;

τ_{00} is the variance between schools;

σ^2 is the variance within schools.

In essence, the ICC of the null model serves as a baseline for interpreting the explanatory power of more advanced multilevel models such as *means-as-outcomes*, *random-coefficient*, and *intercept and slopes-as-outcomes* (Pike & Saupe, 2002; Raudenbush & Bryk, 2002; Schreiber & Griffin, 2004).

Student-level control variables that theory and empirical evidence have shown to influence educational outcomes were introduced into the level-1 model. According to Bryk and Raudenbush (1992), “In all quantitative research, it is essential that the variables under study have precise meaning so that statistical results can be related to the theoretical concerns that motivate the research” (p. 25). Student-level variables included demographics, family background, academic background, educational aspirations, and academic program. At the school-level, this study focused on contextual and organizational predictor variables that have documented main effects on educational outcomes (Lee & Burkam, 1992; Lee & Smith, 1997; Lee & Burkam, 2003; Palardy, 2008; Schaefer & Meece, 2009). In addition to the individual effects of each school-level variable, the multilevel analyses also measured same-level

interactions of high-minority and high-poverty schools with three organizational variables: (a) academic press for achievement, (b) social support structures, and (c) collective efficacy.

According to Ma, Ma, and Bradley (2008), this approach allows for the examination of the interaction among these variables in addition to their “corresponding main effects” within the model (p. 91). These interactions are represented in models 3.5 and 3.6. Finally, models from both levels were combined to create a full multilevel regression model. The final statistical models for the present analysis are described formally below:

Level-1: Student

$$\begin{aligned}
 Y_{ij} = & \beta_0 + \beta_1 (\text{SES}_{ij}) + \beta_2 (\text{Male}_{ij}) + \beta_3 (\text{Multiracial}_{ij}) + \beta_4 (\text{Hispanic}_{ij}) \\
 & + \beta_5 (\text{Black}_{ij}) + \beta_6 (\text{Asian}_{ij}) + \beta_7 (\text{Remedial Courses}_{ij}) + \beta_8 (\text{Retention}_{ij}) \\
 & + \beta_9 (\text{Aspiration}_{ij}) + \beta_{10} (\text{Academic Program}_{ij}) + r_{ij} \tag{3.4}
 \end{aligned}$$

$$\beta_{1j} = \gamma_{10}, \beta_{2j} = \gamma_{20}, \beta_{3j} = \gamma_{30}, \beta_{4j} = \gamma_{40}, \beta_{5j} = \gamma_{50}, \beta_{6j} = \gamma_{60}, \beta_{7j} = \gamma_{70}, \beta_{8j} = \gamma_{80}, \beta_{9j} = \gamma_{90}, \beta_{10j} = \gamma_{100}$$

Level-2: School

$$\begin{aligned}
 \beta_0 = & \gamma_{00} + \gamma_{01} (\text{Student-Teacher Ratio}_j) + \gamma_{02} (\text{Percent Certified}) + \gamma_{03} (\text{Minority} \\
 & \text{Concentration}_j) + \gamma_{04} (\text{Poverty Concentration}_j) + \gamma_{05} (\text{Very Large School}_j) \\
 & + \gamma_{06} (\text{Large School}_j) + \gamma_{07} (\text{Small School}_j) + \gamma_{08} (\text{Private}_j) + \gamma_{09} (\text{Catholic}_j) \\
 & + \gamma_{010} (\text{Rural}_j) + \gamma_{011} (\text{Urban}_j) + \gamma_{012} (\text{Highly Qualified}_j) + \gamma_{013} (\text{M_SES}_j) \\
 & + \gamma_{014} (\text{Academic Press}_j) + \gamma_{015} (\text{Social Support}_j) + \gamma_{016} (\text{Math Collective Efficacy}_j) \\
 & + \gamma_{017} (\text{English Collective Efficacy}) + \gamma_{018} (\text{Press*Pov Concentration}_j) \\
 & + \gamma_{019} (\text{Press*Min Concentration}_j) + \gamma_{020} (\text{Support*Pov Concentration}_j) \\
 & + \gamma_{021} (\text{Support*Min Concentration}_j) + \gamma_{022} (\text{Math Efficacy*Pov Concentration}_j)
 \end{aligned}$$

$$\begin{aligned}
& + \gamma_{023} (\text{Math Efficacy*Min Concentration}_j) + \gamma_{024} (\text{English Efficacy*Pov Concentration}_j) \\
& + \gamma_{025} (\text{English Efficacy*Minority Concentration}_j) + u_{0j} \tag{3.5}
\end{aligned}$$

Combined: Full

$$\begin{aligned}
Y_{ij} = \beta_0 = & \gamma_{00} + \gamma_{01} (\text{Student-Teacher Ratio}_j) + \gamma_{02} (\text{Percent Certified}) + \gamma_{03} (\text{Minority} \\
& \text{Concentration}_j) + \gamma_{04} (\text{Poverty Concentration}_j) + \gamma_{05} (\text{Very Large School}_j) \\
& + \gamma_{06} (\text{Large School}_j) + \gamma_{07} (\text{Small School}_j) + \gamma_{08} (\text{Private}_j) + \gamma_{09} (\text{Catholic}_j) \\
& + \gamma_{010} (\text{Rural}_j) + \gamma_{011} (\text{Urban}_j) + \gamma_{012} (\text{Highly Qualified}_j) + \gamma_{013} (\text{M_SES}_j) \\
& + \gamma_{014} (\text{Academic Press}_j) + \gamma_{015} (\text{Social Support}_j) + \gamma_{016} (\text{Math Collective Efficacy}_j) \\
& + \gamma_{017} (\text{English Collective Efficacy}) + \gamma_{018} (\text{Press*Pov Concentration}_j) \\
& + \gamma_{019} (\text{Press*Min Concentration}_j) + \gamma_{020} (\text{Support*Pov Concentration}_j) \\
& + \gamma_{021} (\text{Support*Min Concentration}_j) + \gamma_{022} (\text{Math Efficacy*Pov Concentration}_j) \\
& + \gamma_{023} (\text{Math Efficacy*Min Concentration}_j) + \gamma_{024} (\text{English Efficacy*Pov Concentration}_j) \\
& + \gamma_{025} (\text{English Efficacy*Min Concentration}_j) + \gamma_{10} (\text{SES}_{ij}) + \gamma_{20} (\text{Male}_{ij}) \\
& + \gamma_{30} (\text{Multiracial}_{ij}) + \gamma_{40} (\text{Hispanic}_{ij}) + \gamma_{50} (\text{Black}_{ij}) + \gamma_{60} (\text{Asian}_{ij}) \\
& + \gamma_{70} (\text{Remedial Courses}_{ij}) + \gamma_{80} (\text{Retention}_{ij}) + \gamma_{90} (\text{Aspirations}) \\
& + \gamma_{100} (\text{Academic Program}_{ij}) + u_{0j} + r_{ij} \tag{3.6}
\end{aligned}$$

Conceptual Model

This study recognizes the critical role school effects plays in determining educational outcomes. In the conceptual model guiding this study, this research takes the position that students' preparedness for college is the product of a multilevel process that includes both student- and school-level factors (see Figure 3.1). There is a long history in the research

literature reporting the effects of students' background on learning and achievement. Drawing on school effects research, this model assumes that students' educational aspirations and academic behaviors (e.g. course taking patterns) are directly influenced by racial, socioeconomic, and other prior achievement factors. In particular, researchers have noted the link between race and behaviors. For example, a study commissioned by the National Center for Education Statistics (2006) reported that African American students earned fewer academic credits than White students; they were less likely to take advanced placement tests than White students; they were more likely to drop out of high school than White students; and they enrolled in post-secondary institutions at a much lower rate than White students. Acknowledging these types of relationships furthers our understanding of the ways schools influence outcomes, controlling for student factors.

Student background shapes—directly or indirectly—the school context. For example, low-achieving schools with high proportions of minority and economically disadvantaged students are historically concentrated in urban and rural areas, lacking access to the same human and financial resources afforded students in other school contexts (Peske & Haycock, 2006). As an input, this school-level factor has a reciprocal relationship with the organizational characteristics that drive instructional practices and processes. In particular, this study considers the impact of academic press for achievement, social support structures, and collective efficacy on students' educational experiences and preparedness for college.

The selection of variables included in the conceptual model is based on the literature review and relevance to the proposed study (see Appendix A for a summary of operational definitions of variables). These variables are described in the following sections.

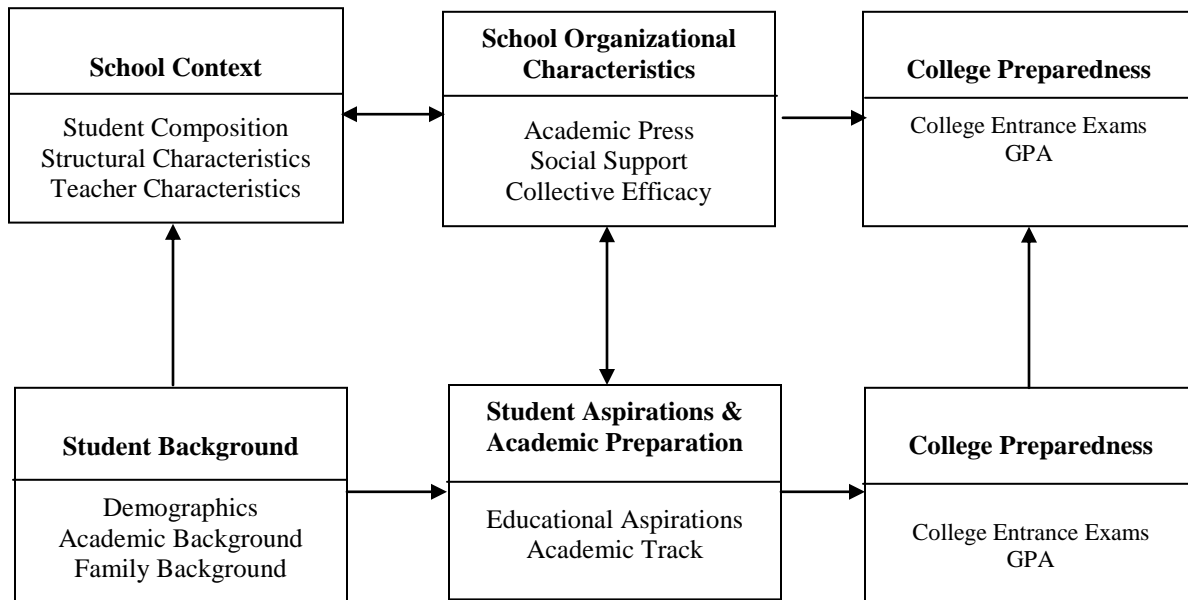


Figure 3.1. Conceptual Model of Multilevel School Effects on College Preparedness
 Adapted from: A Multilevel Conceptual Framework for Analyzing School Effectiveness
 (Rumberger & Palardy, 2004)

Variable Description

The following sections provide a description of student- and school-level variables utilized in the present study. Appendix B provides descriptive statistics for all variables that were transformed or recoded.

Dependent Variables

Dependent measures are consistent with outcomes used in previous investigations to assess high school students' college preparedness. Most school-effects studies at the secondary level have concentrated on the relationship between school contexts and academic achievement as measured by standardized tests (Warren & Edwards, 2005), coursetaking patterns (Adelman, 1999), probability of dropping out (Lee & Burkam, 1992), high school grade point average (Atkinson & Geiser, 2009), and high school completion (Savitz-Romer, Jager-Hyman, & Coles,

2009). This study operationalized preparation based on indicators commonly used in the college admissions process: college entrance exams and high school grade point average (Roderick, Nagaoka, & Coca, 2009).

College entrance exams. College entrance exams are used extensively as an indicator of readiness. Despite the exams' popularity, they are not without their shortcomings. One major concern, primarily attributed to the SAT, is that the exam is flawed and inherently biased (Kohn, 2002). Another major concern with use of standardized tests scores as an indicator of readiness relates to self-selection. This opposition is guided by the belief that students who take the SAT and/or ACT generally plan to attend college, which is not representative of the entire high school student population.

While standardized scores should not be used as the sole indicator of college readiness, exam scores are appropriate for this study for two reasons. First, prior research on the relationship between school effects and educational outcomes traditionally uses the SAT and/or ACT to assess students' preparedness for postsecondary education. Second, exam scores are traditionally used in the admissions process to determine acceptance. Since this dissertation is designed to investigate students' preparedness for postsecondary education, documenting performance on college entrance exams is essential.

The SAT was developed prior to the ACT, but both exams are intended as objective measures of students' readiness to successfully engage in college-level coursework (Briggs, 2001). Though some colleges and universities throughout the country accept both the SAT and ACT, regional differences exist in terms of institutional preference for one entrance exam over

the other. For this reason, in 1997 the ACT and SAT concordance table was jointly developed by the College Board, Education Testing Services (ETS), and ACT (Dorans, 2008).⁸

ELS:2002 reports separate SAT and ACT scores, and also provides a useful composite score based on the concordance table. This variable reports the higher of both entrance exams—SAT and ACT—in terms of SAT score. Consequently, throughout this dissertation the term SAT is synonymous with ACT. The ELS:2002 SAT standardized score variable (TXEESATC) was reported in the first follow-up study. For this dissertation, the variable was recoded into (SAT_CRSWLK).

High school grade point average. High school grades are traditionally cited as indicators of later academic performance (Atkinson & Geiser, 2009). It is important to note, however, biases of its application with respect to grade inflation. Though not a new phenomenon, grade inflation has reignited interest in the use of high school grade point average as an objective measure of student learning and achievement, particularly amid higher standards and accountability measures. Still, research shows that high school grade point average is as predictive of future educational outcomes as college entrance test scores (Roderick, Nagaoka, & Coca, 2009). Since grade point average is cumulative and accounts for both cognitive and non-cognitive skills, I assert that it is a comprehensive predictor of students' ability to successfully transition to and matriculate through college. This study utilizes the ELS:2002 cumulative grade point average variable from academic courses (F1RAGP), which was renamed (HSGPA). The continuous variable ranges from 0.00 to 4.00.

⁸ Also referred to as crosswalks, the concordance table aides the comparison of scores across tests. For examples, if a student takes the SAT, the tables are also useful in estimating performance on the ACT. As it relates to research, scores are generally converted for analysis.

Student-Level Variables

Student-level variables are divided into two broad categories: (a) student background and (b) student behavior and aspirations.

Gender. Gender is a standard control in school effects research. In this study, the gender measure is derived from a self-reported base-year ELS:2002 variable (BYSEX). The dichotomous variable was recoded (0,1) into the variable MALE (49.4%). Females are treated as the reference group, and accounts for 50.6% of the analytic sample.

Race/ethnicity. Race and ethnicity data were obtained during the base-year study. The original eight-category variable (BYRACE_R) was recoded into series of four dichotomous (0,1) variables: Native Hawaii/Pacific Islander, non-Hispanic and Asian, Hawaii/Pac. Islander, non-Hispanic were collapsed into (ASIAN), Black or African American, non-Hispanic (BLACK), Hispanic, no race specified and Hispanic, race specified were collapsed into (HISPAN), and more than one race, non-Hispanic (MULTI). White students treated as the reference group, and represented the largest racial/ethnic group in the analytic sample (58.4%). Of the remaining student populations, Hispanic students represented 13.8%, followed by Black (12.7%), Asian (9.4%), and multiracial (0.4%). Because American Indian/Alaska Native represented less than 1% of the total sample (0.8%), this ethnic group was subsequently excluded from the study.

Family background. Previous school effects literature illustrates the strong correlation between family background and educational outcomes, though empirical evidence citing the strength of these relationships is inconsistent across studies based on how socioeconomic status (SES) is operationalized (Konstantopoulos, 2006). This study relied on two National Center for Education Statistics constructs. I included a standardized composite proxy for family SES

(BYSES2), including father's occupation, mother's occupation, father's education, mother's education, and family income. This variable was renamed STUSES.

Academic background. In Lee and Burkam's (2003) research on dropouts, findings indicated that retention and remediation were related to high school persistence. An investigation of factors related to dropout rates showed that students who were retained between 1st and 8th grades or enrolled in a remedial mathematics or English during 9th or 10th grade were more prone to leave high school than their peers. These measures of prior achievement were utilized in this study. Retention data were obtained from the base-year questionnaire (BYP46) in which parents/guardians responded yes (1) or no (0) to the question: "Was your tenth grader ever held back a grade in school?" The additional measure of academic background related to remediation. Specifically, students were asked "Have you ever been in any of the following kinds of courses or programs in high school?" Students replied yes (1) or no (0) to either remedial English or remedial math. Responses were recoded into a single dichotomous variable (STUREM) to indicate whether students took remedial courses in one or both subjects (0,1). In the analytic sample, 11% of students had taken a remedial course since entering high school

Student expectations. The ELS:2002/04 variable (BYSTEXP) captured students' educational aspirations by asking: "As things stand now, how far in school do you think you will get?" Responses were originally divided into eight categories: (a) less than high school graduation, (b) high school graduation or GED only, (c) attend or complete 2-year college/school, (d) attend college, 4-year degree incomplete, (e) graduate from college, (f) obtain Master's degree or equivalent, and (g) obtain PhD, MD, or other advanced degree. The responses were recoded into a dichotomous variable (STUEXP) that partitioned students into

groups based on those who planned to earn at least a bachelor's degree. Statistics based on the analytic sample indicated that 84% of students expected to complete college.

Academic program. Academic program is a self-reported base-year variable (BYS26), which was derived from the item: "If you had to limit yourself to one of the following three choices, which comes nearest to describing your high school program?" Responses to the type of coursework (a) general, (b) college preparatory, and (c) vocational were recoded into a dichotomous variable (STUPROG) based on participation in a college preparatory program (44%).

School-Level Variables

School-level variables consist of two types: school context and school organizational characteristics. School context accounts for student composition, structural characteristics, and teacher characteristics. Organizational characteristics include academic press, social support, and collective efficacy.

Minority concentration. The proportion of minority students in each school were based on statistics reported by the Common Core of Data (CCD) 2001-2002 and Private School Survey (PSS) 2001-2002. Based on the U.S. Department of Education's definition of high-minority schools (e.g. more than 50% of the student population), the ELS:2002/04 variable (CP02PMIN) was transformed into (SCHMIN) in order to distinguish between high minority ($\geq 50\%$) and low minority ($\leq 49\%$) schools.⁹ Low minority comprises the reference group.

Poverty concentration. Similar to minority concentration, poverty concentration is derived from the U.S. Department of Education. High-poverty schools are defined here as more than 50% of students on the free and reduced lunch program. The counts provided by CCD and

⁹ See U.S. Department of Education, National Center for Educational Statistics (2002). *The Condition of Education 2002*.

PSS were transformed into a dichotomous variable (SCHPOV) representing high poverty ($\geq 50\%$) and low poverty ($\leq 49\%$) schools. Low poverty is the referent.

School size. School enrollment was constructed from CCD and PSS data.

Categorization of school size was based on prior research. In particular, Lee's (2000) study of school size provides evidence of size effects on achievement. Her analyses indicated that moderately sized schools performed better than their peers in different types of schools. In the present analysis, schools of moderate size were treated as the reference group. All others were coded into a series of dichotomous variables: (a) small (0-600), (b) large (1,501-2,500), and (c) very large (2,501+).

School sector. The ELS:2002/04 variable BYSCTRL was constructed from CCD and PSS data, originally coded as (a) public, (b) catholic, and (c) other private. The variable was transformed and recoded into two variables: (CATH) and (PRIV). Public served as the reference group.

School location. School location describes to the locale recorded in CCD and PSS. The original source data were coded as (a) urban, (b) suburban, and (c) rural. This ELS:2002/04 variable was transformed and recoded into two variables: (URB) and (RUR). Suburban was treated as the reference group.

Student-teacher ratio. Student-teacher ratio refers to the proportion of students with respect to the number of teachers in a school. Obtained from CCD and PSS, the continuous was renamed SCHSTR.

Teacher certification. The base-year administrator questionnaire asked: "What percentage of full-time and part-time teachers in your school are certified? (If you share a teacher with another school, please count that teacher as part-time.)" Specifically, the variable BYA24A

documented the percentage of full-time teachers in a particular school. For analytic purposes, this continuous variable was renamed PERFCERT.

Highly qualified teacher. Recent research highlights noticeable variations in the quality of teachers employed in different types of schools (Clotfelter, Ladd, Vigdor, & Wheeler, 2007). For example, a study on the impact of teacher quality found that schools with high concentrations of low income and minority students were more likely to employ ineffective teachers than other school settings (Education Trust, 2008). In addition to its primary purpose, this dissertation examines the impact of current accountability standards on educational outcomes. Under the No Child Left Behind Act (2001), for example, states are mandated to ensure that teachers are “highly qualified.” Therefore, the inclusion of this measure also provides an empirical test of the presumption that a highly qualified designation contributes to educational outcomes.

The measure for teacher quality was constructed from three items on the teacher questionnaire: (a) “Counting this year, how many years have you taught at the elementary and secondary level? Please also note the number of years in total”;¹⁰ (b) “In the state in which your school is located, what type of teaching certification do you hold in the field you teach the students named on the student list?”; and (c) “What were your major and minor (or 2nd major) fields of study for your bachelor's degree?” A sum index was created for teachers that had at least four years of experience, held a regular or standard state certification, and majored in the

¹⁰ Four years of teaching was coded 1, and all other responses were coded 0. Though four years may seem arbitrary, it is based on usage in reports published by the U.S. Department of Education during Margaret Spelling’s tenure as Secretary of Education. For instance, in *The Secretary’s Fourth Annual Report on Teacher Quality: A Highly Qualified Teacher in Every Classroom* (2005), a clear distinction is made between novice (synonymous with new) and experienced teachers. Novice teachers are defined as those with three or few years of experience. The implication is that experienced teachers have four or more years of experience. While differences exist in the literature about how experience is measured (see for example Darling-Hammond, 1999; Johnson & Birkeland, 2003; Rivkin, Hanushek, & Kain, 2005), the estimate utilized in this study is consistent with operational definition utilized by those in office during and immediately following the passage of NCLB.

subject taught. If the sum for math or English teachers totaled (3), then SCHHQT was coded 1. High quality teachers accounted for 46% of the analytic sample. In his work on the effects of social composition in public high schools, Palardy (2008) constructed a similar composite for “highly qualified” teachers.

Academic press. Schools’ normative emphasis was captured by students’ and administrators’ responses to the item: “Indicate how much each of the characteristics listed below describes your school's climate” as it related to: (a) student morale is high, (b) teachers at this school press students to achieve academically, (c) teacher morale is high, (d) students place a high priority on learning, and (e) students are expected to do homework. Scores were rated on 5-point Likert-type scale anchored with the words “not accurate at all,” “somewhat accurate,” and “very accurate.” Exploratory factor analysis of this base-year school climate variable produced a factor which accounted for 63% of the total variance in the data. Table 3.5 shows the factor loadings, which measures the proportion of variance the factor captures from each variable. The Cronbach’s alpha for this factor was ($\alpha = .853$), indicating strong consistency across items. Reliability could not be increased by deleting any of the variables. A correlation matrix of measures used to construct academic press is presented in Appendix C.

Table 3.5.

Exploratory Factor Analysis for Academic Press

Factor and Item Labels	Factor and ELS:2002 Item Descriptions	Item Loadings
Academic Press for Achievement	5-pt Likert scale (1 = <i>not at all</i> , 5 = <i>very accurate</i>)	
BYA51A	Student morale is high	.727
BYA51B	Teachers at this school press students to achieve academically	.837
BYA51C	Teacher morale is high	.679
BYA51D	Students place a high priority on learning	.784
BYA51E	Students are expected to do homework	.656
Eigenvalue		3.173
Variance Explained		63.46
Cronbach Alpha		.853

Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).

Note: Tabulations by the Author. All values are weighted with the normalized F1PNLWT panel weight.

Social support. Social support is made up of items that relate to students' perceptions of schools' affective dimensions. The item "How much do you agree or disagree with each of the following statements about your current school and teachers?" measured: (a) students get along well with teachers; (b) the teaching is good; (c) teachers are interested in students, (d) when I work hard on schoolwork, my teachers praise my effort; and (e) in class I often feel "put down" by my teachers. Scores were rated on 4-point Likert-type scale anchored with the words "strongly agree," "agree," "disagree" and "strongly disagree." Exploratory factor analysis of this base-year measure of students' school experiences and activities produced a factor which accounted for 48% of the total variance in the data. Table 3.6 shows the items loadings. The Cronbach's alpha for this factor was ($\alpha = .719$), indicating moderate consistency across items. Reliability could not be increased by deleting any of the variables. A correlation matrix of measures used to construct social support is presented in Appendix C.

Table 3.6.

Exploratory Factor Analysis for Social Support

Factor and Item Labels	Factor and ELS:2002 Item Descriptions	Item Loadings
Social Support Structures	4-pt Likert scale (1 = <i>strongly agree</i> , 5 = <i>strongly disagree</i>)	
BYS20A	Students get along well with teachers (reverse)	.487
BYS20E	The teaching is good (reverse)	.694
BYS20F	Teachers are interested in students (reverse)	.776
BYS20G	When I work hard on schoolwork, my teachers praise my effort (reverse)	.557
BYS20H	In class I often feel "put down" by my teachers	.422
Eigenvalue		2.393
Variance Explained		47.85
Cronbach Alpha		.

Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).

Note: Tabulations by the Author. All values are weighted with the normalized F1PNLWT panel weight.

Collective efficacy (English). Collective efficacy consists of items that measure teachers' beliefs about schools' shared values and norms. The composite index was created using exploratory factor analysis to examine responses to the prompt: "When students are successful in achieving intended goals or objectives, it is often attributed to one of the following sources. In your opinion, how important is each source of success?" Ratings on a 4-point Likert-type scale produced scores relative to (a) teacher's attention to the unique interests and abilities of the student, (b) teacher's use of effective methods of teaching, and (c) teacher's enthusiasm or perseverance. The factor accounted for 67% of the total variance, which is approaching respectability. Table 3.7 shows the items loadings. The Cronbach's alpha for this factor was ($\alpha = .764$), indicating moderate consistency across items. Reliability could not be increased by deleting any of the variables. A correlation matrix of measures used to construct English collective efficacy is presented in Appendix C.

Table 3.7.

Exploratory Factor Analysis for Collective Efficacy (English Teachers)

Factor and Item Labels	Factor and ELS:2002 Item Descriptions	Item Loadings
Collective Efficacy Structures	4-pt Likert scale (1 = <i>extremely important</i> , 5 = <i>not at all important</i>)	
BYTE44D	Teacher's attention to the unique interests and abilities of the student	.658
BYTE44E	Teacher's use of effective methods of teaching	.790
BYTE44F	Teacher's enthusiasm or perseverance	.681
Eigenvalue		2.004
Variance Explained		66.82
Cronbach Alpha		.764

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).

Note: Tabulations by the Author. All values are weighted with the normalized F1PNLWT panel weight.

Collective efficacy (math). The composite measure for math teachers' collective efficacy was created from the ELS:2002/04 item used in the analyses of English teachers' collective efficacy: "When students are successful in achieving intended goals or objectives, it is often attributed to one of the following sources. In your opinion, how important is each source of success?" Ratings on a 4-point Likert-type scale produced scores relative to (a) teacher's attention to the unique interests and abilities of the student, (b) teacher's use of effective methods of teaching, and (c) teacher's enthusiasm or perseverance. The factor explained 68% of the total variance. Table 3.8 shows the items loadings. The Cronbach's alpha for this factor was ($\alpha = .750$), indicating moderate consistency across items. Reliability could not be increased by deleting any of the variables. A correlation matrix of measures used to construct math collective efficacy is presented in Appendix C.

Table 3.8.

Exploratory Factor Analysis for Collective Efficacy (Math Teachers)

Factor and Item Labels	Factor and ELS:2002 Item Descriptions	Item Loadings
Collective Efficacy Structures	4-pt Likert scale (1 = <i>extremely important</i> , 5 = <i>not at all important</i>)	
BYTM44D	Teacher's attention to the unique interests and abilities of the student	.667
BYTM44E	Teacher's use of effective methods of teaching	.823
BYTM44F	Teacher's enthusiasm or perseverance	.678
Eigenvalue		2.041
Variance Explained		68.04
Cronbach Alpha		.750

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).

Note: Tabulations by the Author. All values are weighted with the normalized F1PNLWT panel weight.

Limitations

Despite the advantages of utilizing ELS:2002/04, two methodological challenges were experienced. The first issue related to the availability of measures included in the conceptual framework driving this research. As Bryk and Driscoll (1998) note in their study using High Schools and Beyond (HS&B) data, the use of “large, general purpose surveys” often limits researchers to “creating proxy measures based on existing questions” (p. 16). Consequently, factor analysis is often used in educational studies to compress a large number of variables into a single factor. Following the direction of prior school effects research (Goodard & Goodard, 2001; Schaefer & Meece, 2009), this study used exploratory factor analysis to collapse selected ELS:2002/04 variables into three composite measures of high school organizational characteristics: (a) academic press for achievement, (b) social support structures, and (c) collective efficacy. Academic press was constructed by combining variables related to schools’ normative environment; social support included variables describing schools’ affective and

communal dimensions; and collective efficacy was constructed from data pertaining to teachers' shared beliefs about their ability to positively affect student learning.

Second, the large scale nature of longitudinal studies makes them susceptible to potential sources of biases; ELS:2002/04 was no exception. Because a primary aim of this analysis was to draw valid inferences about a given population, this process would have been compromised if the sample was biased. Therefore, it was important to understand why data were missing and to treat missing cases with the most appropriate and accessible method available.

Summary

This chapter described the methodological approaches employed in this dissertation. The ELS:2002/04 data collection and sampling techniques were presented, along with an overview of how these data were used to construct the analytic sample ($n = 13,358$). In addition, the conceptual model illustrated the theoretical relevance of variables selected for the study. I concluded by offering a summary of how data were transformed and recoded for multilevel modeling.

CHAPTER IV

RESULTS

Introduction

This chapter presents the results of hierarchical linear modeling. I begin with an overview of centering and standardizing variables. Next, I describe the series of hierarchical linear models used to examine school effects through multiple lenses. The modeling begins with the simplest multilevel model and progresses to more complex models: (a) unconditional, (b) means-as-outcomes, (c) random-coefficient and (d) intercepts as slopes-as-outcomes. This process is applied to both outcome measures: college entrance exams and high school grade point average. I conclude with a summary of result findings, which indicate that the greatest proportion of variance in that outcome measures is explained at the school-level.

Centering Predictor Variables

Variable placement is critical to accurate interpretation of statistical models. One of the primary considerations when building multilevel models relates to centering predictor variables (Kreft, 1995; Ma, Ma, & Bradley, 2008). Variables can be either grand-mean or group-mean centered. Grand-mean centering ($X_{ij} - \bar{X}_{..}$) of variables can occur at both the student level and school level. With respect to student-level variables, another form of grand-mean centering is standardization (i.e. z-score transformation [$M = 0$, $SD = 1$]). This type of centering provides useful information in interpreting student performance relative to the entire population (Rumberger & Palardy, 2008). Conversely, group-mean centering ($X_{ij} - \bar{X}_{.j}$) reflects the

difference between individual student performance and the group's mean (Hox, 2002). In this dissertation, student-level variables are group mean centered and school-level variables are grand mean centered.

Multilevel Models

Social scientists use a variety of multilevel modeling techniques to examine hierarchically structured data. As with any statistical analysis, appropriate model selection is based on the research questions guiding the investigation. Researchers have spent more than two decades (Raudenbush & Bryk, 1992, 2002; Snijders & Bosker, 1999; Schreiber & Griffin, 2004) unraveling the intricacies of multilevel modeling with education data. What emanated from this body of work was a systematic approach to hierarchical linear modeling, particularly as it relates to school effects research. Taken together, researchers proposed an array of models that can be used to examine student- and school-level effects. Based on the intent of this dissertation to understand the full range of school-level influences on college preparedness, I determined that applying a series of four hierarchical linear models was most appropriate for the addressing the research questions guiding this study:

1. How does college preparedness vary within and across secondary schools?
2. What are the effects of secondary school context on college entrance exams and high school grade point average?
3. What are the main and interaction effects of academic press for achievement, social support, and collective efficacy on college entrance exams and high school grade point average?

Models

The unconditional model (Model I) is the simplest of the multilevel models. It is void of student- and school-level variables, and bears statistical similarities to the one-way ANOVA model (Raudenbush & Bryk, 2000; O’Connell & McCoach, 2008). The equation is written as: $Y_{ij} = \gamma_{00} + u_{0j} + r_{ij}$, where $r_{ij} \sim N(0, \sigma^2)$ and $u_{0j} \sim N(0, \tau^2)$. The unconditional model is an essential step in HLM analyses for two reasons. First, the unconditional model is used to estimate the grand mean of the outcome measure. In addition, the model indicates the proportion of variance in the outcome measure as a function of school characteristics (Rumberger and Palardy, 2004). The proportion of variance is captured by the intraclass correlation coefficient (ICC), which is computed using the following ratio: $[p = \tau_{00} / (\tau_{00} + \sigma^2)]$.

The mean-as-outcomes model (Model II) includes only school-level predictors, and is “one form of a random-intercept model” (Raudenbush & Bryk, 2002, p. 37). In one respect, the means-as-outcomes model is intended to explain the predictive power of school level variables in relation to the outcome measure over and above that of the unconditional model. If the explanatory power of the means-as-outcomes model is greater than that of the preceding model, that difference is reflected by a smaller ICC.

The primary function of the random-coefficient model (Model III) is to examine the random effects of student-level predictors (Rumberger & Palardy, 2004). All level-1 variables are included in this model, while level 2 includes only intercepts and error terms. To measure these effects, student-level variables are group-mean centered, representing the mean performance of students in the schools. This model alters the interpretation of the intercept term. As opposed to representing the expected performance of the average student, the intercept term (β_{0j}) reflects the school’s unadjusted mean performance (Raudenbush & Bryk, 2002).

Model IV, intercepts and slopes-as-outcomes, includes predictors at both levels. As a final step in the multilevel modeling series, the intercepts and slopes-as-outcomes model can be applied to improve the fit of student- and school-level models. That is to say, results indicate the proportion of variability explained with the inclusion of both level-1 and level-2 predictors (Pituch, 1999).

The following sections present results from multilevel modeling. First, I present the unconditional model for SAT and GPA, respectively. Table 4.1 includes results of this model. Then, I present the random-coefficient, means-as-outcomes, and intercepts and slopes-as-outcomes models for SAT and GPA, respectively. Tables 4.2 and 4.3 present results of these models.

College Entrance Exam

One-way ANOVA

By estimating the unconditional model, I was able to partition the total variance in SAT scores into variance that can be explained by the level-1 model (students) and the level-2 model (schools). The estimated grand mean of SAT scores ($\hat{\gamma}_{00}$) among the 750 high schools was 994.17, slightly lower than the actual mean of the analytic sample (984.59). The estimate reliability was moderately strong (0.760), which suggested that the sample means were a good predictor of the true mean. The variance among school means for SAT was significant ($\chi^2 = 3752.080$, $df = 734$, $p < 0.001$).

I also calculated the intraclass correlation coefficient (ICC) to establish whether between and within-school variances account for differences in mean SAT. The estimate of the within-school variance (σ^2) was 31785.165, while the between-school variance (τ^2) was 10688.968. Therefore, the ICC for the unconditional model was determined by the ratio of between-school

variance to the total variance: $[p = \tau_{00} / (\tau_{00} + \sigma^2) = 10688.968 / (10688.968 + 31785.165)] = 0.251$.

Results showed that the portion of variance that occurs between schools is approximately 25%, while 75% of the variance in mean SAT was attributed to within-school variability. Results from the unconditional model suggest that schools do account for variation in average SAT scores. Therefore, the null hypothesis that there is no variability across schools was rejected.

To determine the extent of variation in mean SAT scores among high schools, I used the parameter estimates to calculate the range of plausible values (Raudenbush & Bryk, 2002). In addition to the observed mean SAT score, the range of plausible values (also referred to as the 95% confidence interval) provides a basis for comparing scores between schools with the highest and lowest mean SAT scores (e.g. 2 standard deviations).

$$\begin{aligned} \text{Range of plausible values} &= \hat{\gamma}_{00} \pm 1.96 \frac{(\hat{\tau}_{00})^{1/2}}{\sqrt{n}} \\ &= 994.17 \pm 1.96 (10.688) \\ &= (973.22, 1015.12) \end{aligned}$$

Results of the range of plausible values indicated that high schools with the highest mean SAT were within approximately 600 points of the of the maximum score. This is significant because in 2004, when students in the ELS:2002/2004 were assumedly high school seniors, the College Board (2004) reported that the average SAT score for college-bound seniors was 1026. Therefore, mean scores in high schools at the 2.5th percentile were more than 50 points below the national average.

High School Grade Point Average

One-way ANOVA

Understanding how between- and within-school differences account for the total explained variance in mean high school grade point average is paramount to the present analysis.

The unconditional model was the initial phase of this investigation. A comparison of the estimated grand mean of GPA (2.66) to that of the analytic sample (2.67) indicated a slight difference. The estimated reliability was respectable (0.728), suggesting that systematic variances exist between schools. The parameter estimates ($\sigma^2 = 0.521$, $p < 0.001$; $\tau_{00} = 0.099$, $p < 0.001$) were used to examine the proportion of variance across schools. The intraclass correlation coefficient (ICC) was used to decompose the total variance in GPA to within- and between-school variance. The ICC for this model [$p = \tau_{00} / (\tau_{00} + \sigma^2) = 0.099 / (0.099 + 0.521) = 0.159$] indicates that 16% of the total variance occurs between schools. Though 84% of the variance in GPA existed at the student level, the chi-square test of the hypothesis was significant ($\chi^2 = 3022.583$, $df = 737$, $p < 0.001$) and showed that schools do account for variance in the mean GPA. Consequently, the null hypothesis that there is no variability across schools was rejected.

The amount of variance in the mean GPA that exists across schools was determined by the plausible values range:

$$\begin{aligned} \text{Range of plausible values} &= \hat{\gamma}_{00} \pm 1.96 \frac{(\hat{\tau}_{00})^{1/2}}{\sqrt{n}} \\ &= 2.66 \pm 1.96 (0.028) \\ &= (2.61, 2.71) \end{aligned}$$

Assuming a normal distribution, the range of plausible values shows that GPA was estimated to vary between 2.61 and 2.71 in U.S. high schools.

The estimates of the unconditional models affirm the application of multilevel modeling to further analysis of SAT and GPA. According to Lee (2000), “this first step can also indicate whether HLM is needed or whether a single level analytic method is appropriate. Only when the

ICC is more than trivial (i.e., greater than 10% of the total variance in the outcome) would the analyst need to consider multilevel methods. Ignoring this step (i.e., assuming an ICC of either 0

Table 4.1

Parameter Estimates and Descriptive Statistics for Unconditional SAT and GPA Models		
	SAT Score (I)	GPA (I)
Parameter Estimate		
Grand mean β ($\hat{\gamma}_{00}$)	994.17***	2.67***
(Standard error)	(4.370)	(0.014)
Within schools (σ^2)	31785.165***	0.521***
(Standard error)	(178.284)	(0.521)
Between schools (τ_{00})	10688.968***	0.099***
(Standard error)	(103.388)	(0.315)
ICC (Between school variance)	25%	16%
Descriptive Statistics		
Plausible Values (Low)	791.53	2.043
Overall Sample Mean	994.17	2.67
Plausible Values (High)	1196.81	3.277

***p<.001

Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/04).

Note: Tabulations by the Author.

or 1) would be inappropriate if the research question were multilevel” (p. 128). Thus, HLM is a valid method for analyzing the existing dataset and for progressing to more advanced multilevel models.

College Entrance Exams

Means-as-Outcomes Models

The means-as-outcomes model was used to investigate disparities in educational outcomes that can be attributed to differences in school inputs (Rumberger & Palardy, 2004). In order to address these school-level variances, student-level predictors were excluded from the means-as-outcomes model. The present analysis considered seventeen main effects of all

contextual and organizational variables. This model also included eight same-level interactions of press, support and efficacy by minority concentration over 50% and poverty concentration over 50%. All school-level variables were grand mean centered. Results of the main and interaction effects are reported in Table 4.2.

The grand mean of SAT scores for the means-as-outcomes model was 986.91. According to Table 4.2, eleven of the contextual and organizational school-level predictors were significantly related to SAT score. In sum, student-teacher ratio, large school, private school, Catholic school, mean SES, and mean social support were shown to have significant positive relationships to mean SAT. The effects of student-teacher ratio (4.19) and social support were moderate (48.21). However, the effects of school size, school sector, and mean socioeconomic status of the student population were much greater. For example, holding all other predictors constant, the mean SAT in large schools (217.37) was higher than in moderate-size schools. A comparison of school sector showed that the mean SAT was higher in private schools (190.01) and Catholic schools (82.96) than in public schools. Expectedly, a one unit increase in mean SES was associated with a higher SAT score (245.38).

While also statistically significant, five school-level variables were shown to have a negative relationship to SAT. The effect of percent of full-time certified teachers (-0.78) and schools with a poverty concentration over 50% (-67.65) was moderate. Notably, the negative size effects were larger. After controlling for other variables in the model, very large schools (-280.77) as well as small schools (-82.51) were shown to have a lower mean SAT than moderate-size schools. Results showed only one additional significant effect of school organizational characteristics—either as main effect or interaction effect—on the outcome measure. More specifically, the mean English collective efficacy had a significant negative

effect on mean SAT (-13.36). Though the coefficient for the collective efficacy of English teachers was significant, the magnitude of the effect was relatively small given the range of possible SAT scores (i.e. from 0 to 1600). All other school-level predictors of contextual and organizational characteristics were non-significant.

When controlling school-level variables, the variance component representing mean SAT scores [$p = \tau_{00} / (\tau_{00} + \sigma^2) = 2693.921 / (2693.921 + 31787.598) = 0.078$] was reduced by approximately 17%. A similar comparison to the variance explained in the unconditional model [$p = \tau_{00} (\text{ANOVA}) - \tau_{00} (\text{Means-as-outcomes}) / \tau_{00} (\text{ANOVA}) = (10688.968 - 2693.921) / 10688.968 = 0.748$] confirmed that the means-as-outcomes model had greater explanatory power relative to the unconditional model. More precisely, school-level predictors accounted for 75% of the variance in mean SAT that exists between schools.

Random-coefficient

The intent of the random-coefficient model was to examine the effects of student-level predictors on SAT score. The variables were group mean centered and specified as both fixed and random effects. Results of the random-coefficient model showed a slight reduction in the grand mean SAT score when compared to the unconditional model (from 994.17 to 993.39). The estimated reliability of the current model was 0.798.

Results indicated that regression coefficients for SES, gender, multiracial, Hispanic, Asian, student remediation, student retention, student aspirations, and academic program had positive associations with the outcome measure. On average, students of higher SES (90.98), male students (23.11), students who aspired to earn at least a bachelor's degree (97.90), and students who were enrolled in a college preparatory program (46.93) tended to have a higher SAT than female students, students of lower SES, students whose aspirations did not include

earning at least a bachelor's degree, and students whose high school academic program was either general or vocational. Of the four racial/ethnic student-level variables included in the model, multiracial (46.40), Hispanic (38.41), and Asian (55.38) were all shown to have significant positive effects on SAT, which indicated higher performance than White students. It is noteworthy that all other racial/ethnic groups, except Black students, were shown to have a statistically significant effect on SAT score.

Predictors that were significantly and negatively related to mean SAT included student remediation (-47.06) and student retention (-110.43). Though SAT performance of students with prior academic challenges was expected to be lower than their counterparts, the gap in negative effects is worth noting. That is, the difference in average performance by students who received remediation in either math or English is less pronounced than by those who had been retained at least a year.

Each of the student-level variables was modeled with random effects to test their homogeneity. The random effects of the current model indicated that, in addition to average levels of SAT scores, regression slopes for multiracial, Hispanic, and Asian varied across schools. It should also be noted that these were the same racial/ethnic variables shown to have a significant and positive effect on the outcome measure.

The intraclass correlation coefficient (ICC) was used to assess the explanatory of the random-coefficient model as compared to the unconditional model: $[p = \sigma^2(\text{ANOVA}) - \sigma^2(\text{Random-coefficient}) / \sigma^2(\text{ANOVA}) = (31785.165 - 26447.575) / 31785.165 = 0.168]$. Approximately 17% of variance in mean SAT can be explained by student-level predictors in the random-coefficient model. The variance explained at the student-level in the current (17%) was

substantially lower than the variance explained at the school-level by the means-as outcomes model (75%).

Intercepts and Slopes-as-Outcomes

The reliability estimate of the model was moderate (.550), with a grand mean SAT score of 986.89. The inclusion of both student and school predictors mediated effects at the student level. Among the ten student-level predictors, nine variables (SES, male, multiracial, Hispanic, Asian, student remediation, student retention, student aspirations and academic program) were shown to have statistically significant effects on SAT scores. Variables with a positive and statistically significant relationship to SAT scores included SES, male, multiracial, Hispanic, Asian, student aspirations, and academic program. Predictors with significant negative relationships remained student remediation and student retention from the random-coefficient model.

Randomly varying slopes among five of the student-level predictors indicated a relationship to school-level variables, meaning that each relationship could be modeled separately. For male students (23.11) in particular, four student-level variables were shown to significantly influence performance on the SAT: very large school (-37.81), large school (29.06), small school (-10.87), and rural school (-36.79). Although only moderate effects, on average, male students in very large schools, small schools, and rural schools tend to earn lower scores on the SAT. Conversely, male students are expected to perform better on the SAT in schools that enroll between 1,500 and 2,500 students (large schools).

Additionally, the random effects presented in table 4.2 show a reduction in Hispanic students' SAT score when more teachers are highly qualified (-41.91). This effect is a departure from what one would expect. That is, one would expect to see more positive outcomes in the

presence of more qualified teachers. The interaction between English efficacy and poverty concentration over 50% was shown to have a positive effect on Hispanic (22.34) and Black (19.72) students' SAT performance; however, the adverse was true for multiracial students (-16.34). Though significant, the interaction effects were weak.

Coefficients for twenty-four school-level variables either increased or decreased by relatively small increments. The interaction between support and minority concentration over 50% had the largest change, which was still minimal (+2.58). Two other changes were observed in terms of significance. First, though the relationship remained negative, the effect of mean English efficacy was no longer significant. Second, the interaction between press and minority concentration over 50% became significant (22.29, $p > 0.05$ to 21.09, $p < 0.01$). Therefore, the total effect of press in schools with minority concentration over 50% increased from -2.58 to 18.51.

In terms of school-level effects, the intraclass correlation coefficient (ICC) was used to assess the variance explained by student-level predictors. The ICC also reflects the predictive power of the intercepts and slopes-as-outcomes model: $[p = \tau_{00} (\text{Random-coefficient}) - \tau_{00} (\text{Intercepts and slopes} / \tau_{00} (\text{Random-coefficient})) = (11256.98486 - 3173.00741) / 11256.98486 = 0.718]$. An examination of results indicated that student-level predictors in the fully conditional model explained approximately 72% of the variance in SAT scores that exists between schools.

Parameter estimates for the multilevel SAT models are presented in table 4.2. Overall, the school-level variables explained the greatest proportion in variance in SAT. As shown in figure 4.1, the means-as-outcomes model explained 75% at the school level, while the intercepts

and slopes-as-outcomes model explained 72% of variance at the school level. The student-level variables in the random-coefficient model explained only 17% of variance in SAT.

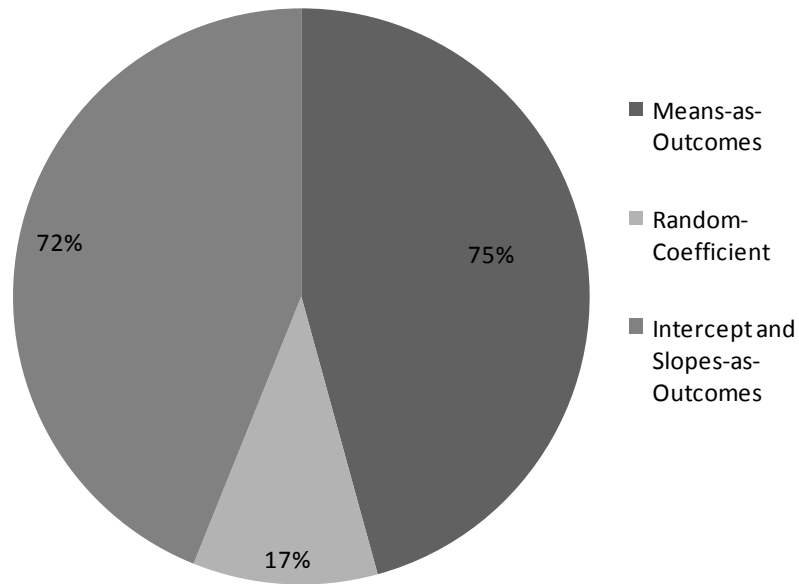


Figure 4.1. Distribution of Variance Explained in Multilevel Modeling of SAT
Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002). Tabulations by the Author.

Table 4.2

Parameter Estimates for Multilevel SAT Models

	<i>Means-as- Outcomes Model I</i>	<i>Random- Coefficient Model</i>	<i>Intercepts and Slopes-as- Outcomes Model</i>
	(II)	(III)	(IV)
<i>Fixed Effects</i>			
Intercept (γ_{00})	986.91***	993.39***	986.89***
School-level Variables			
Student-teacher Ratio (γ_{10})	4.19***		4.18***
Percent of Full-time Certified Teachers (γ_{20})	-0.78**		-0.78**
School Minority Concentration (γ_{30})	-20.82		-21.97
School Poverty Concentration (γ_{40})	-67.65***		-68.20***
Very Large (γ_{50})	-280.77**		-279.28**
Large (γ_{60})	217.37**		216.20**
Small (γ_{70})	-82.51**		-82.29**
Private (γ_{80})	190.01***		190.65***
Catholic (γ_{90})	82.96**		83.76**
Rural (γ_{010})	16.76		16.42
Urban (γ_{011})	2.38		2.16
Highly Qualified (γ_{012})	12.43		12.33
Mean SES (γ_{013})	245.36***		245.29***
Mean Press (γ_{014})	-2.40		-2.58
Mean Support (γ_{015})	48.21***		47.77***
Mean Math Efficacy (γ_{016})	-6.96		-6.64
Mean English Efficacy (γ_{017})	-13.36**		-13.24
Press and Poverty Concentration (γ_{018})	0.97		0.94
Press and Minority Concentration (γ_{019})	22.29		21.09**
Support and Poverty Concentration (γ_{020})	14.73		14.84
Support and Minority Concentration (γ_{021})	-29.62		-27.04
Math Efficacy and Poverty Concentration (γ_{022})	1.54		1.25
Math Efficacy and Minority Concentration (γ_{023})	8.77		8.67
English Efficacy and Poverty Concentration (γ_{024})	-0.68		-0.65
English Efficacy and Minority Concentration (γ_{025})	0.94		0.53
Student-level Variables			
Socioeconomic Status(γ_{10})		90.98***	90.98***
Male (γ_{20})		23.11***	23.11***
Very Large School(γ_{25})			-37.81*
Large School (γ_{26})			29.06*
Small School (γ_{27})			-10.87*
Rural (γ_{210})			-36.79*
Multiracial (γ_{30})		46.40**	46.40**
English Efficacy and Poverty Concentration (γ_{324})			-16.34*
Hispanic (γ_{40})		38.41**	38.41**
Highly Qualified (γ_{412})			-41.91*
English Efficacy and Poverty Concentration (γ_{424})			22.34*

Black (γ_{50})		-173.38	-173.38
English Efficacy and Poverty Concentration (γ_{524})			19.72*
Asian (γ_{60})		55.38*	55.38*
Student Remediation (γ_{70})		-47.06***	-47.06***
Student Retention (γ_{80})		-110.43***	-110.43***
Student Aspirations (γ_{90})		97.90***	97.90***
Academic Program (γ_{100})		46.93***	46.93***
<i>Random Effects</i>			
τ_{00}		11178.30***	2958.95***
τ_{01}		1917.72	381.00
τ_{02}		557.10	503.45
τ_{03}		2433.46***	4027.42**
τ_{04}		4394.59**	9422.51**
τ_{05}		2241.46	1402.01
τ_{06}		2081.67***	1613.92**
τ_{07}		1134.25	1564.00
τ_{08}		966.68	946.72
τ_{09}		2142.41	691.63
τ_{10}		1280.65	930.79
Within schools (σ^2)	31787.60***	26447.58***	26466.79***

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

Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/04).

High School Grade Point Average

Means-as-Outcomes

The grand mean GPA of the means-as-outcomes model mirrors the parameter estimate of the unconditional model: 2.66. Results from the means-as-outcomes model for GPA showed that the main effects of student-teacher ratio, large school, private school, mean SES, and mean social support were significantly and positively associated with the outcome measure. The largest overall effect was observed for small schools (0.91), indicating that GPA tends to be lower in moderate-size schools. Higher mean SES (0.46) was also associated with higher mean GPA. Additionally, one organizational characteristic was observed to have a moderate effect. In particular, mean support (0.23) was shown to increase GPA by nearly one-fourth point (on a 4.0-point scale). Positive effects were much smaller for student-teacher ratios (0.01) and highly qualified teachers (0.07).

Expectedly, schools with minority (-0.15) and poverty concentrations over 50% (-0.10) were associated with a reduction in GPA. Simply stated, these significant negative effects indicate that the higher proportions of Black, Hispanic, and economically disadvantaged students in a school, then the lower the GPA. As with SAT scores, very large schools (-0.12) and small schools (-0.34) were shown to have a lower mean GPA than moderate-size schools. All other school-level predictors of contextual and organizational characteristics were non-significant.

A comparison of the unconditional model to the means- as-outcomes model showed a reduction in mean GPA by nearly half [$p = \tau_{00} / (\tau_{00} + \sigma^2) = 0.04575 / (0.04575 + 0.52050) = 0.081$]. However, controlling for school-level variables [$p = \tau_{00}(\text{ANOVA}) - \tau_{00}(\text{Means-as-outcomes}) / \tau_{00}(\text{ANOVA}) = (0.099 - 0.04575) / 0.099 = 0.538$] increased the variance explained at the school-level to approximately 54%. With respect to high school grade point average, the means-as-outcomes model has greater predictive power at the school-level than the unconditional model. More precisely, the school-level predictors explained 54% of the variance in high school grade point averages that exist between schools.

Random-coefficient Model

In the random-coefficient model, student-level predictors were specified as fixed and random effects. The school level was left unconditional. This model included student background characteristics as well as proxies for student aspirations and academic preparation. The parameter for grand mean GPA was 2.65, and the reliability estimate was 0.785.

Results from this model showed six positive and significant relationships including SES, multiracial, Hispanic, Asian, student aspirations, and academic preparation. In particular, higher SES (0.24) was associated with higher mean GPA. As with the SAT random-coefficient model, all racial/ethnic groups other than Blacks were associated with higher outcomes. Hispanic (0.95)

was shown to have the largest effect, followed by Asian (0.21) and multiracial (0.12). Predictably, and consistent with the SAT means-as-outcomes model, students who aspired to obtain at least a bachelor's degree (0.41) and enrolled in a college preparatory program (0.25) were expected to earn a higher GPA than students with dissimilar aspirations or history of course-taking patterns.

While also statistically significant, male (-0.27), student remediation (-0.11), and student retention (-0.28) had negative effects on mean GPA. Results supported my contention that remediation and retention have negative effects on educational outcomes. Additionally, as female students served as the reference group, males were also expected to earn a lower GPA.

Slopes were specified to vary randomly to test their homogeneity. Regression slopes for all four racial/ethnic groups varied across schools: multiracial, Hispanic, Black, and Asian. Of these coefficients, only Black was non-significant. Slopes were also observed to vary for student retention, student aspirations, and academic program.

A comparison of ICCs from the unconditional model and the random-coefficient model [$p = \sigma^2(\text{ANOVA}) - \sigma^2(\text{Random-coefficient}) / \sigma^2(\text{ANOVA}) = (0.521 - 0.405) / 0.521 = 0.223$] shows that using student-level predictors increased the variance explained from 16% to 22%. The overall predictive power of student-level variables (22%) is nearly one-third less than the variance explained by school-level predictors in the means-as-outcomes model (54%).

Intercepts and Slopes-as-Outcomes Model

The intercepts and slopes-as-outcomes model included both student- and school-level predictors. The student-level variables in the final models were all treated as fixed and random effects. The grand mean GPA for this model was 2.65, which was similar to the previous models.

Among the student-level predictors, all ten variables (SES, gender, multiracial, Hispanic, Black, Asian, student remediation, student retention, student aspirations, and academic program) were shown to have statistically significant effects on high school grade point average. The direction and strength of all relationships of student-level predictors to GPA were consistent with results of the random-coefficient model.

The varying slopes of seven slopes were shown to have significant relationships with variables at the student level. Results showed that poverty concentration, either as a main effect or interaction effect, was associated with lower GPA for all racial/ethnic groups except Hispanic students. There were no decompositions on the Hispanic coefficient. Other notable results showed that students with aspirations to earn at least a bachelor's degree experience tend to experience greater gains in private schools (0.63). The same was true for student enrolled in college preparatory programs who attend rural schools (0.25).

At the school level, ten school context variables were shown to have significant effects on GPA. School context variables with a significant positive relationship to GPA included student-teacher ratio (0.01), large schools (0.91), private schools (0.38), highly qualified teachers (0.07), and mean SES (0.46). In terms of organizational characteristics, the main effect of mean social support (0.23) and the interaction of math efficacy and poverty concentration (0.04) were associated with an estimated higher GPA. The only major departure from the means-as-outcomes model was observed for the interaction between mean math efficacy and poverty concentration over 50%, which was now significant with regard to GPA. Therefore, the total effect of math efficacy in schools with poverty concentration over 50% increased from 0.00 to 0.04.

Expectedly, schools with concentrations of minority students above 50% (-0.15), schools with poverty concentrations above 50% (-0.11), very large schools (-0.12), and small schools (-0.34) were all shown to have a significant negative relationship to the outcome measure.

Student-level variables in the fully unconditional model accounted for 51% of the variance over schools: [$p = \tau_{00}(\text{Random-coefficient}) - \tau_{00}(\text{Intercepts and slopes}) / \tau_{00}(\text{Random-coefficient}) = (0.10822 - 0.05323) / 0.10822 = 0.508$]. Thus, the explanatory power of the intercepts and slopes-as-outcomes model was greater than the means-as-outcomes model.

Parameter estimates for the multilevel GPA models are presented in table 4.3. As with the SAT models, the school-level variables explained the greatest proportion in variance in GPA. As shown in figure 4.2, the means-as-outcomes model explained 54% at the school level, and the intercepts and slopes-as-outcomes model explained 51% of variance at the school level. Student-level variables in the random-coefficient model explained less one-fourth of variance in GPA (22%).

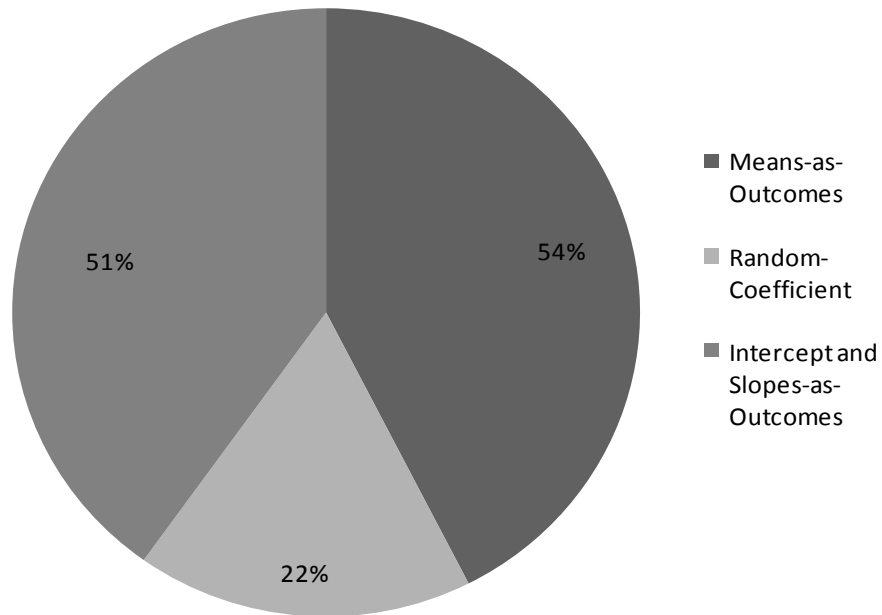


Figure 4.2. Distribution of Variance Explained in Multilevel Modeling of GPA
Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002). Tabulations by the Author.

Table 4.3

Parameter Estimates for Multilevel GPA Models

	<i>Means-as- Outcomes Model I</i>	<i>Random- Coefficient Model</i>	<i>Intercepts and Slopes-as- Outcomes Model Model</i>
	(II)	(III)	(IV)
<i>Fixed Effects</i>	2.66***	2.65***	2.65***
Intercept (γ_{00})			
School-level Variables			
Student-teacher Ratio (γ_{10})	0.01***		0.01***
Percent of Full-time Certified Teachers (γ_{20})	-0.00		-0.00
School Minority Concentration (γ_{30})	-0.15***		-0.15***
School Poverty Concentration (γ_{40})	-0.10**		-0.11*
Very Large (γ_{50})	-0.12**		-0.12*
Large (γ_{60})	0.91**		0.92**
Small (γ_{70})	-0.34**		-0.34*
Private (γ_{80})	0.36*		0.38*
Catholic (γ_{90})	0.11		0.13
Rural (γ_{010})	-0.02		-0.02
Urban (γ_{011})	-0.02		-0.03
Highly Qualified (γ_{012})	0.07**		0.07*
Mean SES (γ_{013})	0.46***		0.48***
Mean Press (γ_{014})	-0.00		-0.00
Mean Support (γ_{015})	0.23***		0.23***
Mean Math Efficacy (γ_{016})	-0.00		-0.00
Mean English Efficacy (γ_{017})	-0.03		-0.03
Press and Poverty (γ_{018})	0.02		0.02
Press and Minority (γ_{019})	0.02		0.02
Support and Poverty (γ_{020})	0.02		0.03
Support and Minority (γ_{021})	-0.04		-0.04
Math Efficacy and Poverty (γ_{022})	0.03		0.04*
Math Efficacy and Minority (γ_{023})	-0.08		-0.08
English Efficacy and Poverty (γ_{024})	-0.02		-0.03
English Efficacy and Minority (γ_{025})	0.03		0.03
Student-level Variables			
Socioeconomic Status(γ_{10})		0.24***	0.24***
Male (γ_{20})		-0.27***	-0.27***
Multiracial (γ_{30})		0.12*	0.12*
Support and Poverty (γ_{320})			0.07**
Math Efficacy and Poverty Concentration (γ_{322})			-0.04*
Hispanic (γ_{40})		0.95*	0.95*
Black (γ_{50})		-0.14	-0.14*
School Poverty Concentration (γ_{54})			-0.14*
Support and Poverty Concentration (γ_{520})			-0.10**
Asian (γ_{60})		0.21*	0.21*
School Poverty Concentration (γ_{64})			-0.09*
Support and Poverty Concentration (γ_{620})			-0.07*

Student Remediation (γ_{70})		-0.11***	-0.11***
Rural (γ_{710})			-0.30**
Math Efficacy and Poverty Concentration (γ_{722})			0.09*
Student Retention (γ_{80})		-0.28***	-0.28***
School Poverty Concentration (γ_{84})			0.19*
English Efficacy (γ_{817})			-0.03**
Student Aspirations (γ_{90})		0.41***	0.41***
Percent of Full-time Certified Teachers			0.01*
School Poverty Concentration (γ_{94})			-0.19*
Private (γ_{98})			0.63*
Academic Program (γ_{100})		0.25***	0.25***
Rural (γ_{1010})			0.22**
Support and Minority Concentration (γ_{1021})			0.25*
<i>Random Effects</i>			
τ_{00}		0.07***	0.11***
τ_{01}		0.00	0.02
τ_{02}		0.01	0.00
τ_{03}		0.01*	0.04*
τ_{04}		0.03*	0.03**
τ_{05}		0.02**	0.01**
τ_{06}		0.01*	0.03**
τ_{07}		0.03	0.02
τ_{08}		0.00*	0.03**
τ_{09}		0.02*	0.04*
τ_{10}		0.02*	0.01**
Within schools (σ^2)	0.521***	0.405***	0.405***

* p<.05; ** p<.01; ***p<.001

Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/04).

Summary of Results

In sum, the hierarchical linear modeling in this chapter consisted of four submodels. All data cleaning and data management were completed using IBM SPSS 19. Additionally, transformations and calculations (i.e. factor analysis and interactions) were completed prior to importing SPSS variables into HLM 7.0. The HLM 7.0 software package was used to conduct the multilevel analyses. This section includes a brief summary of the findings:

- Results from the unconditional models indicated that multilevel modeling was appropriate for this study. The proportion of variance explained was 25% for the SAT

model and 16% for the GPA. Because both were above 10%, I continued modeling at more advanced levels.

- A comparison of models revealed that the greatest proportion of variance in the outcome measures was explained at the school level.
- When examining the main effects of press, support, and collective efficacy, results indicated that mean support was the only organizational variable shown to have a significant positive relationship to school-level SAT and GPA.
- The interactions between three organizational characteristics—math collective efficacy, English collective efficacy, support—and poverty concentration over 50% showed the strongest positive and statistically significant association with student-level predictors.

CHAPTER V

DISCUSSION, CONCLUSION, AND IMPLICATIONS

Introduction

The purpose of this study was to investigate the relationship between high school organizational characteristics and students' preparedness for college, as measured by college entrance exams and high school grade point average. Though previous attempts have been made to examine the main effects of academic press for achievement, social support structures, and collective efficacy on educational outcomes, few empirical studies have explored the interaction effects between these school characteristics and school context. Given the current educational policy focus on increased rigor and standards, it is critical that we understand the conditions under which high schools are more or less likely to graduate students who demonstrate readiness for postsecondary education.

Rumberger and Palardy (2004) note the existence of various conceptual models employed in prior school effectiveness studies. Given the purpose of the current research, this study relied on an adaptation of the economic framework used to conduct recent multilevel investigations of school effects. The Multilevel Conceptual Framework for Analyzing School Effects (Rumberger & Palardy, 2004), also referred to as the General Multilevel Conceptual Framework for Studying School Effects (Palardy, 2008), considers the affect of school inputs and processes that occurs at various levels of the organization: student, classroom, and school. This analysis deviated from recent investigations by controlling for specific classroom-level

factors at school level. In particular, this study considered the within- and between-school effects of full-time certified teachers and highly qualified teachers on outcomes. This view is both timely and relevant in light of recent federal mandates and reform efforts that place teacher quality and school effectiveness at the center of education policy debates.

Utilizing data from the Education Longitudinal Study of 2002 (ELS:2002), this study investigated high school organizational effects on students' preparedness for postsecondary education. Broadly, this research was designed to address one overarching question: What are the influences of academic press, social support, and collective efficacy on educational outcomes? In an effort to address this question, I posed three specific research questions:

1. How does college preparedness vary within and across schools?
2. What are the effects of school context on college entrance exams and high school grade point average?
3. What are the main and interaction effects of academic press for achievement, social support, and collective efficacy on college entrance exams and high school grade point average?

I employed two-level hierarchical linear modeling (HLM) to address the research questions guiding this study. Because students were nested in schools, I viewed multilevel modeling as the most appropriate method for examining the dataset. As discussed in Chapter Three, HLM has become a widely used approach in education research where within- and between-school effects are under investigation. In fact, Raudenbush and Bryk (1986, 2002) contend that multilevel modeling was developed to account for misleading results from other statistical approaches used to examine hierarchically structured data.

This research was intended to advance prior school effects research by broadening our conception of influential high school organizational characteristics. Where traditional studies focused on the tension or cohesion between press and support, this dissertation also examined the role of collective efficacy. In doing so, I examined not only the main effects of each concept but also the interaction of each with high-minority and high-poverty schools. Finally, this study used the most recently released longitudinal dataset to investigate school-level differential effects on educational outcomes.

Though most studies discussed in Chapter Two on the role of collective efficacy in schools are relatively current, (Bandura, 2000; Hoy & Sabo, 1998; Hoy, Sweetland, & Smith, 2002; Lee, 2000; Lee, 2003; Sweetland & Hoy, 2000), a large body of research on press and support was conducted primarily during the late 1980s and early 1990s. Since such time, several federal education policies have aimed to set national goals for the American education system. The propositions espoused and education reforms advocated within these policies have in some ways—either directly or indirectly—resulted in cumulative effects on school practices. Notable examples include *The Goals 2000: Educate America Act* (1994) and the *No Child Left Behind Act* (2001). Although there may be divergence in terms of specific provisions included in these federal policies, there are consistencies among certain elements of the reforms. In particular, both focus on the paramount importance of increasing standards and accountability, improving teacher quality, and developing more high-stakes assessment measures. Consequently, the emphasis on academic rigor has increased.

In addition to federal policies, the American education system has seen an influx of other trends as well. For example, the issue of school choice has led to an array of schooling options. Researchers note that advance of school choice, vouchers, and charter schools may have stifled

school desegregation efforts from previous decades (Rumberger & Palardy, 2005). In particular, charter schools have garnered significant attention in the past two decades. Since passage of the first charter school law in 1991, the number of charter schools throughout the country has grown exponentially. In fact, the National Center for Education Statistics (NCES) reports that charter school enrollment had increased from 340,000 to 1.3 million students between 1999 and 2008 (U.S. Department of Education, 2010). NCES also reports that charter schools, which are generally smaller than traditional public schools and concentrated in urban areas, enroll high proportions of racially and ethnically diverse students. Interestingly, researchers note that small schools, which may include charter schools, also enroll more economically disadvantaged students than schools of other sizes (Lee & Smith, 1997).

These are only a few of the educational trends to occur since the publication of earlier school effects research. However, they are worth noting because of their relevance to the current education landscape. Moreover, such trends may have contributed to discrepancies between findings in this study and those presented in prior research on similar topics.

This chapter discusses the major findings of the study, which are used to draw the conclusion and explore implications for policy and practice. The first section of this chapter summarizes the findings relative to each research question. The next sections present the conclusion from the analyses, followed by implications for policy and practice to promote college preparedness in U.S. high schools.

Discussion

Research Question One: How does college preparedness vary within and across secondary schools?

Across the four models, this study found that variance in the outcome measures was better explained at the school level than at the student level. With respect to SAT, the variance attributed to student-level variables (i.e. student background characteristics, aspirations, and academic track) was 17% in the means-as-outcomes model. The inclusion of school-level variables (i.e. contextual and organizational) in the random coefficients and intercepts and slopes-as-outcomes model explained variance in average SAT score at 75% and 72%, respectively. Similarly, the means-as-outcomes model used to analyze GPA showed that school-level variables attributed 54% of the variance and 51% in the intercepts and slopes-as-outcomes model, while student level variables in the random coefficient model explained only 22% of variance at the student level.

These findings are consistent with prior research that observed more variance in educational outcomes at the student level (Konstantopoulos, 2006). Examining the changes in school effects across the National Longitudinal Study of the High School Class of 1972 (NLS:72), High School and Beyond first follow-up from 1982 (HSB:82), and the second follow-up of the National Educational Longitudinal Study of 1988 (NELS:88), Konstantopoulos found that “the between-school variation in achievement or school effects increased significantly” between 1972 and 1992 (p. 2577).

One explanation for this finding is that the internal structure of most American high schools is homogenous by nature. In the decades following the landmark *Brown v. Board of Education II* (1955) ruling, many school districts were either forced to or voluntarily developed

policies to ensure racially, ethnically, or socioeconomically balanced schools. Despite these efforts, subsequent court rulings such as *Parents Involved in Community Schools v. Seattle School District* (2007), residential patterns, demographic shifts, private school enrollment, district policies, and school choice have fueled a resurgence of public school resegregation. Frankenberg, Lee, and Orfield (2003) assert that “segregation is a failed educational policy” and each year students are attending schools with less diversity (p. 6). That is one facet of the homogeneity that exists within schools. The other relates to ability grouping.

Grouping (or tracking) is a system of sorting students into a particular course or curriculum based on perceived academic ability (Gamoran, 1987). Students that have demonstrated high ability are typically assigned to college preparatory course, while less academically successful students are placed in lower tracks. An unfortunate reality of this hierarchical differentiation is that it shapes expectations held by others in the school building. Even more unfortunate is that, historically, there has been an overrepresentation of minority and economically disadvantaged students in low-level courses (Oakes, 1985; Tierney & colleagues, 2003).

The effects of homogenous classrooms may be less pronounced as a result of the homogeneity that exists within schools. That is, to say there is a disproportionate representation of minority and ethnically diverse students engaged in college preparatory coursework assumes there is diversity within the school. However, as I have already discussed, schools are not always heterogeneous. Based on residential patterns alone, many schools across the nation enroll high concentrations of minority and economically disadvantaged students. And the converse of this argument is true: high proportions of non-minority and affluent students are often clustered in the same schools.

In summary, the multilevel analyses used to partition total variance in the continuously distributed outcome measures showed that U.S. schools affected students differently in terms of average SAT and average GPA.

Research Question Two: What are the effects of secondary school context on college entrance exams and high school grade point average?

Structural characteristics. In this dissertation, structural characteristics referred to school size, school sector, and school urbanicity. School size and sector showed a significant impact on both outcomes measures. School urbanicity showed no significant impact on mean achievement in high schools. However, three student-level variables showed statistically significant variance decomposition by school urbanicity, and each was significant for rural schools. Students who had ever taken a remedial course had an estimated 0.30 lower GPA than students who had never taken a remedial course, students in college preparatory programs had an estimated 0.22 higher GPA than students in general or vocational programs, and male students had an estimated 36.79 lower GPA than female students.

Overall, findings on size effects indicated that very large schools and small schools showed a strong and negative impact on outcomes measures. This implies that mean SAT and GPA is higher in moderate-size schools. However, a comparison of large and moderate-size schools showed that large schools were associated with a strong, positive impact on college preparedness measures. Specifically, mean SAT score in large schools was 217.37 higher than moderate-size schools and mean GPA in large schools was 0.91 higher than moderate-size schools.

Research on school-size effects, particularly at the high school level, shows that achievement in moderate-size schools (e.g. 600–900 students) tends to be greater than in larger

or smaller schools (Lee & Burkam, 2003). My results support this assertion, with the exception of large schools. In their work on achievement by school size, Lee and Burkam organized schools into four categories: small (0-600 students), medium (601-1,500 students), large (1,501-2,500 students) and very large (more than 2,500 students). This study used the same groupings.

This discrepancy in the results for large schools could be a function of more high-achieving students attending schools that enroll between 1,501 and 2,500 students. As Lee and Burkam (2003) note, more economically disadvantaged students attend small or very large schools. The correlation between socioeconomic status and educational outcomes could be a possible explanation for why mean SAT and GPA were lower in small and very large schools (Sirin, 2005).

Private schools and Catholic schools both showed higher mean SAT and GPA than public schools. With respect to private schools, mean SAT was 190 points higher than public schools and GPA was 0.36 higher in private schools. Both results were statistically significant. Though not as pronounced as the variance between private and public schools, mean SAT in Catholic schools was higher than in public schools (82.96 points). This finding is relevant in light of prior research which documents the differences in normative environment between Catholic and public schools (Bryk, Lee, & Holland, 1993; Lee, 2000).

School resources. Student-teacher ratio, certified full-time teachers, and highly qualified teachers were used in this study to gauge school resources. Of these variables, only student-teacher ratio showed positive and statistically significant effects on mean SAT and mean GPA. Though a weak relationship, a one unit decrease in student-teacher ratio was associated with a 4.19 increase in mean SAT and a 0.01 increase in GPA. I interpret this finding with caution, but

the statistical significance of this relationship implies that there is some association between smaller class sizes and achievement.

Surprisingly, full-time certified teachers was negatively associated with both mean SAT and mean GPA. Given the weakness of the relationships, it would be irresponsible to suggest that a higher proportion of certified teachers in a school results in lower achievement rates. In fact, it is probable that exclusion of part-time certified teachers from the analysis affected this result. Interestingly, however, one student-level variance showed a statistically significant decomposition by full-time certified teachers. Although a weak association, students who aspired to earn at least a bachelor's degree had an estimated 0.01 higher GPA than students who did not aspire to earn a bachelor's degree.

Given the policy relevance of "highly qualified" teachers, this study sought to understand the effects of one of this decades most controversial education laws. A primary emphasis of the *No Child Left Behind Act* (2001) was that teachers of core academic subjects demonstrate that highly qualified status. According to this legislation, highly qualified designation is based on three components: (a) teachers have at least four years of experience, (b) teachers hold a regular or standard state certification, and (c) teachers majored in the subject taught. Guided by Palardy's (2008) work on the social composition in public high schools which included a sum-index composite for "highly qualified," I created a composite measure to examine the effects of teacher quality. The variable was shown to have a positive association to mean SAT; however, the relationship was not statistically significant. In regard to GPA, highly qualified teachers were associated with a 0.07 increase in performance. It should be noted that these data were compiled only a year after *No Child Left Behind* was signed into law; therefore, it is possible that more recent data would yield different results.

School composition. Variables used to examine school composition included school minority concentration, school poverty concentration, and mean SES. There were inconsistencies in terms of the statistical significance of variables across models; however, school minority and poverty concentration were shown to have negative effects on mean SAT and mean GPA. Findings indicated that schools with higher minority and poverty concentrations were negatively associated with SAT and GPA, and higher SES predicted higher SAT and GPA. This aligns with prior research which suggests that schools' social composition influences outcomes (Gamoran, 1992). In particular, this study found that schools with minority concentration over 50% estimated a lower mean SAT of 20.82 points and lower mean GPA of 0.15; schools with poverty concentration over 50% estimated a lower mean SAT score of 67.65 points and lower mean GPA of 0.10. Findings also showed that one unit increase in mean SES was associated with 245.36 higher mean SAT and 0.46 higher mean GPA.

Researchers assert that racial segregation is associated with socioeconomic segregation in schools (Rumberger & Palardy, 2005). Similarly, the National Center for Education Statistics (NCES) notes that racial and ethnic minorities are concentrated in high poverty schools (U.S. Department of Education, 2010). Given the challenging context of high-minority and high-poverty schools, the findings that measures of performance were lower relative to other school contexts is consistent with what one would expect. Research suggests that schools with high proportions of minority and economically disadvantaged students are often hampered by challenges including resource allocation, teacher turnover, dilapidated facilities, transiency, local politics, high teacher transfer and turnover rates, low morale, discipline issues, unsafe environment and threats of violence, low parent and community involvement, and low student motivation (Portin, 2000; Condrón & Roscigno, 2003; Krajewski, 2005). These challenges,

particularly low student motivation, could serve as a possible explanation for lower academic achievement in high-poverty and high-minority schools.

In summary, the quality of the secondary schools students attend affects educational outcomes. Although student learning extends beyond school walls, research has demonstrated the relationship between structural characteristics (Lee & Bryk, 1989; Cotton, 1996; Gamoran, 1996; Lee & Smith, 1997), school resources (Hedges, Laine, and Greenwald, 1994; Kruger, 1999, 2003), and school composition (Lee & Croninger, 1999; McDonough, 2005; Palardy, 2008) and academic achievement. However, educational opportunities are rarely equitable: there are systematic differences in students' educational experiences based, in part, on the types of schools they attend.

Research Question Three: What are the main and interaction effects of academic press for achievement, social support, and collective efficacy on college entrance exams and high school grade point average?

In addition to investigating the relationship between school organizations and college preparedness, another aim of this study was to understand the role of academic press for achievement, social support structures, and collective efficacy in relation to educational outcomes. Main effects and interaction effects were used to assess these associations. As Ma, Ma, and Bradley (2008) note, interactions between school context and climate (organizational) variables are rarely explored. Conceivably, press, support, and efficacy have different effects when modeled individually. Therefore, it was important to understand the interplay of these organizational characteristics with contextual characteristics, particularly minority and poverty concentration.

Academic press for achievement. Academic press refers to the normative environment of schools. Empirical evidence suggests a strong relationship between rigor and educational outcomes (Sammons, Hillman, & Mortimore, 1995; Lee & Smith, 1999; Adelman, 2006). When controlling for student-level variables, this study found no statistical relationship between mean press and the outcome measures. This discrepancy in findings may be attributed to measure of academic press in the present study. For example, Lee and Smith's (1999) measure for academic press was derived from student and teacher perceptions of standards and academic performance in schools. This study utilized school administrator responses in the Education Longitudinal Study of 2002 (ELS:2002) dataset to construct the measure for academic press. Also using the ELS:2002 questionnaire, Schaefer and Meece (2009) drew a similar conclusion about the unexpected predictability of press on high school students' academic achievement.

While the interaction terms for press showed positive effects, only one result was statistically significant. Two student-level variances showed decomposition by press interactions that were statistically significant. When press interacted with minority concentration over 50%, students who had ever been retained had an estimated 0.18 lower GPA than students who had never been retained. Additionally, when press interacted with poverty, student who aspired to earn at least a bachelor's degree had an estimated 0.07 lower GPA than students who did not aspire to earn a bachelor's degree.

Social support structures. Social support relates to the relationships between students and teachers. The support in schools is characterized by affective connections (Klem & Connell, 2004) and communal school organizations (Bryk and Driscoll, 1988). When controlling for student-level variables, the main effects of mean support showed a positive and statistically significant impact on the outcome measures. The interactions between minority concentration

and poverty concentration were not significant. The main effect of support was associated with higher mean SAT score of 48.21 and mean GPA of 0.23, which is consistent with one would expect. Contrary to expectations, Black and Asian students GPA were lower when support interacted with minority concentration over 50%. The correlation between social support and academic press could be one of the possible explanations for lower GPAs among these student groups. In their study on the affect of school organization and structure on dropping out of school, Lee and Burkam (2003) noted that “students with strong social support who attended schools with low academic press learned almost nothing, whereas students who reported considerable support from these sources learned quite a lot if they also attended schools where they were pushed academically” (p. 363).

Collective efficacy. Collective efficacy encompasses teachers’ shared beliefs and norms that drive their instructional practices. Several recent studies link collective efficacy to educational outcomes (Bandura, 2000; Lee, 2000; Sweetland & Hoy, 2000). The Education Longitudinal Study of 2002: ELS 2002/04 included responses from both math and English teachers, so this study considered the collective efficacy of both groups. When controlling for student-level variables, the main effects of both mean math and English collective efficacy showed negative and weak associations with the outcome measures. One explanation for this contrast from previous findings would be differences in the measures used for collective efficacy. In their work on high school achievement, Hoy, Sweetland, and Smith (2002) used twelve items to construct the measure, with a reliability of 0.98. The composite measure in this study utilized three items from teacher surveys, with reliabilities of 0.74 (English) and 0.75 (math). Between SAT and GPA, only one result was statistically significant. More specifically, mean English efficacy was related to a 13.36 reduction in SAT score.

There were many inconsistencies between the collective efficacy interactions, and the results of the interactions were not significant. Findings indicate that when considering the interaction between collective efficacy and minority concentration over 50% (English), students who had been retained had an estimated 0.03 lower GPA than student who had never been retained. Additionally, the results of the interaction between collective efficacy and poverty concentration over 50% showed that multiracial students had an estimated 0.04 lower GPA than White students (math), students who had ever taken a remedial course had an estimated 0.09 higher GPA than students who had taken no remedial courses (math), students who had ever been retained had an estimated 0.03 lower GPA than student who had never been retained (English), multiracial students had an estimated 16.34 lower SAT score than White students (English), Hispanic students had an estimated 41.91 lower SAT score than White students (English), and Black students had an estimated 19.72 higher SAT score than White students (English).

Conclusion

The current national agenda is to reclaim America's position in a globally-competitive market. Many assert that public education has failed to adequately prepare students for college. Although this country has seen its share of legislation intended to ensure equal access to educational opportunities for all students, there remain significant disparities in the quality of education students receive. These differences, in most instances, stem from the types of schools students attend. For several decades school effects literature has attempted to document the aspects of schools and schooling that either abate or enhance students' educational outcomes. This research contributes to those efforts by: (1) documenting the variances in educational outcomes that occur within schools and between schools, (2) examining the relationship between

high school context and outcomes, and (3) focusing on three key aspects of high school organizational characteristics to demonstrate their main and interaction effects on outcomes. Based on the findings presented in this study, one conclusion can be drawn: students' preparedness for college is shaped by the schools they attend, and the differences that exist within and between schools either attenuate or exacerbate achievement gaps.

It is clear that differences in educational opportunity exist. It is important that we continue to address the challenges associated with providing the necessary structures for secondary schools to successfully educate students. Although school context plays a major role in students' educational experiences, there is little that can be done about where schools are located or the types of students that attend certain schools. However, this research supports the belief that there is more we can do to address the internal organizational characteristics of schools.

The literature suggests that academic press is a salient predictor of educational outcomes. This study found quite the opposite, which may be a function of how the measure was constructed in this study. Additionally, Hoy, Sweetland, and Smith (2002) contend that press is most effective when mediated by collective efficacy. Assuming this to be true, one could argue that because the main effects of collective efficacy were shown to have negative and weak effects on SAT and GPA, the measure of academic press in the present study was less "potent" (p. 89). Overall, social support structures were shown to have the most significant association with students' preparedness for college, in terms of college entrance exams and high school grade point average. That is to say, when 2004 high school seniors felt connected to the adults in the school and encouraged to perform well, then schools demonstrated positive effects on outcomes. Other researchers have also found that the social capital gained through positive

relationships with teachers is associated with lower dropout rates (Croninger and Lee, 2001). This finding does not diminish the role of press in schools; however, it recognizes the existence of other organizational characteristics that should continue to be explored more fully.

Implications for Policy and Practice

This study focused on examining the organizational characteristics of high schools to better understand educational outcomes. Findings from these analyses led to several important implications for policy and practice. Though a primary focus of this research was on the academic press for achievement, social support structures, and collective efficacy in schools, the following implications speak to improving American education in general.

While improving America's competitiveness among other industrialized countries is a national concern, pressing students to achieve academically should not be viewed as the sole policy lever. From the publication of *A Nation at Risk* to passage of the current *No Child Left Behind Act* (2001), federal policy making that targets improved educational outcomes have centered on increasing academic rigor and standards. Although academic rigor is important to the educational process, too often the decision to implement higher standards and accountability are done so without consideration of the negative unintended consequences on student populations. As the evidence from this research suggests, there are other factors that should be considered. For instance, what are the consequences when high-stakes tests (i.e. high school exit exams) are imposed on students already at risk of academic failure? How are students in already low-performing schools expected to succeed when the appropriate conditions for their success are not in place? What happens to the already pronounced racial and socioeconomic achievement gaps when certain students are more or less advantaged than others?

Consideration of these questions requires a shift in the way we approach policymaking in this country. Far too often we overlook the most obvious barriers to successful execution of our education policies. This is not to suggest that we should not encourage and expect all students to achieve at high rates. It is, however, a cautionary warning that we will continue to experience the same types of results if we fail to institute the appropriate support structures for students and schools to be successful. Numerous externally developed support programs like Advancement Via Individual Determination (AVID) and Project GRAD were designed to strengthen students' educational performance and preparedness in college. Although these programs are designed to expose students to more challenging coursework, they provide support structures to foster success. Policymakers should look to existing, successful support programs and borrow from those models.

A second policy implication refers to the disparities that are directly related to school context. In particular, high-minority and high-poverty schools are often fraught with challenges that are constraining. Many of these schools are also classified as high-needs schools. As opposed to continuously developing one-size-fits-all approaches to remedy educational problems, perhaps policymakers should sharpen their focus on specific issues that plague certain types of schools. With that said, it is important to acknowledge the existence of programs such as Title I and aspects of the Elementary and Secondary Education Act (ESEA) that include provisions for schools with high concentrations of economically disadvantaged students. However, there remains room for improvement. Various state incentives have been established to attract qualified teachers and administrators to high-needs schools, but the results have been disappointing. As opposed to investing already waning resources into bonuses, why not focus on the root cause of the problem. I propose that a more promising investment would be improving

the educational conditions that exist in these schools. It appears as though the school turnaround component of the current administration's Race to the Top initiative will come close to addressing these root causes, but this remains to be seen.

Establishing a clear set of college preparedness and readiness indicators is paramount. From the K-12 perspective, preparedness is generally demonstrated by high school graduation. The assumption has been that if students graduate from high school, then they are adequately prepared for postsecondary opportunities. However, high proportions of college freshman are required to enroll in remedial courses. Enrollment in remedial courses is, according to the argument, a clear indication that the alignment between high school and postsecondary is fractured. That is to say, while students have met the minimum requirements of a high school education, they are academically unprepared to engage in college-level work. From the higher education perspective, indicators such as college entrance exams and high school grade point average are used by postsecondary institutions to determine whether students are prepared to meet institutional expectations. As indicated by these measures of preparedness, there is indeed a disconnect between secondary schools and institutions of higher education. Therefore, the P-16 pipeline must continue to be addressed and strengthened to provide students with seamless transitions from one educational level to the next.

The final implication is for practice. Given the current state of accountability, practitioners are faced with expectations unlike in the past. Each year schools are required to make adequate yearly progress or face stringent sanctions. In many ways, this has resulted in a different way that practitioners approach the educational process. Instead of focusing on ensuring that all students learn, we are now more concerned with whether students can demonstrate competency on assessments. The expectations are high, and those expectations are

transferred to the students. As findings in this study suggest, social support is important to educational outcomes. If teachers and administrators were to direct their attention toward creating school environments that promote positive relationships, shared values and norms, high expectations, and persistent motivation, then it is conceivable that more students would be inclined to stay in school, graduate from high school, and pursue postsecondary education.

Of paramount concern are students who attend schools where high graduation rates are uncommon (i.e. lower than 50%). Balfanz and Legters (2004) refer to these schools as “dropout factories.” According to Balfanz and Legters, these schools are characterized by weak promoting power, wherein the proportion of high school freshman is typically higher than high school seniors. This trend must not continue to persist. The future is upon us, and we must begin to make the necessary changes in our educational system that will yield the most favorable results for all students. As we move toward developing educational policies and practices to improve college preparedness, we must be mindful of the role school context and organizations play in translating those goals into reality. Otherwise, some students will continue to progress and make meaningful contributions to our society, while other less fortunate students continue to be left behind.

REFERENCES

- Achieve, Inc. (2005). *Out of many, one: Toward rigorous common core standards from the ground up*. Washington, DC: Author
- Adelman, C. (1999). *Answers in the Tool Box: Academic Intensity, Attendance Patterns, and Bachelor's Degree Attainment*. Washington, DC: U.S. Department of Education.
- Adelman, C. (2006). *The tool box revisited: Paths to degree completion from high school through college*. Washington, DC: U.S. Department of Education.
- Address to the Joint Session of Congress*. (2009, February). Podcast retrieved from http://www.whitehouse.gov/the_press_office/Remarks-of-President-Barack-Obama-Address-to-Joint-Session-of-Congress/
- Alliance for Excellent Education. (2006). *Paying double: Inadequate high schools and community college remediation* (Issue Brief August 2006). Washington, DC: Author.
- Allison, P. D. (2002). *Missing data*. Thousand Oaks, CA: Sage.
- Atkinson, R. C., & Geiser, S. (2009). Reflections on a century of college admissions tests. *Educational Researcher*, 38(9), 665-676, 665.
- Avery, C., & Hoxby, C. M. (2004). Do and should financial aid packages affect students' college choices? In C. M. Hoxby (Ed.), *College choices: The economics of where to go, when to go, and how to pay for it*. Chicago, IL: University of Chicago Press.
- Bakke v. Regents of the University of California*, 483 U.S. 265 (1978).

- Balfanz, R., & Legters, N. (2004). *Locating the dropout crisis: How to target and transform high schools which produce the nation's dropouts*. Baltimore, MD: Center for Research on the Education of Students Placed At Risk.
- Bandalos, D. (1996). Confirmatory factor analysis. In J. Stevens (Ed.), *Applied multivariate statistics for the social sciences* (pp.389-420). Mahwah, NJ: Lawrence Erlbaum.
- Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*, 117-148.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman and Company.
- Bandura, A. (2000). Exercise of human agency through collective efficacy. *Current Directions in Psychological Science, 9*, 75-78
- Baum, S., & Payea, K. (2004). *Education pays 2004*. New York, NY: The College Board.
- Benbow, C. (1980). *Review of instructionally effective schools*. New York, NY: Clearinghouse on Urban Education, Columbia University Teachers College.
- Bickel, W. E. (1983, April). Effective schools: Knowledge, dissemination, inquiry. *Educational Researcher, 12*(4), 3-5.
- Bidwell, C., & Kasarda, J.D. (1980). Conceptualizing and measuring the effects of school an schooling. *American Journal of Education, 88*(4), 401-429.
- Boy, D., Grossman, P., Lankford, H., Loeb, S., & Wyckoff, J. (2009). *Who leaves? Teacher attrition and student achievement*. CALDER Working Paper No. 23. Washington, DC: The Urban Institute.

- Bryan, J. A., Day-Vines, N. L., Holcomb-McCoy, C., & Moore-Thomas, C. (2010, June). Using national education longitudinal data sets in school counseling research. *Counselor Education and Supervision, 49*(4), 266-279.
- Briggs, D. C. (2001). The effect of admissions test preparation: Evidence from NELS:88. *Chance, 14*(1), 10-18.
- Bryk, A. S., & Driscoll, M. E. (1988). *The high school as community: Contextual influences and consequences for students and teachers*. Madison: Wisconsin Center for Education Research, National Center on Effective Secondary Schools.
- Bryk, A.S., & Raudenbush, S. W. (1992). *Hierarchical linear models: Applications and data analysis methods*. Newbury Park, CA: Sage.
- Bryk, A. S., Lee, V. E., & Holland, P. B. (1993). *Catholic schools and the common good*. Cambridge: Harvard University Press.
- Burkam, D. T., & Lee, V. E. (2003). *Mathematics, foreign language, and science coursetaking and the NELS:88 transcripts data (NCES 2003-01)*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Cahalan, M. W., Ingels, S. J., burns, L. J., Planty, M., & Daniel, B. (2006). *United States high school sophomores: A twenty-two year comparison, 1980-2002 (NCES 2006-327)*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Camara, W. J., & Echternacht, G. (2002). *The SAT I and high school grades: Utility in predicting success in college*. New York, NY: The College Board.

- Chait, R., & Venezia, A. (2009). *Improving academic preparation for college: What we know and how state and federal policy can help*. Washington, DC: Center for American Progress.
- Clotfelter, C. T., Ladd, H. F., Vigdor, J. L., & Diaz, R. A. (2004). Do schools accountability systems make it more difficult for low-performing schools to attract and retain high-quality teachers? *Journal of Policy Analysis and Management*, 23(2), 251-271.
- Clotfelter, C. T., Ladd, H. F., Vigdor, J. L., & Wheeler, J. (2007, June). High poverty schools and the distribution of teachers and principals. *North Carolina Law Review*, 85(5), 1345-1380.
- Coleman, J. S., Campbell, E., Hobson, C., McPartland, J., Mood, A., Weinfeld, F., & York, R. (1966). *Equality of educational opportunity*. Washington, DC: Government Printing Office.
- Condron, D. J., & Roscigno, V. J. (2003). Unequal spending and achievement in an urban school district. *Sociology of Education*, 76(1), 18-36.
- Costello, A. B., & Osborne, J. W. (2005, July). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation*, 10(7). Retrieved from <http://pareonline.net/pdf/v10n7.pdf>
- Cotton, K. (1996, December). *Affective and social benefits of small-scale schooling*. (Clearinghouse on Rural Education & Small Schools: EDORC965). Retrieved from ERIC database.
- Croninger, R. G. & Douglas, K. M. (2005). Missing data and institutional research. In P. D. Umbach, (Ed.), *Survey research: Emerging issues. New directions for institutional research* (pp. 33-49). San Francisco, CA: Jossey-Bass.

- Croninger, R. G., & Lee, V. E. (2001). Social capital and dropping out of high schools: Benefits to at-risk students of teachers' support and guidance. *Teacher College Record*, 103(4), 548-581.
- Cuban, L. (1983). Effective Schools: A friendly but cautionary note. *Phi Delta Kappan*, 64(10), 695-696.
- Cuban, L. (1992). Curriculum stability and change. In P. W. Jackson, (Ed.), *Handbook of research on curriculum* (pp. 216-247). New York, NY: Macmillan.
- Cybulski, T., Hoy, W. K., & Sweetland, S. R. (2005). *The roles of collective efficacy and fiscal efficiency in school achievement*. *The Journal of Educational Administration*, 43, 439-461.
- Dalton, B., Glennie, E., & Ingels, S. J. (2009). *Late high school dropouts: Characteristics, experiences, and change across cohorts (NCES 2009-307)*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Darling-Hammond, L. (1999, December). *Teacher quality and student achievement: A review of state policy evidence*. Seattle: University of Washington Center for the Study of Teaching and Policy.
- Davis, L., Ajzen, I., Saunders, J., & Williams, T. (2002). The decision of African American students to complete high school: An application of the theory of planned behavior. *Journal of Educational Psychology*, 94(4), 810-819.
- De La Rosa, M. L., & Tierney, W. (2006). *Breaking through the barriers to college: Empowering low-income communities, schools, and families for college opportunity and student financial aid*. Los Angeles, CA: Center for Higher Education Policy Analysis, University of Southern California.

- Deil-Amen, R., & Turley, R. L. (2007). A review of transition to college literature in sociology. *Teachers College Record*, 109(2), 2324-2366.
- Diamond, J. B., Randolph, A., & Spillane, J. P. (2004). Teachers' expectations and sense of responsibility for student learning: The importance of race, class, and organizational habitus. *Anthropology and Education Quarterly*, 35(1), 75-98.
- Dougherty, C., Mellor, L., & Jian, S. (2006). *The relationship between advanced placement and college graduation: 2005 AP Study Series, Report 1*. Austin, TX: National Center for Educational Accountability.
- Dorans, N. (2008, August). *The practice of comparing scores on different tests: Appropriate comparisons require careful data collection, analysis, and interpretation*. Retrieved from http://www.ets.org/Media/Research/pdf/RD_Connections6.pdf
- Dounay, J. (2008). *Improving outcomes for traditionally underserved students through early college high schools: Policy Brief Early/Middle College High School*. Washington, DC: Education Commission of the States.
- Duncan, K. C., & Sandy, J. (2007). Explaining the performance gap between public and private school students. *Eastern Economic Journal*, 33(2), 177-191.
- Edmonds, R. (1979). Effective schools for the urban poor. *Educational Leadership*, 37, 15-24.
- Firestone, W. A., & Rosenblum, S. (1988). Building commitment in urban schools. *Educational Evaluation and Policy Analysis*, 10, 285-299.
- Frankenberg, E., Lee, C., & Orfield, G. (2003). *A multiracial society with segregated schools: Are we losing the dream?* Cambridge, MA: Harvard Civil Rights Project.
- Gamoran, A. (1987). The stratification of high school learning opportunities. *Sociology of Education*, 60(3), 135-155.

- Gamoran, A. (1996). Student achievement in public magnet, public comprehensive, and private city high schools. *Educational Evaluation and Policy Analysis, 18*(1), 1-18.
- Geiser, S., & Santelices, M. V. (2007). *Validity of high school grades in predicting student success beyond the freshman year: High school record vs. standardized tests as indicators of four-year college outcomes*. Berkeley, CA: Center for Studies in Higher Education Research, University of California.
- Goldrick-Rab, S., Carter, D. F., & Wagner, R. W. (2006). What higher education has to say about the transition to college. *Teachers College Record, 109*(10), 2444-2481.
- Goddard, R. D., Hoy, W. K., & Hoy, A. (2000). Collective efficacy: Its meaning, measure, and impact on student achievement. *American Educational Research Journal, 37*, 479-508.
- Goodard, R. D., & Y. L. Goodard. (2001, October). A multilevel analysis of the relationship between teacher and collective efficacy in urban schools. *Teaching and Teacher Education, 17*(7), 807-818.
- Goddard, R. D., Hoy, W. K., & Hoy, A. (2004). Collective efficacy beliefs: Theoretical developments, empirical evidence, and future directions. *Educational Researcher, 33*(3), 3-13.
- Goodard, R. D., LoGerfo, L., & Hoy, W. K. (2004). High school accountability: The role of perceived collective efficacy. *Educational Policy, 18*(3), 403-425.
- Goodman, J. (2008). *Skills, schools and credit constraints: Evidence from Massachusetts*. Discussion Paper No. 0809-03. New York, NY: Department of Economics Discussion Papers Series, Columbia University.

- Graham, J. W., & Donaldson, S. I. (1993, February). Evaluating interventions with differential attrition: The importance of nonresponse mechanisms and use of follow-up data. *Journal of Applied Psychology, 78*(1), 119-128.
- Graham, J. W., & Hofer, S. M. (2000). Multiple imputation in multivariate research. In T. D. Little, K. U. Schnabel, & J. Baumert, (Eds.), *Modeling longitudinal and multiple-group data: Practical issues, applied approaches, and specific examples* (pp. 201-218). Hillsdale, NJ: Erlbaum.
- Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *American Review of Psychology, 60*, 549-576.
- Greene, J. P., & Forster, G. (2003, September). *Public high school graduation and college readiness rates in the United States*. Education Working Paper Number 3. New York, NY: Manhattan Institute for Policy Research.
- Gruenert, S. (2005). Correlations of collaborative school culture with student achievement. *NASSP Bulletin, 89*(645), 43-55.
- Grynberg, N. (2006, December 1). C.U. Aims to Attract Diverse Student Body. *The Cornell Daily Sun*. Retrieved from <http://cornellsun.com/node/20364>
- Hahs-Vaughn, D. L. (2005). A primer for using and understanding weights with national datasets. *The Journal of Experimental Education, 73*(3), 221-248.
- Hanson, K., & Litten, L. (1982). Mapping the Road to Academe: A review of research on women, men, and the college selection process. In P. Perun (Ed.), *The undergraduate woman: Issues in educational equity* (pp. 73-98). Lexington, MA: DC Heath and Company.

- Hanushek, E. A. (1986, September). The economics of schooling: Production and efficiency in public schools. *Journal of Economic Literature*, 24(3), 1141-1177.
- Hanushek, E. A. (1989). The impact of differential expenditures on school performance. *Educational Researcher*, 18(4), 45-51, 62.
- Hayton, P., & Spillane, J. P. (2005). *Professional community or communities*, Working Paper. Evanston, IL: Northwestern University Institute for Policy Research.
- Hedges, L. V., Laine, R. D., & Greenwald, R. (1994, April). Does money matter? A meta-analysis of the effects of differential school inputs on student outcomes. *Educational Researcher*, 23(3), 5-14.
- Hofman, D. A. (1997). An overview of the logic and rationale of hierarchical linear models. *Journal of Management*, 23(6), 723-744.
- Hossler, D., & Gallagher, K. (1987). Studying College Choice: The three-phase model and implications for policymakers. *College and University*, 2, 207-221.
- Howley, C., Howley, A., & Shamblen, S. (2001). Riding the school bus: A study of the rural versus suburban experience in five states. *Journal of Research in Rural Education*, 17(1), 41-61.
- Hox, J. J. (2002). *Multilevel analysis: Techniques and application*. Mahwah, NJ: Erlbaum.
- Hoy, W. K., & Miskel, C. G. (1996). *Educational administration: Theory, research, and practice*. New York, NY: McGraw-Hill.
- Hoy, W. K., Smith, P. A., & Sweetland, S. R. (2002). The development of the organizational climate index for high schools: Its measure and relationship to faculty trust. *The High School Journal*, 86(2), 38-49.

- Hoyt, W. K., Sweetland, R., & Smith, P. A. (2002). Toward an organizational model of achievement in high schools: The significance of collective efficacy. *Educational Administration Quarterly*, 38(1), 77-93.
- Hoyt, J. E., & Sorensen, C. T. (2001). High school preparation, placement testing, and college remediation. *Journal of Development Education*, 25(2), 26-34.
- Huang, F. L., & Moon, T. R. (2009). Is experience the best teacher? A multilevel analysis of teacher characteristics and student achievement in low performing schools. *Educational Assessment, Evaluation and Accountability*, 21(3), 209-234.
- Ingels, S. J., Pratt, D. J., Rogers, J. E., Siegel, P. H., & Stutts, E. S. (2005). *Education longitudinal study of 2002: Base-year to first-year follow-up data file documentation (NCES 2006-344)*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Ingels, S. J., Pratt, D. J., Wilson, D., Burns, L. J., Currivan, D., Rogers, J. E., & Hubbard-Bednasz, S. (2007). *Education longitudinal study of 2002 (ELS:2002): Base-year to second follow-up data file documentation (NCES 2008-347)*. Washington, DC: U.S. Department of Education, National Center for Education Statistics, B-3.
- Ingersoll, R. M. (2002). The teacher shortage: A case of wrong diagnosis and wrong prescription. *NASSP Bulletin*, 86(631), 16-31.
- Ishitani, T. T. (2006). Studying attrition and degree completion behavior among first-generation college students in the United States. *The Journal of Higher Education*, 77(5), 861-885.
- Jefferson, A. L. (2005). Student performance: Is more money the answer? *Journal of Education Finance*, 31(2), 111-124.

- Johnson, S. M., & Birkeland, S. E. (2003). Pursuing a “sense of success”: New teachers explain their career decisions. *American Educational Research Journal*, 40(3), 581-617.
- Kim, J. O., & Mueller, C. W. (1978). *Introduction to factor analysis: What it is and how to do it*. Newbury Park, CA: Sage.
- Kohn, A. (2002, November 8). The dangerous myth of grade inflation. *The Chronicle of Higher Education*, 49(11), B.7.
- Konstantopoulos, S. (2006). Trends of school effects on student achievement: Evidence from NLS:72, HSB:82, and NELS:92. *Teachers College Record*, 108(12), 2550-2581.
- Koretz, D. M., Madaus, G. F., Haertel, E., & Beaton, A. E. (1992). *National educational standards and testing: A response to the recommendations of the National Council on Education Standards and Testing*. Santa Monica, CA: RAND, Institute on Education and Training.
- Krajewski, B. (2005). In their own words. *Educational Leadership*, 62(6), 14-18.
- Kreft, I. G. G. (1995, April). *The effects of centering in multilevel analysis: Is the public school the loser or winner?* Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.
- Krueger, A. (1999, May). Experimental estimates of education production functions. *The Quarterly Journal of Economics*, 114(2), 497-532.
- Krueger, A. B., & Whitmore, D. M. (2001, January). The effect of attending a small class in the early grades on college-test taking and middle school test results: Evidence from Project STAR. *The Economic Journal*, 111(468), 1-28.
- Krueger, A. (2003, February). Economic considerations and class size. *The Economic Journal*, 113(485), F34-F63.

- Kruse, S., Louis, K., & Bryk, A. (1994). *Building professional community in schools*. Wisconsin: Center on Organization and Restructuring Schools.
- Kreysa, P. G. (2007). The impact of remediation on persistence of under-prepared college students. *Journal of College Students Retention: Research, Theory & Practice*, 8(2), 251-270.
- Kuh, G. D., Kinzie, J., Buckley, J. A., Bridges, B. K., & Hayek, J. C. (2006). *What matters to student success: A review of the literature*. Washington, DC: National Postsecondary Education Cooperative.
- Ladson-Billings, G. (2006). From the achievement gap to the education debt: Understanding achievement in U.S. schools. *Educational Researcher*, 35(7), 3-12.
- Lavin, D. E., & Hyllegard, D. (1996). Perspectives on open-access higher education. In *Changing the odds: Open admission and the life chances of the disadvantaged*. Retrieved from http://books.google.com.proxy-remote.galib.uga.edu/books?hl=en&lr=&id=_GZ9SS7HZcwC&oi=fnd&pg=PA1&dq=open+admission,+college&ots=sXAOMLiRcM&sig=u___SvkzxBXMMY8DvkSPKqJot10#v=onepage&q=open%20admission%2C%20college&f=false
- Lee, C., & Kim, E. (2010). Academic readiness for college: The role of school administrators. *AASA Journal of Scholarship & Practice*, 6(4), 14-28.
- Lee, V. E., & Bryk, A. S. (1989). A multilevel model of the social distribution of high school achievement. *Sociology of Education*, 62(3), 172-192.
- Lee, V.E., Dedrick, R.F., & Smith, J.B. (1991). The effect of the social organization of schools on teachers' efficacy and satisfaction. *Sociology of Education*, 66, 164-187.

- Lee, V. E., & Burkam, D. T. (1992). Transferring high school: An alternative to dropping out? *American Journal of Education*, 100(4), 420-453.
- Lee, V. E., & Smith, J. B. (1994). *High school restructuring and student achievement. A new study finds strong links*, Issue Report No. 7. Madison, WI: Office of Educational Research and Improvement.
- Lee, V. E., & Smith, J. B. (1995). Effects of high school restructuring and size on early gains in achievement and engagement. *Sociology of Education*, 68(4), 241-270.
- Lee, V.E., & Smith, J.B. (1996). Collective responsibility for learning and its effects on gains in achievement for early secondary school students. *American Journal of Education*, 104(2), 103-147.
- Lee, V.E., Smith, J.B., & Croninger, R.G. (1997). How high school organization influences the equitable distribution of learning in mathematics and science. *Sociology of Education*, 70(2), 128-150.
- Lee, V. E., & Croninger, R. G. (1999). *Elements of social capital in the context of six schools*. Washington, DC: Office of Educational Research and Improvement.
- Lee, V. E., & Smith, J. B. (1999). Social support and achievement for young adolescents in Chicago: The role of school academic press. *American Educational Research Journal*, 36(4), 907-945.
- Lee, V.E., Smith, J.B., Perry, T.E., & Smylie, M.A. (1999). *Social support, academic press, and student achievement: A view from the middle grades in Chicago*. Chicago, IL: Chicago Annenberg Challenge.
- Lee, V. E. (2000). Using hierarchical linear modeling to study social contexts: The case of school effects. *Educational Psychologist*, 35(2), 125-141.

- Lee, V. E., & Loeb, S. (2000). School size in Chicago elementary schools: Effects on teachers' attitudes and students' achievement. *American Educational Research Journal*, 37(1), 3-31.
- Lee, V. E., & Burkam, D. T. (2003). Dropping out of high school: The role of school organization and structure. *American Educational Research Journal*, 40(2), 353-393.
- Legault, L., Green-Demers, I., & Pelletier, L. (2006). Why do high school students lack motivation in the classroom? Toward an understanding of academic amotivation and the role of social support. *Journal of Educational Psychology*, 98(3), 567-582.
- Lumina Foundation for Education. (2009). *A stronger nation through higher education: How and why Americans must meet a "big goal" for college attainment*. Indianapolis, IN: Author.
- Ma, X., & McIntyre, L. J. (2005). Exploring differential effects of mathematics courses on mathematics achievement. *Canadian Journal of Education*, 28(4) 827-852.
- Ma, X., Ma, L., & Bradley, K. D. (2008). Using multilevel modeling to investigate school effects. In A. A. O'Connell & D. B. McCoach (Eds.), *Multilevel modeling of educational data* (pp. 59-110). Charlotte, NC: Information Age.
- Mace-Matluck, B. (1987). *The effective schools movement: Its history and context*. An SEDL Monograph. Austin, TX: Southwest Educational Development Laboratory.
- McClafferty, K. A., McDonough, P. M., & Nuñez, A. (2002, April). *What is a college culture? Facilitating college preparation through organizational change*. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.
- McDill, E. L., Natriello, G., & Pallas, A. M. (1986). A Population at Risk: Potential Consequences of Tougher School Standards for Student Dropouts. In G. Natriello (Ed.),

- School dropouts: Patterns and policies* (pp.106-147). New York, NY: Teachers College Press.
- McDonough, P. M. (2005). Counseling and college counseling in America's high schools. In D. A. Hawkins & J. Lautz (Eds.), *State of college admission* (pp. 107–121). Washington, DC: National Association for College Admission Counseling.
- Murphy, J. F., Weft, M., Hallinger, P., & Mitman, A. (1982). Academic press: Translating high expectations into school policies and classroom practices. *Educational Leadership*, 40, 22-26.
- Myers, D., Olsen, R., Seftor, N., Young, J., & Tuttle, C. (2004). *The impacts of regular upward bound: Results from the third-follow up data collection*. Washington, DC: Mathematica Policy Research, Inc.
- National Education Summit on High Schools. (2005). *An Action for Improving America's High Schools*. Washington, DC: Author.
- National Science Foundation. (2010). *Science and engineering indicators: 2010*. Retrieved from <http://www.nsf.gov/statistics/seind10/start.htm>
- Natriello, G., & Dornbusch, S. M. (1984). *Teacher Evaluative Standards and Student Effort*. New York, NY: Longman, Inc.
- Newmann, F. M. (1994). *School-wide professional community*. Madison, WI: Center on Organization and Restructuring of Schools.
- Oakes, J. (1985). *Keeping track: How schools structure inequality*. New Haven, CT: Yale University Press.

- Oakes, J. (2005). Oakes, J., Wells, A., Jones, M., & Datnow, A. (1997). Detracking: the social construction of ability, cultural politics, and resistance to reform. *Teachers College Record*, 98, 482-510
- O'Connell, A. A., & McCoach, D. B. (2008). *Multilevel modeling of educational data*, (Eds.). Charlotte, NC: Information Age.
- Osborne, J. W. (2000). Advantages of hierarchical linear modeling. *Practical Assessment, Research & Evaluation*, 10(7). Retrieved from <http://pareonline.net/getvn.asp?v=7&n=1>
- Osher, D., & Fleischman, S. (2005). Positive culture in urban schools. *Educational Leadership*, 62(6), 84-85.
- Palardy, G. J. (2008). Differential school effects among low, middle, and high social class composition schools: A multiple group, multilevel latent growth curve analysis. *School Effectiveness and School Improvement*, 19(1), 21-49.
- Perna, L. W. (2000, April). *Racial/ethnic group differences in the realization of educational plans*. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.
- Perna, L. W. (2006). Studying college access and choice: A proposed conceptual model. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research*, Vol. XXI (pp. 99-157). The Netherlands: Springer.
- Perna, L. W., Rowan-Kenyon, H. T., Thomas, S. L., Bell, A. Anderson, R., & Li, C. (2008). The role of college counseling in shaping college opportunity: Variations across high schools. *The Review of Higher Education*, 31(2), 131-159.
- Peske, H. G., & Haycock, K. (2006). *Teaching Inequality: How Poor and Minority Students are Shortchanged on Teacher Quality*. Washington, DC: Education Trust.

- Phillips, M. (1997). What makes schools effective? A comparison of the relationships of communitarian climate and academic climate to mathematics achievement and attendance during middle school. *American Educational Research Journal*, 34(4), 633-662.
- Pike, G. R., & Saupe, J. L. (2002). Does high school matter? An analysis of three methods of predicting first-year grades. *Research in Higher Education*, 43(2), 187-207.
- Pituch, K. A. (1999). Describing school effects with residual terms: Modeling the interaction between school practice and student background. *Evaluation Research*, 23(2), 190-211.
- Plank, S., & Jordan, W. J. (2001). Effects of information, guidance, and actions on postsecondary destinations: A study of talent loss. *American Educational Research Journal*, 38(4), 947-979.
- Planty, M., Provasnik, S., Hussar, W., Snyder, T., Kena, G., Hampden-Thompson, G., . . . Choy, S. (2007). *The condition of education: 2007*. Washington, DC: National Center for Education Statistics (NCES 2007064).
- Portin, B. (2000). The changing urban principalship. *Education and Urban Society*, 32(4), 492-505.
- Prasad, B., & Lewis, L. (2003). *Remedial education at degree-granting postsecondary institutions in fall 2000*. Retrieved from <http://nces.ed.gov/pubs2004/2004010.pdf>
- Pritchard, R.J., Morrow, D., & Marshall, J.C. (2005). School and district culture as reflected in students voice and student achievement. *School Effectiveness and School Improvement*, 16(2), 153-177.
- Raudenbush, S.W., & Bryk, A.S. (1986). *A hierarchical model for studying school effects*. *Sociology of Education*, 59(1), 1.

- Raudenbush, S.W., & Bryk, A.S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.
- Raudenbush, S. W., & Willms, J. D. (1995). *The estimation of school effects*. *Journal of Educational and Behavioral Statistics*, 20(4), 307-335.
- Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005, March). Teachers, schools, and academic achievement. *Econometrica*, 73(2), 417-458.
- Roderick, M., Nagaoka, J., & Allensworth, E. (2006). *From high school to the future: A first look at Chicago public school graduates' college enrollment, college preparation, and graduation from four year colleges*. Chicago, IL: Consortium on Chicago School Research, University of Chicago.
- Rogers, J., Oakes, J., Valladares, S., & Terriquez, V. (2006). *California educational opportunity report: Roadblocks to college*. Los Angeles, CA: UCLA/IDEA and UC/ACCORD.
- Rosenbaum, J. (2001). *Beyond college for all: Career paths for the forgotten half*. New York, NY: Russell Sage Foundation.
- Rumberger, R. W., & Thomas, S. L. (2000). The distribution of dropout and turnover rates among urban and suburban high schools. *Sociology of Education*, 73(1), 39-67.
- Rumberger, R.W., & Palardy, G.J. (2005). Does desegregation still matter? The impact of school composition on academic achievement in high school. *Teachers College Record*, 107(9), 1999-2045.
- Rumberger, R.W., & Palardy, G.J. (2004). Multilevel models for school effectiveness research. In D. Kaplan (Ed.), *Handbook of quantitative methodology for the social sciences* (pp. 235–258). Thousand Oaks, CA: Sage.

- Sammons, P., Hillman, J. & Mortimore, P. (1995). *Key characteristics of effective schools*. London: Institute of Education/OFSTED.
- Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, 75(3), 417-453.
- Savitz-Romer, M., Jager-Hyman, J. & Coles, A. (2009). *Removing roadblocks to rigor: Linking academic and social supports to ensure college readiness and success*. Washington, DC: Pathways to College Network, Institute for Higher Education Policy.
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, 7(2), 147-177.
- Schaefer, V. A., & Meece, J. L. (2009, April). *Facing an uncertain future: Aspirations and achievement of rural youth*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, LA.
- Schreiber, J. B., & Griffin, B. W. (2004). Review of multilevel modeling and multilevel studies in The Journal of Educational Review (1992-2002). *The Journal of Educational Review*, 98(1), 24-33.
- Shouse, R. C. (1996). Academic press and sense of community: Conflict, congruence, and implications for student achievement. *Social Psychology of Education*, 1, 47-68.
- Smith, P. A. (2002). The organizational health of high schools and student proficiency in mathematics. *International Journal of Educational Management*. 16(2), 98-104.
- Snijders, T. A. B., & Bosker, R. (1999). *Multilevel analysis: An introduction to basic and advanced multilevel modeling*. London: Sage.

- Snipes, J. C., Holton, G. I., Doolittle, F., & Szejnberg, L. (2006). *Striving for student success: The effect of Project GRAD on high school student outcomes in three urban school districts*. New York, NY: MDRC.
- St. John, E. P. (1991). What really influences minority attendance? Sequential analyses of the high school and beyond sophomore cohort. *Research in Higher Education*, 32(2) 141-158.
- Stapleton, L. M., & Thomas, S. L. (2008). The use of national datasets for teaching and research: Sources and Issues. In A. A. O'Connell & D. B. McCoach (Eds.), *Multilevel modeling of educational data* (pp. 11-57). Charlotte, NC: Information Age.
- Strayhorn, T. L. (2009). Accessing and analyzing national databases. In T. J. Kowalski & T. J. Lasley, II (Ed.), *Handbook of data-based decision making in education* (pp. 105-122). New York: Routledge.
- Strong American Schools. (2008). *Diploma to nowhere*. Washington, DC: Author.
- Sum, A. (1999). Literacy in the labor force: Results from the National Adult Literacy Survey. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Sweetland, S. R., & Hoy, W. K. (2000). School characteristics and educational outcomes: Toward an organizational model of student achievement in middle schools. *Educational Administration Quarterly*, 26, 703-729.
- Syverson, S. (2007). The role of standardized tests in college admissions: Test-optional admissions. *New Directions for Student Services*, 18, 55-70.
- The College Board. (2004). *2004 college-bound seniors: A profile of SAT test-takers*. New York, NY: Author.

- Thomas, S. L., & Heck, R. H. (2001). Analysis of large-scale secondary data in higher education research: Potential perils associated with complex sampling designs. *Research in Higher Education, 42*(5).
- Thomas, S. L., Heck, R. H., & Bauer, K. W. (2005). Weighting and adjusting for design effects in secondary data analyses. *New Directions for Institutional Research, 127*, 61.
- Tierney, M. L. (1980). The impact of financial aid on student demand for public/private higher education. *Journal of Higher Education, 51*(5), 527–545.
- Tierney, W. G., Colyar, J. E., & Corwin, Z. B. (2003). *Preparing for college: building expectations, changing realities*. Los Angeles: Center for Higher Education Policy Analysis.
- Trusty, J., & Niles, S. G. (2003). High school math courses and completion of the bachelor's degree. *Professional School Counseling, 7*(2), 99-107.
- U.S. Department of Education. (2005). *The secretary's fourth annual report on teacher quality: A highly qualified teacher in every classroom*. Washington, DC: Office of Postsecondary Education.
- U.S. Department of Education. (2002). *The condition of education 2002*. Washington, DC: National Center for Education Statistics.
- U.S. Department of Education. (2004). *The condition of education 2004*. Washington, DC: National Center for Education Statistics.
- U.S. Department of Education. (2009). *The condition of education 2009*. Washington, DC: National Center for Education Statistics.
- U.S. Department of Education. (2010). *The condition of education 2010*. Washington, DC: National Center for Education Statistics.

- Walker, E. N. (2007, November). Why aren't more minorities taking advanced math?
Educational Leadership, 65(3), 48-53.
- Ward, Nadia. (2006). Improving equity and access for low-income and minority youth into institutions of higher learning. *Urban Education*, 41(1), 50-70.
- Warren, J. R., & Edwards, M. R. (2005). High school exit exams and high school completion: Evidence from the early 1990s. *Educational Evaluation and Policy Analysis*, 27(1), 53-74.
- Watt, K., Powell, C., & Mendiola, I. (2004). Implications of one comprehensive school reform model for secondary school students underrepresented in higher education. *Journal of Education for Students Placed At Risk*, 9(3), 241-259.
- Wayman, J. (2003). *Multiple imputation for missing data: What is it and how can I use it?*
Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.
- Wirt, J., Choy, S., Rooney, P., Provasnik, S., & Sen, A. (2004). *The condition of education: 2004*. Washington, DC: National Center for Educational Statistics (NCES 2004077).

APPENDIX A

Operational Definitions of Variables		
Recoding Label	ELS Variable/Question	Operationalization
Dependent Variables		
SAT/ACT Score (SAT_CRSWLK)	TXEESATC: NCES variable reported as a higher entrance exam (SAT or ACT) composite score that is standardized in terms of the SAT, using the SAT concordance.	Continuous
Grade Point Average (HSGPA)	F1RAGP: NCES variable reported GPA for all academic courses taken excluding 8th grade, based on a four-point scale (A = 4.0; F = 0.0). Academic subjects include mathematics, science, English, social studies, fine arts, and non-English.	Continuous
Student-Level Variables		
<i>Student Background</i>		
Gender (MALE)	BYSEX: “What is your sex?”	Recoded. Dichotomous (0,1). Female is the reference group.
Race/Ethnicity (HISPAN) (BLACK) (ASIAN) (MULTI)	BYRACE_R: NCES variable constructed from base-year student questionnaire. (1) = Amer. Indian/Alaska Native, non-Hispanic (2) = Asian, Hawaii/Pac. Islander, non-Hispanic (3) = Black or African American, non-Hispanic (4) = Hispanic, no race specified (5) = Hispanic, race specified (6) = Native Hawaii/Pac. Islander, non-Hispanic (7) = More than one race, non-Hispanic	Recoded. Series of four dichotomous (0,1) variables. White is the reference group.

	(8) = White, non-Hispanic	
Socioeconomic Status (STUSES)	BYSES2: NCES constructed composite measure of father's occupation, mother's occupation, father's education, mother's education, and family income.	Standardized composite
Retention (STURET)	BYP46: "Was your tenth grader ever held back a grade in school?" (0) = No (1) = Yes	Dichotomous
Remediation (STUREM)	BYS33D, BYS33E: "Have you ever been in any of the following kinds of courses or programs in high school?" D. Remedial English E. Remedial math (0) = No (1) = Yes	Recoded. Dichotomous: Remedial coursework in one or both subjects = 1; otherwise = 0).
<i>Student Aspirations & Academic Preparation</i>		
Educational Aspirations (STUEXP)	BYSTEXP: "As things stand now, how far in school do you think you will get?" (1) = Less than high school graduation (2) = High school graduation or GED only (3) = Attend or complete 2-year college/school (4) = Attend college, 4-year degree incomplete (5) = Graduate from college (6) = Obtain Master's degree or equivalent (7) = Obtain PhD, MD, or other advanced degree	Recoded. Dichotomous: Aspired to earn at least a bachelor's degree = 1; otherwise = 0).
Academic Program (STUPROG)	BYS26: "If you had to limit yourself to one of the following three choices, which comes nearest to describing your high school	Recoded. Dichotomous: College preparatory program = 1; otherwise = 0).

program?”
 (1) = General
 (2) = College Preparatory
 (academic)
 (3) = Vocational (including technical
 or business)

School-Level Variables

School Context

Minority Concentration (SCHMIN)	CP02PMIN: Percent of schools’ minority students as indicated by Common Core of Data 2001-2002 and Private School Survey 2001-2002.	Recorded. Dichotomous: Low minority is the reference group. High Poverty: $\geq 50\%$ Low Poverty: $\leq 49\%$
Poverty Concentration (SCHPOV)	CP02FLUN: Percent of schools’ students that qualify for free/reduced lunch as indicated by Common Core of Data 2001-2002 and Private School Survey 2001-2002.	Recorded. Dichotomous: Low poverty is the reference group. High Poverty: $\geq 50\%$ Low Poverty: $\leq 49\%$
Size (SCHSML) (SCHLRG) (SCHVLRG)	CP02STEN: Schools’ total student enrollment as indicated by Common Core of Data 2001-2002 and Private School Survey 2001-2002.	Recorded. Series of dummy coded (0,1) variables. Medium is the reference group. Small: 0-600 Medium: 601-1,500 Large: 1,501-2,500 Very Large: 2,501+
Sector (CATH) (PRIV)	BYSCTRL: Public, Catholic, or Other Private School as indicated in the source data for sampling: the Common Core of Data (CCD) 1999-2000 and the Private School Survey (PSS) 1999-2000. (1) = Public (2) = Catholic (3) = Other private	Recorded: Dummy coded (0,1) variables. Public schools are the reference group.
Location	BYURBAN: Urbanicity of school	Recorded: Dummy coded

(URB) (RUR)	locale as indicated in the source data for sampling: the Common Core of Data (CCD) 1999-2000 and the Private School Survey (PSS) 1999-2000. (1) = Urban (2) = Suburban (3) = Rural	(0,1) variables. Suburban is the reference group.
Student-Teacher Ratio (SCHSTR)	CP02STRO: Schools' student-teacher ratio as indicated by Common Core of Data 2001-2002 and Private School Survey 2001-2002.	Continuous
Certified F/T Teachers (PERFCERT)	BYA24A: "What percentage of full-time and part-time teachers in your school are certified? (If you share a teacher with another school, please count that teacher as part-time.)" A. Full-time	Continuous
Highly Qualified Teachers (SCHHQT)	BYTE26C, BYTM26C: "Counting this year, how many years have you taught at the elementary and secondary level? Please also note the number of years in total." A. Elementary Total (K-6) B. Secondary (7-12) C. Total (K-12) BYTE29, BYTM29: "In the state in which your school is located, what type of teaching certification do you hold in the field you teach the students named on the student list?" (1) = Regular or standard certification (standard certification offered in your state) (2) = Probationary certification (the initial certification issued after satisfying all requirements except the completion of the probationary period) (3) = Temporary, provisional, or	Recoded. Dichotomous: Created new variables. If HQE =3 or HQM = 3, then SCHHQT =1; otherwise = 0.

emergency certification (require additional coursework before regular certification can be obtained)

(4) = I am not certified in this field, but am currently in a program to obtain state certification in this field

(5) = I am not certified in this field and I am not currently in a program to obtain state certification in this field

BYTE31A, BYTE31A: “What were your major and minor (or 2nd major) fields of study for your bachelor's degree?”

(1) = Education

(2) = English

(3) = Mathematics

(4) = History/social studies/social science

(5) = Natural/physical sciences

(6) = Foreign languages

(7) = Physical education

(8) = Vocational education

(9) = Business

(10)=Other

School Organization

Academic Press
(SCHPRS)

BYA51A-BYA51E: “Indicate how much each of the characteristics listed below describes your school's climate.”

A. Student morale is high

B. Teachers at this school press students to achieve academically

C. Teacher morale is high

D. Students place a high priority on learning

E. Students are expected to do homework

(1) Not at all

(2) Between not at all and somewhat accurate

(3) Somewhat accurate

(4) Between somewhat and very

Standardized composite measure based on exploratory factor analysis.

	accurate (5) Very accurate	
Social Support (SCHSUP)	<p>BYS20A, BYS20E, BYS20F, BYS20G, BYS20H: “How much do you agree or disagree with each of the following statements about your current school and teachers?”</p> <p>A. Students get along well with teachers E. The teaching is good F. Teachers are interested in students G. When I work hard on schoolwork, my teachers praise my effort H. In class I often feel "put down" by my teachers</p> <p>(1) Strongly agree (2) Agree (3) Disagree (4) Strongly disagree</p>	<p>Recoded. Reverse coded BYS20A, BYS20E, BYS20F, BYS20G.</p> <p>Standardized composite measure based on exploratory factor analysis.</p>
Collective Efficacy English (SCHEFFE)	<p>BYTE44D-BYTE44F: “When students are successful in achieving intended goals or objectives, it is often attributed to one of the following sources. In your opinion, how important is each source of success?”</p> <p>D. Teacher's attention to the unique interests and abilities of the student E. Teacher's use of effective methods of teaching F. Teacher's enthusiasm or perseverance</p> <p>(1) Extremely important (2) Very important (3) Not very important (4) Not at all important</p>	<p>Recoded. Reverse coded BYTE44D, BYTE44E, BYTE44F</p> <p>Standardized composite measure based on exploratory factor analysis.</p>
Collective Efficacy Math (SCHEFFM)	<p>BYTM44D-BYTM44F: “When students are successful in achieving intended goals or objectives, it is often attributed to one of the</p>	<p>Recoded. Reverse coded BYTM44D, BYTE44M, BYTM44F</p>

following sources. In your opinion, how important is each source of success?"

D. Teacher's attention to the unique interests and abilities of the student

E. Teacher's use of effective methods of teaching

F. Teacher's enthusiasm or perseverance

(1) Extremely important

(2) Very important

(3) Not very important

(4) Not at all important

Standardized composite measure based on exploratory factor analysis.

Source: Education Longitudinal Study of 2002 (ELS: 2002/04) Data Files and Electronic Codebook System.

APPENDIX B

Descriptive Statistics of Analytic Sample Transformations

Variable	No. of Obs.	Min.	Max.	Mean	Standard Deviation
Dependent Variables					
SAT Score	10848	1.00	3.00	1.85	0.60
Grade Point Average	12470	0.00	7.00	5.09	1.44
Student Background					
Male	6593	0.00	1.00	0.49	0.50
Hispanic	1838	0.00	1.00	0.19	0.39
Black	1697	0.00	1.00	0.17	0.38
Asian	1305	0.00	1.00	0.14	0.35
Multiracial	603	0.00	1.00	0.07	0.26
Socioeconomic Status	13358	-2.11	1.98	0.08	0.75
Retention	10858	0.00	1.00	0.08	0.28
Remediation	10857	0.00	1.00	0.10	0.30
Student Aspirations & Academic Preparation					
Educational Aspirations	10858	0.00	1.00	0.77	0.42
Academic Program	10858	0.00	1.00	0.54	0.50
School Context					
Minority Concentration	2921	0.00	1.00	0.27	0.44
Poverty Concentration	791	0.00	1.00	0.07	0.26
Very Large School	6625	0.00	1.00	0.14	0.34
Large School	9075	0.00	1.00	0.37	0.48
Small School	9110	0.00	1.00	0.37	0.48
Other Private	1240	0.00	1.00	0.41	0.49
Catholic	1812	0.00	1.00	0.59	0.49
Rural	2481	0.00	1.00	0.36	0.48
Urban	4389	0.00	1.00	0.40	0.49
Student-Teacher Ratio	12969	4.39	40.00	16.48	4.21
Certified F/T Teachers	12859	0.00	100.00	91.88	18.49
High Quality Teachers	10856	0.00	1.00	0.57	0.50

Source: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002).

Note: Tabulations by the Author. All values are weighted with the normalized F1PNLWT panel weight.

APPENDIX C

Correlations of the Measured Variables for Academic Press for Achievement

	1	2	3	4	5
1. Student morale is high	1.000				
2. Teachers at this school press students to achieve academically	.588	1.000			
3. Teacher morale is high	.586	.561	1.000		
4. Students place a high priority on learning	.546	.649	.511	1.000	
5. Students are expected to do homework	.434	.589	.377	.570	1.00

Correlations of the Measured Variables for Social Support Structures

	1	2	3	4	5
1. Students get along well with teachers	1.000				
2. The teaching is good	.369	1.000			
3. Teachers are interested in students	.366	.538	1.000		
4. When I work hard on schoolwork, my teachers praise my effort	.249	.364	.454	1.000	
5. In class I often feel "put down" by my teachers	.208	.288	.314	.258	1.00

Correlations of the Measured Variables for Math Collective Efficacy

	1	2	3
1. Teacher's attention to the unique interests and abilities of the student	1.000		
2. Teacher's use of effective methods of teaching	.520	1.000	
3. Teacher's enthusiasm or perseverance	.447	.538	1.000

Correlations of the Measured Variables for English Collective Efficacy

	1	2	3
1. Teacher's attention to the unique interests and abilities of the student	1.000		
2. Teacher's use of effective methods of teaching	.550	1.000	
3. Teacher's enthusiasm or perseverance	.451	.559	1.000