The Dissertation Committee for Jean Evelyn Brooks Certifies that this is the approved version of the following dissertation:

School Characteristics Associated with the Educational Resilience of Low-Income and Ethnic Minority Youth

Committee:

Cynthia G. Franklin, Supervisor

Calvin L. Streeter, Co-Supervisor

Roberta R. Greene

Frank C. Richardson

David W. Springer

School Characteristics Associated with the Educational Resilience of Low-Income and Ethnic Minority Youth

by

Jean Evelyn Brooks, B.A., M.S.W.

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Dedication

This dissertation is dedicated to my husband, Jim, for his support and understanding throughout the process, as well as to our three children. It is also dedicated to children and youth throughout the world and those who contribute in whatever way to their positive development.

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School Characteristics Associated with the Educational Resilience of Low-Income and Ethnic Minority Youth

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Supervisor: Cynthia G. Franklin

Co-Supervisor: Calvin L. Streeter

This study empirically tested Benard's (1991, 2004) theory of resilience and youth development by examining the influence of caring relationships, high expectations and opportunities for participation and contribution within the schools on the mathematics achievement and timely graduation of public high school students. Additional analyses focused on subsamples of students who were at risk of academic failure and school dropout—students from the lowest socioeconomic quartile, African American and Hispanic students, and a generic at-risk sample that includes students from these three groups plus students who had nontraditional families, had a disability, or were retained a grade in school. The study used data from the Educational Longitudinal Study: 2002, which was designed to monitor young people as they transition from tenth grade to postsecondary education and/or employment. Hierarchical Linear Models and Hierarchical Generalized Linear Models were used for the analyses.

Experiences within the schools that conveyed caring relationships, high expectations, and opportunities for participation and contribution were associated with higher senior year mathematics achievement scores and increased odds of timely graduation for the overall public school sample and for the at-risk groups. Suggestions are made for increasing caring relationships, high expectations, and opportunities for participation and contribution within the schools. The limitations of this study and directions for further research are also discussed.

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Chapter 1: Problem Statement

Closing the achievement gap in public education has been a major focus of the No Child Left Behind Act (NCLB) of 2001 (U.S. Department of Education, n.d.). Many children and youth in the United States are being left behind educationally—performing at less than satisfactory levels of academic achievement and often leaving school before earning a high school diploma. The consequences are costly for the individuals, their families and communities, and for society as a whole. Employment opportunities and potential earnings are clearly linked to educational level. School failure and dropout are associated with a number of social problems and associated costs to society (Richman, Bowen, & Woolley, 2004). Research that documents the factors that contribute to school success, particularly for those most at risk for school failure and dropout, can be used to develop interventions that can contribute to closing the achievement gap.

In 2006-2007, the most recent year for which such data is available, only about 73.9 percent of the 2003-2004 freshman class had graduated on time with a high school diploma, as reported by the U. S. Department of Education (Aud et al., 2010). The status dropout rate (the proportion of 16- to 24-year-olds who had not completed high school or earned an equivalent credential but were no longer enrolled in school) was 8 percent in 2008 (Aud et al., 2010).

Actual dropout rates may be even higher than official reports. Swanson and Chaplin (2003) developed a Cumulative Promotion Index (CPI) to calculate the probability of on time high school completion based on the promotion rates (9 to 10, 10

to 11, 11 to 12) and actual high school completion (12 to graduation) during a focal school year. For the most recently compiled graduation rates based on this measure, the class of 2007, the graduation rate was 68.8 percent, reflecting two consecutive years of decline (Swanson, 2010).

The economic consequences of school failure and dropout are considerable in terms of higher rates of unemployment, poverty, and welfare dependency (Christenson & Thurlow, 2004; Richman, Bowen, & Woolley, 2004). Youth who drop out of school without obtaining further education are also subject to disadvantages associated with limited earning potential. High school dropouts who work full-time all year earn approximately 78 percent of the wages and salaries earned by workers with high school diplomas or GEDs and even less (51 percent) when compared with those with a baccalaureate degree (Aud et al., 2010). The loss of income for these individuals and their families is magnified at a larger level through loss of national income and potential tax revenues through that income (Richman, Bowen, & Woolley, 2004). Other social problems associated with school dropout and failure include delinquency and crime (Christenson & Thurlow, 2004; Drennon-Gala, 1995; Richman, Bowen, & Woolley, 2004), early sexual involvement and pregnancy, higher mortality rates, higher health care costs, increased admissions for mental health services, increased use of social services, and decreased political participation (Richman, Bowen, & Woolley, 2004).

Dropout rates and school failure disproportionately affect low-income and ethnic minority youth (Aud et al., 2010; Biddle & Berliner, 2003; Maruyama, 2003; Richman, Bowen, & Woolley, 2004; Swanson, 2010). Aud et al. (2010) report that only 68 percent

of students in high-poverty schools graduated in 2007-2008 while as many as 91 percent of students attending low-poverty schools graduated. While there was no measurable difference in graduation rates from the low-poverty schools from 1999-2000 to 2007-2008, there was an 18 percent drop in graduation rates in high-poverty schools during that time frame. Similarly, Swanson (2010) reports that in school districts serving large numbers of minority and/or low income youth, only about 55 to 60 percent graduate. Although more than two-thirds of White and Asian students graduate from high school, only about 54 percent of African American students and 56 percent of Hispanic students graduate. Male students from these groups had even lower graduation rates which fell below 50 percent (Swanson, 2010). Status dropout rates in 2008 were highest for Hispanic youth born outside the United States (35 percent) and lowest for Whites (6 percent). Hispanic youth born inside the United States had a status dropout rate of 11 percent as did African American youth (Aud et al., 2010).

Balfanz and Legters (2004) developed a measure called promoting power to indirectly estimate the number of high school graduates at the school level. This measure compares the number of freshman at a high school to the number of seniors four years later. The socioeconomic and racial disparities they found in their earlier report have continued since then (Everyone Graduates Center, n.d.). Based on a three-year average for the classes of 2005, 2006, and 2007, schools with low promoting power (schools in which fewer than 60 percent of high school students made it to the senior year on time) were disproportionately schools that served low income and ethnic minority students. Among those schools with low promoting power, 80.6 percent were schools in which 40

percent or more of the students were eligible for free or reduced price lunches and 71.2 percent were schools in which 50 percent or more of the students were racial or ethnic minorities.

Inequalities begin even before children enter school. Using data from 16,000 kindergarten-age children from the U.S. Department of Education's Early Childhood Longitudinal Study, Lee and Burkham (2002) found considerable cognitive differences in test scores at kindergarten entrance based on race/ethnicity and socioeconomic status, with socioeconomic status accounting for the largest variation. Differences in in-home activities accounted for some of the differences in achievement. The study also used measures of the school social context, school resources, and school environments to evaluate the quality of the schools that participated in the study. Consistently, they found that ethnic minority and low-income children were most likely to attend the lowest quality schools, increasing their disadvantages in the educational system.

These disadvantages continue into middle and high school. Using data from the California Healthy Kids Survey for 2004-2006, Austin, Hanson, Bono, and Cheng (2007) found that students in schools serving larger proportions of Hispanic students or a combination of African American and Hispanic students had lower scores on standardized tests. They also had lower scores on measures including supportive relationships with adults at school, experiencing opportunities for meaningful participation at school, feeling safe at school, and feeling connected to the school and higher rates of harassment and victimization. The data gathered in 2006-2008 produced similar results (Austin, Nakamoto, & Bailey, 2010).

Thus, not only are youth disadvantaged by their ethnic minority or income status; they are also disadvantaged by the public schools they are most likely to attend (Biddle & Berliner, 2003; National Research Council and the Institute of Medicine, 2004). Their educational risks may be a consequence of the school environment to which they are exposed and the inaccessibility of higher quality schools (Waxman, Gray, & Padron, 2003). Segregation by ethnicity in schools is particularly problematic because it appears to be systematically linked to segregation by class. Aud et al. (2010) used the percentage of students eligible for free or reduced price lunch to distinguish between high-poverty schools (in which 76-100 percent of enrolled students were eligible for free or reduced lunch) and low-poverty schools (in which fewer than 26 percent of students were eligible) in the 2007-2008 academic year. In high-poverty elementary schools, 14 percent of students were White, 34 percent were African American and 46 percent were Hispanic; in contrast, 75 percent of the students in low-poverty elementary schools were White, 6 percent were African American, and 11 percent were Hispanic. At the secondary level, 11 percent of students in high-poverty schools were White, 38 percent were African American, and 44 percent were Hispanic. In the low-poverty secondary schools, 76 percent were White, 7 percent were African American, and 10 percent were Hispanic (Aud et al., 2010).

Despite the intent of No Child Left Behind, significant differences remain between high-poverty and low-poverty schools in academic assessments and graduation rates. On each National Assessment of Educational Progress (NAEP) administered between 1998 and 2009, average reading and mathematics scores for fourth and eighth

grade students from high-poverty schools have been lower than those from students from low-poverty schools. Some progress has been made in lowering the achievement gap—average scores for students from high-poverty schools in fourth grade reading and both mathematics tests have risen more points in comparison to low-poverty schools. However, the achievement gap has widened in regard to eighth grade reading scores with no measurable differences in average achievement for students in the high-poverty schools. Significant differences are found in eighth grade assessments of music and visual arts in 2008, with students from high-poverty schools scoring on average 40 points lower than students from low-poverty schools (Aud et al., 2010).

Furthermore, there are vast differences in school funding levels between wealthy and impoverished communities, ranging from $15,000 or more per student in the most affluent communities to less than $4,000 in some of the nation's poorest communities. These funding disparities are reflected in disparities in regard to other educational resources such as teacher qualifications (Aud et al., 2010; Hanushek, Kain & Rivkin, 2001; Haycock, 1998; Sunderman & Kim 2005; The Education Trust, 2008a), school buildings, curricula (Alexander, 2002; Wimberly, 2002), class sizes, even measures of academic press (a construct which is associated with better academic achievement; Phillips, 1997) as well as other resources—all of which further handicap low-income and ethnic minority children and youth and contribute to gaps in achievement and graduation rates based on socioeconomic status and ethnicity (Biddle & Berliner, 2003; National Research Council, 2004; Orfield & Lee, 2005; Prince, 2002). The inequitable distribution of resources between high-poverty and low-poverty schools is recognized in

the current proposed reauthorization of the Elementary and Secondary Education Act which would expect "states and districts to track equitable access to effective teachers and principals, and where needed, take steps to improve access to effective educators for students in high-poverty, high-minority schools" (U.S. Department of Education, 2010, p. 5).

The consequences of disparities in educational resources go beyond gaps in achievement test scores. Indeed, one of the criticisms of NCLB is that while standards based on achievement scores are emphasized, up until recently there has been minimal emphasis on graduation rates (Balfanz and Letgers, 2004; Orfield, Losen, Wald, & Swanson, 2004). Of particular concern has been the possibility that NCLB's initial accountability requirements for student achievement would create an incentive to "push out" low-scoring students to improve school-level academic achievement. This would be particularly damaging to those students most likely to be at a disadvantage in academic achievement—ethnic minorities, low-income students, students with disabilities, and English language learners—contrary to the manifest intent of the law to eliminate the achievement gaps (Orfield et al., 2004).

In Orfield et al.'s (2004) study, 39 states had "soft" graduation rate floors, which enabled them to meet Adequate Yearly Progress with only slight improvement. For the class of 2007, according to the Education Trust (2008b), only 14 states had graduation goals that required more than minimum progress. Up until the 2009-2010 school year, states have been only required to set graduation rates in the aggregate, rather than to disaggregate those rates by ethnic/racial or socioeconomic subgroups (Hoff, 2008). Thus,

schools could have been considered to be performing well based on academic achievement even if only half of their ethnic minority freshmen graduate. Soon after the initial implementation of NCLB, only nine states disaggregated graduation rates for initial determinations of Adequate Yearly Progress as they did with measures of academic achievement (Orfield et al., 2004).

It was not until late 2008 that the Department of Education issued new regulations that focused on more stringent requirements in regard to graduation rates. These new regulations mandate a uniform method of measuring graduation rates based on the percent of students who graduate within four years of enrollment in high school. Furthermore, schools will be required to disaggregate graduation rates by race and ethnicity, socioeconomic subgroups, students with disabilities, and English language learners. The regulations require that this new method be implemented by the 2011-2012 school year as part of the requirements for Adequate Yearly Progress (Hoff, 2008).

In 2010, as part of the blueprint for the proposed reauthorization of the Elementary and Secondary Education Act, the goal is pushed even further—that all students graduate or are on track to graduate by 2020 ready for college or a career. Accountability measures at the high school level would include not only graduation rates, but also college enrollment rates and the rates of students enrolling in college without need for remedial courses. These measures would also be disaggregated by race and ethnicity, socioeconomic subgroups, students with disabilities, English language learners, and gender (U. S. Department of Education, 2010).

It is not always clear whether improvements in schools aimed at improving academic achievement as measured by scores on standardized examinations are compatible with other measures of student success such as graduation rates. Allensworth (2004), for example, studied the effects of the implementation of an eighth-grade promotion gate in Chicago on school dropout rates. Although conclusions from her study are limited due to the other changes occurring in the Chicago Public Schools at the time of the study as well as the lack of a control group, Allensworth found that achievement test scores increased significantly after implementation of the promotion gate policy. The higher achievement resulted in lower dropout rates among those students who were promoted to ninth grade but higher dropout rates for the ten percent of students who scored lower on the eighth-grade test and were retained. Overall, the improved achievement balanced out the increased dropout rates among the retained students, since dropout rates in the Chicago Public Schools remained the same the first two years and declined slightly the next two years. However, the improvements in achievement were uneven across racial groups, increasing racial disparities relative to school dropout rates. Only students who were not African American experienced decreased dropout rates.

Concern about the achievement gap and its impact for ethnic minority and economically disadvantaged children and youth has inspired a variety of efforts to improve education for low-income and ethnic minority children (Borman, Hewes, Overman, & Brown, 2002; Comer, Haynes, Joyner, & Ben-Avie, 1996; Dryfoos, 1994; Edmonds, 1979; Solomon, Battistich, Watson, Schaps, & Lewis, 2000). Central to these efforts is the idea that improvement in the educational environment (the schools) can

offset disadvantages that children might face in their homes and communities, thereby contributing to the educational success of at-risk students. Support for this possibility is suggested by research identifying high-poverty, high performing schools. Standard & Poor's School Evaluation Services (2005), for example, identified 397 schools in 25 urban school districts in which students achieved reading and mathematics scores above the state average even though 75 percent or more of the students from these schools were economically disadvantaged. While the existence of such schools leads some to assume "that separate schools can be made equal," existing inequalities among schools—particularly those that are segregated by both class and ethnicity—make this assumption questionable (Orfield & Lee, 2005, p. 4).

Given the risks faced by ethnic minority and low income youth, the literature on resilience suggests that risks can be mitigated by certain assets, both within the individual and within the environment that surrounds the individual. Benard (2004) identifies four individual-level strengths of resilient children—social competence, problem-solving skills, autonomy, and a sense of purpose and future. She views these strengths not as the cause of resilience but as outcomes of healthy youth development. She identifies three key protective factors within the environment that contribute to healthy youth development and enhance resiliency in children—a caring and supportive environment, high positive expectations along with the support needed to meet those expectations, and ongoing opportunities for meaningful involvement and responsibility that enable children to have some control over their lives. Benard (2003) associates the same three environmental factors with "turnaround teachers and schools" that can contribute to

closing the achievement gap. It is her position that teachers and schools can foster resilience among youth classified as at-risk by providing higher levels of these three protective factors.

This study was based on Benard's work, particularly on the three environmental protective factors—caring relationships, high expectations, and opportunities for participation and contribution. The first two research questions addressed in this study are as follows:

1. Do caring relationships, high expectations, and opportunities for participation and contribution within the schools influence the mathematics achievement of public high school students?
2. Do caring relationships, high expectations, and opportunities for participation and contribution within the schools influence the timely graduation of public high school students?

The second two research questions considered the factors that place a student at risk of poor outcomes in mathematics achievement and timely graduation. These factors include socioeconomic status, race/ethnicity (African American or Hispanic), having a first language other than English, having a nontraditional family (other than both biological parents), having been retained a grade or more in school, and having a disability.

3. Does the risk factor predict lower mathematics achievement of public high school students?

4. Does the risk factor predict lower odds of graduating on time of public high school students?

The final two research questions focused on students who were at risk of lower mathematics scores or not graduating on time. For these students, the research questions were as follows:

5. Do caring relationships, high expectations, and opportunities for participation and contribution within the schools influence the mathematics achievement of public high school students who are at risk of poor academic achievement?
6. Do caring relationships, high expectations, and opportunities for participation and contribution within the schools influence the odds of timely graduation of public high school students who are at risk of high school dropout?

This study investigated the impact of these three key protective factors within the schools to determine their influence on mathematics achievement and timely graduation among public high school students in general. Then, it identified students who were at risk of lower mathematics achievement or not graduating on time. Finally, it investigated whether these three environmental protective factors promoted educational resilience in the form of mathematics achievement and timely graduation among at-risk students. It was anticipated that results from this study would help determine whether school-level interventions to build caring relationships, high expectations, and opportunities for participation and contribution would enhance academic outcomes.

Chapter 2: Literature Review

Educational Resilience

When at-risk students achieve academic outcomes that are better than expected, they are said to be educationally resilient. Wang, Haertel, and Walberg (1995) define educational resilience as "the heightened likelihood of success in school and in other aspects of life, despite environmental adversities, brought about by early traits, conditions, and experiences" (p. 5). Their construct of educational resilience is based on theories of resilience developed from prevention research and the field of developmental psychopathology, research on the characteristics of resilient children and the characteristics of the environments with which they interact, and research on schools that work effectively with students who are at risk of school failure and school dropout. An understanding of these areas is critical in identifying promising interventions to increase the academic success of students at greatest risk. Indeed, the concept of educational resilience is built on the premise that it "can be fostered through interventions that enhance children's learning, develop their talents and competencies, and protect or buffer them against environmental adversities" (Wang, Haertel, & Walberg, 1997, p. 1). Such interventions would lead to the development of healthy and productive classroom and school environments and extend appropriate supports within the home and community contexts (Wang, Haertel, & Walberg, 1998).

Early Contributions to the Study of Resilience

The construct of resilience emerged from research on a variety of populations—children classified as at-risk, children living in violent communities, and adult survivors of various traumas. Werner and Smith (1992) were pioneers in resilience research through their longitudinal study of 505 individuals who were born in 1955 in Hawaii. One-third of the individuals they studied were classified as at-risk due to such factors as perinatal stress, poverty, poorly educated parents, and/or troubled family environments. Although many of the at-risk children experienced a variety of problems as they grew up, Werner and Smith noticed that one-third of the children classified as high-risk were capable and caring young adults at age 18. Focusing on the group who were classified as high-risk when young children, they examined the differences between those who had obtained positive outcomes and those who had encountered problems. The group was then studied at age 30. One finding that was especially noteworthy at this point was that even among those high-risk youth who had problems during adolescence, most had achieved some level of recovery from those problems by the age of 30.

According to Werner and Smith (1992),

> *Resilience* and *protective factors* are the positive counterparts to both *vulnerability*, which denotes an individual's susceptibility to a disorder, and *risk factors*, which are biological or psychosocial hazards that increase the likelihood of a negative developmental outcome in a group of people. (p. 3)

They viewed resilience as a characteristic of individuals that varies over "a range from relative resiliency to vulnerability in the face of adverse environmental conditions, a

range that changed at different points of the life cycle" (p. 202). Some high-risk children appeared to be relatively resilient throughout the life cycle despite adverse circumstances. Others went through some difficult times and then became more resilient. Some children, not initially classified as high-risk, became more vulnerable in response to stressful life circumstances.

Garbarino, Dubrow, Kostelny, and Pardo (1992) took a different approach in their research focusing on children living in violent communities—children in war-torn countries (Mozambique, Cambodia, Israel and Palestine) and in the inner-city of Chicago with violence related to gang warfare. Resilient children, according to Garbarino et al., are those who

> develop a high degree of competence in spite of stressful environments and experiences. . . . When confronted with stress, they attempt to master the stress rather than retreating from or defending against it. . . . Resilient children are able to manipulate and shape their environment, to deal with its pressures successfully, and to comply with its demands. . . . Finally, resilient children have the capacity to make sense of the stressful and traumatic events confronting them. (pp. 101-103)

Although they recognized the value of resilience, they recognized that resilience has its limits and stressed the importance of reducing community violence. In their opinion, communities should be striving to "prevent the accumulation of risk *and* to enhance the social and psychological resources that underlie coping and resilience" (p. 225).

The study of adult survivors has also contributed to the concept of resilience. Lifton (1993) developed the concept of the protean self which

> turns out to be surprisingly resilient. It makes use of bits and pieces here and there and somehow keeps going. . . . We find ourselves evolving a self of many possibilities, one that has risks and pitfalls but at the same time holds out considerable promise for the human future. (pp. 1-2)

Wolin and Wolin (1994) focused on adult survivors of troubled families. They defined resilience as the "capacity to bounce back, to withstand hardship and repair yourself" (p. 5). Based on their work with adult survivors of alcoholic parents, they viewed damages as challenges from which resiliencies may allow the child to rebound. From their perspective,

> as a result of the interplay between damage and challenge, the survivor is left with pathologies that do not disappear completely and with resiliencies that limit their damage and promote their growth and well-being. (p. 16)

Definitions of Resilience

Evolving as it has from studies of diverse populations, the construct of resilience has multiple definitions. Masten (1994) identified three major categories of resilience. The first category refers to people classified as high-risk who "overcome the odds" to obtain outcomes that were better than expected. The children in Werner and Smith's study (1992) fall into this category. The second category of resilience refers to people who are able to adapt well under stressful experiences. The third category refers to

differences among individuals in their recovery from traumatic experiences. In regard to this third category, Masten points out that

> By definition, traumatic experiences are expected to reduce the quality of functioning. No one is *invulnerable*, despite use of the term in years past. When stressors are extreme or life-threatening, resilience refers to patterns of recovery. (p. 8)

Although Masten (1994) identifies three categories of resilience, she defines it as "successful adaptation despite risk and adversity" (p. 3).

Zimmerman and Arunkumar (1994) also describe three models of resiliency—the compensatory model, the challenge model, and the protective factor model. In the compensatory model, some variable neutralizes the risk by exerting an independent influence on the outcome of interest. In the challenge model, exposure to moderate stress serves as a challenge to strengthen competence to cope with additional stressful situations. In the protective factor model, there is an interaction between risk and protective factors in which the protective factor moderates exposure to the risk factor. In this model, the effects of the protective factor are stronger in the presence of risk.

Kaplan (1999) recognizes the variability in the definitions of resilience. Some definitions view resilience as the achievement of positive outcomes under adverse circumstances. Other definitions distinguish resilience from outcomes and consider resilience to be the cause of the positive outcomes. He notes that other variability in definitions may be accounted for by variations among outcomes, in the characteristics of resilience that produce positive outcomes, and in nature of the risk factors.

Rutter (2001) defines resilience simply as “the phenomenon of overcoming stress or adversity. . . it means that someone's life outcome has been relatively good, despite his or her experience with situations shown to carry a major risk for developing psychopathology” (p. 13). Richman and Fraser (2001) find three elements common to Rutter's definition of resilience as well as other definitions. In the definitions, "resilience requires exposure to significant risk, overcoming risk or adversity, and success that is beyond predicted expectations" (p. 6).

It thus follows that to understand resilience, one must understand the concept of risk, the factors that influence the ability to overcome risk, and the outcomes that can be identified as success. Without some form of risk, successful outcomes are to be expected. Richman and Fraser (2001) define risk as "the presence of one or more factors or influences that increase the probability of a negative outcome for a child or youth" (p. 2). Risk factors relate both to the individual and to the environment in which he/she lives.

> At the individual level, they include genetic or biological factors (such as attention deficit and hyperactivity disorder, or low birth weight) and social characteristics (such as having a risk-taking temperament). Ecological or contextual factors may be conceptualized also as risk factors. These include, for example, parental loss due to divorce, separation, or death; or living in a neighborhood with high crime, social disorganization, and poverty. (Richman & Fraser, 2001, p. 3)

Risk is also related to stress—a single critical life event, a chronic stressful situation within everyday life, or the cumulative effects of multiple stresses. While some researchers discuss the concept of additive risk, Kirby and Fraser (1997) discuss the cumulative effects of multiple risk factors: "Although the effect of a single stressor may be negligible, the effect of three stressors may be far greater than a threefold increase in risk" (p. 12). Kirby and Fraser also discuss the concepts of risk processes, "mechanisms whereby a risk factor contributes over time to heightened vulnerability" (p. 13), and risk chains, "linkages of conceptually distinct risk factors or processes" (p. 13). They point out that a negative outcome is not produced by a single event but rather by interactional processes over time.

"The positive counterparts of risk" (Masten, 1994, p. 6) are called assets. Assets provide certain advantages to individuals. They include things like high income, good health, good schools, and athletic talent. In some cases, the lack of these assets may pose a risk. In other cases, although assets provide an advantage, lack of the asset is not necessarily a risk.

The factors that "moderate the effects of risks or adversities on adaptation" (Masten, 1994, p. 7) are called vulnerabilities and protective factors. The term vulnerability "refers to the idea that some at-risk people are more likely to develop an undesirable outcome or disorder" (Greene & Conrad, 2002, p. 33). Although this term is most frequently used to describe individual characteristics, it can also be applied to other systems (Masten, 1994).

According to Masten (1994), "protective factors is used as a generic term for moderators of risk or adversity that enhance good outcomes, regardless of whether they lie in the individual, the environment, or in some interaction between the two" (p. 7). Protective factors have been categorized into three types. One type of protective factor serves as a buffer against the effects of risk factors; social support may buffer a person against negative influences. A second type of protective factor may interrupt the risk chain; reducing family conflict early may prevent the conflict from escalating and causing further harm. The third type of protective factor may prevent the first occurrence of a risk factor; an easy-going temperament may diminish the likelihood of a young child being abused (Kirby & Fraser, 1997).

Rutter (1987), on the other hand, prefers the terms mechanism and process rather than factor to describe protection from negative outcomes. He finds that "many vulnerability or protective processes concern key turning points in people's lives, rather than long-standing attributes or experiences as such" (p. 318). He identified four protective mechanisms. The first, reduction of risk impact, operates in two ways—"alteration of the meaning or danger of the risk variables for that child; and alteration of the child's exposure to or intimate involvement with the risk situation" (p. 325). The second protective mechanism involves the reduction of negative chain reactions. The third group of protective mechanisms relates to the development of self-esteem and self-efficacy through secure early relationships and through the successful accomplishment of various tasks. The final protective mechanism relates to the availability of opportunities provided in the environment.

As Wang, Haertel and Walberg (1998) point out,

> A one-to-one correspondence between a particular adversity and a protective factor that mitigates its effect is neither possible nor necessarily desirable. . . . We may not find it possible, for example, to determine which of several protective factors, such as a caring teacher, a close-knit peer group, or participation in a cooperative learning experience, ameliorate a teenager's sense of estrangement from school.
>
> Several protective factors, moreover, may work together to mitigate a particular adversity, and a single protective factor can mitigate against several adversities. (pp. 7-8)

The lack of a one-to-one correlation of risks and protective factors or mechanisms suggests the need to enhance protection for at-risk children in a variety of ways.

Recognizing that risks and assets, as well as vulnerabilities and protection, may lie at the level of the individual or of the environment, the concept of resilience must be understood in an ecological context (Greene, 2002; Jozefowicz-Simbeni & Allen-Meares, 2002; Richman & Fraser, 2001). It is not something that can be developed by sheer will-power within the at-risk person; it is developed through the interactions of people with their environments—families, schools, neighborhoods, and the larger community. Environments may contribute to a person's risk for various problems, but can also provide protection from those risks and enhance the likelihood of positive outcomes: "Resilience is not necessarily based on individual characteristics; it occurs at the nexus of high risk and exceptional resources, whether these resources are personal or

environmental in nature" (Richman & Fraser, 2001, p. 6). According to Greene (2002), "the phenomenon of resilience occurs in the context of person-environment interaction, and the circumstances that influence resilience are embedded in family, school, neighborhood, and the larger community" (p. 17).

Failure to recognize the phenomenon of resilience from an ecological perspective may result in placing the blame on individuals who succumb to the risks in their lives. As Rigsby (1994) states,

> A danger of employing the concept of resilience as it has heretofore been understood is that we may reinforce the negative consequences of the old Horatio Alger myth: an implicit belief that anyone can make it if he or she tries hard enough. An inevitable result is that we will again "blame the victim" of the complex processes that create and perpetuate poverty and stress in our society. Although we will be talking about resilience, we will be inferring "nonresilience" as well. (pp. 92-93)

Thus, it is incumbent upon persons studying resilience to work toward the development of a multilevel theory to incorporate the family, community, and societal factors as they influence the adaptation of individuals.

If environmental factors can contribute to resilience within individuals, then those factors can be modified to increase the protection or assets in people's lives. Indeed, Zimmerman & Arunkumar (1994) consider environmental change to be a more efficient and economical way to build resilience than interventions directed toward changing individuals directly. Benard (1991) focuses on cultivating positive environmental

contexts within families, schools, and communities, recognizing that protective factors within one or more of these systems can counteract risks that children experience from another system.

Characteristics of the Resilience-Promoting Environment

In their classic study of resilience, Werner and Smith (1992) found protective factors within the family and the larger community that contributed to resilience. Family-level protective factors included the educational level of the opposite-sex parent, the acceptance and responsiveness of parents in interaction with their children, and the presence of rules and structure in the households of adolescent children. Werner and Smith also identified caring adults in the community with whom the children liked to associate as a major protective factor. These included members of the extended family as well as leaders of youth and church groups. By adolescence, a caring teacher filled this role for students who became successful adults. By young adulthood, supportive spouses may have filled the role of caring adults.

Garbarino, Dubrow, Kostelny, and Pardo (1992) cite the importance of "a secure attachment relationship between the child and the primary caretaker" (p. 103) in infancy. They concluded that "children are most likely to endure the emotional stress and physical disruption of war and chronic violence if they can remain with their primary caretaker and be taken care of in a stable, routine manner" (p. 105). They cite social support systems (including friends, neighbors, and teachers) as important protective factors in the community through the provision of emotional support for children. Additionally, they note that the community can provide support to the parents in providing a positive

environment for their children as well as support for schools in providing appropriate educational environments to foster children's development.

Among the environmental protective factors recognized by Masten (1994) are “effective parenting; connections to other competent adults; . . . [and] good schools and other community assets” (p.14). Recognizing the frequency with which parents and mentors serve as protective factors, Masten (1994) identified the common elements of effective parents and mentors. These parents and mentors are consistent in their nurturing behavior, demonstrate that they value the child, serve as role models, provide constructive feedback as they guide the child, and provide opportunities for information and worthwhile experiences.

Similarly, Kirby and Fraser (1997) identified a number of factors at the environmental level that protect children from a variety of risks. Within the broader environment, they identify opportunities for education, employment, growth, and achievement as protective factors that provide youth reason to expect to achieve their goals in life. They also identify protective factors within the family, school, and neighborhood: social support; presence of a caring, supportive adult; positive parent-child relationship; and effective parenting.

In her work on resilience, Benard (1991, 2003, 2004) emphasizes the importance of the environment in positive youth development. She focuses on the "power of one person—often unbeknownst to him or her—to tip the scale from risk to resilience" (2003, p. 216). The "turnaround people" she identifies provide a caring relationship with the youth, showing an active interest in getting to know him/her. They have positive and

high expectations for the youth that reflect "the adult's deep belief in the young person's innate resilience and self-righting capacities" (p. 217). Finally, they create opportunities for meaningful contributions for the youth to exercise his/her own social competence in the community. It is Benard's contention that a combination of these three key protective factors—caring relationships, high expectations, and opportunities for participation and contribution—work together in a dynamic protective process to produce positive outcomes for youth (2004, p. 44).

In Benard's view, "the development of human resiliency is none other than the process of healthy human development—a dynamic process in which personality and environmental influences interact in a reciprocal, transactional relationship" (1991, p. 20). In her model of resiliency (Youth Development Process: Resiliency in Action), protective factors in the family, school, and community (caring relationships, high expectations, and opportunities for participation and contribution) meet the basic developmental needs of youth (safety, love/belonging, respect, autonomy/power, challenge/mastery, and meaning). Meeting these needs builds internal resilience strengths (social competence, problem-solving skills, autonomy, sense of purpose and bright future), thereby resulting in improved social, health, and academic behaviors as well as reduced health-risk behaviors (2004, pp. 107-108).

Benard (2004) recognizes that children and adolescents benefit from the provisions of these protections in a variety of environments. The family, the school, and the community all have a role in contributing to positive youth development. This study, however, dealt with the role of the school in supporting educational resilience. This is, in

part, because the outcomes of interest in this study are educational—mathematics achievement and timely high school graduation. However, other important reasons for focusing on the schools include the potential of schools to enhance the development of their students, including their educational resilience, as well as their ability to provide an organizational base from which to mobilize positive youth development at the family and community levels.

Influence of Schools on Student Outcomes

The research on school characteristics and effectiveness is voluminous. One classic study of the influence of schools on student outcomes is Coleman's (1966) report on *Equality of Educational Opportunity*. Coleman found greater within-school variations in student achievement than between-school variations. Furthermore, the largest proportion of the between-school variation in student achievement was due to differences in the family backgrounds of the students entering the school rather than to characteristics of the schools themselves.

While these findings contributed to a "widespread acceptance among academics that schools made little difference" (Rutter, Maughan, Mortimore, Ouston, & Smith, 1979, p. 1), Coleman also found that the achievement of ethnic minority students was more dependent on school characteristics than was the achievement of White students. School factors that were associated with achievement for ethnic minority students included school facilities, teacher quality, and the educational backgrounds and goals of other students at the school. This finding was particularly noteworthy given the inequitable school conditions available to ethnic minority students in the 1960s. In

recognition of the "differential sensitivity to school variations" (p. 297), Coleman found that "it is for the most disadvantaged children that improvements in school quality will make the most difference in achievement" (p. 22). This differential sensitivity to differences between schools may indicate that the schools provide a protective function for disadvantaged students.

Coleman's overall findings of the relative lack of influence of school characteristics were limited, in part, by his reliance on a measure of verbal ability as his measure of student achievement. Verbal ability is more likely to be influenced by experiences in the family as opposed to mathematics and science achievement which are more directly influenced by the schools (Rutter et al., 1979). Another limitation of Coleman's study was his reliance on cross-sectional data, reflecting student scores at a single point in time. This prevented his study from measuring how well schools did in improving the achievement of their students, given the characteristics and initial performance of students enrolled at the school.

Rutter et al. (1979) took another approach in their study of the influence of schools on student outcomes. Their study was part of a larger study of children in an inner borough of London and included observations of school processes of twelve secondary schools over three years (when students were in the age range of 11 to 14). Outcome measures included student attendance and behavior as well as examination scores at the end of their fifth year in the secondary school and delinquency rates by the time the youth reached the age of eighteen. Rutter and his colleagues recognized that

> The differences in attainment between children within any one school are much greater than any differences in average attainment between schools. Raising the quality of education does not have the effect of making every one alike. This is because children vary (as a result of both genetic endowment and home experiences) in their ability to profit from educational opportunities. Improving schools will not necessarily make any difference to individual variations.
>
> But it may have a decisive impact in raising overall standards of attainment. (1979, p. 7)

Their study focused on whether and how schools could make a difference in student outcomes.

Rutter et al. found that schools do indeed make a difference in student outcomes, even after controlling for the characteristics of students entering those schools. The differences they found were systematically related to the characteristics of those schools as social institutions. Many of those factors were ones which were under the control of the teachers—"the degree of academic emphasis, teacher actions in lessons, the availability of incentives and rewards, good conditions for pupils, and the extent to which children were able to take responsibility" (1979, p. 178). The only school-level factor which made a difference but was not under the control of the teachers was the mix of academic abilities of students entering the school. The combined effect of these factors was more powerful than the effect of any single factor, suggesting to Rutter and his colleagues that there was some overall school "ethos" involved. They concluded that "the importance of the separate school process measures may lie in their contribution to

the ethos or climate of the school as a whole" (1979, p. 183). Among those school process measures that contributed to those schools with more successful student outcomes were classroom activities that kept the students actively engaged, teachers' expectations that their students would succeed, assigning students specific school or classroom responsibilities, pleasant conditions in the schools, an emphasis on student successes, and positive relationships between students and teachers.

Coleman's (1966) and Rutter et al.'s (1979) studies of schools are part of a very extensive body of research documenting the effects of school characteristics on the academic achievement of its students. This research takes a variety of tracks. One track (education production) focuses on the ways in which quantifiable school resources (funding, teacher quality) contribute to academic achievement or school dropout. A second track explores the characteristics of high-poverty, high-achieving schools. Additional studies focus on a wide variety of school characteristics such as academic press and sense of community as predictors of academic achievement or school dropout.

Education Production Studies

Coleman's (1966) study focused the attention of many education researchers on the relationship between school inputs (expenditures, teachers, facilities) and school outputs (educational achievement). Hanushek (1989) conducted a meta-analysis of 187 education production studies and found no consistent and direct relationship between school inputs (teacher/student ratio; teacher education, experience, and salary; expenditures per student; administrative inputs; facilities) and student performance. These findings led him to conclude that education policies should not focus on inputs

(expenditures, class size, teacher education and experience), but rather on student performance. Although Hanushek found dramatic differences among teachers and schools in their effectiveness, he found flaws in the measurement of which characteristics of teachers and schools were responsible for those differences.

There are numerous additional education production studies. In a re-analysis of Hanushek's studies, Hedges, Laine, and Greenwald (1994) found a systematic and positive pattern of relationships between educational resources and student outcomes. Larger schools are associated with lower academic achievement by economically disadvantaged students while smaller schools lessen the achievement gap for students at economic risk, as demonstrated by Bickel, Howley, Williams, and Glascock (2000) in a study of Texas schools. Similarly, lower class sizes can provide advantages. In an experimental study (Project Student-Teacher Achievement Ratio) in Tennessee, children in early elementary classes of 17 or fewer outperformed their peers in classes of 22 or more. The academic effectiveness of smaller classes was particularly important for inner-city and ethnic minority students (Tennessee State Department of Education, 1990). In analyzing data from the High School and Beyond Study, McNeal (1997) found that larger pupil/teacher ratios were associated with a higher risk of dropping out.

Rice (2003, p. v) considers teacher quality to be "the most important school-related factor influencing student achievement." In her review of numerous empirical studies on the relationship between teacher characteristics and teacher performance, Rice (2003) found that teacher quality was positively associated with student achievement. Teacher characteristics that had positive effects included experience, teacher scores on

tests of verbal abilities, selectivity or prestige of college or university attended by teacher, coursework in content and pedagogy, advanced degrees, and certification. Many of these effects were context-specific, depending upon the level of education, the subject area, and the student population. In some instances, measures of teacher quality (such as selectivity of college or university attended, advanced degrees in subject, and teacher test scores) had greater impact on the performance of low-income or ethnic minority students.

Rather than using more commonly accepted demographic measures of teacher quality, Sanders and Rivers (1996) took a value-added approach to identifying teacher quality, using statewide data from the Tennessee Value-Added Assessment System. Five levels of teacher effectiveness were determined based on the current mathematics scores for their students and taking into account their previous mathematics scores. Progress of individual students was traced through sequences of teachers of varying levels of effectiveness. Third and fourth grade teachers had highly significant residual effects on the performance of their former students when the students were tested in fifth grade. Fifth grade students who had had a sequence of three highly effective teachers scored 52 to 54 percentile points higher than those who had had a sequence of three very ineffective teachers. The study found that highly effective teachers could produce very substantial achievement gains in their students, but residual effects from ineffective teachers in previous years remained. About ten percent more African American students were assigned to the least effective teachers, although student achievement was similar for similar levels of teacher effectiveness for both African American and White students.

The study concluded that the effects of teachers are both additive and cumulative, still measurable two years later regardless of the effectiveness of subsequent teachers.

High-Performing, High-Poverty Schools

Edmonds (1979) is recognized for his pioneering efforts in the effective schools movement. His primary concern was the education of low-income inner-city students. It was his belief that all children are educable and that the quality of the school is a critical factor in determining what they learned. He was especially concerned with the common belief (and finding from numerous studies) that family background is the primary determinant of student performance, since this belief relieved teachers of their responsibility to be effective in educating students from all family backgrounds. In his opinion, the crucial component of effective schools is "a climate in which it is incumbent on all personnel to be instructionally effective for all pupils" (p. 22). Other characteristics of effective schools, according to Edmonds, are strong administrative leadership, the expectation that all students meet specified achievement levels, an orderly climate that is not too rigid, a focus on directing school energy and resources toward student acquisition of academic skills, and ongoing monitoring of student progress. By developing student academic success, effective schools may shield students from risks by enhancing their "self-esteem, efficacy, and a sense of belonging within the school" (Borman & Rachuba, 2000, p. 6).

High-performing, high-poverty schools do not accept excuses for poor academic performance by their students (Bell, 2001). On the contrary, they engage their students in challenging content in a learning environment which incorporates research-based

learning principles and supports a vision of school success. At a symposium of educational researchers and educators from high-performing, high-poverty schools, participants identified the following practices of these schools:

1. Implement rigorous standards for all students as the school's main goal.
2. Focus on delivery of high-quality teaching and learning for all students.
3. Emphasize hard work, high expectations and persistence.
4. Promote discipline and a safe, orderly environment as key to learning.
5. Make district support evident and essential.
6. Have principals who are models of strong instructional leadership.
7. Have principals who are persistent and innovative in obtaining resources to serve students' needs.
8. Share leadership among administrators, faculty and parents.
9. Collaborate on school goals and professional development.
10. Regularly use assessment as a diagnostic tool to reinforce the school's academic goals.
11. Intervene early and often to promote the academic success of all students.
12. Promote a policy of inclusiveness and a sense of family.
13. Work actively with parents to extend the mission of the school into the home.
14. Help faculty and students see themselves as part of the system as a whole through articulation of the academic program across grade levels. (Bell, 2001, p. 10)

In a qualitative study with nine principals of high-performing, high-poverty schools, Cole-Henderson (2000) identified the following characteristics of schools which served primarily low-income African American students in pre-K through eighth grade but achieved test scores at or above the state and district averages: relatively low teacher and student turnover, high attendance by teachers and students, strong agreement about the primacy of the school's mission statement, the use of site-based management, competent teachers, student dress codes, adequate facilities, substantial parental involvement, and high expectations for their students.

In another study which compared an audit of eight high-performing, high-poverty elementary schools in Kentucky with an earlier audit of eight low-performing schools, Kannapel and Clements (2005) found that the high-performing schools were significantly higher on audit measures of reviewing and aligning the curriculum, assessing individual students and tailoring instruction to the needs of individual students, providing a caring atmosphere with high expectations for all students, ongoing professional development based on student achievement data, and efficient use of instructional time and resources.

In another attempt to identify the characteristics of high-performing, high-poverty schools, Picucci, Brownson, Kahlert, and Sobel (2002) did a qualitative study of seven public middle schools with average or above average achievement scores even though 50 percent or more of the students qualified for free or reduced lunches. In their interviews and observations, they identified several characteristics of schools in which low income students performed at higher than expected levels. In some respects, these characteristics resembled Benard's (1991) identification of resilience-promoting environments. The

schools had high expectations of all their students, built caring environments for the staff and students, and provided needed support to enable students and their teachers to reach their goals. They had challenging curricula, recognized staff and students who demonstrated their commitment to academic performance, and expanded academic opportunities for students. They created structures to ensure that all students would be known by at least one adult. They extended the school day for both academic and nonacademic services to students. They sought to create collaborative environments, valuing staff input within the school and reaching out to parents and the larger community to support student learning. They supported improved teaching and learning through block scheduling, common planning time for teachers, ongoing and in-depth professional development, and ongoing use of data.

Resilience-Promoting School Environments

Concern about educational risks faced by ethnic minority and low-income children has led educators, researchers, and government officials to examine the ways in which schools can foster resilience and produce better outcomes for their students (Borman & Rachuba, 2000; Downey, 2008; Learning First Alliance, 2001; National Governors Association Center for Best Practices, 2000; Nettles & Robinson, 1998; Picucci et al., 2002; Wang, Haertel, & Walberg, 1994, 1998). Since school is the primary institution that focuses on promoting the cognitive development of the child, it is logical to focus on the school environment for its impact on the educational outcomes of at-risk students.

In one form or another, many educators support the inclusion of caring relationships, high expectations, and opportunities for participation and involvement as ingredients in efforts to improve schools. The Oregon State Department of Education (2000), for example, focused on the use of resiliency theory to enhance students' connections with their schools and their subsequent academic outcomes. The themes they highlight include a sense of belonging, a sense of competence through meeting expectations, empowerment through meaningful participation, and usefulness through service learning. Henderson and Milstein (2003) are also concerned with the development of resilience in schools. Yamauchi (2003) describes several elements of resiliency-promoting school environments in a Hawaiian Studies Program designed to promote retention and a sense of belonging among students.

One key component of effective schools is that they respond to the basic needs of their students (Wang, Haertel, & Walberg, 1998). Malley et al. (2003) emphasize the importance of schools meeting the basic needs of students—emotional and physical safety, sense of belonging, opportunity to make choices, sense of competence, and enjoyment. In quality schools, students feel safe from physical harm, are expected to do their best work, feel that their work has purpose and meaning, and perceive that both students and teachers care about the school environment.

Stage-environment fit theory also focuses on the importance of schools addressing the developmental needs of their students. Schools that meet basic student needs for safety, connections to others, and a sense of competence help their students develop socially, emotionally, and ethically, as well as academically. As students' basic needs are

met in school, the students become more committed to the norms and values of the school community and their behavior reflects that commitment (Learning First Alliance, 2001).

Caring Relationships

One specific developmental need is for affiliation, for a sense of belonging and connectedness with others (Benard, 1996). Caring, supportive relationships with trusted adults can fulfill that need and thus serve as an essential protective factor (Benard, 1991; Pianta & Walsh, 1998; Schorr, 1997). Such relationships with teachers can be especially beneficial to student development (Benard, 1996; Drennon-Gala, 1995; Wang, Haertel, & Walberg, 1998; Werner & Smith, 1982; Zimmerman & Arunkumar, 1994), particularly for students in difficult life circumstances who may lack such caring away from the school environment (Wang, Haertel, & Walberg, 1997).

Adults can demonstrate their caring by keeping promises, respecting confidentiality, spending time to listen, demonstrating empathy, affirming the positives, respecting youth by involving them in making decisions, and serving as good role models (Laursen & Birmingham, 2003). Teachers also demonstrate caring when they know all their students by name, pay attention to each one, encourage the participation of each student in class, communicate their expectations that each student can be successful, intervene when students are having problems, develop opportunities for relationship building within the classroom, and recognize student strengths and accomplishments (Brooks, 2006; Henderson & Milstein, 2003; Wang, Haertel, & Walberg, 1998).

Indeed, the presence of "sustained, caring, supportive interactions among teachers and students" (Wang, Haertel, & Walberg, 1997, p. 16) is an important characteristic of

resilience-promoting schools. Students experience positive social interactions both with their peers as well as with the adults within the school. Such schools are nurturing environments in which teachers as well as students feel a sense of involvement and belonging, also known as a sense of community (Learning First Alliance, 2001).

> The objective of creating a supportive learning community ought to be that everyone involved—staff, parents, and especially students—feels a strong sense of belonging in school, being concerned about one another's welfare, making significant contributions, having opportunities for ongoing learning and growth, and hold important goals and values in common with others. Students must be central in the effort to build the school community because students themselves—their relations with each other and with adults in the school—are key to their motivation, attitudes, and interpersonal behavior, and are the single greatest influence on school climate. Adults should share responsibility with students for creating and maintaining a supportive school environment. (Learning First Alliance, 2001, p. 3)

This emphasis tends to enhance student attachment to and engagement with the school (Wang, Haertel, & Walberg, 1997, 1998). Connections to school are likely to enhance students' academic goals as well as their academic achievement (Resnick et al., 1997).

The importance of relationships with teachers is highlighted by Croninger and Lee's (2001) study of data from the National Educational Longitudinal Study of 1988. They found that teacher-based social capital reduced the risk of high school dropout by about half. Independent variables in this study included students' reports about their

teachers' support of their school efforts and teachers' reports about providing guidance to their students. The positive effects of teacher-based social capital were particularly important for socially disadvantaged students and students who had previous academic problems. In a qualitative study of 11 graduating seniors who were low-income, African American, and learning disabled, Murray and Naranjo (2008) found that caring teachers was one of the factors that contributed to school persistence for these at-risk students.

Talking with teachers in high school was associated with postsecondary participation by African American students in another study (Wimberly, 2002). Based on data from the Educational Longitudinal Study of 2002, Dalton, Glennie, and Ingels (2009) found that dropout rates were higher for students when neither the English teacher nor the math teacher reported talking with the student outside of class. Likewise, Crosnoe and Elder (2004) found that supportive relationships with teachers were associated with lower levels of off-track academic behaviors. Unexpectedly, however, these supportive relationships exacerbated off-track academic behaviors in the presence of the risk of emotionally distant relationships with parents. Even at the elementary level, Liew, Chen, and Hughes (2010) found that positive teacher student relationships were associated with reading and mathematics achievement a year later for academically at-risk students with low levels of task accuracy.

Connections among students and teachers may develop more easily in smaller schools, which are more effective in promoting the educational resilience of students in inner-city schools (Learning First Alliance, 2001; National Association of Secondary School Principals, 2002; Wang, Haertel, & Walberg, 1997, 1998; Zimmerman &

Arunkumar, 1994). Such schools are more protective, reducing the risks of school dropout (Zimmerman & Arunkumar, 1994). There is substantial support for the relationship between small school size and academic achievement (Finn & Rock, 1997; Learning First Alliance, 2001; WestEd, 2001). There is also an interaction effect between poverty and school size which suggests that small schools are particularly important for the poorest students (WestEd, 2001). Small schools are also associated with fewer incidents of violence and other behavior problems, higher attendance, lower dropout rates, increased participation in extracurricular activities, a greater sense of belonging, higher levels of parent and community involvement, improved communication and instructional quality, greater teacher job satisfaction, and built-in accountability (WestEd, 2001).

To some extent, these findings are challenged by another study (Weiss, Carolan, & Baker-Smith, 2010), in which size of the school is not correlated with mathematics achievement. Using cross-sectional data of high school sophomores in the Educational Longitudinal Study of 2002, this study found no correlation between school size and mathematics scores in the tenth grade. Using the same data, Schneider, Wyse, and Keesler (2006/2007), found that school size made no difference in twelfth grade mathematics scores. Wyse, Keesler, and Schneider (2008) later used propensity matching to account for selection effects in the data and again found that school size made no difference in twelfth grade math scores. However, using change in math scores as the dependent variable, Werblow and Duesbery (2009), found a curvilinear relationship between school size and changes in math scores in that students from the smallest schools

(<674 students) and the largest schools (>2,692) reported the greatest gains in mathematics achievement from tenth to twelfth grade. Furthermore, they found a linear relationship between school size and dropout rates with larger schools having a higher dropout rate, providing support for the educational benefits of attending smaller schools. None of these studies, however, looked at the ratio of adults to students at the schools which may have affected students' exposure to caring relationships.

Smaller schools contribute to a sense of belonging in the school community, enhance the likelihood that each child will be known well by at least one adult, increase rates of participation in extracurricular activities, improve school attendance rates, and reduce school dropout rates (Learning First Alliance, 2001). Due to the impact of smaller learning communities on the educational resilience of students in schools that serve greater proportions of low-income and ethnic minority youth, many educators advocate creating smaller schools within schools to increase the connections between students and their teachers. Team teaching, block scheduling, and looping (in which groups of students stay with the same teacher(s) for more than one year) are some of the strategies used to create more personal learning communities (Learning First Alliance, 2001).

High Expectations

Caring and supportive relationships between teachers and their students are also reflected in teachers who have positive and high expectations for all their students and who provide ample opportunities for students to participate in meaningful ways (Benard, 1996; Wang, Haertel, & Walberg, 1998). An emphasis on high academic expectations is characteristic of schools that promote educational resilience. Teachers at such schools,

supported by targeted professional development programs, use evidence-based instructional practices and engage all their students through challenging curricula and the teaching of higher order thinking skills (Krovetz, 1999; Wang, Haertel, & Walberg, 1997, 1998). Effective schools demonstrate the value of high academic achievement by maximizing classroom time spent on academic tasks (Wang, Haertel, & Walberg, 1997; 1998).

High expectations have been shown to have a positive effect on the academic achievements of both advantaged and at-risk students. Schoon, Parsons, and Sacker (2004) in a study of youth in Great Britain found that teacher expectations contributed to academic achievement in secondary schools. Teacher expectations was the most important factor in determining school adjustment of disadvantaged youth, although its protective effect was even greater for socially advantaged youth. In another study, Wimberly (2002) found that the expectations of school personnel were associated with participation in postsecondary education. In the Educational Longitudinal Study of 2002, students who dropped out of school (when compared to those who did not drop out by the spring semester of the senior year) were more likely to have teachers who expected them to either drop out or go no further than high school (Dalton et al., 2009).

High expectations can be communicated in a variety of ways. Teachers who demonstrate an interest in the performance of each student, providing constructive feedback, are demonstrating their high expectations as are teachers who exhibit the work of all their students or who simply tell them, “I know you can do it.” Curricula that are rich and challenging, along with teaching strategies that recognize the diverse learning

styles of their students, and encourage their active involvement in learning also convey high expectations. Finally, teachers demonstrate high expectations when they provide clear rules about behavioral expectations and enforce them fairly (Brooks, 2006).

One key means of communicating high academic expectations is through the quality of the learning experiences offered to students.

> Students are most motivated to learn, feel the greatest sense of accomplishment, and achieve at the highest levels when they are able to succeed at tasks that spark their interest and stretch their capacities. To be meaningful, learning must effectively connect to students' questions, concerns, and personal experiences, thereby capturing their intrinsic motivation and making the value of what they learn readily apparent to them. . . . When students find purpose in their learning, and when they feel challenged and successful much of the time, they become more involved in their own learning and more invested in, and attached to, the school community. (Learning First Alliance, 2001, pp. 4-5)

Providing challenging content in a variety of academic subjects as well as exposing students to the arts, sports, community service, and the work world can help students make connections between the real world and their learning experiences in school, thus enhancing their motivation and engagement in learning (Learning First Alliance, 2001; Wang, Haertel, & Walberg, 1998). Engaging students in critical thinking learning activities communicates the message that they are capable of solving complex problems (Benard, 1996).

One practical measure of high expectations is the curriculum to which students are exposed (Prichard Committee for Academic Excellence, 2005). Cappella and Weinstein (2001), for example, found that enrollment in a traditional academic curriculum in high school was associated with academic resilience (intermediate or advanced proficiency scores on a twelfth grade reading test) for eighth grade students who were at the lowest proficiency level in reading at the beginning of the NELS-88 study.

High expectations for all students, along with the support they need to meet those expectations, let students know that they can be successful in school. If expectations are lowered for any student (particularly those who are less gifted, demonstrate behavioral problems, or come from an at-risk background), they are less likely to believe they can succeed in school and therefore less likely to put in the effort to do as well as they otherwise might be able to do (Battistich, Watson, Solomon, Lewis, & Schaps, 1999; Henderson & Milstein, 2003; Learning First Alliance, 2001; Wang, Haertel, & Walberg, 1998).

Teachers in effective schools believe that children can succeed despite diversity in their social and educational backgrounds. Believing that they can make a difference in the development of their students, such teachers assume a sense of responsibility for the academic success of their students (Wang, Haertel, & Walberg, 1997). According to Benard (1996), "successful teachers of poor children refuse to label their students 'at risk'; they look at each child and see the gem that is inside and communicate this vision back to the child" (p. 108). These high expectations then become internalized by the

child in the form of increased levels of self-esteem and self-efficacy (Benard, 1996). In spite of the potential of teachers to provide protection for at-risk students, Oswald, Johnson, and Howard (2003) found that teachers in Australia acknowledged the importance of individual student traits and the family environment in building educational resilience, but undervalued their own potential contribution.

One major issue associated with expectations is whether or not schools isolate low-achieving students into remedial and watered-down classes. The practice of tracking students by ability labels separates students according to their teachers' expectations and often places students at greater risk (Benard, 1996; Nettles & Robinson, 1998). The most effective schools are more likely to place students in heterogeneous groups (Benard, 1996; Krovetz, 1999), and less likely to isolate children with learning disabilities, limited English proficiency, and poor academic skills from the learning activities of the overall student body (Wang, Haertel, & Walberg, 1998). Programs that separate at-risk students from the mainstream classroom tend to provide weaker instruction with less emphasis on higher order thinking skills required for comprehension and problem solving (Wang, Haertel, & Walberg, 1995; 1997) and deny students access to higher expectations, superior instructional strategies, and interaction with more successful peers.

Not only are high expectations about academic performance important in effective schools; high expectations for behavior are also critical to an orderly and structured school climate that makes it possible for teachers to focus on the instructional process in their classrooms (Wang, Haertel, & Walberg, 1997, 1998). Students need clear guidelines about what behaviors are expected of them and what the consequences are for

violating rules, and these guidelines must be consistently and fairly enforced (Benard, 1996; Learning First Alliance, 2001).

Opportunities for Participation and Contribution

Effective schools provide abundant opportunities for students to participate in activities that they consider to be meaningful (Benard, 1996; Wang, Haertel, & Walberg, 1997; Zimmerman & Arunkumar, 1994). Teaching strategies which engage students in hands-on activities working with others contribute to developing individual characteristics of resilience—a sense of a future, autonomy, problem solving skills, and social competence (Benard, 1996).

Meaningful participation allows students to see themselves as resources within the school environment rather than as passive objects (Henderson & Milstein, 2003). Teaching strategies which emphasize cooperative learning allow students to develop closer relationships with their peers and develop skills in collaborating with others (Learning First Alliance, 2001). Effective schools work with the students' intrinsic motivations by connecting curricula to students' interests and real-life experiences (Benard, 1996). Teaching strategies that increase student responsibility for learning by actively engaging them in the process are likely to enhance the students' sense of personal agency (Wang, Haertel, & Walberg, 1998). Opportunities for active participation in the learning process and exercising decision making in the classroom build the student's responsibility for his or her own learning (Benard, 1996) while participation in school or classroom governance helps the student see him/herself as a

valued member of the school community. Service learning activities can help students see their value and contribution to the community in which they live.

Students can also enhance their competence and extend their connections to caring adults and peers through their participation in extracurricular and after-school activities (Brooks, 2006). Structured, school-based participation in extracurricular activities is associated with higher levels of academic achievement and attainment as well as lower levels of school dropout (Feldman & Matjasko, 2005). Such participation both reflects and enhances students' connections and attachment to school, resulting in higher levels of academic achievement, attendance, and educational aspirations (Learning First Alliance, 2001). In a longitudinal study of 695 students, Mahoney (2000) found that those who participated in school extracurricular activities were more likely to graduate from high school. In another study of 392 students who were followed from seventh through twelfth grade, participation in extracurricular activities was associated with a significantly lower dropout rate among students who were rated as at-risk in seventh grade due to their academic and behavioral performance. The relationship between extracurricular activities and dropout rate was more modest for those students who were rated academically competent (Mahoney & Cairns, 1997).

For the at-risk student, it was expected that academically-oriented extracurricular activities would enhance their experiences in the classroom while nonacademic activities might extend the students' relationships and raise their status within the school. More competent students were presumed to be firmly attached to the school and much less likely to drop out, so that extracurricular involvement was not as crucial in heightening

their connections to the school community. For students with marginal connections to the school community, extracurricular activities may provide a positive and voluntary means of strengthening those connections. The opportunity to interact in a nonacademic environment with peers with greater attachments to the school is one way of extending those connections (Wang, Haertel, & Walberg, 1998). One concern raised by Mahoney and Cairns (1997) was the unequal distribution of extracurricular participation since at-risk students were significantly less likely to be involved in such activities. They noted that even when extracurricular activities are available in a particular school, selection mechanisms (such as grade point average requirements) may limit the opportunities of at-risk students to participate in these activities.

Similarly, Wimberly (2002) found that African American students who participated in extracurricular activities were more likely to go on to postsecondary education and Jordan (1999) found that students who participated in sports activities had higher self-reported grade point averages and higher scores on achievement tests in reading, mathematics, history and science. Using the data set from the Educational Longitudinal Study of 2002, Dumais (2008) found that time spent in school-sponsored activities was associated with higher math scores in the senior year. In her study, the impact was most beneficial for students from the lowest socio-economic quartile even though these students spent, on average, the least amount of time in such activities. In another study, Hunt (2005) found the reverse situation—that higher grades in the sophomore year predicted higher levels of extracurricular activities during the senior year. However, he acknowledges that this might be due to school regulations that limit

extracurricular activities for reasons of poor academic performance or due to overall lack of attachment to the school which is reflected in both poor academic performance and lack of involvement in school activities.

Opportunities for participation and contribution are so significant in the development of resilience that activities should be designed to promote maximum participation from all students regardless of skill level (Learning First Alliance, 2001). Indeed, those students at the greatest risk, with the fewest positive connections to the school community, may need the benefits of such participation even more than the more advantaged students who are already firmly attached to school.

Active engagement in the school can be considered an important avenue for increasing student achievement (Connell, Spencer, & Aber, 1994; Fredricks, Blumenfield, & Paris, 2004; Nettles & Robinson, 1998; Wang, Haertel, & Walberg, 1995). Engagement is viewed as a means to boost academic achievement and counteract student boredom and alienation. Engagement includes behavioral components (participation in the classroom, following the rules and regulations, involvement in school activities), emotional components (ties to teachers and peers, identification with the school, and the value placed on school success), and cognitive components (investment in the effort needed to do academic work). Several studies have found measures of engagement to be positively correlated with academic achievement and school completion (Connell, Spencer, & Abel, 1994; Finn & Rock, 1997; Fredricks, Blumenfield, & Paris, 2004).

Although active engagement in school is required for all students in all schools, the National Research Council and the Institute of Medicine (2004) emphasize the importance of engagement specifically for disadvantaged students in high-poverty, urban schools. Students from more advantaged backgrounds who become disengaged often get second chances and eventually graduate. Disengaged students from disadvantaged backgrounds are more likely to drop out of school, resulting in extremely limited opportunities for future employment. The Council recognizes that disadvantaged students are influenced by adverse influences of marginalized families and communities, but views the opportunity to participate in an engaging school community as one way of lessening those disadvantages.

In spite of the resilience-promoting benefits of engaging schools for disadvantaged youth, few urban high schools are engaging. Compared to schools in more advantaged communities, they lack resources, are located in dilapidated buildings, have the least qualified teachers, have more limited teacher-student interaction, have curricula that are unresponsive to the needs of their students, and have few connections with the community that reinforce the links between educational achievements and career opportunities (National Research Council, 2004).

Engaging schools have instructional methods that build on students' previous learning, monitor student engagement and learning on an ongoing basis, provide ongoing professional development opportunities for teachers, have high and achievable expectations for all students with individualized assistance for those who need help to meet those expectations, test to assess higher-order critical thinking skills, provide

smaller learning communities to develop more personalized relationships between teachers and students, eliminate tracking by ability, create opportunities for low-achieving students to develop relationships with higher-achieving students, diffuse counseling responsibilities among school staff, improve coordination with organizations and groups serving youth, and facilitate student access to social services in the community (National Research Council, 2004). Engaging schools:

> promote students' confidence in their ability to learn and succeed in school by providing challenging instruction and support for meeting high standards, and they clearly convey their own high expectations for their students' success. They provide choices for students and they make the curriculum and instruction relevant to adolescents' experiences, cultures, and long-term goals, so that students see some value in the high school curriculum. . . . Engaging schools promote a sense of belonging by personalizing instruction, showing an interest in students' lives, and creating a supportive, caring social environment. (National Research Council, 2004, pp. 2-3)

The benefits of engagement are documented by research. In a secondary analysis of low-income African American and Hispanic youth participating in the National Educational Longitudinal Survey of 1988, Finn and Rock (1997) found that active behavioral engagement on the part of at-risk students served as a protective mechanism that fostered opportunities for academic success. This relationship was independent of family context and of the students' levels of self-esteem and locus of control. Although participation in extracurricular activities was not correlated with academic success in

their study, Finn and Rock (1997) still considered the possibility that such participation might play a role in fostering identification with school.

The Combination of Caring Relationships, High Expectations, and Opportunities for Participation and Contribution

Although some of the studies described above focus primarily on one characteristic of a resilience-promoting school environment, Benard (2004) emphasizes that it is the dynamic process in which caring relationships, high expectations, and opportunities for participation and contribution operate together that creates healthy development. WestEd developed a module based on Benard's resilience framework (The Resilience and Youth Development Module—RYDM) that includes external environmental resources as well as internal resources for use in the Healthy Kids Survey as part of their contract with the California Department of Education. In one of the earlier studies using the RYDM, Hanson, Austin, and Lee-Bayha (2003) found that school levels of caring relationships, high expectations, and meaningful participation were positively and significantly associated (at the .01 level) with Academic Performance Index scores (based on the Stanford 9 Achievement Test) at the school level in California schools. There were some limitations in this study. Since only school level data of the academic scores were available in this study, relationships at the student level could not be studied. Measures of improvement in test scores over time and school continuation rates were not available in the initial study.

Subsequently, however, Hanson, Austin, and Lee-Bayha (2004) were able to do a longitudinal analysis with school-level test score data that reflected school-level annual

changes in SAT-9 scores. Three measures of external resilience measures on the RYDM were consistently related to school-level changes in test scores—caring relationships at school, high expectations at school, and meaningful participation in the community. Meaningful participation at school, as measured in their instrument, was not consistently related to school-level changes in test scores. This study had some of the same limitations as the previous study with regard to the school-level only data, but did offer the advantage of longitudinal data.

As part of the California Healthy Kids Program, WestEd has also developed a California School Climate Survey (Austin & Bailey, 2008) which was administered to 26,901 professional staff in 4,136 schools in 535 school districts from fall 2004 to spring 2006 along with the California Healthy Kids Survey. Participation on the part of staff was voluntary. All items on their survey (including measures of caring relationships, high expectations, and opportunities for participation and contribution) were positively correlated with higher school levels on the Academic Performance Index. However, school levels of all climate issues were relatively low and decreased from elementary schools to middle schools and from middle schools to high schools. Data in this report were not examined in relation to student scores on the California Healthy Kids Survey to determine whether students and staff perceived the schools in a similar manner.

Jennings (2003) used the California Healthy Kids Survey to study the impact of caring adult relationships in schools, caring peer relationships in schools, and meaningful participation in school on the grade point averages of 229 seventh grade students from four middle schools in a diverse California school district. In this study, he found that

students with moderate levels of meaningful participation (but not high levels) had significantly higher grade point averages than students with low levels. He also found a significant correlation between caring peer relationships and grade point averages, but he did not find a significant correlation between adult caring relationships at school and grade point averages. The study was cross-sectional with a relatively small, non-random sample.

In Turkey, Gizir and Aydin (2009) used the Resilience and Youth Development Module to assess the protective factors contributing to the academic resilience of 872 eighth grade students living in poverty in Ankara, Turkey. In their study, they found that school caring and high expectations (used as a single variable) as well as home high expectations and peer caring relationships had a positive impact on the academic resilience of these students. They used sixth, seventh, and eighth grade GPAs as their measure of academic achievement. School meaningful participation was not significantly related to academic achievement in their study. One limitation of their study is that it was cross-sectional and did not measure how exposure to protective factors over time contributed to academic resilience.

Reis, Colbert, and Hebert (2005) conducted a three-year qualitative study of 35 economically disadvantaged high school students. In their study, they found a combination of three school characteristics—supportive adults, high expectations in the form of opportunities to enroll in honors and advanced classes, and participation in multiple extracurricular activities—that distinguished students who achieved academically from underachievers.

In a quantitative study, Akey (2006) used data from an evaluation of a First Things First school reform program in a large urban school district. Her data included 449 students who were available for all three years of the program, from the 2001-2002 school year through the 2003-2004 school year, thus excluding students who may have dropped out of school during that time frame or transferred to other schools. In her measures of school context, she included measures of supportive teacher relationships, high academic and conduct expectations, and high quality pedagogy (which included active learning, making connections and extensions, and student-to-student interactions). Using path analysis, she found that supportive teacher relationships, high conduct expectations, and student-to-student interactions were positively associated with student engagement and perceived academic competence. Student engagement and perceived academic competence had significant positive influences on mathematics achievement on the Stanford Achievement Test. This study was limited to a school serving primarily low-income, low-achieving Hispanic students and thus may not generalize beyond this population.

At the elementary level, Cefai (2007) studied classrooms in Malta. Teachers first completed a seven-item questionnaire on each of their students regarding their pro-social behavior in the classroom, motivation and engagement in classroom activities, as well as autonomy and problem solving. The classrooms with the highest levels were then studied through participant observation and semi-structured interviews. These classrooms were characterized by a sense of classroom belonging and connectedness, teacher attention to and support of students, teachers expressing the belief that all

students had the potential to succeed and could learn, activity-based instructional strategies, and recognition of student efforts. The lack of a comparison group or in-depth study of classrooms in which students scored lower on pro-social behavior, problem solving, and motivation and engagement in school activities was one limitation of this study. Although this study did not focus on achievement scores, it did focus on student behaviors that are consistent with higher achievement.

Some recent studies have measured support as a single construct which combines caring relationships and high expectations. In a psychometric assessment of the Resilience and Youth Development Module of the Healthy Kids Survey, Hanson and Kim (2007) found that the scales they used to measure caring relationships and high expectations actually measured the same factor—supportive relationships. As part of this analysis, they examined data from a sample of 2,898 in a large county in Southern California and found significant negative relationships between their measures of school support and school meaningful participation with substance use, truancy, and being depressed for secondary school students. They found significant positive relationships with school connectedness, self-reported school grades, and scores on the California Standards Test, also for secondary school students. For elementary school students, the measure of school support was negatively associated with substance use, aggression victimization and perpetration, and feeling unsafe, but positively associated with school performance.

Also using the California Healthy Kids Survey, Sharkey, You, and Schnoebelen (2008) selected a random sample of 10,000 students from the survey that was

administered in the 2005-2006 school year. From that sample, 823 students were identified as having family strengths, based on student responses to the family assets questions in the survey, and 806 were identified as having family risks, based on the same information. The scale they used to measure school assets was the supportive relationships scale identified by Hanson and Kim (2007). In their survey, they found that school assets were related to student engagement for students with high family assets as well as those with low family assets, suggesting that school assets are meaningful for all students, not just for those at risk. However, they found that school assets had a stronger impact on the internal assets of students in the family risk category than they did with those in the family strength category. No direct measures of academic outcomes were used in this study. The student engagement measure used was the School Connectedness Scale developed from items used in the National Longitudinal Study of Adolescent Health (McNeely, Nonnemaker, & Blum, 2002), which measures the student's psychological bonds with the school rather than academic, behavioral or cognitive behaviors.

Perry, Liu, and Pabian (2010) used the Teacher Support Scale developed by Metheny, McWhirter, and O'Neil (2008) in their study of 285 urban youth in middle and high school. This scale includes items which measure caring teachers as well as items which measure high expectations. Through structural equation modeling, they demonstrated that teacher support was directly associated with both career preparation and school engagement and indirectly associated with student grades.

Other studies have focused on some aspects of caring relationships and high expectations as separate variables. Shin, Lee, and Kim (2009) used multi-level modeling techniques to assess the effects of two school variables on mathematics achievement—school disciplinary climate and teacher-student relationships. The data used was from the 2003 administration of the Program for International Student Assessment (PISA) from the Organization for Economic Cooperation and Development. They studied the impact of these variables for 15-year old students in Korea, Japan, and the United States. They found that school disciplinary climate was positively associated with mathematics achievement in all three countries, but that the teacher-student relationship was positively related to mathematics achievement only in Japan.

Other studies sought to compare and contrast the relative effectiveness of caring relationships and high expectations. Borman and Rachuba (2000), for example, compared the effective schools model with the peer-group composition model, the school resources model, and the supportive school community model to determine which school characteristics were most powerful in promoting academic achievement for low-income students. The effective schools model included the schools' emphases on maximizing learning time, monitoring student progress, clear school-wide goals, and strong leadership on the part of the principal. The peer-group composition model took into account the percentages of low-income and ethnic minority students in the school as well as the overall academic performance of students at the school. The school resources model included the teacher's years of experience, class size, and the availability of instructional resources. The supportive schools model included measures of a safe and

orderly environment (which is also traditionally considered a part of the effective schools model), teacher-student relationships, and support for parent involvement. In their analysis of data from the Prospects study of elementary school students, they found that the supportive school community model was the most powerful model in predicting academic resilience of low-income students.

Shouse (1995) studied the influence of academic press and school sense of community on academic achievement. He examined cross-sectional data from the first follow-up survey of the National Education Longitudinal Study (NELS:88) when students were generally in tenth grade. He investigated the correlations of academic press and sense of community with mathematics test scores for schools serving students from varying levels of socioeconomic status. Although academic press was associated with achievement in all the schools, it had the strongest effect for schools serving primarily low-income students. Notably, these were the schools with the lowest levels of academic press. In schools serving low-income students that had low levels of academic press, sense of community was negatively associated with academic achievement. The relationship between sense of community and academic achievement was reversed when academic press was higher. For schools serving primarily low-income and middle-income students, the strongest effects on mathematics test scores were a combination of academic press and a sense of community. For schools serving the most economically advantaged students, the strongest effect was for high levels of communality and low levels of academic press. This study concluded that developing a sense of community in

schools serving low-income students would only result in educational resilience if it were accompanied by a strong academic emphasis.

In apparent contradiction to the findings from Borman and Rachuba (2000) and Shouse (1995) and in spite of the general appeal of the supportive school community model (also known as the communitarian model), Phillips (1997) found that an academic press model had a positive relationship to mathematics achievement and school attendance in a longitudinal study of middle school students. The communitarian model, in contrast, was not related to either achievement or attendance. Phillips criticized Shouse's study for including some measures of academic press in his communitarian index and for including items related to disciplinary climate in his measure of academic press. Since the students in Phillips' study lived in a middle-class suburban county rather than the inner-city, it is possible that her findings apply primarily to more advantaged students and do not negate the importance of a communitarian model for students at greater risk and in greater need for a supportive school community. Furthermore, the schools in her study were located in a single school district, also limiting the generalizability of her findings.

In studying the effects of school climate and academic press on high school dropout, however, McNeal (1997) found no relationship between either school climate or academic press on the likelihood of a student dropping out. Smyth and Hattam (2002), on the other hand, found that school climate or culture may be associated with school dropout. They conducted qualitative research with 209 young people in Australia who had left school early or were on the verge of doing so. They identified three school

cultures—the aggressive school culture which focused on strict academic and behavioral standards, the passive school culture which tried to balance traditional models of education with a more caring climate, and the active school culture which was more committed to a model of working with all enrolled students. Cultural factors in the schools which contributed to early school leaving included holding students individually responsible for their failures without recognizing the role of the school in the process, harsh treatment of students who do not conform, behavioral policies that made it difficult for students to continue in their studies, uninspiring teaching methods, and lack of respect for the students.

In examining the characteristics of effective schools, educators and researchers should keep in mind that these characteristics should not be considered in isolation from one another.

> No single education policy or practice, no matter how well grounded in research, can be expected to increase students' academic engagement if the policies and practices in which they are embedded are ignored. For example, small, personalized schools may not enhance meaningful cognitive engagement and learning if they do not also provide effective teaching and a strong press for achieving high academic standards; the most engaging teaching practices may have little effect on a student who is homeless, has serious untreated health problems, or faces the chronic threat of violence. . . . Student engagement and learning are affected by a complicated set of nested variables. . . . some of the simple solutions that have been proposed, such as raising standards, can alone do

> more harm than good. Realistically, the reforms that are needed will require greater resources than are currently provided. At the very least, the inequities in resource allocation, with schools serving students with the greatest needs having the fewest resources, will need to be redressed. (National Research Council, 2004, pp. 9-10)

This point is highlighted by concerns of the Learning First Alliance (2001) that focusing too narrowly on high academic standards may limit attention to building safe and supportive learning communities. Similarly, Shouse's (1995) work shows that a sense of community enhances the educational resilience of disadvantaged youth only when the school places an emphasis on academic press. Therefore, schools aiming to produce higher levels of academic achievement and high school graduation rates by low-income and ethnic minority youth would be most effective if they included the combination of the characteristics described in this section.

A Model Resilience-Promoting School

In a model school for building resilience, high levels of caring relationships, high expectations, and opportunities for participation and contribution would be integrated throughout the school environment. The environment and activities in the school would be structured to address the developmental needs of students—needs for belonging, competence, and autonomy.

Caring relationships in schools are more likely if there are sufficient numbers of adults per student so that each student would be known well by one or more adults. This adult would demonstrate caring by addressing the student by name, being available to

listen to the child, demonstrating understanding, recognizing the student's strengths, and showing respect for the child. Some schools would enhance the adult:child ratio of caring through the involvement of parents, volunteers, and non-instructional employees in this process. Ideally, class sizes and schools would be smaller to provide a more personalized environment; larger schools would be structured to work toward this goal (i.e. schools within schools). Because these schools and their personnel care about their students, they keep in frequent contact with parents to engage their participation, knowing how important family involvement can be to the education and healthy development of their children. Caring for students would also be expressed through the efforts of school employees to enhance the school environment and educational strategies to foster optimal development of the students. Schools with the highest levels of caring relationships would focus on developing positive social interactions among students as well as between students and teachers, thereby generating a strong sense of community or belonging within the school.

High expectations are demonstrated by teachers and schools which act on the belief that *all* children can succeed and provide students the support needed to make success possible. Such schools offer challenging curricula and use evidence-based instructional practices. Rather than tracking some students into low-expectation classes for lower-performing students, such schools involve students in a variety of undifferentiated courses. Higher academic expectations are accompanied by higher behavioral expectations, with clear, consistent, and fair student disciplinary rules.

Student problem-solving skills are enhanced through involvement in critical thinking learning activities.

Resilience-promoting schools provide students with multiple opportunities for student participation and contribution. Teaching strategies in the classroom actively involve students in the learning process. Students are given responsibilities in the classroom that help them to recognize that their contribution makes a difference (i.e., participation in classroom governance and teacher evaluation, cooperative learning activities, specific rotated assignments such as taking attendance or leading classroom discussion). Students have opportunities to experience the relationship between education and employment through work-based learning activities. They have the opportunity to see themselves as valued members of the community through service learning. Furthermore, they are exposed to opportunities to develop their multiple intelligences or strengths (in the arts, student government, athletics, etc.) both in the classroom and extracurricular activities. It is particularly important in resilience-promoting schools that multiple extracurricular activities are available to all students. Limiting such activities to the most talented students deprives others of the opportunities and benefits to be derived from such participation.

The optimal resilience-promoting school environment balances all three characteristics. An emphasis on caring relationships without high expectations may result in lack of student effort to meet achievement goals. An emphasis on high expectations without caring relationships may result in unwillingness to perform as expected due to the lack of support and caring. Opportunities for meaningful

participation and involvement would provide fewer benefits if not provided in a caring environment that fostered student striving to reach realistic goals.

Assessment of Previous Studies on School Level Factors That Contribute to Educational Resilience

Although there are numerous research studies on factors that contribute to positive educational outcomes, relatively few of them focus on school-level environmental factors that are discussed in the literature on resilience. Many studies, including the Coleman Report (1966), concentrate on characteristics of the individual student (such as family background, demographic and/or psychological variables) that contribute to academic success. Since the literature on resilience considers internal as well as external protective factors, there are also studies which compare resilient to nonresilient students, again finding differences at the level of the individual student.

Focusing on individual characteristics, however, places responsibility for academic outcomes solely on the student and ignores the contribution of the school. However, schools do make a difference in the educational and behavioral outcomes of their students even when they serve similar groups of students, as found in Rutter et al.'s (1979) study and in the literature on high-poverty, high-performing schools.

Although Benard (2004) has identified three environmental characteristics of resilience-promoting schools, there is relatively little research that examines the impact of all three characteristics on educational outcomes (Akey, 2006; Cefia, 2007; Reis, Colbert, & Hebert, 2005; Shouse, 1995; Smyth, 1999; Wimberly, 2002). Most notable in this regard is the work of Hanson, Austin, and Lee-Bayha (2003, 2004) since it is based on

Benard's (1991, 2004) protective factors in the Resilience and Youth Development Module of the California Healthy Kids Survey. Since this is part of the statewide school assessment data required every two years in California, there is now a substantial data base of responses to this survey. For the most part, data collection efforts have been restricted to the state of California in which studies have compared data on measures of student health, school well-being and academic performance only at the school level.

There are some exceptions, however. Jennings (2003) used the California Healthy Kids Survey to measure the relationship between caring relationships at school and meaningful participation with grade point averages of a small, non-random sample of seventh grade students in California. Gizir and Aydin (2009) used the Resilience and Youth Development Module to assess protective factors associated with higher grade point averages of 872 eighth grade students living in poverty in Ankara, Turkey. More recently, WestEd has developed a School Climate Survey to be administered to professional school staff which will be used in evaluations of all grantees of the federal Safe Schools/Healthy Students Program (Gregory Austin, personal communication, July 22, 2010).

Even in the Resilience and Youth Development Module based on Benard's work, there is no longer a differentiation between Benard's conception of caring relationships and high expectations. In a psychometric assessment of the California Healthy Kids Survey (Hanson & Kim, 2007), there was no measureable distinction between caring relationships and high expectations. Since this study, the items on the two measures have been combined into one—supportive relationships. If caring relationships and high

expectations are separate factors, the Resilience and Youth Development Module cannot be used to distinguish between these two factors. This may account for the earlier studies comparing communality and academic press

Other literature which would appear to support Benard's conceptualization of school-level protective factors is inconsistent in the specific measures used and with Benard's description of these factors, as noted in Tables A1 through A4. Caring relationships, for example, are defined in many studies by student reports on a variety of items as well as by teachers' reports of speaking with the student outside of class. Other studies focus only on school size as a variable which would determine opportunities for caring relationships to develop (Schneider, Wyse, & Keesler, 2006/2007; Weiss, Carolan, & Baker-Smith, 2010; Werblow & Duesbery, 2009; Wyse, Keesler, & Schneider, 2008), but do not measure the extent to which caring relationships are associated with school size. Additional studies focus only on caring relationships and do not include measures of high expectations and opportunities for participation and contribution (Crosnoe & Elder, 2004; Croninger & Lee, 2001; Liew, Chen, & Hughes, 2010; Resnick et al., 1997). The studies conducted by Shouse (1995) and Phillips (1997) included additional items in their constructs of communality, making it difficult to determine exactly what they were measuring.

A variety of measures have been used that reflect Benard's (2004) construct of high expectations. These measures include tracking by ability levels, participation in an academic curriculum, teachers' expectations for their students' success, the number of advanced levels of courses offered, and a construct called academic press that is also

defined differently from one study to another (Lee & Burkam, 2003; McNeal, 1997; Phillips, 1997; Shouse, 1995). The literature on opportunities for participation and contribution tends to focus on student participation in extracurricular activities (Camp, 1990; Dumais, 2008; Hunt, 2005; Jordan, 1999; Mahoney & Cairns, 1997; Randolph, Fraser, & Orthner, 2004), but it is clear from Benard's work (2004) that there are additional forms of participation that could contribute to this concept, such as community service and experiential learning activities.

Notably, relatively few studies take into account the nested structure of the research data on school effects and use multi-level modeling techniques in their analysis (Lee & Burkam, 2003; McNeal, 1997; Phillips, 1997; Schneider, Wyse, & Keesler, 2006/2007; Shouse, 1995; Smyth, 1999; Werblow & Duesbery, 2009). However, the data in many of those studies is relatively dated and may not reflect current conditions of high schools in the United States. McNeal's data was from the High School and Beyond data set from 1980. Lee and Burkham (2003) and Shouse (1995) used data sets from the National Educational Longitudinal Survey from 1988. Phillips (1997) used data from middle schools in a single school district. Smyth's (1999) data was from Ireland.

Although there is support in all these studies for Benard's (2004) construct of resilience-promoting school environments, only a few recent studies use Benard's work as the framework for their studies—using the Resilience and Youth Development Model that was developed originally for the California Healthy Kids Survey.

Conceptual Framework

The current study on educational resilience focuses on ways in which schools can provide some protection in view of the educational risks faced by low-income and ethnic minority children. It is specifically concerned with school levels of the three environmental characteristics identified by Bernard (1991, 2004) that contribute to healthy development and resilience—caring relationships, high expectations, and opportunities for participation and involvement.

In Benard's view (2004), caring relationships within the school are characterized by the following:

- *Every student has a caring relationship with adults at his or her school. . . .*
- *Schools and classrooms feel like communities. . . .*
- *Schools and classrooms make use of a number of school-group processes. . . .*
- *Schools and classes are small. . . .*
- *Caring relationships among school staff are encouraged and supported. . . .*
- *Discipline is designed to keep students feeling connected. . . .*
- *Early intervention services are available. . . .*
- *School-based mentoring programs link students with community volunteers. . . .*
- *Families and the community are invited to partner with the school. . . .*

Benard, 2004, pp. 71-73).

High expectations at the school level are likely to include the following strategies:

- *Instruction is individualized to accommodate the broad range of students. . . .*
- *Learning opportunities are structured so that success is possible. . . .*
- *The curriculum is rich with art, music, and outdoor experiences and projects. . . .*
- *Students have a choice of interest-based after-school clubs. . . .*

(Benard, 2004, p. 77)

School-level opportunities for participation and contribution are more likely to be found in schools in which the following are present:

- *Students experience "voice and choice" in their daily life at school. . .*
- *Students have many experiential learning opportunities. . . .*
- *Group process is infused throughout the curriculum and school day. . .*
- *Students have many opportunities to express themselves through the arts. . . .*
- *Students have opportunities for community service learning. . . .*
- *Students have a way to take responsibility for their transgressions. . . .*

(Benard, 2004, pp. 81-85).

Although various aspects of these protective factors have been studied previously, the research that focuses on all three independent variables is limited and the operational definitions of the variables in that literature are not consistent.

Even the Resilience and Youth Development Module of the California Healthy Kids Survey, which is based on Benard's theoretical resilience framework (WestEd, 2007), provides only a limited sample of these three protective factors at the school level. This instrument includes external resilience assets at the levels of school, home, community, and peers as well as internal resilience assets. The three items comprising caring relationships at school are as follows: "At my school, there is a teacher or some other adult who…

- really cares about me.
- notices when I'm not there.
- listens to me when I have something to say" (Hanson, Austin, & Lee-Bayha, 2003, p. 66).

The items comprising high expectations at school are as follows: "At my school, there is a teacher or some other adult who…

- tells me when I do a good job.
- always wants me to do my best.
- believes that I will be a success" (Hanson, Austin, & Lee-Bayha, 2003, p. 66).

The items comprising meaningful participation at school are as follows: "I do interesting activities at school," "At school, I help decide things like class activities or rules," and "I do things at my school that make a difference" (Hanson, Austin, & Lee-Bayha, 2003, p. 66).

The present study differs from Hanson, Austin, & Lee-Bayha's (2003) study in that it is focused only on protective factors available in the school environment. It also

differs from the earlier study in the dependent variables of concern—a measure of senior year mathematics achievement and a dichotomous measure of whether or not the student graduated from high school on time. The measures of caring relationships, high expectations, and opportunities for participation and contribution used in this study include several elements from Benard's conceptualization of these measures in the literature and some of the ways in which these measures are operationally defined in the research. Figure 2.1 provides a diagram of the overall conceptual framework and the various measures that were used in this study.

Caring Relationships

Caring relationships as operationalized in this study included several measures—student perceptions of caring relationships with their teachers, students' experiences of negative interactions with others at school, teachers' reports of speaking with the students outside of class, the student:teacher ratio, and a school policy of prompt notification of unexcused student absences. Students' perceptions of caring relationships at school are commonly included in other studies of school effects (Borman & Rachuba, 2000; Crosnoe & Elder, 2004; Croninger & Lee, 2001; Lee & Burkam, 2003; Phillips, 1997; Resnick et al., 1997; Shouse, 1995; Wimberly, 2002) (see Tables A1 and A4). Students' experiences of negative interactions with others at school are also used as a measure which indicates that caring relationships did not extend throughout the school.

Another measure of caring relationships comes from the teachers—the teachers' reports of whether or not they speak with the student outside of class. This serves as an indication that the student has a relationship with at least one caring adult at school who

takes the time to meet with him/her as an individual. This measure is used in Croninger & Lee's (2001) and in Wimberly's (2002) studies (see Tables A1 and A4).

The student:teacher ratio is included in this study because caring relationships (Benard, 2004) are likely to be stronger when schools and classes are relatively small. This is confirmed in McNeal's (1997) study which found that lower student:teacher ratios reduced the odds of students dropping out of school (see Table A4).

Benard (2004) considers outreach to the families and the community to be an extension of caring relationships at schools. In this study, this was measured by the school's policy on notifying parents of unexcused student absences. Prompt notification of student absences is one way in which schools can demonstrate that they care about the student and what he/she is doing that may be keeping him/her from succeeding academically.

High Expectations

High expectations as operationalized in this study include another group of variables—students', parents' and the administrators' views of the academic emphasis of the school as well as the level of school discipline, teacher expectations and beliefs, and communication with parents about the accomplishments of the students.

The academic emphasis of the school is a major component of high expectations. Academic press was one variable used in a number of studies (McNeal, 1997; Phillips, 1997; Shouse, 1995; Wimberly, 2002). In this study, students, parents and the administrators provide their experiences and perspectives regarding the academic emphasis of the school.

Student perceptions of high academic expectations can be measured in more than one way. In the Resilience and Youth Development Module of the California Healthy Kids Survey, one item refers to a teacher or adult at school who "tells me when I do a good job" (Hanson, Austin, & Lee-Bayha, 2003, p. 66). There is a similar item in the ELS data set: "When I work hard on schoolwork, my teachers praise my effort." The same item is used as a measure of the school's social organization in Lee & Burkam's study (2003) but will be used as a measure of high expectations in this study which, like the Resilience and Youth Development Module, is based on Benard's conceptualization of high expectations. Two other variables are combined in this measure—whether or not the student goes to school because the subjects are "interesting and challenging" or because "teachers expect success."

Students' perceptions of what their counselor, favorite teacher, and coach want them to do after high school predicted student educational expectations and participation in postsecondary education in Wimberly's study (2002). This measure is also used in this study as a measure of high expectations. Another measure included in this study was whether or not the student was enrolled in a college prep program, an indication that the school considered the student as having the potential to succeed in college. A similar measure at the school level was the administrator's report of the percentage of students enrolled in college prep classes.

In this study, another measure of high academic expectations was found in the responses of parents to items that included their tenth grader was "challenged at school" and "working hard at school" and that the school was preparing "students well for

college." Administrators also reported on high academic expectations when reporting on the extent to which "teachers at this school press students to achieve academically," "students place a high priority on learning," and "students are expected to do homework."

A school that exhibits high expectations "holds students accountable" and "uses discipline that is consistent, strict, and fair" (Benard, 2004, p. 125). High expectations focus on the development of the whole child with attention to student behavior as well as to their academic growth. This variable, however, is treated inconsistently in the literature. In Lee and Burkham's study (2003), fair discipline is part of the social (as opposed to academic) organization of the school. In Shouse's study (1995), disciplinary climate is considered part of the school's academic press, thus weakening the construct of academic press from Phillip's perspective (1997). In the present study, the disciplinary climate appears to be part of Benard's (2004) construct of high expectations and thus is included as one of the indicators of high expectations. Measures of school discipline were developed from the questionnaires administered to students, parents, and the administrators.

Actual teacher expectations for the student are a direct measure of the school's level of high expectations as a protective factor. In Schoon, Parsons, & Sacker's study (2004), teacher expectations were the most significant protective factor in predicting academic attainment. In Phillips' study (1997), teachers' reports of their expectations of the likelihood of their students completing high school and college constituted one measure of academic press, which was found to be positively associated with student

attendance and mathematics achievement scores. Teacher expectations were measured in this study in terms of how far they expect their students to go in school.

Benard (2004) asserts that high expectations are expressed in schools through a "'no excuses, never give up' philosophy (persistence/determination)," a belief "in the innate capacity of all to learn," and the use of "a variety of instructional strategies to tap multiple intelligences" (p. 125). Teachers who believe in the importance of their efforts in contributing to the success of their students are more likely to have high expectations for themselves and their students. Thus, teacher beliefs in the importance of "teacher's attention to the unique interests and abilities of the student," "teacher's use of effective methods of teaching," and "teacher's enthusiasm or perseverance" to the success of students in "achieving intended goals or objectives" were considered as an indication of high expectations in this study. This is not a component of high expectations as observed in previous studies, although Shouse (1995) included teacher's belief that students can learn as part of the measures of communality. Phillips (1997) contended that the inclusion of this variable in the category of communality was one of the problems that confounded the constructs of communality and academic press in Shouse's study.

According to Benard (2004), high expectations in schools are exemplified in part by calling the student's "home to report students' good behavior and achievements" (p. 125). Although the researcher has not observed this variable in previous studies, it is included in this study because it is part of Benard's view of high expectations. This measure is based on the reports of both parents and teachers.

Opportunities for Participation and Contribution

Opportunities to participate and contribute are extremely important to Benard's theory:

> It is through having the opportunities to be heard in a physically and psychologically safe and structured environment – to voice one's opinion, to make choices, to engage in active problem solving, to express one's imagination, to work with and help others, and to give one's gift back to the community – that youth develop the attitudes and competencies characteristic of healthy development and successful learning: social competence, problem solving, autonomy, and a sense of self and future. (Benard, 2004, p. 79)

The measures of participation and contribution that were included in this study are participation in teacher evaluations, active involvement in the classroom, availability of and participation in work-based learning, school and community involvement, availability of and participation in sports, and participation in other extracurricular activities.

Participation in school decisions is included in the Resilience and Youth Development Module of the California Healthy Kids Survey by the item "I do things at my school that make a difference" (Hanson, Austin, and Lee-Bayha, 2003). There is no similar measure in the other studies that have been reviewed by the researcher. However, the ELS study includes one item in which students may make a difference—whether or not they participate in the evaluation of teachers at their schools.

Teaching strategies that engage students in hands-on learning activities are more likely to enhance the development of resilience (Benard, 2006), including the students' sense of personal agency (Wang, Haertel, & Walberg, 1998). In this study, measures of active student involvement in the learning process in his/her mathematics class will be used as a measure of participation. A similar measure has not been identified in the studies reviewed by the researcher.

Benard (2004) considers experiential learning opportunities as one way to extend student participation and contribution in learning that is meaningful to students. Experiential learning can include a variety of hands-on learning activities. The specific experiential learning opportunities included in this study are work-based learning and community service. Although measures of these activities are not included in the studies reviewed by the researcher, they are included in the present study since they constitute part of Benard's construct of opportunities for participation and contribution.

The measure of opportunities for participation and contribution that is most frequently cited in the literature is participation in school-based extracurricular activities. Such activities enhance student connections with the school and provide additional opportunities for students to develop competence. The relationship between these activities and academic outcomes varies by study. Participation in extracurricular activities was found to be related to substantial reductions in school dropout rates (Mahoney and Cairns, 1997) as well as to higher educational expectations and participation in postsecondary education (Wimberly, 2002). However, such participation did not distinguish between resilient and nonresilient students in Finn and Rock's study

(1997), nor did it predict self-reported grades and educational expectations in Hunt's study (2005). Despite the apparently contradictory findings, extracurricular activities are included in the present study since they are part of Benard's construct of opportunities for participation and contribution.

Resilience Outcomes

Two dependent variables (senior year mathematics achievement scores and timely high school graduation) are included as measures of resilience outcomes. They are incorporated in the conceptual framework because of the focus of the study on school effectiveness and the educational disadvantages experienced by low-income and ethnic minority youth.

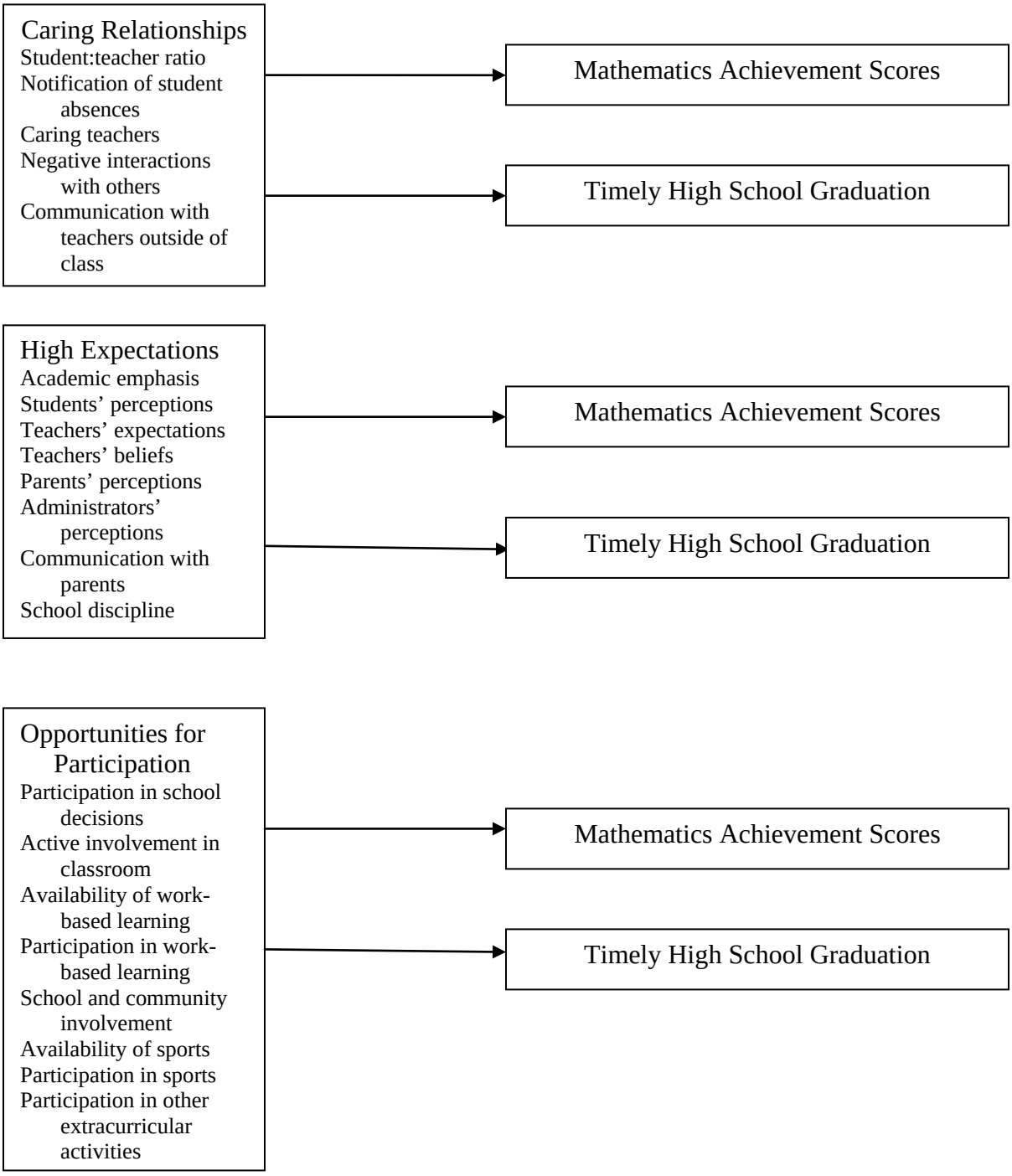
Mathematics achievement scores are considered important measures of school and teacher effectiveness because such scores (when compared with other academic subjects) are more subject to in-school influences (Rutter et al., 1979; Shouse, 1995), and they are used in other studies of school/teacher effectiveness (Borman & Rachuba, 2000; Phillips, 1997; Sanders and Rivers, 1996; Shouse, 1995). In this study, mathematics achievement scores are measured in the senior year to determine the extent to which students' experiences of caring relationships, high expectations, and opportunities for participation and contribution in the sophomore year contribute to the students' academic development by the spring of the senior year.

The second outcome of interest in this study is timely graduation from high school. This measure is chosen because of the importance of high school graduation to future postsecondary and occupational success. It also means that the student has

overcome whatever obstacles place him/her at risk for high school failure and dropout. High school graduation/dropout rates are used in other studies of school effectiveness (Croninger & Lee, 2001; Lee & Burkam, 2003; Mahoney & Cains, 1997; McNeal, 1997; Randolph, Fraser, & Orthner, 2004; Smyth, 1999; Smyth & Hattam, 2002).

Figure 2.1

Conceptual Framework for the Study



Chapter 3: Methodology

Research Questions

This study investigated whether the presence of three environmental-level protective factors is predictive of academic achievement gains and high school graduation rates of public high school students. The specific questions that were addressed in this study are as follows:

1. Do caring relationships, high expectations, and opportunities for student participation and contribution within the schools influence the mathematics achievement of public high school students?
2. Do caring relationships, high expectations, and opportunities for student participation and contribution within the schools influence the odds of timely graduation of public high school students?

These two research questions were answered first for the overall public school population.

The next research questions focused on which factors place students at risk for poor academic achievement and high school dropout. The risk factors that were considered include race/ethnicity (particularly African American and Hispanic youth who are typically disadvantaged in educational outcomes); low socioeconomic status; living in a nontraditional family structure (without both biological parents); having been retained a grade in school; having a first language other than English; and having a learning,

physical, or emotional disability. The specific questions that were addressed in this analysis are as follows:

3. Does the risk factor predict lower mathematics achievement of public high school students?
4. Does the risk factor predict lower odds of graduating on time of public high school students?

The final research questions focused on whether caring relationships, high expectations, and opportunities for student participation and contribution within the schools serve a protective function for students at risk of poor educational outcomes. The specific questions that were included in this part of the study include the following:

5. Do caring relationships, high expectations, and opportunities for student participation and contribution within the schools influence the mathematics achievement of public high school students who are at risk of poor academic achievement?
6. Do caring relationships, high expectations, and opportunities for student participation and contribution within the schools influence the odds of timely graduation of public high school students who are at risk of high school dropout?

The specific hypotheses that were investigated in this study for each group of students are as follows:

1. Caring relationships within the schools during tenth grade will influence mathematics achievement scores in twelfth grade.

2. High expectations within the schools during tenth grade will influence mathematics achievement scores in twelfth grade.
3. Opportunities for participation and contribution within the schools during tenth grade will influence mathematics achievement scores in twelfth grade.
4. Caring relationships within the schools during tenth grade will influence odds of graduation on time.
5. High expectations within the schools during tenth grade will influence odds of graduation on time.
6. Opportunities for participation and contribution within the schools during tenth grade will influence odds of graduation on time.

Data Source

Existing data sources have been reviewed for use in this study. The advantages of using existing data sources include the size of the sample as well as the use of rigorous sampling methods in determining the schools and students that would be included in the study. Among the data sources considered for use in this study are the National Educational Longitudinal Study from 1988 (NELS:88), the National Longitudinal Study of Adolescent Health, and the Educational Longitudinal Study from 2002 (ELS:2002).

The NELS: 88 data has the advantage of being longitudinal. It includes data from students, teachers, school administrators, and parents, beginning from when the students were in grade 8 (in 1988) and continuing over some length of time. The disadvantage of the data is that students in the survey were in tenth grade in 1990, and may not have had

the opportunity to participate in some of the educational reforms that have been developed in more recent years.

The National Longitudinal Study of Adolescent Health was considered for this study because the data was collected somewhat more recently than the NELS:88 data (with the first wave of data collected in the 1994-95 academic year) and it included longitudinal data. It collected data from students, their parents, and the administrators of their schools and was enhanced by pre-existing data sets on neighborhoods and schools. It did not include data from the teachers, however, and therefore did not include relevant information on the interactions of teachers with their students.

The ELS:2002 is the data source that has been selected for this secondary analysis. It has information from students, their parents, their English and mathematics teachers, their school administrators, and an independent survey of school facilities by the person administering the survey. The data set provides initial academic achievement data in the form of English and mathematics test scores, senior-level academic achievement data on mathematics test scores, transcripts of the students, and reports on the students' completion/non-completion of high school graduation requirements. One advantage of the data set is that some of the data of interest in this study can be triangulated, with data from more than one person. Another advantage of the data set is that the data were collected relatively recently so that it more accurately reflects current experiences of high school students and the characteristics of the schools they attend. Another major advantage of this data set is that it is longitudinal. It includes data from the students who were high school sophomores in Spring 2002, follow-up data when they were expected to

be high school seniors in Spring 2004, and their final high school transcripts. Information on student status and outcomes in 2004 (still in school, transferred, graduated early/on-schedule, or dropout) allows for the use of school-level data in 2002 as predictors of student status in 2004.

The ELS:2002 was implemented in a nationally representative sample that included 752 schools. The target population of schools included approximately 27,000 public, Catholic, and other private schools that included tenth grade students. Of the 1,221 eligible schools that were sampled, 752 responded, which represented a 67.8 percent (weighted) response rate (Ingels et al., 2004). Of the 752 schools included in the survey, 92.4 percent were public schools, 4.3 percent were Catholic schools, and the remainder of the schools (3.4 percent) were private schools other than Catholic schools (Tabs, 2004). Most of the schools that participated in the sample also completed a school administrator questionnaire and a library questionnaire. Almost all (a weighted response rate of 98.5 percent) of the school administrators completed this survey. Additionally, the field staff conducting the surveys completed a facilities checklist reporting their observations of each of the schools participating in the study (Ingels et al., 2004).

The target population of students consisted of spring-term tenth graders enrolled in schools in the target school population in 2002. Foreign exchange students were excluded from the target population. 87.3 percent (weighted response rate) of the eligible students selected for the study participated in completing the student questionnaire. Some students were excluded from participation due to limited English proficiency or mental or physical disabilities that would interfere with their completion of the

questionnaire. 163 students were excluded from participation due to limited English proficiency or disabilities (Ingels et al., 2004). Of the 17,591 eligible sophomore students selected for the study, 15,362 completed the base-year questionnaire. 14,543 (95.1 percent weighted response rate) of those students also had test data (Tabs, 2004).

Additional data to support analyses at the student level were collected from parents and the teachers who were teaching tenth grade English and mathematics to these students. 13,488 parents (87.5 percent weighted response rate) completed the questionnaire. A total of 7,135 teachers completed questionnaires for 91.6 percent (weighted response rate) of the students (Ingels et al., 2004).

Non-response bias analyses were performed at the school and student levels, both prior to computing weights and after weights were computed. Missing values for 14 analysis variables and the reading and mathematics assessment scores were imputed to reduce survey bias due to missing data. To compensate for unequal probabilities in selecting schools and students as well as to adjust for nonparticipating schools and students, three sets of weights were calculated—a school-level weight, a student-level weight, and a contextual weight for "expanded" student sample (Ingels et al., 2004).

More than half of the students (60.3 percent) identified themselves as White, non Hispanic. 15.9 percent were Hispanic or Latino; 14.4 percent were Black or African American; 4.3 percent were multiracial; 4.2 percent were Asian or Pacific Islander; and one percent were American Indian or Alaska Native. Approximately half (50.3 percent) of the students attended suburban schools; 30.2 percent attended urban schools; and 19.6

percent attended rural schools. The majority of the students (86 percent) reported that English was their native language (Tabs, 2004).

The data collected in this study are multilevel, providing information about the individual student, his/her parent, and his/her math and English teachers during the sophomore year, as well as about the school attended. The study focused on a filtered sample of the overall data. Students included in the filtered sample were members of the original sophomore cohort, enrolled in public schools, and did not transfer to another school between tenth and twelfth grades. This reduced the sample to approximately 11,360 students enrolled in approximately 580 schools. Table 3.1 shows some of the characteristics of the filtered sample.

Table 3.1
Characteristics of Filtered Samples

	Sophomore Cohort N=16,020	Public School Students N= 12,610	Students Who Did Not Transfer N=11,360
Mean Math Score in Twelfth Grade	49.61	47.68	48.05
Percent Graduating on Time	88.8	86.5	88.2
Percent from Lowest SES Quartile	23.6	28.1	27.4
Percent African American	17.1	19.1	18.3
Percent Hispanic	14.9	16.3	15.8
Percent with First Language Other than English	17.0	19.0	18.8
Percent from Nontraditional Family	40.6	44.3	42.6
Percent Retained a Grade in School	12.1	13.6	13.1
Percent with Disability	11.4	12.4	11.7

Independent Variables

The independent variables in this study focus on the characteristics of the school and relate to the three school-level protective factors that are hypothesized to protect against risk—caring relationships, high expectations, and opportunities for participation and contribution. These factors are expected to influence the quality of the learning experience and student academic outcomes. Because these are complex factors, each protective factor was explored from several perspectives.

Caring Relationships

The extent to which the schools provide students with caring relationships is dependent on a number of factors. Those variables that are expected to contribute to caring relationships within the schools are as follows:

Level-One Variables

Students' perceptions of caring relationships with teachers. This variable is a scaled item based on students' responses to the following items: "Students get along well with teachers," "The teaching is good," and "Teachers are interested in students." The items were originally coded so that 1 = strong agree, 2 = agree, 3 = disagree, and 4 = strongly disagree. The items were reverse coded so that a higher number indicates a positive response to the items. The scores on the three-item scale range from 3 to 12. In a principal components analysis with the full data set, this variable accounted for 62 percent of the variance with a Cronbach's alpha of .704. In the data set filtered for public school students who did not transfer to another school, the variable accounted for 61 percent of the variance with a Cronbach's alpha of .685. This variable did not meet the

assumptions of a normal distribution due to kurtosis of 1.379 (s.e. .049) but was used without transformations.

Students' perceptions of negative interactions at school. Caring relationships may not have been experienced by students who had negative experiences with others at the school. A three-item scale was constructed for negative interactions—"Someone threatened 10th grader," "Got into a physical fight at school," and "Someone hit 10th grader." These items were coded on a three-point scale in which 1 = never, 2 = once or twice, and 3 = more than twice. In the unfiltered data set, the scale accounted for 60 percent of the variance, with a Cronbach's alpha of .672. In the filtered data set, which included public school students who did not transfer to another school, the scale accounted for 60 percent of the variance, with a Cronbach's alpha of .661. This variable did not meet the assumptions of a normal distribution due to problems with skewness (1.989, s.e. 0.024) and kurtosis (3.892, s.e. 0.049) but was used without transformations.

Teachers' talking with students outside of class. For each student in the survey, their mathematics and English teachers were asked one question—whether or not the student talked with them outside of class about school work, plans for after high school, or personal matters. If the teacher answered yes, it was coded 1; otherwise it was coded 0. For each teacher, a yes response indicates the presence of a caring relationship with that student.

Level-Two Variables

Student:teacher ratio. This school level variable from the Common Core of Data has been merged with the ELS:2002 data set and is available in the restricted ELS:2002

data set. A lower student:teacher ratio is expected to increase the opportunity for caring relationships since students and teachers would know each other better. This variable met the assumptions of a normal distribution

School notification of unexcused student absence. Prompt notification to parents of student absence can be considered evidence of caring about the student whereas lack of notification can be considered as evidence of lack of caring. The school administrator reports on the school's policy of parental notification on a six-item scale. This scale was recoded so that a higher value indicates more prompt notification. Because this variable did not meet the assumptions of a normal distribution, due to skewness of -1.550 (s.e. 0.025) and kurtosis of 2.070 (s.e. 0.050), a squared transformation of this variable was used which met the assumptions of normality.

High Expectations

The existence of high expectations for students appears to be an essential ingredient for producing high levels of student academic achievement. Although high academic expectations (academic press) are considered part of this construct, high behavioral expectations are another part.

Level-One Variables

Enrollment in college prep program. Whether the student considered him/herself to be enrolled in a college prep, general, or vocational program at school combines what guidance the school has provided the student and what expectations he/she has for him/herself. This item was recoded so that 1 represents enrolled in a college prep program and 0 indicates a general or vocational program.

Student perceptions of high expectations. Two scales were developed—one for high academic expectations and another for high behavioral expectations. In another measure of high expectations, students were asked whether school personnel thought they should go to college after completing high school.

Academic expectations were measured on a three-item scale—"I go to school because classes are interesting and challenging," "I go to school because teachers expect success," and "When I work hard on my school work, my teachers praise my effort." Originally coded on a four-point scale from 1 = strongly agree to 4 = strongly disagree, the items were recoded so that a higher score is consistent with higher expectations. In the unfiltered data set, the scale accounted for 56 percent of variance and Cronbach's alpha = .619. In the filtered data set, the scale accounted for 57 percent of the variance, with a Cronbach's alpha of .617. This variable met the assumptions of a normal distribution.

Behavioral expectations were measured on a five-item scale—"Everyone knows school rules," "School rules are fair," "Punishment is the same no matter who you are," "School rules are strictly enforced," and "Students know punishment for broken rules." The scale was originally coded from 1 = strongly agree to 4 = strongly disagree but was reverse coded so that a higher score indicates agreement with the statement and higher behavioral expectations. The scale accounted for 37 percent of the variance in the unfiltered data set, with a Cronbach's alpha of .672. In the filtered data set, it accounted for 43 percent of the variance, with a Cronbach's alpha of .667. The variable met the assumptions of a normal distribution.

In the third variable, high expectations were measured by student responses to the question regarding whether or not their school counselors, favorite teachers, or coaches think going to college is the most important thing for them to do right after high school. Since students did not always have counselors, favorite teachers, or coaches, the three variables were combined into one variable indicating that the student could identify at least one person who thought that going to college is the most important thing for the student to do right after high school.

Parents' evaluation of high expectations at school. Parents evaluated the school on two scales—one based on academic expectations, the other based on expectations with regard to school discipline.

Parents' academic expectations were summarized in a three-item scale—"My tenth grader is challenged at school," "My tenth grader is working hard at school," and "School prepares students well for college." The items were originally coded on a four-point scale from strongly agree to strongly disagree but were recoded so that a higher value indicates agreement with the statement and higher expectations. On the unfiltered data set, the scale explains 59 percent of the variance with a Cronbach's alpha of .685. On the filtered data set, the scale explains 59 percent of the variance with a Cronbach's alpha of .657. The scale had a small problem with kurtosis (1.018, s.e. 0.057) and was used without transformations.

Expectations in regard to school discipline were measured by the parents' responses to the statements—"Drinking on school grounds is a problem," "Drug use on school grounds is a problem," "Theft on school grounds is a problem," "Violence on

school grounds is a problem," and "Lack of discipline in class is a problem." These items were coded on a four-point scale with 1 = strongly agree and 4 = strongly disagree, thus a higher score is consistent with higher expectations in the school. This scale accounted for 65 percent of the variance with a Cronbach's alpha of .868 in the unfiltered data set. It accounts for 62 percent of the variance, with a Cronbach's alpha of .846 in the filtered data set. Although the kurtosis was somewhat higher than desired (1.436, s.e. 0.065), no transformations were made in this variable.

Teacher expectations for student progress in school. English and mathematics teachers were asked to rate how far each of their students are expected to go in school on a seven-point scale ranging from will not complete high school to achieving a doctoral or professional degree. A higher value on this item indicates higher expectations of their students. There were two variables, one for the English teachers and the other for the math teachers. The correlation between the two items is .667. Combined as a two-item scale, the scale accounts for 83 percent of the variance in the unfiltered data set, with a Cronbach's alpha of .800. In the filtered data set, the scale accounts for 83 percent of the variance, with a Cronbach's alpha of .793. This variable met the assumptions of a normal distribution.

Teachers' beliefs in their power to help their students succeed. Teachers who believe that they can make a difference in their students' success are more likely to have high expectations for themselves and their students. This variable was measured by teacher response regarding the importance of each of the following three items to student success—"teacher's attention to the unique interests and abilities of the student,"

"teacher's use of effective methods of teaching," and "teacher's enthusiasm or perseverance." Each of these items was measured on a four-point scale from extremely important to not at all important, and reverse coded so that a higher score indicated greater importance. Since there was a response from the English teachers as well as the math teachers, there were a total of six items. A principal components factor analysis was performed to ensure that these items constituted a single factor, and Cronbach's alpha was calculated to determine the reliability of this scale.

When the six variables were considered, a two-component solution was generated—one for the English teachers and another for the math teachers. In the unfiltered data set, the responses of the English teachers accounted for 35 percent of the variance while the responses of the math teachers accounted for 32 percent of the variance. Cronbach's alpha was .762 for the English teachers and .757 for the math teachers. In the filtered data set, the responses of the English teachers accounted for 36 percent of the variance while the responses of the math teachers accounted for 32 percent of the variance. Cronbach's alpha for the scale for the English teachers was .766, while for the math teachers it was .758. Both of these variables met the assumptions of a normal distribution.

Communication with parents about student accomplishments. This factor was measured by three variables—reports from the English and math teachers of whether they have talked with parents about a student's accomplishments and parent's reports of whether the school has contacted them about the student's positive or good behavior. Teacher reports are dichotomous—the teacher either has or has not contacted the

student's parents about the student's achievements. Parent reports are on a four-point scale from none to more than four times. Although there were issues with skewness (1.558, s.e. 0.026) and kurtosis (1.554, s.e. 0.053), no transformations were made with this variable.

Level-Two Variables

Academic emphasis of school. This was measured by two items. The first is the administrator's report of the percent of students in college prep classes. This encompasses the expectations of students, teachers, and school counselors that students will succeed in high school and be able to pursue education beyond high school.

A second measure from the administrator was the response to three items—"Teachers at this school press students to achieve academically," "Students place a high priority on learning," and "Students are expected to do homework." These items are measured on a five-point scale from not accurate at all to very accurate, with a higher score indicating higher expectations. In the unfiltered data set, this scale accounts for 75 percent of variance, with a Cronbach's alpha of .833. In the filtered data set, the scale accounts for 73 percent of the variance, with a Cronbach's alpha of .813. This variable met the assumptions of a normal distribution.

Administrator's view of how much learning is hindered by lack of discipline and safety. Administrators were originally asked how much learning of tenth graders is hindered by lack of discipline and safety, on a scale of 1 = not at all to 4 = a lot. The items were recoded so that a higher value would indicate higher expectations of discipline. This variable met the assumptions of a normal distribution.

Administrator's view of high expectations in school discipline. Administrators were asked several questions concerning how often certain problems occurred at the school on a five-point scale from 1 = happens daily to 5 = never happens, so that a higher score was consistent with higher expectations. A principal components analysis broke this into three scales—use of alcohol and drugs, disrespect of others, and criminal activity.

The scale related to use of alcohol and drugs included three items—"How often the use of alcohol is a problem," "How often use of illegal drugs is a problem," and "How often students on alcohol/drugs is a problem." In the unfiltered data set, this component accounted for 44 percent of the variance with a Cronbach's alpha of .879. In the filtered data set, this component accounted for 42 percent of the variance with a Cronbach's alpha of .892. To achieve a normal distribution, the squared transformation of this variable was used in the analysis.

The scale related to disrespect of others included three items—"How often student bullying is a problem," "How often verbal abuse of teachers is a problem," and "How often student disrespect for teachers is a problem." In the unfiltered data set, this component accounted for 16 percent of the variance, with a Cronbach's alpha of .761. In the filtered data set, this component accounted for 18 percent of the variance, with a Cronbach's alpha of .738. To achieve a normal distribution, the squared transformation of this variable was used in the analysis.

The scale related to criminal activity included three additional items—"How often physical conflicts are a problem," "How often robbery/theft is a problem," and "How

often vandalism is a problem." This component accounted for 11 percent of the variance in the unfiltered data set, with a Cronbach's alpha of .714. It accounted for 13 percent of the variance in the filtered data set, with a Cronbach's alpha of .725. To achieve a normal distribution, the squared transformation of this variable was used in the analysis.

Administrator's report of students participating in academic counseling. Administrators were asked about the percent of the student body that participated in academic counseling. A higher percentage of students enrolled in academic counseling would indicate higher expectations. Since this question applied only to respondents whose school has an academic counseling program, responses of NA were coded as 0. In the filtered data set, skewness was -1.117 (s.e. 0.025) and kurtosis was -.151 (s.e. 0.050). This variable was used without transformations.

Opportunities for Participation and Contribution

Student participation in a variety of activities provides opportunities for students to make connections with others that emphasize the importance of academic achievement and may also help to establish relationships that help the student bond with the school community. Active and meaningful participation in the school and the larger community also helps students see that they are valued members of that community.

Level-One Variables

Active involvement in the classroom. Active participation in the learning process is expected to contribute to student learning. Students were asked about their participation in two learning activities in their mathematics classroom on a five-point scale ranging from never to daily or almost daily. The two activities included in the scale

are “explain your work to the class orally” and “participate in student-led discussions.” In the unfiltered data set, Cronbach’s alpha is .604, accounting for 71 percent of the variance. In the filtered data set, Cronbach’s alpha is .618, accounting for 72 percent of the variance. This variable met the assumptions for a normal distribution.

Participation in work-based learning. Student participation in work-based learning experiences was measured by the students’ reports of the work-based learning experiences in which they participated. These activities included “cooperative education (work experience that is part of a vocational class and for which you earn class credit),” “internship (work experience arranged by your school, but not necessarily part of a vocational class),” “job shadowing or work-site visits (school-arranged visits to work places to observe one worker or many workers),” “mentoring (a *school-arranged* match with an adult in your career area for advice and support),” and “school-based enterprise (working in a business run by students or teachers from your school).” These reports were then coded into a dichotomous measure of whether or not the student had participated in any work-based learning experience.

Participation in community service. Students reported on whether or not they participated in school-sponsored community service. This was a dichotomous variable.

Availability of and participation in sports activities. Students reported on their participation in eight interscholastic and eight intramural sports—baseball, softball, basketball, football, soccer, another team sport, an individual sport, or cheerleading. Each item was rated on a three-point scale: 1 = school doesn’t have a team, 2 = did not participate, and 3 = participated. Cronbach’s alpha for the combination of interscholastic

and intramural sports was .859 in the unfiltered data set; .862 in the filtered data set. This variable did not meet the assumptions for a normal distribution due to kurtosis of 1.367 (s.e. 0.051) but was used without any transformation.

Participation in non-sports extracurricular activities. Students were asked whether or not they participated in nine non-sports extracurricular activities. These activities included the fine arts, student government, interest-based activities, and academic clubs. The number of such activities in which each student participated was used for this variable. This variable did not meet the assumptions of a normal distribution due to problems with skewness (1.947, s.e. 0.024) and kurtosis (5.179, s.e. 0.049). The square root transformation was used to allow for a normal distribution of this variable.

Overall participation in school-sponsored extracurricular activities. Students were also asked the number of hours they spend on a typical week on school-sponsored extracurricular activities. This is another indication of additional student involvement with school activities. The variable did not meet the assumptions of a normal distribution due to skewness of 1.205 (s.e. 0.024) but was used without any transformations.

Level-Two Variables

The availability of sports activities. The availability of sports activities was based on administrator reports of the number of sports activities available to their students. The administrators rated whether or not each sport on a list of 19 sports was available for male students and whether or not it was available for female students. The total number of sports available to male students was added to the total number available

to female students for a maximum possible score of 38. This scale had a Cronbach's alpha of .868 on the unfiltered data set and a Cronbach's alpha of .859 on the filtered data set. The variable met the assumptions of a normal distribution.

Work-based learning experiences. The availability of work-based learning experiences was measured by the administrators' reports of the number of work-based learning experiences offered at their schools. A three-item scale was constructed which included "internship (work experience arranged by your school, but not necessarily part of a vocational class)," "job shadowing or work-site visits (school-arranged visits to work places to observe one worker or many workers)," and "mentoring (a *school-arranged* match with an adult in your career area for advice and support)." Each item is scored dichotomously, with a 0 indicating the activity is not offered to tenth graders and 1 indicating that the activity is offered to tenth graders at the school. For the unfiltered data set, the scale explained 61 percent of the variance and had a Cronbach's alpha of .689. For the filtered data set, the scale explained 59 percent of the variance and had a Cronbach's alpha of .652. In the filtered data set, skewness was normal (.390, s.e. 0.025), but kurtosis was not (-1.164, s.e. 0.050). No transformations were made for this variable.

Community service. The administrators reported on the percentage of students participating in school-sponsored community service. If this was coded as NA, a legitimate skip, the value was coded as 0 rather than system missing because that meant that the school did not have a school-sponsored community service program. This variable had problems with skewness (2.001, s.e. 0.025) and kurtosis (3.957, s.e. 0.050)

on the filtered data set, so a square root transformation was used which met the assumptions of a normal distribution.

Participation in teacher evaluation. Participation in teacher evaluation is viewed as one way in which students can contribute to the school's decision-making, thus increasing the likelihood that they will feel valued as members of that school. This variable was measured in this study by the dichotomous variable of whether or not students participate in the evaluation of teachers as reported by the school administrators.

Dependent Variables

Two dependent variables were included in this study—mathematics achievement scores in twelfth grade and the odds of high school graduation by Summer 2004. Since the focus of the study was on the effects of the school in which students were enrolled during tenth grade, students who transferred to other schools were filtered from the analysis.

The Educational Longitudinal Study used Item Response Theory (IRT) to measure mathematics achievement scores (Ingels, Pratt, Rogers, Siegel, & Stutts, 2005): IRT-estimated number right scores rely on the patterns of a student's answers (correct, incorrect, or omitted) to provide an estimate of a student's ability. IRT scoring uses each student's overall pattern of right and wrong responses to compensate for correct guessing on the part of low-ability students as well as for the distortion of scores that may be caused by omitted answers. These scores are criterion-referenced scores based on the set of mathematics skills included in the assessment item pool (Ingels et al., 2004). This scoring also allows for comparisons across the different test forms used in the study.

The mathematics tests included items in arithmetic, algebra, geometry, probability, and advanced topics in the categories of skill/knowledge, understanding, and problem solving. The items had been selected from previous assessments—the National Educational Longitudinal Study of 1988, the National Assessment of Educational Progress, and the Program for International Student Assessment. In the tenth grade, each student completed a short multiple-choice test that was immediately scored by survey administrators who then assigned students a second-stage form of low, middle, or high difficulty depending upon their performance on the initial test. During the twelfth grade, the students were administered low, middle, and high difficulty forms based on their projected growth from tenth to twelfth grade. The combined tenth grade forms contained a pool of 72 items; the combined twelfth grade forms contained a pool of 85 items. Common items that were present in the various forms (tenth and twelfth grade as well as tests of low, middle, and high difficulty) allowed the use of one scale for the test scores. The weighted mean for the twelfth grade test scores was 48.3 with a weighted standard deviation of 15.1 (Ingels et al., 2005, p. 36). The second part of the analysis focused on a dichotomous variable—whether or not the student graduated by Summer 2004.

Data Analysis

The data in this study are multilevel. Students are at the first level of analysis. Data from the students, parents, and teachers were included in this level. The schools which the students attend constitute the second level of analysis. Data from the school administrator and the Common Core of Data from the National Center for Education Statistics are included in this level.

The multilevel or nested nature of the data requires modification in the analysis of the data. The students within a particular school have more in common with one another than with students attending other schools. The average correlations among students in one school will be higher than the average correlations among students from different schools. Therefore, multilevel data may violate the assumption of independence of observations required in standard statistical tests, providing estimates of standard errors that are too small and producing "significant" results that are significant only because of the violation of assumptions (Hox, 2002).

Multilevel modeling statistical programs allow variables from more than one level to be combined in a single analysis without violating assumptions as discussed above. The focus of multilevel models in most cases involves explanatory variables at all levels and a dependent variable at the lowest level, as in the proposed study. Because Hierarchical Linear Modeling (HLM) (Raudenbush & Bryk, 2002) has been developed specifically to address the statistical issues in working with the nested data that will be the focus of the study, HLM software was used to perform the statistical analyses in this study.

To answer the first two research questions, three separate analyses were conducted due to the many independent variables that compose each of the three main independent constructs (caring relationships, high expectations, opportunities for participation and contribution). The first question involves an interval level of measurement—mathematics achievement scores in twelfth grade. The variables that compose the construct of caring relationship were entered in a hierarchical linear model

regression to determine the influence of caring relationships on mathematics achievement scores. Similarly, the variables that compose the construct of high expectations were entered in a second hierarchical linear model regression to determine the influence of high expectations on mathematics achievement scores. Finally, the variables that compose the construct of opportunities for participation and contribution were entered in a third hierarchical linear model regression to determine the influence of opportunities for participation and contribution on mathematics achievement scores.

The regression used in a two-level simple HLM regression is characterized by a level-one equation and two level-two equations which are combined into one overall combined equation. (Raudenbush & Bryk, 2002). In the simplest form, with only one independent variable at level-one (the student level),

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{ij} + r_{ij.}$$

In this formula, *i* refers to the number of level one units (students) that are nested in *j* level two units (schools). Student *i* is nested in school *j*. β_{0j} and β_{1j} refer to the level-one coefficients. Y_{ij} refers to the student level outcome variable and r_{ij} refers to the level-one random effect. At level-two (the school level), with only one independent variable at this level,

$$\beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{0j.}$$

$$\beta_{1j} = \gamma_{10.}$$

In this formula, γ_{00} and γ_{01} refer to level-two coefficients, W_j refers to a level-two independent variable, and u_{0j} is a level-two random effect. When the level-one and level-two equations are combined into the overall regression equation,

$$Y_{ij} = \gamma_{00} + \gamma_{10}X_{ij} + \gamma_{01}W_j + u_{0j} + r_{ij.}$$

The simple model demonstrated was expanded to account for the number of independent variables at each level of the analysis.

In each of these regression models, the dichotomous independent variables were uncentered. In all these cases, 0 represented the absence of the independent variable and 1 represented the presence of the independent variable, making the value of 0 meaningful. In these instances, $X_{ij} = 0$ meant that the student did not have that characteristic so that the intercept β_{0j} was the expected outcome for such a student (Raudenbush & Bryk, 2002). All of the continuous variables, both at level-one and level-two, were centered around the grand mean. When grand mean centering is used, the intercept becomes the expected outcome for a student whose value on X_{ij} is the same as the grand mean for that variable (Raudenbush & Bryk, 2002).

The second research question involves a dichotomous variable—whether or not the student graduated from high school by August 31, 2004. The HLM model described above would not be appropriate in this case because the dependent variable is dichotomous. However, HLM includes a Hierarchical Generalized Linear Model (similar to logistic regression) that is appropriate for this outcome variable. This question was analyzed with three hierarchical generalized linear regressions to determine the influence of each of the three constructs (caring relationships, high expectations, and opportunities for participation and contribution) on high school graduation. The regression equations applicable to this model, however, are different since the outcome has a Bernoulli

distribution rather than a normal distribution. In this model, at level-one, with one level-one independent variable,

$$\text{Prob}\,(Y_{ij} = 1/\beta) = \varphi.$$

$$\text{Log}[\varphi/(1-\varphi)] = \eta.$$

$$\eta = \beta_{0j} + \beta_{1j}X_{ij.}$$

At level-two, with one level-two independent variable,

$$\beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{0j.}$$

$$\beta_{1j} = \gamma_{10.}$$

When the two levels of equations are combined, the equations applicable to this model are the following:

$$\text{Prob}\,(Y_{ij} = 1/\beta) = \varphi.$$

$$\text{Log}[\varphi/(1-\varphi)] = \eta.$$

$$\eta = \gamma_{00} + \beta_{1j}X_{ij} + \gamma_{01}W_j + u_{0j.}$$

Again, in these analyses, the dichotomous independent variables were uncentered and the continuous variables were centered around the grand mean.

The third and fourth research questions involved whether certain student characteristics (socioeconomic status and ethnicity, for example) placed students at risk for lower mathematics achievement scores and lower odds of graduating by Summer 2004. The at-risk characteristics included being of the lowest socioeconomic quartile, being African American or Hispanic, having a first language other than English, having a nontraditional family (without both biological parents), having a disability, and having been retained a year or more in school. Again, Hierarchical Linear Modeling was used

with the mathematics scores as the dependent variable and Hierarchical Generalized Linear Modeling was used with the odds of graduating on time as the dependent variable. All of the at-risk characteristics were dichotomous variables, with a 1 indicating the presence of the risk and 0 indicating the absence of the risk, and were uncentered in these analyses.

After the at-risk groups were identified, research questions five and six focused on the impact of caring relationships, high expectations, and opportunities for participation and contribution on mathematics achievement scores and the odds of graduating on time with the at-risk students. There were four at-risk samples used in this analysis—students from the lowest socioeconomic quartile, African American students, Hispanic students, and a generic at-risk group that included students with any of the identified risks, including students from the lowest socioeconomic quartile, African American students, Hispanic students, students from nontraditional families (without both biological parents), students who had been retained a grade or more in school, and students who had a disability. These analyses followed the same pattern as in research questions one and two. Hierarchical Linear Modeling was used to examine the impact of caring relationships, high expectations, and opportunities for participation and contribution on the mathematics scores of each of the at-risk samples. Hierarchical Generalized Linear Modeling was used to examine the impact of the three constructs on the odds of graduating on time for each of the at-risk samples.

Prior to conducting these analyses, however, attention had to be given to the presence of missing data. Missing data often become an issue with large scale surveys.

It was so with this survey, particularly in light of the number of variables included in the study. There were several responses that were considered as missing in the present analysis. These included don't know, refused, item legitimate skip/NA, nonrespondent, out of range, multiple responses, partial interview breakoff, survey component legitimate skip/NA, and missing. Of the 44 variables (including several scales) in this analysis, seven were missing fewer than 6 percent of the data, 24 were missing 10-20 percent of the data, 11 were missing 20-35 percent of the data, and two were missing over 40 percent of the data. Table 3.2 presents the percent of missing data for each of the variables included in the analysis. HLM, along with most statistical software, restricts analysis only to those cases which have complete data on the variables being studied. However, given the combination of missing data on the numerous variables in this study, a decision to limit the analysis to only those cases with complete information on the variables of interest would have reduced the sample size from approximately 11,360 to fewer than 1,120.

In the presence of missing data, one must consider the pattern of missingness (King, Honaker, Joseph, & Scheve, 2001; Schafer & Graham, 2002)—whether the data is missing completely at random (MCAR), missing at random (MAR), or missing not at random (MNAR). If the data is missing completely at random, the probability of a missing response is independent of any characteristics of the person being studied. If the data is missing at random, the missingness does not depend on the values that are missing but may depend on other observed characteristics of the individual. In the case of missing not at random, the missingness is related to the value that would have been

Table 3.2

Percent of Missing Data

Category	Variable	Percent of Missing Data
Caring Relationships	Caring relationships with teachers	12.4%
	Negative interactions	10.5%
	Talks with English teacher	25.9%
	Talks with math teacher	23.3%
	Student:teacher ratio	3.6%
	Notification of student absences	14.5%
High Expectations	Enrolled in college prep program	1%
	School personnel recommend college	19.9%
	School contacted parents re: accomplishments	23.9%
	English teacher contacted parents	32%
	Math teacher contacted parents	28.3%
	English teacher's belief in influence on students	24.5%
	Math teacher's beliefs in influence on students	22.2%
	How far in school teachers expect student to go	42.8%
	Parent evaluation of high expectations at school	34.1%
	Parent view of school discipline	49.8%
	Student view of high behavioral expectations	12.6%
	Student view of high academic expectations	11.2%
	Academic emphasis	17.4%
	Learning is not hindered by lack of discipline	17.3%
	Alcohol/drugs not a problem	17.3%
	Disrespect not a problem	18.4%
	Crime not a problem	17.2%
	Percent of students in college prep program	17.5%
	Percent receiving academic counseling	14.8%
Opportunities for Participation and Contribution	Sports participation	20.1%
	Hours/week in extracurricular activities	10.5%
	Participated in community service	19.2%
	Participated in work-based learning	19.2%
	Active participation in math class	11.2%
	Participation in non-sports extracurricular activities	10.4%
	Students evaluate teachers	14.7%
	Number of sports offered at school	13.7%
	Work-based learning offered	15.2%
	Percent in school-sponsored community service	14.1%
Risk Factors	Lowest socioeconomic quartile	5.1%
	African American	12.2%
	Hispanic	0%
	Retained a grade in school	22.8%
	Has disability	22.8%
	First language other than English	5.1%
	Nontraditional family	4.4%
Dependent Variables	Senior math scores	16.3%
	Graduation by Summer 2004	4.6%

observed if it were not missing. Since there is no way to determine the actual value of the missing data in a data set, there is no way to determine whether the case is missing at random or missing not at random (King, Honaker, Joseph, & Scheve, 2001; Schafer & Graham, 2002; Sinharay, Stern, & Russell, 2001).

There was an attempt, however, to explore the data set to determine the reasons for the missingness. Planned missingness (if the researcher did not intend for every person to answer every question), for example, is normally considered to be missing completely at random (MCAR) (Schafer, & Graham, 2002). Approximately six percent of the parents in the sample, for example, participated in a partial interview which was broken off before some of the questions of interest in this study.

In the Educational Longitudinal Study of 2002, attempts were made to gather data from a wide range of sources (including, but not limited to, students, parents, teachers, and administrators). Even if no data were collected from one set of the respondents, there was still useful information to be gained from the other respondents. Approximately 1,800 parents (15.8 percent) did not respond to the survey at all, making it impossible to determine their reasons for not answering the specific questions of relevance to this study. Furthermore, approximately 2,800 (24.7 percent) of the English teachers and 2,520 (22.2 percent) of the math teachers were nonrespondents to the study. Excluding the nonresponding parents and teachers from the study would have reduced the sample size from approximately 11,360 to 6,650, resulting in a loss of 41 percent of the data from the study. There is no reason to suspect that this missing data was missing not at random (MNAR). Based upon the assumption that the data were missing at random, the

researcher chose to use multiple imputation for the missing variables. This was chosen as a procedure for several reasons.

First, the imputation of some individual variables was used by the National Center for Education Statistics in preparing the survey data for release to researchers. The individual variables which were imputed included: student sex, race/ethnicity, language minority status, Hispanic subgroup, Asian subgroup, school program type, postsecondary educational aspirations, parental aspirations for student postsecondary achievement, family composition and income, educational attainment and occupation of mother and father, student enrollment status in Spring 2004, and student ability estimates for reading and mathematics. Student gender was imputed logically based on student names. Student ethnicity was imputed logically using student names and school-level information. Weighted sequential hot deck imputation was used to impute the remainder of the variables except for the math and reading ability estimates (theta) which were imputed through multiple imputation (Ingels et al., 2004). Math ability estimates (theta) were imputed for nonrespondents in the sophomore year. Additionally, senior year math ability estimates (theta) were imputed for 2002 sophomore students who attended transfer schools in 2004, were homeschooled in 2004, or did not complete the senior year examination. The ability estimates (theta) were then used to construct the math test scores for these students (Ingels et al., 2005).

Second, other procedures available to deal with missing data have a number of limitations. If complete case analysis (otherwise known as listwise deletion) had been used, only those cases with complete information on all the variables would have been

used, reducing the sample size by more than 90 percent. Not only would a substantial amount of available data be excluded, but it is unlikely that the 10 percent of cases with complete data would be representative of the population of high school sophomores. Pairwise deletion, on the other hand, would distort the information further. If each correlation between two variables is based on the available data for those two variables, each analysis would be based on different individuals. Both methods would work if the data are missing completely at random (MCAR), but would be inaccurate if the data were missing at random (MAR) or not at random (MNAR) (Schafer & Graham, 2002; Sinharay, Stern, & Russell, 2001).

The several advantages of multiple imputation are a third reason for using this as a method for handling the missing data. In many ways, it seems to be the most practical approach when working with a large data set (Raghunathan, 2004; Schafer & Graham, 2002). It utilizes all available observed data to predict the missing data and produce $m>1$ complete data sets which can be used for statistical software and analyses that require the use of complete data. Since the missing values are filled in with different imputations in the various imputed data sets, the uncertainty of the missing values is preserved. Because of the multivariate normality assumption of multiple imputation, the process preserves the distribution of the imputed values without any assumption of causal ordering. Thus, any distinctions between independent and dependent variables are made during the analysis after the imputed data sets have been developed (King, Honaker, Joseph, & Scheve, 2001; Schafer & Graham, 2002). Even if 40 percent of the data is missing, as few as five imputations give 93 percent efficiency (Sinharay, Stern, & Russell, 2001).

HLM software, the software chosen for use in this study, uses listwise deletion for incomplete data sets but has an option for estimation settings that works well with multiply imputed data sets (Raudenbush, Bryk, Cheong, & Congdon, 2004).

Even though multiple imputation is based on the MAR assumption, it is still recommended because of the lack of available information to distinguish whether the data is missing at random or not at random (Sinharay, Stern, & Russell, 2001). Furthermore, the theory of multiple imputation does not require the MAR assumption, and in many situations, the divergence from MAR assumptions is most likely not serious (Schafer & Graham, 2002). Multiple imputation has been demonstrated to be effective even in cases in which the data are not missing at random (MNAR) (Glynn, Laird, & Rubin, 1993), producing a root mean square error that closely approximates the complete data (King, Honaker, Joseph, & Scheve, 2001). However, since the distinction between MAR and MNAR cannot be tested using only the observed data, the validity of the use of multiple imputation cannot be verified absolutely (King, Honaker, Joseph, & Scheve, 2001) and caution should be exercised in viewing the results of this study.

Amelia II was the software used to do the multiple imputations. This software is available online at http://gking.harvard.edu/amelia/. The two assumptions that are used in this software are that the data are missing at random (MAR) or completely at random (MCAR) and that the data are multivariate normal (Honaker, King, & Blackwell, 2009). Although it cannot be known for sure that the data are MAR, efforts were undertaken to ensure that the data was multivariate normal. First, all the continuous variables were assessed for univariate normality. Some of them were transformed to produce univariate

normality. The square transformation was used for the school policy on notification of student absences as well as for the school administrator's assessment of problems at school in the areas of substance abuse, disrespect for others, and criminal activity. The square root transformation was used for the number of non-sports extracurricular activities in which the student participated as well as for the administrator's report of the percent of students at the school who engaged in school-sponsored community service.

After the transformations, multivariate normality was assessed through an SPSS macro developed by DeCarlo and downloaded through his homepage at Columbia University (http://www.columbia.edu/%7E1d208/). His macro provides a visual check of multivariate normality (the points appearing on a diagonal line) and identifies the multivariate outliers (DeCarlo, 1997). Three multivariate outliers (with Mahalanobis distances greater than the critical F) were identified in the data set and those cases were removed from the data set before performing the multiple imputations.

Five data sets were imputed. Three diagnostic procedures were undertaken to examine the imputed data sets. First, the distribution of imputed values was compared to the distribution of the observed values. Although not identical, the distribution patterns were very similar. Second, the data were overimputed, meaning that the observed values were treated sequentially as though they had been missing. This produces a line of perfect agreement in which the imputed model accurately predicted the observed value ($y = x$) and lines representing 90% confidence intervals (Honaker, King, & Blackwell, 2009). A visual examination of the overimputed figures, showed that in most cases the line crossed through the middle of the 90% confidence intervals, although there were a

few times in which the line missed some of the 90% confidence intervals. The third diagnostic procedure is overdispersed starting values in which the procedure is run from different start values. In this case, the initial start values converged on the same horizontal line.

Research questions five and six required an analysis of the data for separate groups—students from the lowest socioeconomic quartile, African American students, Hispanic students, and a generic at-risk group which included students from the above groups, but also included students who had been retained a grade in school, had a disability, or had a nontraditional family (without both biological parents). Following a suggestion by Schafer & Graham (2002), the data set was split into four separate data sets consisting of students from each of the four groups and separate imputations and analyses were performed for each of the subgroups.

One additional methodological issue involved the explanation of variance. HLM does not produce a true R-squared value in the output due to the complexity of multiple levels and slopes in HLM models (Hox, 2002). One formula that has been used to explain the variance was suggested by Kreft & deLeeuw (1998) and Singer (1998). The formula involves comparing the model used in the analysis (a restricted model) with an unrestricted one (one that has the dependent variable but no independent variable). Under this formula:

variance = (unrestricted error – restricted error)/unrestricted error.

The within-unit variance is found by inserting the level-1 error terms in the above formula and shows how well the independent variables explain the dependent variables.

The between-unit variance is found by inserting the level-2 error terms in the formula and shows how much variance between the schools is accounted for by the independent variables (Division of Statistics and Scientific Computation, 2010).

The logistic regression, however, requires a different procedure to estimate explained variance. Snijders & Bosker (1999) offer a formula to explain variance in multilevel logistic regressions. The procedure first involves computing a new variable ($\hat{Y}_{ij}$) in the SPSS data set, the linear predictor for Y. This variable is computed by the coefficients produced in the model so that if there were only one level-one and one level-two variable,

$$\hat{Y}_{ij} = \beta_{00} + \beta_{10}X_{ij} + \beta_{01}W_j .$$

In this model, β_{00} is the coefficient for Intercept 2; β_{10} is the coefficient for level-one variable X_{ij}, and β_{01} is the coefficient for level-two variable W_j. The variance for this newly computed variable ($\hat{Y}_{ij}$) is $\sigma^2_{F.}$ The overall variance for the model is $\sigma^2_F + \tau^2_0 + \sigma^2_R$, in which τ^2_0 represents the unexplained level-two variance and σ^2_R represents the unexplained level-one variance (which is fixed to $\pi^2/3$ for logistic models).

The proportion of the variance explained by the model is as follows:

$$R^2_{dicho} = \sigma^2_F / (\sigma^2_F + \tau^2_0 + \sigma^2_R).$$

For the logistic regressions, only the overall proportion of variance explained by the model is reported.

In a few instances, additional analyses required the examination of interactions between some of the independent variables in relation to the two dependent variables. Those interactions were probed using computational tools developed by Preacher,

Curran, and Bauer (2006) based on the work by Aiken and West (1991), available at http://people.ku.edu/~preacher/interact/index.html.

Chapter 4: Findings

The first research question addressed in this study was to determine whether three environmental protective factors influenced the mathematics achievement of public high school students.

Research Question 1

Do caring relationships, high expectations, and opportunities for participation and contribution within the schools influence mathematics achievement of public high school students?

The dependent variable in this question was mathematics achievement scores during the senior year. The data sample used for this analysis was from the Educational Longitudinal Survey of 2002 and included approximately 11,360 public high school students who had not transferred from their tenth grade high school.

The items that constituted the construct of caring relationships in this analysis included student reports of caring relationships with teachers (a level-one scale), student reports of negative interactions with others at school (a level-one scale), the reports of the English and math teachers about whether or not the student had talked with them outside of class (two level-one dichotomous variables), the student:teacher ratio at the school (a level-two variable), and a squared transformation of school practices regarding parental notification of student absences (a level-two variable).

As demonstrated in Table 4.1, many of the variables constituting the construct of caring relationships were significantly associated with the senior-level math scores. Caring relationships with teachers, negative interactions with others, and math teacher

Table 4.1
The Influence of Caring Relationships on Mathematics Achievement in the Senior Year

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
Caring relationships with teachers****	1.142945	0.109227	10.464	140	0.000
Negative interactions with others****	-0.910052	0.152427	-5.970	40	0.000
English teacher talks with student outside of class	0.283945	0.406609	0.698	20	0.494
Math teacher talks with student outside of class****	1.378789	0.325643	4.234	970	0.000
Level-Two Variables					
Student:teacher ratio	-0.036760	0.086099	-0.427	580	0.669
School practices on parent notification of student absences**	0.082089	0.034255	2.396	90	0.019

Model explains 2.4 percent of within-unit variance; 6.9 percent of between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

reports of talking with the student outside of class were all significantly associated with senior-level math scores at the $p < .001$ level. Caring relationships with teachers ($\beta = 1.143$) and math teacher reports of talking with the student outside of class ($\beta = 1.379$) were positively associated with math scores, while negative interactions with others ($\beta = -0.910$) were negatively associated with math scores. School practices on parent notification of student absences ($\beta = 0.082$) had a small positive association with math scores at the $p < .05$ level. Although these variables had significant relationships to senior mathematics achievement scores, overall this model explained only a small amount of the variance. Using the formula proposed by Kreft and de Leeuw (1998) and Singer (1998) for calculating within-unit and between-unit variance, the model accounted for only 2.4 percent of the variance within the schools and 6.9 percent of the variance between the schools.

The level-one variables included in the construct of high expectations included whether or not the student was enrolled in a college prep program, student perceptions of high academic and behavioral expectations, student perceptions of whether someone at the school (their favorite teacher, school counselor, or coach) thought that the best thing they should do after high school was to attend college, parents' evaluations of high academic and behavioral expectations at the school, teachers' expectations for how far they expected the student to go in school, teachers' beliefs in their power to help their students succeed, and communication with parents about their tenth grader's accomplishments. The level-two variables included the academic emphasis of the school, the percent of students at the school who were enrolled in college prep classes, the

administrator's view of how much learning is hindered by lack of discipline, the percent of students at the school receiving academic counseling, and the squared transformations of the extent of substance abuse, disrespect for others and criminal activity at the school.

As demonstrated in Table 4.2, relatively few items composing the construct of high expectations were associated with senior-level math scores, and several of those variables were negatively associated with senior-level math scores. The three variables that were positively associated with senior-level math scores at the $p < .001$ level were whether or not the student reported that he/she was enrolled in a college prep program ($\beta = 1.569$), how far his/her teachers expected him/her to go in school ($\beta = 3.754$), and the administrator's perceptions of the academic emphasis of the school ($\beta = 0.553$). Additionally, parents' perceptions of high expectations in school discipline ($\beta = 0.300$) were positively associated with math scores at the $p < .05$ level.

Students' perceptions of high academic expectations ($\beta = -0.432$), on the other hand, were negatively associated with senior-level math scores at the $p < .001$ level. To explore this issue further, a listwise HLM analysis was done with the original data set and the three items composing student academic expectations. Two of the items were positively and significantly associated with senior year math scores—"When I work hard on my school work, my teachers praise my effort" ($\beta = 0.459$, $p < .05$), and "I go to school because I think the subjects I'm taking are interesting and challenging" ($\beta = 1.218$, $p < .001$). The third item was negatively and significantly associated with senior year math scores—"I go to school because my teachers expect me to succeed" ($\beta = -1.386$, $p <$

Table 4.2
The Influence of High Expectations on Mathematics Achievement in the Senior Year

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
Enrolled in college prep program****	1.569425	0.288702	5.436	30	0.000
School personnel recommended college	-0.187810	0.320949	-0.585	10	0.567
School contacted parents about accomplishments***	-0.473222	0.153962	-3.074	40	0.004
English teacher contacted parents about accomplishments	-0.191819	0.282610	-0.679	30	0.503
Math teacher contacted parents about accomplishments	-0.107972	0.265734	-0.406	60	0.686
English teacher's belief in influence on student success***	-0.360218	0.115496	-3.119	20	0.005
Math teacher's belief in influence on student success***	-0.410328	0.125431	-3.271	20	0.005
How far in school teachers expected student to go****	3.753918	0.076602	49.005	10	0.000
Parent evaluation of high expectations at school*	-0.249673	0.113611	-2.198	10	0.050

*p< .1, **p<.05, ***p<.01, ****p< .001

Table 4.2 (continued)
The Influence of High Expectations on Mathematics Achievement in the Senior Year

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Parents' view of expectations in school discipline**	0.300149	0.089658	3.348	10	0.018
Students' view of high behavioral expectations**	-0.321699	0.099622	-3.229	10	0.020
Students' view of high academic expectations****	-0.432484	0.093237	-4.639	20	0.000
Level-Two Variables					
Academic emphasis****	0.553110	0.099630	5.552	100	0.000
Learning is not hindered by lack of discipline	0.412637	0.317695	1.299	570	0.195
Alcohol/drugs not a problem	0.000190	0.005654	0.034	210	0.973
Disrespect not a problem*	-0.009147	0.005190	-1.762	570	0.078
Crime not a problem	0.006916	0.007545	0.917	60	0.364
Percent of students in college prep program*	0.012888	0.006924	1.861	50	0.068
Percent of students receiving academic counseling**	-0.011687	0.005251	-2.226	530	0.026

Model explains 45.1 percent of within-unit variance; 75.2 percent of between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

.001). This secondary analysis provides some support for the view that students' perception of high academic expectations in school might contribute to their academic achievement. Whether or not their teachers expect them to succeed may not be a primary motivation for their attendance at school.

Similarly, student perceptions of high behavioral expectations ($\beta = -0.322$) were negatively associated with math scores at the $p < .05$ level. To explore this finding further, a listwise HLM analysis was done with the original data set examining the influence of the variables that were included in high behavioral expectations along with two others that were originally considered but excluded during factor analysis. The two additional items were "Other students often disrupt class" and "Disruptions by other students get in the way of my learning," both of which were coded so that a higher score indicates higher behavioral expectations. The three items that were positively and significantly associated with senior math scores were "school rules are fair" ($\beta = 3.054$, $p < .001$), "other students [do not] often disrupt class" ($\beta = 0.892$, $p < .001$), and "disruptions by other students [do not] get in the way of my learning" ($\beta = 1.850$, $p < .001$). Three of the other items included in the scale of high behavioral expectations were negatively associated with senior year math scores at the $p < .001$ level—"everyone knows the school rules" ($\beta = -1.165$), "school rules are strictly enforced" ($\beta = -1.318$), and "students know punishments for broken rules" ($\beta = -2.424$). One of the items on the scale was not significantly related to senior year math scores—"Punishment is the same no matter who you are." Based on this analysis, some components of high behavioral expectations may play a role in supporting academic achievement.

Furthermore, the beliefs of English and math teachers in their ability to influence student success were negatively associated with senior-level math scores at the $p < .01$ level ($\beta = -0.360$ for the English teachers and $\beta = -0.410$ for the math teachers). Further exploration of the data was done to determine the reason for this unexpected finding. A separate HLM analysis focusing on only those two variables confirmed the negative finding. A frequency analysis showed that most teachers responded that the teacher's attention, teaching methods, and enthusiasm were either extremely important or very important to student success. For the individual variables that were completed by the English teachers, the percentage responding that the teacher was either extremely or very important to student success ranged from 94.3 percent for the importance of teachers' attention to 99 percent for the importance of teachers' enthusiasm. For the math teachers, the percentage responding that the teacher was either extremely or very important to student success ranged from 87.5 percent for the importance of teachers' attention to 97.5 percent for the importance of teachers' enthusiasm.

Additionally, correlations were analyzed comparing the years of teaching experience to teachers' responses on these items. These correlations were very small (less than .10) but significant (perhaps due to the large sample size) and in the same direction with more experienced teachers less likely to indicate that the teacher's efforts were extremely important to student success. Given the relative lack of variability on these items and the correlations with less teaching experience, it appears this variable may indirectly measure fewer years of teaching experience, accounting for the unexpected negative findings on this item.

Furthermore, schools that contacted parents about the student's accomplishments, according to parental reports ($\beta = -0.473$), were unexpectedly negatively associated with math scores at the $p < .01$ level. Since this finding was contrary to expectations, it was examined in a separate HLM analysis as the only independent variable. In this secondary analysis, it had a positive and significant impact on senior year math scores ($\beta = 0.476$, $p < .05$). However, as other independent variables were added to the model, the relationship became insignificant and finally negative. It appears that associations between this variable and the other independent variables in this model may have been responsible for this finding.

To explore this finding further, the interaction between parent reports of the school contacting them about their tenth grader's accomplishment and how far the teachers expected the student to go in school was explored. The interaction was significant ($\beta = 0.097$, $p < .05$). In exploring this interaction using the Preacher, Curran, and Bauer (2006) calculator for probing HLM interactions (based on Aiken & West, 1991), it was found that when the variable of how far the teachers expected the student to go in school is one standard deviation about the grand mean, the variable of parent reports about school contact has an intercept of 56.43 and a slope of -1.12 ($p < .001$). When the variable of how far the teachers expected the student to go in school is one standard deviation below the grand mean, the variable of parent reports has an intercept of 36.48 and a slope of -1.65 ($p < .001$). Thus, the variance of teacher expectations with parent reports of school contacts has changed the relationship between parent reports of school contacts and senior year math scores.

Another unexpected finding was that schools in which a higher percent of students received academic counseling ($\beta = -0.012$) were negatively associated with math scores at the $p < .05$ level. When this variable was used as the only independent variable, the relationship with senior year math scores was positive, but not statistically significant. Again, this suggests some association with one or more of the several other independent variables in the model.

Overall, this model explained a large portion of the variance both within and between schools. Using the formula proposed by Kreft and de Leeuw (1998) and Singer (1998) for calculating within-unit and between-unit variance, 45.1 percent of the variance within the schools and 75.2 percent of the variance between schools were explained by this model.

The level-one variables in the construct of opportunities for participation and contribution included active participation in math class, participation in work-based learning, participation in school-sponsored community service, availability of and participation in sports activities, the hours spent each week in school-sponsored extracurricular activities, and the square root transformation of the number of non-sports extracurricular activities in which the student participated. The level-two variables that were included were the number of sports activities available at the school, the availability of work-based learning experiences, whether or not students participated in teacher evaluation, and the square root transformation of the percent of students participating in school-sponsored community service.

Table 4.3 demonstrates that four of the variables associated with the construct of opportunities for participation and contribution were positively associated with senior-level math scores. Hours per week spent in extracurricular activities at school ($\beta = 0.459$, $p < .001$), participation in school-sponsored community service ($\beta = 1.358$, $p < .01$), participation in non-sports extracurricular activities ($\beta = 4.157$, $p < .001$), and the number of sports offered at school ($\beta = 0.546$, $p < .001$) were all associated with higher senior-level math scores.

On the other hand, three of the variables associated with opportunities for participation and contribution were negatively associated with senior-level math scores. Students who reported a higher level of participation in sports ($\beta = -0.758$, $p < .001$), who reported participation in school-sponsored work-based learning ($\beta = -3.800$, $p < .001$), and who reported active participation in math class ($\beta = -0.359$, $p < .001$) had lower senior-level math scores. Due to the unexpected negative findings, additional analyses were undertaken to explore the issues further.

In regard to sports participation, a listwise HLM analysis with the original data set was done examining the influence of participation in interscholastic sports and the influence of participation in intramural sports separately. In this analysis, participation in interscholastic sports was positively and significantly ($p < .001$) associated with senior year math scores, with a coefficient of 0.686; whereas participation in intramural sports was negatively and significantly ($p < .001$) associated with senior year math scores, with a coefficient of -1.156. It appears that the strong negative impact of participation in

Table 4.3
The Influence of Opportunities for Participation and Contribution on Mathematics Achievement in the Senior Year

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
Participation in sports****	-0.757765	0.039521	-19.174	50	0.000
Hours per week in extracurricular activities****	0.458748	0.028803	15.927	40	0.000
Participated in school-sponsored community service***	1.357893	0.455567	2.981	20	0.009
Work-based learning****	-3.799763	0.393344	-9.660	20	0.000
Active participation in math class****	-0.358794	0.057297	-6.262	2220	0.000
Participation in non-sports extracurricular activities****	4.156671	0.280165	14.837	20	0.000
Level-Two Variables					
Students evaluate teachers	0.237143	1.153576	0.206	30	0.839
Number of sports at school****	0.545541	0.056285	9.693	50	0.000
Work-based learning offered	-0.279913	0.241109	-1.161	510	0.247
Percent of students in school-sponsored community service	0.076208	0.095970	0.794	580	0.428

Model explains 14.2 percent of within-unit variance; 38.4 percent of between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

intramural sports was responsible for the negative findings related to sports participation in this study.

The original data set was then examined further for correlations of sports participation with the composite test score in math and reading during the sophomore year and with the ninth grade GPA. Participation in interscholastic sports was positively and significantly associated with both the composite test scores and the ninth grade GPA with relatively low correlations (below 0.10, $p < .001$). On the other hand, participation in intramural sports was negatively associated with both variables (with correlations of -.315 and -.230, respectively), all at the $p < .001$ level. Students who participated in intramural sports were more likely to be at-risk academically.

In the case of the negative association between work-based learning and senior year math scores, additional correlations were analyzed in the original data set. Student participation in cooperative education, internships, mentoring, job-shadowing, or school-based enterprise were negatively associated with students' standardized composite test score in math and reading in tenth grade and with their grade point averages in ninth grade. These correlations were low (between -.126 and -.008) but all in the same direction, indicating that participants in work-based learning may have been experiencing some academic problems.

To determine whether participation in intramural sports and work-based learning was beneficial in regard to senior math scores for academically at-risk students, a subset of the original data set was developed to include only students whose ninth grade GPA was 2.00 or below or whose standardized composite test scores in reading and math fell

more than one standard deviation below the mean. In a listwise HLM analysis for this academically at-risk group, both participation in intramural sports and participation in work-based learning were negatively associated with senior year math scores at the $p < .001$ level ($\beta = -0.560$ for participation in intramural sports and $\beta = -2.006$ for participation in work-based learning).

Because of the negative association between the variable representing active participation in math class and senior year math scores, additional correlations were made in the original data set between a wide range of activities in math class and the students' scores on the senior year math examination. There were only three activities that were positively and significantly associated with math scores at a correlation of .20 or higher. These three activities were how often the student reviewed work in math class, used a calculator in math class, and used a graphing calculator in math class. Four other activities were positively and significantly associated with senior year math scores, but the correlations were less than .20. These activities were how often the student listens to the math teacher's lecture, copies the math teacher's notes from the board, does problem-solving in math class, and explains work to math class orally. Notably, any activities associated with the use of computers in math class were negatively associated with senior year math scores. Overall, opportunities for participation and contribution accounted for 14.2 percent of the variance within schools and 38.4 percent of the variance between schools using the formula proposed by Kreft and de Leeuw (1998) and Singer (1998).

The second research question was concerned with the role of caring relationships, high expectations, and opportunities for participation and contribution in relationship to timely graduation.

Research Question 2

Do caring relationships, high expectations, and opportunities for student participation and contribution within the schools influence timely graduation of public high school students?

A multilevel logistical regression was used in this analysis, since the dependent variable, graduation on time, is dichotomous. A student was considered to have graduated on time if he/she graduated by the summer of 2004. The same sample of public high school students who had not transferred from their tenth grade school was used in this analysis. The same variables constituting the constructs of caring relationships, high expectations, and opportunities for participation and contribution were also used.

As shown in Table 4.4, the construct of caring relationships had a small but significant impact on graduation rates. Students who reported caring relationships with teachers were more likely to graduate on time with an odds ratio of 1.16 ($p < .001$), while those who reported negative interactions with others at school were less likely to graduate on time with an odds ratio of 0.83 ($p < .001$). Students whose English and math teachers reported talking with them outside of class were more likely to graduate (with an odds ratio of 1.24 for the English teachers, $p < .05$; and an odds ratio of 1.26 for the math teachers, $p < .01$). Students who attended schools in which there was a higher

Table 4.4
The Influence of Caring Relationships on Graduation by Summer 2004

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Caring relationships with teachers****	0.148338	0.024765	5.990	40	0.000	1.159905	(1.103, 1.219)
Negative interactions with others****	-0.182999	0.024621	-7.433	160	0.000	0.832769	(0.793, 0.874)
English teacher talks with student outside of class**	0.211815	0.088714	2.388	20	0.030	1.235919	(1.024, 1.491)
Math teacher talks with student outside of class***	0.228840	0.070637	3.240	250	0.002	1.257141	(1.094, 1.445)
Level-Two Variables							
Student:teacher ratio***	-0.037580	0.010428	-3.604	580	0.001	0.963117	(0.944 ,0.983)
School practices on parent notification of student absences**	0.011473	0.004534	2.531	190	0.012	1.011539	(1.003, 1.021)

Model explains 4.7 percent of variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

student:teacher ratio were somewhat less likely to graduate with an odds ratio of 0.96 ($p < .01$). School practices on parental notification of student absences had minimal impact on graduation rates, with an odds ratio of 1.01 ($p < .05$). Using the formula developed by Snijders and Bosker (1999), this model accounted for 4.7 percent of the variance.

Table 4.5 demonstrates the association of the construct of high expectations with the likelihood of graduating on time. The variable that appeared to have the highest impact on graduating on time was how far the teachers expected the student to go in school ($\beta = 0.494$), with an odds ratio of 1.64 and a 95 percent confidence interval of 1.58 to 1.71 ($p < .001$). Parents' evaluations of high expectations at school ($\beta = .135$) were also significant in predicting timely graduation at the $p < .001$ level, with an odds ratio of 1.14 and a 95 percent confidence interval of 1.08 to 1.22. At the $p < .01$ level, the administrator's view that learning is not hindered by lack of discipline was also associated with increased odds of graduating on time, with an odds ratio of 1.29 and a 95 percent confidence interval of 1.09 to 1.53.

A few other variables representing the construct of high expectations were associated with small, but significant, changes in the odds ratio of graduating on time. Parents' perceptions of expectations in school discipline ($\beta = 0.033$) were associated with slightly increased odds of 1.03, with a confidence interval of 1.01 to 1.06, ($p < .05$). Likewise, students' perceptions views of high academic expectations ($\beta = 0.051$) were associated with slightly increased odds of graduating on time with odds of 1.05 and a 95 percent confidence interval of 1.01 to 1.10 at the $p < .05$ level.

Table 4.5
The Influence of High Expectations on Graduation by Summer 2004

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Enrolled in college prep program*	0.134286	0.078334	1.714	110	0.089	1.143720	(0.980, 1.335)
School personnel recommended college	0.034313	0.084944	0.404	50	0.688	1.034909	(0.872, 1.228)
School contacted parents about accomplishments	-0.078568	0.047314	-1.661	30	0.106	0.924439	(0.840, 1.018)
English teacher contacted parents about accomplishments	0.112126	0.118471	0.946	10	0.372	1.118654	(0.861, 1.453)
Math teacher contacted parents about accomplishments	0.012573	0.074176	0.170	170	0.866	1.012653	(0.875, 1.172)
English teacher's belief in influence on student success	0.004680	0.041077	0.114	10	0.912	1.004691	(0.918, 1.100)
Math teacher's belief in influence on student success	-0.042225	0.027513	-1.535	100	0.128	0.958654	(0.908, 1.012)
How far in school teachers expected student to go****	0.494307	0.019633	25.177	30	0.000	1.639362	(1.575, 1.706)
Parent evaluation of high expectations at school****	0.134969	0.029158	4.629	20	0.000	1.144502	(1.078, 1.215)

*p< .1, **p<.05, ***p<.01, ****p< .001

Table 4.5 (continued)
The Influence of High Expectations on Graduation by Summer 2004

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Parents' view of expectations in school discipline**	0.033485	0.13471	2.486	160	0.014	1.034052	(1.007, 1.062)
Students' view of high behavioral expectations	-0.016320	0.016826	-0.970	90	0.335	0.983812	(0.951, 1.017)
Students' view of high academic expectations**	0.051141	0.022917	2.232	90	0.028	1.052472	(1.006, 1.101)
Level-Two Variables							
Academic emphasis	-0.012642	0.027027	-0.468	30	0.642	0.987437	(0.935, 1.043)
Learning is not hindered by lack of discipline***	0.254291	0.086199	2.950	100	0.004	1.289547	(1.087, 1.530)
Alcohol/drugs not a problem	0.000364	0.001330	0.274	570	0.784	1.000364	(0.998, 1.003)
Disrespect not a problem	-0.000918	0.001347	-0.682	50	0.498	0.999082	(0.996, 1.002)
Crime not a problem	0.000487	0.001577	0.309	570	0.757	1.000487	(0.997, 1.004)
Percent of students in college prep program	0.001018	0.002146	0.474	10	0.642	1.001018	(0.996, 1.006)
Percent of students receiving academic counseling**	-0.003197	0.001426	-2.242	100	0.027	0.996808	(0.994, 1.000)

Model explains 36.9 percent of variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

One variable in this model was negatively associated with the odds of graduating on time—the percent of students at the school receiving academic counseling. However, the impact of this variable was negligible, with an odds ratio of 0.9968 and a confidence interval ranging from 0.994 to 1.000 ($p < .05$). When this analysis was repeated using the percent of students at the school receiving academic counseling as the only independent variable, the findings were no longer significant. It appears that there was some interaction with the other independent variables in this analysis that contributed to the negative results. Overall, this model explained 36.9 percent of the variance in graduating on time using the formula developed by Snijders and Bosker (1999).

As illustrated in Table 4.6, several of the variables associated with the construct of opportunities for meaningful participation and contribution were associated with increased odds of graduating on time. Participation in non-sports extracurricular activities ($\beta = 0.450$) appeared to have the largest impact, increasing the odds to 1.57, with a 95 percent confidence interval of 1.39 to 1.77 at the $p < .001$ level. Participation in school-sponsored community service ($\beta = 0.257$) was also associated with higher odds of graduating on time, with an odds ratio of 1.29 and a 95 percent confidence interval of 1.04 to 1.61 at the $p < .05$ level. Hours per week in extracurricular activities at school ($\beta = 0.100$) was associated with slightly increased odds of graduating on time, with an odds ratio of 1.11 and a 95 percent confidence interval of 1.09 to 1.12 ($p < .001$). The number of sports offered at school ($\beta = 0.024$) had an even smaller association with on-time graduation, with an odds ratio of 1.02 and a 95 percent confidence interval of 1.01 to 1.04 ($p < .01$).

Table 4.6
The Influence of Opportunities for Participation and Contribution on Graduation by Summer 2004

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Participation in sports****	-0.048961	0.010818	-4.526	20	0.000	0.952218	(0.931, 0.974)
Hours per week in extracurricular activities****	0.100191	0.008306	12.062	190	0.000	1.105382	(1.087, 1.124)
Participated in school-sponsored community service**	0.257411	0.107574	2.393	40	0.022	1.293576	(1.041, 1.608)
Work-based learning**	-0.223898	0.094094	-2.380	10	0.032	0.799397	(0.653, 0.978)
Active participation in math class	-0.016781	0.015497	-1.083	40	0.286	0.983359	(0.953, 1.015)
Participation in non-sports extracurricular activities****	0.450107	0.059720	7.537	70	0.000	1.568480	(1.392, 1.767)
Level-Two Variables							
Students evaluate teachers	-0.041905	0.183058	-0.229	60	0.820	0.958961	(0.665, 1.382)
Number of sports at school***	0.023948	0.008202	2.920	390	0.004	1.024237	(1.008, 1.041)
Work-based learning offered at school	0.002353	0.046047	0.051	40	0.960	1.002356	(0.913, 1.100)
Percent of students in school-sponsored community service	-0.013596	0.015324	-0.887	580	0.376	0.986496	(0.957, 1.017)

Model explains 13.8 percent of variance.
*p< .1, **p<.05, ***p<.01, ****p< .001.

On the other hand, two variables in the construct of opportunities for participation and contribution were associated with lower odds of graduating on time. Student participation in sports ($\beta = -0.049$) was negatively associated with the odds of graduation on time, with an odds ratio of 0.95 and a 95 percent confidence interval of 0.93 to 0.97 ($p < .001$). Participation in sports was divided into participation in interscholastic and intramural sports and considered in a listwise HLM analysis with the original data set. Participation in interscholastic sports increased the odds of graduating on time to 1.14 ($p < .001$), while participation in intramural sports decreased the odds of graduating on time to 0.90 ($p < .001$). Participation in work-based learning ($\beta = -0.224$) was also associated with lower odds of graduating on time, with an odds ratio of .80 and a 95 percent confidence interval of 0.65 to 0.98 ($p < .05$).

Since lower performing students are more likely to participate in intramural sports and work-based learning, an additional analysis was done to see if these activities would enhance on-time graduation for academically at-risk students—those with low ninth grade GPAs and with lower scores on the standardized composite math and reading examination. The lack of significant findings indicates that these activities did not influence, but did not hurt, the odds of graduating on time for this group of students. Using the formula developed by Snijders and Bosker (1999), this model accounted for 13.8 percent of the variance in the odds of graduating by Summer 2004.

The third and fourth research questions related to the factors that are associated with risks to mathematics achievement and to graduation on time. The risk factors that were considered included low socioeconomic status; race/ethnicity (particularly African

American and Hispanic youth who are typically disadvantaged in educational outcomes); living in a non-traditional family structure (without both biological parents); having a first language other than English; having been retained a grade in school; and having a learning, physical, or emotional disability.

Research Question 3

Does the risk factor predict lower mathematics achievement of public high school students?

Academic achievement in the risk analysis was measured by student performance on the senior level math test. As shown in Table 4.7, most of the identified risk factors were associated with lower scores on the math exam administered during the senior year. The students who were at risk for lower scores included those whose parents thought their tenth grader had a disability ($\beta = -10.292$), African American students ($\beta = -7.989$), those who had been retained a grade in school ($\beta = -7.041$), Hispanic students ($\beta = -6.127$), those from the lowest quartile socioeconomic status ($\beta = -5.257$), and those who lived in a non-traditional family without both biological parents ($\beta = -2.651$), all at the $p < .001$ level. Unexpectedly, having a first language other than English was not significantly related to student scores on the senior-level math test.

Since the findings in regard to having a first language other than English were unanticipated, further analyses were performed. As a single independent variable, having a first language other than English is associated with lower math scores ($\beta = -2.146$, $p < .001$). However, when the interactions are examined between language risk and the other risk factors along with the original independent variables, the risk of having a first

Table 4.7
Mathematics Achievement in the Senior Year Risk Analysis

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Lowest Quartile SES****	-5.257243	0.369495	-14.228	40	0.000
African American****	-7.988544	0.398314	-20.056	230	0.000
Hispanic****	-6.126827	0.448261	-13.668	460	0.000
Living in a non-traditional family****	-2.651216	0.296249	-8.949	60	0.000
First language other than English	-0.234330	0.483287	-0.485	50	0.629
Has been retained a grade in school****	-7.040960	0.456204	-15.434	20	0.000
Has a disability****	-10.292119	0.405595	-25.375	120	0.000

Model explains 20.9 percent of within-unit variance; 56.9 percent of between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

language other than English and being Hispanic is associated with lower math scores (β = -2.944, $p < .01$), while the risk associated only with having a first language other than English is only marginally significant ($p < .10$).

This interaction was probed further, using the computational tool developed by Preacher, Curran and Bauer (2006) based on the work of Aiken and West (1991). If the student is not Hispanic, there is not a significant relationship between having a first language other than English and math scores (the intercept is 47.41; the slope is 0.822; $p = 0.13$). If the student is Hispanic, there is a significant negative relationship between having a first language other than English and math scores (the intercept is 41.39; the slope is -2.30; $p < .001$). Thus, having a first language other than English appears to be a significant risk only for Hispanic students. When being Hispanic is removed from the original model, the risk of having a first language other than English again becomes significant (β = -1.747, $p < .01$), although it is the lowest risk in the presence of the other risks. Overall, this model of risk factors explained 20.9 percent of the variance within schools and 56.9 percent of the variance between schools, using the formula proposed by Kreft and de Leeuw (1998) and Singer (1998).

Research Question 4

Does the risk factor predict lower odds of graduating on time of public high school students?

Research question 4 was tested through a multi-level logistical analysis, using the same risk factors as the independent variables and graduation on time as the dependent variable. As demonstrated in Table 4.8, most of the risk variables were associated with

Table 4.8
Graduation on Time Risk Analysis

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Lowest Quartile SES****	-0.61316	0.077115	-7.951	40	0.000	0.541636	(0.464, 0.633)
African American***	-0.230328	0.082523	-2.791	1800	0.006	0.794273	(0.676, 0.934)
Hispanic****	-0.522514	0.087178	-5.994	5010	0.000	0.593028	(0.500, 0.704)
Living in non-traditional family****	-0.544608	0.073528	-7.407	60	0.000	0.580069	(0.501, 0.672)
First language other than English	-0.026826	0.088375	-0.304	740	0.761	0.973530	(0.819, 1.158)
Has been retained a grade in school****	-1.027251	0.114728	-8.954	10	0.000	0.357990	(0.278, 0.461)
Has a disability****	-0.631007	0.095320	-6.620	30	0.000	0.532056	(0.437, 0.647)

Model explains 10 percent of variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

lower odds of graduating on time. Students who had been retained a grade in school (β = -1.027) had the lowest odds of graduating on time, with an odds ratio of 0.36 and a 95 percent confidence interval of 0.28 to 0.46 ($p < .001$). Those who had a disability (β = -0.631) also had reduced odds of graduating on time, with an odds ratio of 0.53 and a confidence interval of 0.44 to 0.65 ($p < .001$). Students from the lowest quartile of socioeconomic status (β = -0.613) had odds of 0.54 of graduating on time, with a confidence interval of 0.46 to 0.63 ($p < .001$). Living in a non-traditional family (β = -0.545) was also associated with reduced odds of graduating on time with an odds ratio of 0.58 and a 95 percent confidence interval of 0.50 to 0.67 ($p < .001$).

Ethnicity also made a difference in rates of graduating on time, especially for Hispanic students (β = -0.523), with an odds ratio of 0.59 and a 95 percent confidence interval of 0.50 to 0.70 ($p < .001$). African American students (β = -0.230) also had reduced odds of graduating on time, with an odds ratio of 0.79 and a 95 percent confidence interval of 0.68 to 0.93 ($p < .01$).

Unexpectedly, having had a first language other than English had no impact on graduation on time. Because it was originally anticipated that having a first language other than English would also be a risk factor for graduating on time, additional analyses were done. As an individual independent variable, it is associated with significantly reduced odds (0.75) of graduating on time at the $p < .001$ level. When included with the other risk variables, it loses its significance. When the interactions are examined between language risk and being Hispanic, the risk of having a first language other than English and being Hispanic is associated with reduced odds of graduating on time (0.68, $p < .05$).

There is no significant relationship between having a first language other than English and the odds of timely graduation in this model.

This interaction was probed further, using the computational tools developed by Preacher, Curran, and Bauer (2006) based on the work of Aiken and West (1991). If the student is not Hispanic, there is not a significant relationship between having a first language other than English and graduation on time (the intercept is 2.15; the slope is 0.07; $p = .538$). If the student is Hispanic, there is a significant negative relationship between having a first language other than English and graduation on time (the intercept is 1.66; the slope is -0.32, $p < .05$). Thus, having a first language other than English appears to be a statistically significant risk only for Hispanic students. When included with the other risk variables (excluding being Hispanic), having a first language other than English decreases the odds of graduating on time to 0.82 at a $p < .05$ level of significance. Apparently, having a first language other than English is a risk factor for graduating on time, but it loses its significance in interaction with being Hispanic. Overall, the model explained 10 percent of the variance in the odds of graduating by Summer 2004, using the formula developed by Snijders and Bosker (1999).

Research questions 5 and 6 focus on the influence of caring relationships, high expectations, and opportunities for meaningful contribution and participation on students who were at risk for lower mathematic scores and reduced odds of graduation by Summer 2004.

Research Question 5

Do caring relationships, high expectations, and opportunities for student participation and contribution within the schools influence the mathematics achievement of public high school students who are at risk of poor academic achievement?

To examine this question, the sample used in the earlier analysis was filtered for three specific at-risk populations—students from the lowest quartile of socioeconomic status, African American students, and Hispanic students. It was also filtered for a generic category of at-risk students which included students from the three groups listed above, but also included students who lived in nontraditional families, students who had been retained a grade in school, and students who had a disability. Multiple imputations of each of the four data sets were performed because of missing data issues.

Table 4.9 presents the coefficients and probabilities for the influence of caring relationships on mathematics achievement scores among the original samples and the four at-risk samples. More detailed information about the analysis of the at-risk samples is included in Appendix B, Tables B1 - B4. The variable caring relationships with teachers was positively and significantly associated with mathematics achievement scores for students from the lowest socioeconomic quartile and the generic at-risk group, although the coefficients were lower than for the original sample. It was positively but not significantly related to the mathematics achievement scores of the African American and Hispanic students. Negative interactions with others were negatively associated with the mathematics achievement scores with all groups, but the association for African

Table 4.9
The Influence of Caring Relationships on Mathematics Achievement in the Senior Year

Variable	Original Sample β	Low SES β	African American β	Hispanic β	At-Risk β
Level-One Variables					
Caring relationships	1.142945****	0.688586****	0.349741	0.176313	0.862488****
Negative interactions	-0.910052****	-0.775403**	-0.152684	-1.099928**	-0.609878***
Talks with English teacher	0.283945	-0.250011	0.897656	0.255757	-0.117875
Talks with math teacher	1.378789****	1.644860	1.266972	1.144261	1.113392**
Level-Two Variables					
Student:teacher ratio	-0.036760	-0.059431	-0.157766	-0.061621	-0.014220
Notification of student absences	0.082089**	0.069867*	0.009507	0.158064***	0.058619*

*p< .1, **p<.05, ***p<.01, ****p< .001

American students was not statistically significant. The coefficient for Hispanic students was larger than the coefficient for the original sample.

Talking outside of class with the math teacher, significant for the original sample, had no significant relationship to the mathematics scores of three subgroups, but was positively and significantly associated with the mathematic scores of the generic at-risk group. Notification of student absences, which was significant at the .05 level with the original sample, was only marginally significant ($p < .10$) for students from the lowest socioeconomic quartile and the generic at-risk group. However, with Hispanic students, this variable was significant at the .01 level with a higher coefficient. Although for most groups, this model accounted for much less variance than it did for the original sample, for Hispanic students the model explained 13.5 percent of the between-unit variance as compared to the original model which explained 6.9 percent of the between-unit variance.

Table 4.10 illustrates the influence of high expectations on mathematics achievement scores for the original sample as well as the four subgroups. More detailed information about the analysis of the four subgroups is included in Appendix B, Tables B5 - B8. This model accounted for 45.1 percent of the within-unit variance for the original sample and 75.2 percent of the between-unit variance for that sample. For the subgroups, the within-unit variance ranged from 35.2 percent for the African American sample to 41.1 percent for the generic at-risk group. The between-unit variance ranged from 66.3 percent for the students from the lowest socioeconomic quartile to 75.5 percent for African American students.

Table 4.10
The Influence of High Expectations on Mathematics Achievement in the Senior Year

Variable	Original Sample β	Low SES β	African American β	Hispanic β	At-Risk β
Level-One Variables					
In college prep program	1.569425****	1.433741***	0.295677	0.696862	1.413989****
School personnel recommend college	-0.187810	-0.511406	0.696591	1.401769**	0.006246
School contacted parents about accomplishments	-0.473222***	-0.595298*	-0.480927	-0.268141	-0.446347*
English teacher contacted parents about accomplishments	-0.191819	-0.743123	0.277479	-0.444574	-0.723805**
Math teacher contacted parents about accomplishments	-0.107972	-1.265117**	-0.984854	-1.365490	-0.341209
English teacher's belief in influence on student success	-0.360218***	-0.752480***	-0.506873*	-0.452329	-0.550619***
Math teacher's belief in influence on student success	-0.410328***	-0.511558**	-0.515159**	-0.318851	-0.534301***
How far in school teachers expected student to go	3.753918****	3.240244****	2.841555****	3.161293****	3.481004****
Parent evaluation of high expectations at school	-0.249673*	0.129217	-0.184945	0.383574	-0.090667

*p< .1, **p<.05, ***p<.01, ****p< .001

Table 4.10 (continued)
The Influence of High Expectations on Mathematics Achievement in the Senior Year

Variable	Original Sample β	Low SES β	African American β	Hispanic β	At-Risk β
Parents' view of expectations in school discipline	0.300149**	0.421669***	0.293604**	0.495612****	0.272544**
Students' view of high behavioral expectations	-0.321699**	-0.420114*	-0.174683	-0.105996	-0.285057***
Students' view of high academic expectations	-0.432484****	-0.513761**	-0.498536**	-0.984981***	-0.602854****
Level-Two Variables					
Academic emphasis of school	0.553110****	0.261867	0.759261***	0.358322*	0.474962***
Learning is not hindered by lack of discipline	0.412637	0.753454*	0.229413	-1.171581*	0.592207
Alcohol/drugs not a problem	0.000190	0.001913	-0.011971	-0.001585	-0.008375
Disrespect not a problem	-0.009147*	-0.018813**	-0.012322	-0.012645	-0.016762***
Crime not a problem	0.006916	0.030632***	0.015965	0.005567	0.018086**
Percent of students in college prep program	0.012888*	0.016801	0.035659**	0.006732	0.010320
Percent of students receiving academic counseling	-0.011687**	-0.020996**	0.017059	0.005179	-0.013282**

*p< .1, **p<.05, ***p<.01, ****p< .001

For all groups in the analysis, the teachers' expectations about how far they expected the student to go in school were significant at the $p < .001$ level, although the coefficient was highest for the original sample. Being enrolled in a college prep program was also positively associated with mathematics achievement scores, significantly so for students from the lowest socioeconomic quartile and the generic at-risk category as well as for the original sample

Parents' perceptions of high expectations in school discipline were positively and significantly associated with higher mathematics scores for all groups, with the highest coefficients for students from the lowest socioeconomic quartile and Hispanic students. The administrator's reports on the academic emphasis of the school were positively associated with mathematics achievement scores for all groups, and statistically significant for African American students and students in the generic at-risk group as well as the original sample. With regard to this variable, the highest coefficient was for African American students.

For a few groups, other variables in this construct were positively and significantly associated with mathematics achievement scores. There were low but positive associations between the percent of students enrolled in a college prep program and mathematics achievement scores, but this association was statistically significant only for African American students. There were low but positive associations between crime not being a problem and mathematics achievement scores, statistically significant in the case of African American students and the generic at-risk group.

Additional analyses were done with regard to the associations in which very low, but statistically significant, relationships were found. Because of the very low coefficient related to the finding about African American students and the percent of students enrolled in a college prep program, a separate HLM analysis was done in which the percent of students enrolled in a college prep program at their school was the only independent variable. In this second analysis, a slightly stronger relationship was found ($\beta = 0.098$, $p < .001$). Similar analyses were done for the groups in which crime not being a problem was associated with slightly higher math scores. For both groups, the relationships were weaker—$\beta = 0.027$, $p < .05$ for students from the lowest socioeconomic quartile and $\beta = 0.018$, $p < .10$ for students in the generic at risk group. To some extent, the overall findings remained, although it appears there was some association among the multiple other independent variables in the construct of high expectations that influenced these findings.

Some variables in the category of high expectations had unexpected negative associations with mathematics achievement scores. Students in the generic at-risk group whose English teachers reported contacting parents about their tenth grader's accomplishments had lower senior year mathematics scores. Students whose math teachers reported contacting parents about their tenth grader's accomplishments also had lower senior year mathematics scores in each group, but this finding was statistically significant only for students from the lowest socioeconomic quartile. When examined as the only independent variable in HLM analyses, neither variable was significantly related to senior math scores. It appears that there is some association among the other

independent variables that caused these variables to become significant when all the variables associated with high expectations were included in the analyses.

Similarly, the beliefs of teachers in their ability to influence student success were negatively associated with senior year mathematics achievement scores for all students. These associations were statistically significant for English teachers for all groups except African American and Hispanic students. The associations were statistically significant for math teachers for all students except Hispanic students. Separate listwise HLM analyses were done with each of the groups for whom these findings were significant. In all these cases, it appears that the item rating the importance of "teacher's attention to the unique interests and abilities of the students" to student success was the one item that was consistently and significantly associated with lower senior year math scores.

For students in the generic at-risk group, there were small, but statistically significant, negative correlations between the years of teaching experience for both the English and math teachers with the overall scale and with teacher's attention item. Similar findings were found for students from the lowest socioeconomic quartile with regard to their English teachers. However, these correlations were not statistically significant with regard to the math teachers for students in the lowest socioeconomic quartile and were not significant with regard to either teacher for African American students. This scale may have been a very weak substitute for years of experience and does not seem to be a valid measure of teacher's high expectations for themselves and their students.

Student perceptions of high academic expectations, as conceptualized in this model, were negatively associated with mathematics achievement scores for all groups. Based on listwise HLM analyses for the original data set for each of the four groups, this finding was due to strong negative and statistically significant relationships between their responses to the item "I go to school because my teachers expect success" and senior year math scores. These relationships ranged from $\beta = -1.244$, $p < .05$ for the Hispanic students to $\beta = -1.559$, $p < .001$ for the generic at-risk group. The only other statistically significant findings in regard to the items that composed this scale were that students from the lowest socioeconomic quartile ($\beta = 1.088$) and from the generic at-risk group ($\beta = 0.728$) who responded positively to the item "I go to school because I think the subjects I'm taking are interesting and challenging" had higher math scores at the $p < .05$ level.

The generic at-risk group was the only subgroup for which the students' perceptions of high behavioral expectations were significantly and negatively associated with senior math scores ($\beta = -0.285$, $p < .01$). Again, there is some concern that the items used in the scale may not have accurately measured student perceptions of high behavioral expectations at school. In a listwise HLM analysis of the generic at-risk group in the original data set, three items were found to be positively and significantly associated with senior math scores—"school rules are fair" ($\beta = 2.647$, $p < .001$), "other students [do not] often disrupt class" ($\beta = 0.537$, $p < .05$), and "disruptions by other students [do not] get in the way of my learning" ($\beta = 2.266$, $p < .001$). The latter two items were excluded from the scale as it was being developed due to their lack of communality with the other items. The remaining items on the scale were negatively

associated with senior math scores, although the finding in regard to the item "Punishment is the same no matter who you are" was not statistically significant. To some extent, students' perceptions of high behavioral expectations at the school are positively related to senior math scores, but not as they were measured in this study.

There were two very small, but unexpected, negative findings for students from the lowest socioeconomic quartile and from the generic at-risk group. Students who attended schools in which disrespect was not a problem had lower math scores (β = -0.019, $p < .05$ for the first group and β = -0.017, $p < .01$ for the second group). Students who attended schools in which a larger percentage of students received academic counseling had lower math scores (β = -0.021, $p < .05$ for the first group and β = -0.013, $p < .05$ for the second group). These findings were examined again individually in separate HLM analyses. In the individual analyses, the relationships were not statistically significant; in three of the analyses, the relationship with senior year math scores became positive. It appears that these are two variables that were impacted by their associations with other independent variables in the construct of high expectations.

Table 4.11 presents the relationship of opportunities for participation and contribution to mathematics achievement scores for the original sample and the four subgroups. More detailed information about the subgroups is included in Appendix B, Tables B9 - B12. For all groups, there were positive and statistically significant associations between mathematics achievement scores and hours per week in extracurricular activities, participation in non-sports extracurricular activities, and the

Table 4.11
The Influence of Opportunities for Participation and Contribution on Mathematics Achievement in the Senior Year

Variable	Original Sample β	Low SES β	African American β	Hispanic β	At-Risk β
Level-One Variables					
Sports participation	-0.757765****	-0.684128****	-0.728385****	-0.469572****	-0.750632****
Hours/week in extracurricular activities	0.458748****	0.474800****	0.370064****	0.516433****	0.424229****
Participated in school-sponsored community service	1.357893***	1.148626	1.743743*	2.231706**	1.025244*
Work-based learning	-3.799763****	-2.433930***	-1.797932*	-4.179549****	-3.548068****
Active participation in math class	-0.358794****	-0.261571**	-0.102403	-0.336201**	-0.306402***
Participation in non-sports extracurricular activities	4.156671****	2.096622****	1.266365**	1.371607**	3.111413****
Level-Two Variables					
Students evaluate teachers	0.237143	-0.421620	-2.065251	-0.527640	-0.365075
Number of sports at school	0.545541****	0.208940***	0.428523***	0.290160**	0.452487****
Work-based learning at school	-0.279913	-0.337509	-0.406244	-0.355464	-0.220691
Percent of students in school-sponsored community service	0.076208	0.106347	-0.080379	0.287396	0.018471

*p< .1, **p<.05, ***p<.01, ****p< .001

number of sports offered at school. There were also positive and statistically significant associations between participation in school-sponsored community service and mathematics scores for Hispanic students as well as for the original sample. The coefficient for the Hispanic students was the highest in this category.

In an apparent contradiction, there were negative and statistically significant associations between the mathematics achievement scores for all groups and the student's level of participation in sports. Participation in sports was examined in separate listwise HLM analyses to determine the roles of participation in interscholastic versus intramural sports. For all four at-risk groups, participation in intramural sports was significantly associated with lower math scores at the $p < .001$ level. For three of the at-risk groups, participation in interscholastic sports was significantly associated with higher math scores. However, for African American students, there was not a statistically significant relationship between participation in interscholastic sports and senior year math scores. For all four groups, participation in intramural sports was significantly and negatively correlated with ninth grade GPA and the students' composite scores on the tenth grade reading and math examinations.

Participation in work-based learning was negatively and significantly associated with mathematics scores for all groups, although only marginally ($p < .10$) for African American students. The correlation of participation in any work-based learning activity was examined in relation to ninth grade GPA and the standardized test composite score for math and reading. For all groups, this correlation was negative and statistically significant, with correlations ranging from -0.059 to – 0.139.

Because of the correlations of participation in intramural sports and participation in work–based learning with lower ninth grade GPAs and lower composite test scores, additional listwise HLM analyses were done for each of the at-risk groups, including only members of each group with lower GPAs or lower composite test scores. For three of the subgroups, there was not a significant relationship between either participation in intramural sports or participation in work-based learning and senior year math scores. However, for the generic at-risk group (narrowed down to those with lower composite test scores or GPAs), there was a significant negative relationship between participation in work-based learning and senior year math scores ($\beta = -2.951$, $p < .01$). There was no significant relationship between participation in intramural sports and senior year math scores for this group.

More active participation in math class was negatively and significantly associated with mathematics scores for all groups other than the African American students. For each of the four at-risk groups, the learning activities which correlated significantly with senior year math scores at .20 or higher were reviewing work in class and using a calculator. The learning activities which correlated significantly with senior math scores within the range .10 to .20 were listening to the math teacher lecture and using graphing calculators. The use of computers was negatively associated with senior math scores for all of the four at-risk groups.

This model accounted for 14.2 percent of the variance within schools and 38.4 percent of the variance between schools for the original sample. For the at-risk samples, the within-school variance ranged from 8.3 percent for students from the lowest

socioeconomic quartile to 10.7 percent for students from the generic risk sample. The between-school variance ranged from 11.3 percent for students from the lowest quartile of socioeconomic status to 29.3 percent for the generic risk sample.

The sixth research question focused on whether caring relationships, high expectations, and opportunities for meaningful participation and contribution influenced the odds of graduating by the summer of 2004 for at-risk students.

Research Question 6

Do caring relationships, high expectations, and opportunities for student participation and contribution within the schools influence the odds of timely graduation of public high school students who are at risk of high school dropout?

This question was examined separately for each of the subgroups formed in the analysis of the previous research question—students from the lowest socioeconomic quartile, African American students, Hispanic students, and the generic at-risk group that included these three groups as well as students from nontraditional families, those who had been retained a grade in school, and those who had a disability. Table 4.12 displays the coefficients, significance levels and odds ratio for each group in regard to caring relationships and graduation by Summer 2004. More detailed analyses of the at-risk groups are included in Appendix B, Tables B13 - B16.

Caring relationships with teachers significantly increased the odds of graduating by Summer 2004 for each group, whereas negative interactions with others significantly reduced the odds of graduating for each group. Talking with the English teacher outside

Table 4.12
The Influence of Caring Relationships on Graduation by Summer 2004

Variable	Original Sample β	Original Sample Odds	Low SES β	Low SES Odds	African American β	African American Odds	Hispanic β	Hispanic Odds	At-Risk β	At-Risk Odds
Level-One Variables										
Caring relationships	0.148338****	1.159905	0.127513****	1.135999	0.114387**	1.21186	0.133921***	1.143302	0.143082****	1.153825
Negative interactions	-0.182999****	0.832769	-0.152326****	0.858708	-0.194010***	0.823650	-0.219960****	0.802551	-0.135202****	0.873539
Student talks with English teacher	0.211815**	1.235919	0.183997	1.202012	0.442931***	1.557266	0.088143	1.092144	0.216410**	1.241612
Student talks with math teacher	0.228840***	1.257141	0.174639	1.190817	0.117891	1.125121	0.073102	1.075840	0.187740**	1.206520
Level-Two Variables										
Student:teacher ratio	-0.037580***	0.963117	-0.038547***	0.962186	-0.069199****	0.933141	-0.032131*	0.968379	-0.037331***	0.963357
Notification of student absences	0.011473**	1.011539	0.006841	1.006865	0.004947	1.004960	0.000916	1.000917	0.007980*	1.008012

*p< .1, **p<.05, ***p<.01, ****p< .001

of class significantly increased the odds of graduating on time for the original sample, as well as African American students and students in the generic at-risk sample. In the case of African American students, the odds of graduating by Summer 2004 were increased to 1.56 if their English teacher reported talking with them outside of class. Talking with the math teacher outside of class was positively and significantly associated with the odds of graduating by Summer 2004 only for the original sample and the generic at-risk sample. Larger student:teacher ratios were significantly associated with slightly reduced odds of graduating by Summer 2004 for all groups (although only marginally so for Hispanic students, $p < .10$). These reduced odds ranged from 0.93 for African American students to 0.97 for Hispanic students. Prompt notification of student absences was significantly associated with the odds of graduating on time only for the original sample, and even in this case, the odds were changed only to 1.01. The variance in this model was 4.7 percent for the original sample. The variances ranged from 3.6 percent to 4.7 percent for the at-risk samples.

Table 4.13 shows the relationship between high expectations and the odds of graduating by Summer 2004 for each of the at-risk groups as well as the original sample. More detailed analyses for the at-risk groups are included in Appendix B, Tables B17-B20. The one variable that was consistently and positively associated with the odds of graduating by Summer 2004 was how far teachers expected the student to go in school. The odds of graduating on time ranged from 1.53 for students from the lowest socioeconomic quartile to 1.67 for Hispanic students if their teachers expected the student to go further in school.

Table 4.13
The Influence of High Expectations on Graduation by Summer 2004

Variable	Original Sample β	Original Sample Odds	Low SES β	Low SES Odds	African American β	African American Odds	Hispanic β	Hispanic Odds	At-Risk β	At-Risk Odds
Level-One Variables										
Enrolled in college prep program	0.134286*	1.143720	0.352705***	1.422911	0.331027**	1.392397	0.179094	1.196133	0.214135**	1.238789
School personnel recommended college	0.034313	1.034909	-0.069657	0.932713	-0.138366	0.870780	0.312376	1.366668	-0.033810	0.966755
School contacted parents about accomplishments	-0.078568	0.924439	-0.035059	0.965549	-0.216041**	0.805702	0.114043	1.120800	-0.069128	0.933207
English teacher contacted parents about accomplishments	0.112126	1.118654	-0.022368	0.977880	-0.046988	0.954099	-0.213514	0.807741	0.071769	1.074407
Math teacher contacted parents about accomplishments	0.012573	1.012653	-0.047973	0.953159	-0.080151	0.922977	-0.229061	0.795280	0.040148	1.040965
English teacher's belief in influence on student success	0.004680	1.004691	0.000306	1.000306	0.098974	1.104038	0.033736	1.034311	0.036521	1.037196
Math teacher's belief in influence on student success	-0.042225	0.958654	-0.033357	0.967193	0.061396	1.063320	-0.001882	0.998120	-0.025016	0.975295
How far in school teachers expected student to go	0.494307****	1.639362	0.428118****	1.534367	0.454275****	1.575031	0.512958****	1.670225	0.462134****	1.587459
Parent evaluation of high expectations at school	0.134969****	1.144502	0.086027*	1.089836	0.043783	1.044756	0.005364	1.005379	0.080976***	1.084345

*p< .1, **p<.05, ***p<.01, ****p< .001

Table 4.13 (continued)
The Influence of High Expectations on Graduation by Summer 2004

Variable	Original Sample β	Original Sample Odds	Low SES β	Low SES Odds	African American β	African American Odds	Hispanic β	Hispanic Odds	At-Risk β	At-Risk Odds
Parents' view of expectations in school discipline	0.033485**	1.034052	0.051947*	1.053320	0.053200	1.054640	0.023163	1.023433	0.029029*	1.029454
Students' view of high behavioral expectations	-0.016320	0.983812	-0.006839	0.993184	0.026440	1.026792	-0.046762	0.954314	-0.017774	0.982383
Students' view of high academic expectations	0.051141**	1.052472	0.030099	1.030557	0.049628	1.050880	0.095692	1.100421	0.073294***	1.076047
Level-Two Variables										
Academic emphasis	-0.012642	0.987437	0.009228	1.009270	0.015548	1.015669	-0.031374	0.969113	-0.002478	0.997525
Learning is not hindered by lack of discipline	0.254291***	1.289547	0.229679*	1.258196	0.215390	1.240345	0.012915	1.012998	0.242755**	1.274757
Alcohol/drugs not a problem	0.000364	1.000364	0.000553	1.000553	-0.001457	0.998544	0.001363	1.001364	0.000224	1.000224
Disrespect not a problem	-0.000918	0.999082	-0.001258	0.998743	-0.001821	0.998181	-0.002228	0.997775	-0.002118	0.997884
Crime not a problem	0.000487	1.000487	-0.001167	0.998834	0.002641	1.002645	-0.001040	0.998960	0.000355	1.000355
Percent of students in college prep program	0.001018	1.001018	0.002339	1.002342	0.005098	1.005111	0.004200	1.004209	0.001769	1.001770
Percent of students receiving academic counseling	-0.003197**	0.996808	-0.003225	0.996780	-0.000908	0.999092	-0.003056	0.996949	-0.002897**	0.997107

*p< .1, **p<.05, ***p<.01, ****p< .001

Enrollment in a college prep program was significantly associated with increased odds of graduating by Summer 2004 for students from the lowest socioeconomic quartile (1.42), African American students (1.39), and students in the generic at-risk sample (1.24). Parents' perceptions of high expectations at the school were significantly associated with increased odds of graduating on time for the original sample (1.15) and students in the generic at-risk group (1.08). Student perceptions of high academic expectations at school were positively associated with the odds of graduating by Summer 2004 for all groups, but statistically significant odds were found only for the original sample (1.05) and the generic at-risk sample (1.08). Increased odds of graduating on time were found in response to the statement that learning is not hindered by lack of discipline, but statistically significant relationships were found only for the original sample (1.29) and the generic at-risk group (1.27).

There were a few instances in which the variables in this construct were negatively associated with the odds of graduating by Summer 2004. African American students whose parents reported more frequent school contact concerning their student's accomplishments had reduced odds of graduating on time (0.81) at a significance level of $p < .05$. The percent of students receiving academic counseling was negatively and significantly associated with graduating on time but reduced the odds only slightly, to 0.997 for the original sample and the generic at-risk sample. When these analyses were repeated using just one independent variable, the findings were no longer significant, indicating that there is something within the combination of the multiple independent variables in this construct that produced the negative results. This model explained 36.9

percent of the variance for the original sample. For the at-risk samples, the variance ranged from 30 percent for students from the lowest socioeconomic quartile to 36 percent for the Hispanic students.

The relationship between opportunities for meaningful participation and contribution and the odds of graduating by Summer 2004 are shown in Table 4.14. Detailed information about the analyses for the at-risk groups is included in Appendix B, Tables B21 - B24. Across all groups the odds of graduating by Summer 2004 were significantly increased for students who spent more hours per week in extracurricular activities, although the odds were relatively small, ranging from 1.08 for students from the lowest socioeconomic quartile to 1.11 for the original sample. Participation in non-sports extracurricular activities seemed to be a significant component in this regard except for the Hispanic students, increasing the odds of graduating by Summer 2004 for the original sample (1.57), students from the lowest socioeconomic quartile (1.43), African American students (1.43), and the generic at-risk group (1.42). Participation in school-sponsored community service was associated with increased odds of graduating by Summer 2004 for all groups, but was statistically significant only for the original sample (1.29) and the generic at-risk group (1.34).

On the other hand, participation in sports was associated with somewhat lower odds of graduating by Summer 2004, significantly so for the original sample (0.95), African American students (0.93), and the generic at-risk group (0.96). In separate listwise HLM analyses, the roles of participation in interscholastic sports and intramural sports were compared. In both instances, participation in interscholastic sports increased

Table 4.14
The Influence of Opportunities for Participation and Contribution on Graduation by Summer 2004

Variable	Original Sample β	Original Sample Odds	Low SES β	Low SES Odds	African American β	African American Odds	Hispanic β	Hispanic Odds	At-Risk β	At-Risk Odds
Level-One Variables										
Sports participation	-0.048961****	0.952218	-0.019496	0.980693	-0.070796***	0.931652	-0.008460	0.991575	-0.043676****	0.957264
Hours/week in extracurricular activities	0.100191****	1.105382	0.080099****	1.083395	0.092451***	1.096859	0.083276****	1.086842	0.085041****	1.088762
Participated in community service	0.257411**	1.293576	0.211784	1.235881	0.454477	1.575349	0.208494	1.231821	0.293504**	1.341119
Participated in work-based learning	-0.223898**	0.799397	-0.144053	0.865842	-0.264985	0.767218	-0.278799	0.756692	-0.157896*	0.853939
Active participation in math class	-0.016781	0.983359	-0.015314	0.984803	-0.013747	0.986347	-0.035889	0.964748	-0.006924	0.993100
Participation in non-sports extracurricular activities	0.450107****	1.568480	0.360718****	1.434358	0.357039***	1.429091	0.007771	1.007801	0.352065****	1.422001
Level-Two Variables										
Students evaluate teachers	-0.041905	0.958961	-0.182225	0.833414	-0.091924	0.912175	-0.360086	0.697616	-0.080764	0.922412
Number of sports at school	0.023948***	1.024237	0.010005	1.010055	0.012482	1.012560	0.024847	1.025158	0.020289*	1.020496
Work-based learning offered	0.002353	1.002356	0.045514	1.046565	-0.057138	0.944464	-0.042141	0.958735	0.014976	1.015089
Percent of students in school-sponsored community service	-0.013596	0.986496	-0.003429	0.996577	-0.046122	0.954925	0.026548	1.026903	-0.014538	0.985567

*p< .1, **p<.05, ***p<.01, ****p< .001

the odds of graduating on time, with an odds ratio of 1.10 for African American students ($p < .05$) and an odds ratio of 1.11 for students in the generic-at-risk group ($p < .001$). Participation in intramural sports decreased the odds of graduating on time, with an odds ratio of 0.88 for African American students ($p < .001$) and an odds ratio of 0.91 for students in the generic at-risk group ($p < .001$).

Because of the correlations of participation in intramural sports with lower composite test scores in tenth grade and lower grade point averages in ninth grade, separate listwise HLM analyses were done for each at-risk sample, limited only to the students who had lower scores on the composite tenth grade examination or lower GPAs in ninth grade. There were no statistically significant findings regarding the relationship between participation in intramural sports and timely graduation for these students.

Participation in work-based learning was negatively associated with the odds of graduating on time for all groups, but was statistically significant only for the original sample (with an odds ratio of 0.80) and marginally significant ($p < .10$) for the generic at-risk group (with an odds ratio of 0.85).

The proportion of variance explained by this model was 13.8 percent for the original sample. For the at-risk samples, the variance ranged from 5.6 percent for Hispanic students to 11 percent for African American students.

Chapter 5: Discussion

Benard's (1991, 2004) theory for explaining resilience factors and positive youth development is one of the most promising theoretical frameworks to emerge in education. This study examined the influence of caring relationships, high expectations, and opportunities for participation and contribution, which are central to Benard's (1991, 2004) theory, on student outcomes. A longitudinal approach was used to study these factors within the schools during the tenth grade and analyze their influence in relation to math achievement in the senior year and timely graduation from high school. In addition, the study examined the influence of protective factors for four groups of students who were at risk of lower mathematics achievement scores and of high school dropout or delay of timely graduation from high school. The at-risk groups consisted of students from the lowest socioeconomic quartile, African American students, Hispanic students, and a generic group of at-risk students that included students if they were from the lowest socioeconomic quartile, African American, Hispanic, had nontraditional families, had been retained a grade in school, or had a disability.

Numerous other studies using national databases from the National Center for Educational Statistics have examined some of the resilience factors from Benard's research, such as caring relationships, high expectations and opportunities for participation and contribution; and these studies have discovered a positive relationship with academic achievement when examining these factors (Camp, 1990; Cappella & Weinstein, 2001; Croninger & Lee, 2001; Dalton et al., 2009; Dumais, 2008; Finn & Rock, 1997, Hunt, 2005; Jordan, 1999; Lee & Burkham, 2003; McNeal, 1997; Shouse,

1995; Werblow & Duersbery, 2009; Wimberly, 2002). These studies have added some support to our understanding of the importance of the resilience factors suggested by Benard and have laid the groundwork for this study. The present study, however, goes further than the other studies by empirically testing Benard's (2001, 2004) theoretical framework for resilience and positive youth development. In this study, Benard's theory is used as an organizing framework testing how the resilience factors that emerged from Benard's research may actually influence individual academic outcomes including the academic achievement and timely graduation of low-income and ethnic minority youth who are considered to be at-risk for academic failure and dropout.

A few other studies are based on Benard's theory and have used the Resilience and Youth Development Module developed by WestEd (Hanson, Austin, & Lee-Bayha, 2003, 2004). This module has been used extensively throughout the state of California as part of the California Healthy Kids Survey funded by the California Department of Education. Data in those studies, however, have been analyzed only at the school level, examining caring relationships, high expectations, and opportunities for participation and contribution in relation to school levels of academic performance on standardized achievement tests, whereas the current study examines Benard's resilience and positive youth development model at the individual level. Only a few studies to date have examined Benard's factors on individual student academic outcomes at the student level (Gizir & Aydin, 2009; Hanson & Kim, 2007; Jennings, 2003; Sharkey, You, & Schnoebelen, 2008) and these studies have been cross-sectional studies rather than longitudinal and analyzed data only from the students. This study addressed this gap in

literature by providing a longitudinal study that examines individual academic achievement and timely graduation. A major strength to this study is the fact that no other studies have examined on-time graduation using Benard's framework.

The most significant findings of this study were that caring relationships, high expectations, and opportunities for participation and contribution within the school enhance the mathematics achievement and odds of timely graduation of high school students. These findings provide direct empirical support for Benard's (1991, 2004) theory of resilience and youth development as applied to the role of schools in fostering positive academic outcomes. Although her theory is based on numerous studies of youth development and schools, it has not previously been directly tested in a national longitudinal study nor has it been directly tested in any study in regard to timely graduation. Specific findings supporting Benard's theory are discussed below along with some contradictory and mixed findings from this study.

Caring Relationships

For all groups other than African American students, caring relationships were positively and significantly associated with higher math scores. For all groups, caring relationships increased the odds of graduating on time, supporting Benard's (1991, 2004) theory regarding the importance of caring relationships in schools. However, the variances explained by these models were very small, less than ten percent in most cases.

Findings suggest, for example, that caring relationships with teachers were significantly associated with higher math scores for students in the overall sample and two of the at-risk samples and with increased odds of timely graduation for all samples.

These results provide empirical support for Benard's (1991, 2004) theory. However, Shin, Lee, and Kim (2009), using data from the 2003 administration of the Program for International Student Assessment (PISA) from the Organization for Economic Cooperation and Development, found different results. In their study, the teacher-student relationship was positively related to mathematics achievement only in Japan. However, they used the teacher-student relationship as a school-level variable. It may be that caring relationships make a difference in mathematics achievement only as experienced by individual students.

Other studies have shown that caring relationships with teachers and teachers talking with students outside of class increase the odds of graduating from high school (Croninger & Lee, 2001; Dalton et al., 2009; Lee & Burkham, 2003). However, only one of those studies (Lee & Burkham, 2003) uses multilevel modeling techniques to adjust for violations of the assumption of independence of observations due to the nested nature of the data, and the data used in that study is now dated. The present study adds to the previous findings by demonstrating the benefits of caring relationships for students at increased risk of not graduating on time—students from the lowest socioeconomic quartile, African American and Hispanic students, and students in the generic at-risk group.

Consistent with Benard's (1991, 2004) theory, it appears that math teachers who showed caring by talking with the students outside of class had students who responded to that caring by achieving more in math. Talking with the math teacher after class was significantly associated with higher math scores for students in the overall sample as well

as in the generic at-risk group. Talking with teachers outside of class was also associated with higher odds of timely graduation for the overall sample and the generic at-risk sample, with the highest odds of timely graduation for African American students who talk with their English teachers after class.

Students who attended schools with a larger student:teacher ratio were significantly less likely to graduate on time, although the impact of this was relatively small. This finding adds support to McNeal's (1997) finding that larger student:teacher ratios were associated with increased odds of dropping out in the High School and Beyond Study. This study also adds to Werblow and Duesbery's study (2009) with the ELS:2002 data set. They found a linear relationship between school size and dropout rates, with dropout rates highest for students attending the largest schools. This study found that larger student:teacher ratios reduced the odds of timely graduation, not only for the overall public school sample but also for students who already had reduced odds of timely graduation. When the findings from these studies are considered together, it is possible that in smaller schools and those with smaller student:teacher ratios, there are more personalized relations between students and teachers that provide the support that may motivate students to persist in high school. This may be especially important for students who are already at greater risk of high school dropout.

The present study found that not only are caring relationships associated with higher math scores and with increased odds of timely graduation, but negative interactions with others (the opposite of caring relationships) are associated with lower

math scores and significantly reduce the odds of timely graduation. The author has not found another study that uses this as a predictor of academic outcomes.

High Expectations

The positive expectations of their teachers appear to have contributed to student accomplishments in school, providing additional empirical support for Benard's (2004) theory. Unfortunately, it is difficult to separate out the extent to which these high expectations impacted the student-teacher relationship in such a way as to encourage student efforts and persistence in school or whether teachers accurately assessed the motivation and performance of their students in responding to this question.

Enrollment in a college prep program was also a significant predictor of senior year math scores and the odds of graduating on time. Enrollment in such a program reflects the expectations of both the school and the student that the student will pursue college after graduation from high school. At least for some of the samples in this study, students who are encouraged or permitted to enroll in a college prep program by school personnel may respond to that expectation with improved academic outcomes. These findings are also consistent with Benard's (1991, 2004) theory regarding the importance of high expectations in achieving positive outcomes.

Additionally, students were more likely to have higher math scores when their parents perceived that the school had high expectations in regard to school discipline and when the school had a strong academic emphasis. Having a favorite teacher, school counselor, or coach who thought that the most important thing they should do after graduating from high school was to attend college was an important predictor of math

scores for Hispanic students. Furthermore, the parents' evaluations of high academic expectations, students' perceptions of high academic expectations, and the administrator's view that learning is not hindered by lack of discipline increased the odds of graduating on time for the overall and generic at-risk samples. These findings also support Benard's (1991, 2004) theory.

Overall, high expectations accounted for a large portion of the variance in student academic outcomes. Of Benard's three protective factors examined in this study, high expectations contributed the most to mathematics achievement and the odds of timely graduation. It must be kept in mind, however, that there were some unexpected negative findings in the model that also contributed to this variance. These will be discussed later in this chapter.

Opportunities for Participation and Contribution

Opportunities for participation and contribution also had a direct impact on academic outcomes, providing further empirical support for Benard's (1991, 2004) theory. Hours per week spent in school-based extracurricular activities and the number of non-sports extracurricular activities in which the student participated were associated with higher mathematics scores and higher odds of timely graduation for the overall group as well as for most of the at-risk samples. Participation in school-sponsored community service was associated with higher mathematics scores and increased odds of timely graduation for the overall sample and at least one of the at-risk samples. All of these findings support Benard's (1991, 2004) theory regarding the importance of opportunities for participation and contribution in regard to student outcomes.

The findings in regard to hours per week in extracurricular activities confirmed the findings of Dumais (2008) with regard to mathematics achievement with the same data set. However, she did not use multileveling techniques in her analysis nor did she consider any risk other than socioeconomic status. The use of multilevel modeling techniques in the present study adjusts for any violation of the assumption of independence of observations related to the nested nature of the data. The present study confirms Dumais's findings that the benefit was greater for students from the lowest socioeconomic quartile than the overall population, but finds that the benefit was even greater for Hispanic students. Overall, it appears that opportunities for participation and contribution contribute to more positive student outcomes, providing additional support for Benard's (1991, 2004) theory despite some negative findings reported in the next section.

Findings that were Inconsistent with Benard's Theory

With regard to high expectations and opportunities for participation and contribution, some of the findings were inconsistent with Benard's (1991, 2004) theory. Although students' perceptions of high academic expectations were positively associated with the odds of timely graduation for students from overall and generic at-risk samples, they were negatively associated with senior year math scores for each of the groups. It is possible that the items on this scale may not have been a good measure of students' perceptions of high academic expectations at the school. Only one item on this scale was significantly associated with lower math scores for the each of the samples—"I go to school because my teachers expect success." The other two items on the scale were

positively associated with senior math scores for at least some of the samples. Students who performed well on the senior math exam may have had teachers who expected success, but this was not a motivation for students to attend school.

Students' perceptions of high behavioral expectations were significantly and negatively associated with senior math scores for the overall sample and the generic at-risk sample. This finding is also contrary to Benard's (1991, 2004) theory. There is some concern that the items used in the scale may not have accurately measured students' perceptions of high behavioral expectations at school. For both of these groups, three items that represent high behavioral expectations were positively and significantly related to senior year math scores. If student perceptions of high behavioral expectations are positively related to senior math scores, they were not measured well in this study. In Shin, Lee, and Kim's (2009) study of students in Korea, Japan, and the United States, a strong student disciplinary climate was a significant predictor of mathematics scores in all three countries. It may be that the items they used ("students don't listen to what the teacher says" and "there is noise and disorder") more accurately captured pertinent issues with regard to student behavioral expectations.

A negative relationship between teachers' beliefs in the importance of their efforts to the success of their students and senior math scores was found for the overall sample as well as for most of the at-risk samples. This variable had been included in this analysis with the idea that teachers who believed that their efforts were important to the success of their students would have higher expectations for themselves and their students, consistent with Benard's (1991, 2004) theory. Given the relative lack of

variability on these items and the correlations with less teaching experience, this variable may indirectly measure fewer years of teaching experience, accounting for the negative findings on this item. It may also be that teachers in this study were similar to the teachers in another study in Australia, who acknowledged the importance of individual student traits and the family environment in building educational resilience, but undervalued their own potential contribution (Oswald et al., 2003).

There were additional findings that were inconsistent with Benard's (1991, 2004) theory with regard to opportunities for participation and contribution. Participation in sports was negatively associated with senior year math scores for all samples and with reduced odds of timely graduation for the overall sample and two of the at-risk samples. Additional analyses showed that interscholastic sports were associated with higher math scores for all samples with the exception of African American students and were associated with increased odds of timely graduation. Participation in intramural sports, on the other hand, was associated with lower mathematics scores and reduced odds of graduating on time. Participation in work-based learning was also negatively associated with math scores for all samples except for African American students and with reduced odds of timely graduation for students in the overall sample.

Given the academic criteria often required for participation in interscholastic sports, lower performing students may have been more likely to participate in intramural sports, accounting for the negative impact of sports participation on academic outcomes. It is also possible that students participating in interscholastic sports have been given extra help and support, which might also account for these differences. Similarly, lower

performing students may have been encouraged to participate in work-based learning more so than higher performing students. Both participation in intramural sports and participation in work-based learning were negatively correlated with ninth grade GPAs and the standardized composite test score in tenth grade.

When each sample was restricted only to students with low GPAs or lower composite test scores, participation in intramural sports was negatively and significantly associated with senior year math scores only for the overall sample. Participation in work-based learning was negatively and significantly associated with lower math scores only for the overall and generic at-risk samples. Neither participation in intramural sports nor participation in work-based learning was significantly associated with the odds of timely graduation. The overall negative associations of participation in intramural sports and work-based learning with mathematics scores and the odds of timely graduation may be due to the increased participation of academically at-risk students in such activities. Since these activities in the filtered samples did not impact math scores for many of the at-risk groups and did not hurt the likelihood of graduating on time for any group, it is possible that they may have been beneficial in ways not measured in this study.

The activities that were included in the variable active participation in math class were not the activities that make a difference in learning mathematics. For each group, the learning activities which correlated significantly with senior year math scores at .20 or higher were reviewing work in class and using a calculator. Thus, the measure of active participation did not capture those activities which are most beneficial for learning mathematics, contrary to expectations from Benard's (2004) theory.

Implications for Practice

The dynamic connections among caring relationships, high expectations, and opportunities for participation and contribution (Benard, 2004) must be kept in mind in developing any plan to improve these environmental influences in schools. Although they have been studied and discussed as separate environmental protective factors, students need a balance of all three supports for healthy development. Schaps (2005) emphasizes that students need not just caring relationships with their teachers but also high expectations (academic press) along with "challenging and engaging learning opportunities" (p. 53) if they are to become academically successful. As these factors are discussed separately in this discussion, it must be kept in mind that students need a healthy balance of all three protective factors.

Efforts to provide caring relationships, high expectations, and opportunities for participation and contribution must start with the adults at the school since they are the ones who establish the school climate. School administrators should consider ways to make the school a supportive workplace for all employees, in which they can feel that they are valued and their opinions matter, and establish high expectations for teachers and staff. A resilience-promoting environment for the adults at the school will give them the support they need to provide a resilience-promoting school environment for their students (Benard, 2004; Henderson & Milstein, 2003; Woolley, 2006).

Another consideration in enhancing the capacity of the school to provide caring relationships, high expectations, and opportunities for participation and contribution is the ongoing assessment of the school climate. There are several instruments that can be

used to provide an inventory of the success of the school in creating a welcoming, caring climate. Jimmerson, Sharkey, Nyborg, and Furlong (2004) recognize WestEd's Resilience and Youth Development Module and the Search Institute's Developmental Assets Profile as appropriate instruments for conducting an environmental scan to determine the capacity for positive youth development within a school. Woolley (2006) suggests three such instruments with demonstrated reliability and validity – the Organizational Climate Description Questionnaire (Hoy & Tarter, 1997), the School Success Profile (Bowen & Richman, 2001), and the Inventory of School Climate – Student (Brand et al., 2003). Of those instruments, only the Resilience and Youth Development Module is organized around the concepts of caring relationships, high expectations, and opportunities for participation and contribution. WestEd has also developed the California School Climate Survey for administration to school staff and the California Parent Survey to help assess the whole school community across the key stakeholders in that community (WestEd, 2010a & 2010b).

In addition to an environmental scan of the school-level assets discussed, the school should identify resources within the school and the community that are available to address the needs of the students (Adelman & Taylor, 2006). School staff, volunteers, and various organizations within the community can contribute to any effort to provide a supportive school environment.

Caring Relationships

Building caring relationships requires teachers and other adults in the schools showing an interest in their students, being available to talk with them outside of class.

As Benard and Slade (2009) report, adults can help just by "being there" (p. 362)—making time to be of help when students need guidance to cope with a difficult situation. Caring relationships require teachers getting to know the students as individuals to provide them with a personalized level of support (Woolley, 2006). Such relationships can be fostered just by asking how the individual student is doing and taking the time to listen. An interest in students may be part of the motivation of teachers for entering the profession. However, the importance of developing caring relationships with students should be emphasized in the education and supervision of teachers.

Caring relationships can be enhanced by increasing the number of adults within the school who are available to demonstrate caring. Hiring additional teachers may reduce the student:teacher ratio, thereby increasing the likelihood that teachers will have time to demonstrate a personal interest in each student. Smaller classes foster more personal contacts between students and teachers as well as among students and allow for a greater focus on learning, including hands-on learning activities (WestEd., 2010c). To the extent to which smaller classes provide higher levels of caring relationships, they can be beneficial to student development and improved academic outcomes (Benard, 2004).

Some schools, based on the premise that all students should be prepared for college, make deliberate efforts to personalize the relationships between students and their teachers to provide students the social support they need to succeed in high school and prepare for college (Holland & Farmer-Hinton, 2009). One way in which some charter schools have done this is to limit their enrollments to 100 students per grade level (Farmer-Hinton & Adams, 2006; Terrell, 2010). Another way is to develop smaller

learning communities within a larger school (Knight-Diop, 2010). The focus of both efforts is to strengthen interpersonal caring through daily interactions between students and school staff. Within this context, students who feel supported by the adults in the community are likely to work harder to meet the expectations of their teachers.

Benard (2004) also suggests that opportunities to develop caring relationships with an adult can be increased if schools match each student to an adult at the school, utilizing all available adults. Custodians, food service staff, bus drivers, clerical staff, as well as teachers and other professional staff could be assigned to specific students with whom they would briefly talk once a week to see how the student is doing and provide some support. School-based mentoring programs utilizing community volunteers are also an avenue for increasing interactions with available adults (Benard, 2004). These adults can be "turnaround people" for at-risk students who can "tip the scale from risk to resilience" (Benard, 2003, p. 216).

Providing a caring school environment should address the issues that hinder children's well-being. Schools can express caring through the provision of school-based professionals, such as social workers, counselors and other mental health professionals, to help students with the issues they bring to schools (mental health diagnoses, developmental disabilities, health issues, child abuse, and family problems) through a variety of evidence-based practices (Franklin, Harris, & Allen-Meares, 2006). The provision of such services is another demonstration to students that their school cares about them (Benard, 2004).

One specific area in which school-based professionals can help is with regard to interpersonal conflict in the schools. Students attending schools in which they were threatened or hit by others had lower math scores and were less likely to graduate on time. There are a variety of evidence-based practices directed toward the prevention of and intervention with regard to bullying, interpersonal conflict, and violence (Franklin et al., 2006). Some of these practices include changing the culture of the school and resemble efforts to build caring relationships, high expectations, and opportunities for participation and contribution. Mattaini (2006) discusses the creation of a violence-free school climate that includes recognizing contributions and successes (high expectations), acting with respect (caring relationships), sharing power to build community (opportunities for participation and contribution), and healing. Services that address interpersonal conflict do not benefit only the students involved in such conflicts. They also benefit their classmates whose academic outcomes may be negatively impacted by disruptive interactions with others.

High Expectations

In this study, high expectations contributed the most to variance in senior year mathematics scores and the odds of timely graduation, indicating that a culture of high expectations may be central to achieving important academic outcomes. High teacher expectations were consistently related to student achievement. To the extent that these expectations were shaped by the academic performance and behavior of the students, they cannot easily be manipulated to produce improved academic performance. However, if schools took on the mission of preparing all students for success in college, it

might help both students and teachers see the viability of higher educational goals for each student. Taking on such a mission is consistent with the goal of the U.S. Department of Education (2010) that all students graduate or are on track to graduate by 2020, ready for college or a career.

Indeed, some schools have taken on the mission of developing a college culture—a school environment in which *all* students are expected to go to college after graduation (Corwin & Tierney, 2007; Farmer-Hinton, 2008; Farmer-Hinton & Adams, 2006; Holland & Farmer-Hinton, 2009; Knight-Diop, 2010; McClafferty, McDonough, & Nunez, 2002; Terrell, 2010). McClafferty et al. (2002) have identified several principles which they consider essential in the development of a college culture, including the following:

- Ongoing communications within the school that let students know what they need to do to prepare for college, in daily interactions with teachers and all school staff as well as posted on the bulletin boards and communicated through school newspapers or newsletters;
- Clearly articulated expectations that all students are to be prepared for college;
- Easily accessible information and resources about college admissions requirements, college preparatory courses, pre-college testing requirements, the college application process, and the process of seeking and securing financial assistance;
- All school counselors taking on the role of college counselors, guiding student selection of courses (beginning in middle school and throughout the high

school years) and providing assistance in preparing for and applying to college;

- A commitment to preparing students for the PSAT, SAT, and/or ACT tests by ensuring that they have the appropriate coursework and assistance in developing test-taking skills to facilitate their achievements on such tests;
- Active involvement by teachers who incorporate college information into their classes and are available to students and parents for discussion about the academic futures of the students;
- College fairs and workshops communicating to the families that the students can succeed in college and providing easy access to information about all steps of the college planning process;
- Active partnerships with colleges in the community through college fairs, tours to college campuses, and participation in college-based summer enrichment programs; and
- Collaborations with feeder schools to ensure that a college message is communicated from kindergarten through twelfth grade and prepare students for the transitions from one level to the next.

Other ingredients of a college culture of high expectations for all students may include the following:

- A shared belief that all students can be prepared for success in college and the consistent communication of this belief throughout the school community (Corwin & Tierney, 2007; Knight-Diop, 2010);

- Restructuring the curriculum to ensure that all students are offered the appropriate college preparatory classes, including challenging courses, such as Advanced Placement or International Baccalaureate courses (Corwin & Tierney, 2007; Terrell, 2010; Tierney, Bailey, Constantine, Finkelstein, & Hurd, 2009);
- Early identification of students with academic deficiencies and the provision of support to overcome them (Tierney et al., 2009);
- A low student:staff ratio to enhance the likelihood of close, supportive, caring relationships and frequent interactions in support of students' academic futures (Farmer-Hinton, 2008; Knight-Diop, 2010; Terrell, 2010);
- Pairing a relatively small cohort of students with the same counselor throughout high school so that the counselor would know each student well enough to provide guidance in college selection (Farmer-Hinton, 2008);
- College planning support throughout the curriculum including at least one class that focuses on specific college preparation activities (Farmer-Hinton, 2008; Terrell, 2008);
- Encouragement, advice, and hands-on support from teachers and counselors in the college planning process (Conley, McGaughy, Kirtner, van der Valk, & Martinez-Wenzl, 2010; Holland & Farmer-Hinton, 2009; Tierney et al., 2009);

- Extending assistance to students with peer tutoring and assistance with preparing for SAT or ACT tests and completing college essays and applications (Corwin & Tierney, 2007; Knight-Diop, 2010);
- Developing a culture of participation in extracurricular and community service activities in which all students are expected to participate, thus enhancing their college applications (Knight-Diop, 2010; Terrell, 2010); and
- The provision of social services or social service referrals to address the academic, personal, and family problems of students that would pose an obstacle to students' enrollment in college (Corwin & Tierney, 2007; Farmer-Hinton, 2008).

The development of a college culture is particularly important for schools serving a high proportion of at-risk students. More advantaged students are likely to attend schools in which going to college after graduation is the norm and to have been raised in families in which their parents are college graduates who can use their own experiences and social networks to guide their children through the process of preparing for and enrolling in college. Students without such advantages, on the other hand, may need substantial support from school personnel to recognize that college is a realistic possibility and to assist them in preparing for a future in college (Farmer-Hinton, 2008).

Students also need support in identifying the connections between their strengths and future careers. They need to know which classes would better prepare them for their future majors in college (Benard & Slade, 2009). Teachers can enhance their classes by showing the connections between classroom learning and future careers.

Inevitably, in most schools, there are some students who fall behind. In a school with high expectations, attention should be directed to these students to help them see the possibility of succeeding in school and improve in their academic achievement. Farmer-Hinton (2008) discusses a scaffolding process in which teachers provide the additional help or resources that students need to achieve expectations. Franklin, Kim, and Tripodi (2006) cite the use of solution-focused, brief therapy as an intervention that can build upon the strengths of students to overcome a variety of issues that put students at risk for dropping out. Not only is this an intervention that can be used with individual students, it is also an intervention that can be used throughout the school when all school staff are trained in the intervention (Franklin & Streeter, 2003).

Opportunities for Participation and Contribution

Although not measured well in this study, one important way in which students can contribute to the school environment is to share their opinions and suggestions to address problems within the school. Benard (2004) suggests the importance of "voice and choice" (p. 81) in this regard. As suggested by Fallis and Opotow (2003) and emphasized by Kim and Streeter (2006) with regard to class attendance, this is a significant way in which students can feel that they are important and can make a difference. Expanding such participation to address other meaningful issues can help students see themselves as resources within the school community rather than as passive objects (Henderson & Milstein, 2003).

A powerful approach to engage students in meaningful participation is the Listening to Students Circle developed by Benard and Burgoa (Benard & Slade, 2009).

In this process, students sit in the inner circle and speak while school staff and community partners sit in the outer circle and listen, giving them an understanding of what students really think. This contributes to policy and program changes that address students' perspectives while strengthening the relationships between students and adults in the school community.

Active participation can also be encouraged in the classroom through a variety of engaging classroom activities, cooperative learning (working in groups or pairs), and hands-on activities, as Benard and Slade (2009) reported in a discussion of findings in 25 student focus groups. Students also wanted to participate in decision-making in regard to issues such as homework, class rules, school lunches, and restroom issues. When asked what they could do to improve their school or community, students in the focus groups came up with ideas such as peer helping, community service, and school beautification.

Extracurricular opportunities for participation and contribution had a significant positive impact on academic outcomes for students in this study. Such participation, if sufficiently engaging, can serve as a motivation for students to attend school (Kim & Streeter, 2006). Schools and their surrounding communities should consider the value of such activities and provide investments in enriching those activities they currently offer, developing alternative activities, and encouraging students to participate in those activities. Activities should be designed to promote maximum participation from all students regardless of skill level (Learning First Alliance, 2001), since it is those students at greatest risk who may benefit from such participation the most. For that reason, schools should encourage even those students who are performing poorly in school to

participate in school-sponsored extracurricular activities to enhance their attachments to the school and their connections with caring adults, contributing to improved academic outcomes. To enhance the array of extracurricular activities available to students, schools could partner with community resources to provide additional extracurricular activities on school grounds. This is one way in which external community services may be able to make a major contribution to the academic outcomes of students in the local schools.

School-sponsored community service programs also appear to have a positive impact for the students who participate in them and should be encouraged. School-community partnerships could be formed in which students provide services to the community agencies and in turn community agencies provide opportunities for extracurricular activities at the school. Such partnerships between schools and communities are consistent with the current proposal to extend the Elementary and Secondary Education Act (U.S. Department of Education, 2010).

Limitations of the Study and Recommendations for Further Research

The Educational Longitudinal Study of 2002 (ELS:2002) provided many advantages to this study. It is a nationally representative sample that provides data from students, their parents, their English and math teachers, and administrators of the schools they attended. It includes survey and test data from 2002 and 2004, transcript data, and data on their educational and employment experiences after high school.

Although ELS:2002 includes data related to the constructs of caring relationships, high expectations, and opportunities for participation and contribution, the survey was not developed specifically to measure these variables. In an attempt to identify

applicable measures, the researcher included too many possibly relevant independent variables that may have masked the direct effect of some of the more significant measures within the associations among those variables, particularly with regard to the construct of high expectations.

Furthermore, the researcher used the available data to develop scales to measure the various variables in each of these constructs. Some of those scales, upon further analysis and reflection, appear to have not accurately captured the constructs they were designed to measure. This is one limitation of the study. Additionally, several of the scales were in the lower range of acceptable reliability with Cronbach's alphas between .60 and .69, which is another limitation of this study.

Measures that focus more directly on these three constructs might more accurately assess the degree to which students experience caring relationships, high expectations, and opportunities for participation and contribution in the schools they attend. For example, the one instrument which is directly based on Benard's (1991, 2004) work is the Resilience and Youth Development Module of the California Healthy Kids Survey (Hanson & Kim, 2007). This instrument measures caring relationships, high expectations, and opportunities for participation in the school, the family and the community, but has not been used extensively in relationship to individual academic outcomes, such as mathematics achievement and timely graduation. The use of such a measure in relationship to the individual academic outcomes measured in this study could contribute to further research on the value of caring relationships, high expectations, and opportunities for participation and contribution within the schools in relation to academic

outcomes of individual students. Another avenue for further research would be to use the measures of independent variables that were employed in this study along with the Resilience and Youth Development Module to determine if the findings are comparable and if the two sets of independent variables measure the same construct.

Another limitation of this study is that the data was first collected during the spring semester of the sophomore year. By that time, earlier educational experiences would have shaped students' academic achievement and persistence in school. Indeed, it is ninth grade students who are most likely to drop out (Chmelynski, 2004). Studying these experiences over a longer period of time, beginning perhaps in middle or elementary school, would help determine when caring relationships, high expectations, and opportunities for participation and contribution would have the most significant impact on student academic outcomes. It is possible that these constructs may be even more important early in the student's education. As Halpern-Manners, Warren, and Brand (2009) point out, there are multiple trajectories through which students are exposed to educational resources from kindergarten to high school graduation, and these different trajectories may have differential impacts on student outcomes.

While a strength of the Educational Longitudinal Study of 2002 is the variety of respondents, another limitation of this study is the extent of missing data. Incomplete data sets resulted not only from students with incomplete responses, but also if their parents, teachers, and/or school administrators did not complete the survey or respond to all of the items on it. When all of the data of interest in this study were combined, there was a substantial loss (90 percent) of complete data sets. Since neither listwise nor

pairwise deletion seemed appropriate, multiple imputation was used to address the missing data. However, the amount of missing data is a limitation of this study. Since other researchers may disagree with the use of multiple imputation in this study, the use of multiple imputation could be considered another limitation.

One of the assumptions required for the use of multiple imputation is that the data are multivariate normal (Honaker, King, & Blackwell, 2009). Three multivariate outliers were excluded from the analysis, but some of the individual variables used in this study were not normally distributed. This could have affected the accuracy of the imputations, another limitation of this study.

The use of multiple imputation could have been strengthened if additional variables from the original data set had been included in the set of variables submitted for multiple imputation. The use of such an inclusive strategy would have reduced the likelihood of omitting an important cause of missingness, reduced bias, and increased the statistical power of the analysis (Collins, Schafer, & Kim, 2001). Including additional predictors would have strengthened the multiple imputations (Rubin, 1996) and the resulting analysis. Omitting these covariates is a limitation in this study.

Only five imputations were made. Additional imputations may have increased the efficiency very slightly (from 93 percent to 96 percent efficiency, for example) (Rubin, 1996; Sinharay, Stern, & Russell, 2001). Using only five imputations could also be considered a limitation in this study.

An additional limitation of this study was the disparate measures that were used in a variety of metrics. Some variables were transformed to produce normal distributions;

others were not. This prevented the researcher from using the coefficients produced in the output to directly compare the strength of the relationships. Standardizing the variables prior to the analysis would have facilitated direct comparisons of the relative strength of each variable as it related to the dependent variables.

Finally, even though the focus of this study was on identifying those protective factors that facilitated academic achievement and high school graduation for at-risk students, the researcher selected only one group that was clearly at-risk from previous academic experiences—those who had been retained a grade in school, who were included in the generic at-risk sample. The researcher should have considered students who had experienced other risks in the educational system, such as those who had less than satisfactory grade point averages in ninth grade and those whose scores on the tenth grade examinations were below average. This is a subject for further research.

Given the inequalities among schools related to the income levels and ethnic minority status of the students they serve (Aud et al., 2010; Austin et al., 2007; Biddle & Berliner, 2003; Hanushek et al., 2000; National Research Council, 2004; Orfield & Lee, 2005; Phillips, 1997; Sunderman & Kim, 2005; The Education Trust, 2008a), it would be useful to explore whether caring relationships, high expectations, and opportunities for participation and contribution are equally available to students across income levels and ethnicities. Such research would help determine which schools could benefit the most from focusing on these developmental assets.

Further research on these three school-level protective factors should include experimental or quasi-experimental research involving interventions to increase caring

relationships, high expectations, and opportunities for participation and contribution within a specific school or schools. Such a project would involve pre- and post-testing of school characteristics which promote resilience and information about academic outcomes of the students. The Resilience and Youth Development Module could be used in such studies since it is based on Benard's theory of resilience.

Additional research should be done at the elementary school level to determine the extent to which caring relationships, high expectations, and opportunities for participation and contribution within schools promote positive development among elementary school students. It is possible that high levels of these protective factors are needed even more at the elementary level so that students are equipped with positive attitudes toward learning and mastery of basic academic skills. Although there is an elementary school version of the Resilience and Youth Development Module, there is a need for considerable modification of this survey due to psychometric issues (Hanson & Kim, 2007). Thus, further research should be directed at the development and psychometric assessment of an instrument that measures these assets in elementary schools before such an instrument that could be used to evaluate school-level interventions designed to increase these protective factors.

Conclusion

This study makes a significant contribution by examining specific risk factors including lower socioeconomic status, being African American or Hispanic, and a generic at-risk group that includes students in the first three categories along with students living in a nontraditional family (without both biological parents), those who had

been retained a grade in school, and those with a disability. Since all these factors are believed to impact math achievement and timely graduation, this study analyzed these at-risk groups in relationship to Benard's theory to see if the resilience factors would have the same effects. It is significant that caring relationships, high expectations, and opportunities for participation and contribution made a difference for the overall sample of public high school students and for students who were at greater risk of lower mathematics achievement, high school dropout, or delay in graduation. The similarities among these findings across the various samples supports Benard's message that "the development of human resiliency is none other than the process of healthy human development" (1991, p. 19; 2004, p. 9). Although this study started with a concern about the academic risks faced by low-income and ethnic minority youth, the results show that caring relationships, high expectations, and opportunities for participation and contribution within the schools contribute to positive academic outcomes for high school students as a whole as well as for students who are at-risk academically.

As the country moves from a focus primarily on academic achievement scores to a greater focus on graduation rates (Hoff, 2008; U. S. Department of Education, 2010), it is also significant that caring relationships, high expectations, and opportunities for participation and contribution positively impacted both the academic achievement of students in this study and their odds of timely graduation. As Allenswoth's (2004) study showed, improvement of test scores does not always lead to improvement in graduation rates. However, the findings in this study demonstrate that efforts in schools to enhance

these environmental protective factors can strengthen the ability of schools to promote both academic outcomes.

Additionally, it is noteworthy that among the three protective factors within the schools, high expectations in this study contributed the most to the variance in senior year mathematics scores and the odds of timely graduation. Although positive academic outcomes are enhanced by caring relationships and opportunities for participation and contribution, high expectations appear to be particularly important in this regard.

Many students are already on a downward spiral by the time they reach their sophomore year and may have dropped out before they reach the spring semester of the sophomore year. However, this study demonstrates that caring relationships, high expectations, and opportunities for participation and contribution within the schools as late as the tenth grade can make a difference in academic outcomes during the senior year. It seems likely that a positive school environment may make an even greater impact for students at earlier stages of their education.

In developing a protective school environment, one must remember that "children come to school with issues, which are years in the making, that hinder their academic performance" (Franke & Lynch, 2006, p. 1031). They are influenced by several factors outside the school environment and are unlikely to have their academic performance improved significantly with a short-term intervention. If efforts are made within schools to provide high levels of caring relationships, high expectations, and opportunities for participation and contribution, such efforts must be an integral part of the school culture over the long-term.

Appendix A

School Measures of Caring Relationships, High Expectations, .and Opportunities for Participation and Contribution

Table A1
School Measures of Caring Relationships

Author and Date	Population	Measures of Caring Relationships	Findings
Croninger & Lee (2001)	10,979 students from 1,063 public & private high schools from 1990-1992 from NELS data set	6-item scale of student-teacher relationships -- whether students believe teachers are interested in them, value what they say, are good at teaching, care about them and whether they succeed in school, recognize and praise them when they work hard, and put them down in the classroom (reverse coded) Teacher reports of talking with students outside of class	Teacher-based social capital reduced the risk of high school dropout by about half. This social capital was particularly beneficial for students from socially disadvantaged backgrounds and with academic difficulties prior to entering high school who were at the highest risk of dropping out.
Crosnoe & Elder (2004)	11,788 students in grades 7 through 11 in the National Longitudinal Study of Adolescent Health	Teacher support – 3-item scale based on whether student has trouble getting along with teachers, believes that teachers treat students fairly, and feels that teachers care about him/her	Teacher support was associated with on-track academic behavior, but did not act as a protective factor in the presence of risk from emotionally distant relationships with parents.
Liew, Chen & Hughes (2010)	761 low-income and minority first grade children in Texas	Teacher-student relationships – measured by an instrument completed by the teachers	For first grade at-risk students who exhibited low levels of task accuracy, positive teacher-student relationships were positively associated with reading and mathematics achievement one year later.
Murray & .Naranjo (2008)	11 low-income, African American graduating seniors with	Qualitative interviews to identify characteristics of helpful teachers	Helpful teachers (who contributed to the ability of these high-risk students to graduate) demonstrated that they cared, provided useful explanations for solving problems, and exerted a powerful presence in the classrooms.

	learning disabilities		
Resnick et al. (1997)	12,118 adolescents in grades 7-12 from National Longitudinal Study of Adolescent Heath	School connectedness – 6 item scale of items such as "feel that teachers treat students fairly; close to people at school; feel part of your school"	School connectedness was a protective factor in regard to risks of emotional distress, suicidal thoughts and behaviors, violence, substance use, and age of sexual debut One limitation of this study is that only cross-sectional data is included.
Schneider, Wyse, & Keesler, (2006/2007)	Sophomores in ELS:2002	Measures of school size	No significant relationship was found between school size and mathematics achievement score in 10^{th} grade. Used multilevel analysis and propensity scores, but did not look at teacher:student ratio.
Weiss, Carolan & Baker-Smith, 2010	Sophomores in ELS:2002	Measures of size of school and size of sophomore cohort	Cross-sectional data showed no correlation overall between school or cohort size and mathematics achievement. Did not look at teacher:student ratio.
Werblow & Duesbery (2009)	Sophomores in ELS: 2002	Measures of school size broken into quintiles	Found curvilinear relationship between school size and changes in mathematics achievement scores from 10^{th} to 12^{th} grade in which students from the smallest and the largest schools gain the most in these scores. Found linear relationship between school size and dropout rate with larger schools having the highest dropout rate. Used multilevel analysis but did not look at teacher:student ratio.
Wyse, Keesler, & Schneider (2008)	Sophomores in ELS:2002	Used propensity matching to compare the effect of school size on math scores of similar students	No significant differences were found justifying a need for smaller schools. The use of propensity matching strengthened these findings. Did not look at teacher:student ratio.

Table A2
School Measures of High Expectations

Author and Date	Population	Measures of High Expectations	Findings
Cappella and Weinstein (2001)	1,362 8th grade students with low reading scores in NELS-88	Enrolled in academic curriculum in high school	Achieved academic resilience (intermediate or advanced reading proficiency in 12th grade) despite lowest reading proficiency scores in 8th grade
Schoon, Parsons, & Sacker (2004)	9,716 l6-year olds from National Child Development Study in Great Britain (1974 data)	Whether or not teacher considered the student suited for further education Other protective factors in this study included parental involvement in their child's education, parental aspirations, student's educational & occupational aspirations, student's behavioral adjustment at age 16	The protective factors altogether reduced the impact of social adversity on academic attainment at age 33 by half. Teacher expectations were the most significant protective factor.

Table A3
School Measures of Opportunities for Participation and Contribution

Author and Date	Population	Measures of Opportunities for Participation and Contribution	Findings
.Camp (1990)	Subsample of 7,688 students from the High School and Beyond Study	Overall level of participation in various extracurricular and cocurricular activities	Student activity level was associated with higher grades.
Dumais (2008)	Sophomores in Educational Longitudinal Study of 2002	Hours spent per week in school-sponsored extracurricular activities	Hours were associated with higher senior year math scores. Although the benefit was greatest for students from the lowest socioeconomic quartile, these students spent fewer hours in such activities. Did not use multi-level modeling techniques.
Finn & Rock (1997)	1,803 low-income minority students in NELS study	Engagement in school outside of classroom – total amount of homework completed each week, number of school-based athletic activities in which student participated, number of academically oriented extracurricular activities in which student participated	Greater amounts of homework were more characteristic of students who maintained reasonable grades and test scores and persisted through high school. No significant differences were found for measures of extracurricular participation to distinguish resilient from nonresilient students. Did not use multilevel modeling techniques.
Hunt (2005)	13,152 students from the High School and Beyond data set who were included in	Extracurricular participation in sophomore and senior years – participant or nonparticipant in athletics, cheerleading/pep club, church activities, community activities, hobby/vocational clubs, performance activities, and subject matter clubs and the total number of activities in which student	Participation in extracurricular activities during the sophomore year did not appear to predict self-reported grades and educational expectations during the senior year. Better grades may lead to participation in more extracurricular activities. Participation in most extracurricular activities remained stable from the sophomore to senior years.

	the base year and first three follow-up studies (1980–1986)	participated	Used structural equation modeling to track this data from the tenth to twelfth grade.
Jordan (1999)	Sophomores in NELS:88	Participation in team and individual sports	Sports participation was associated with higher self-reported grade point averages and higher achievement scores in tenth grade. For African American students, the finding held with team sports, but not with individual sports. Did not use multi-level analysis.
Mahoney (2000)	695 students tracked from 4th to 12th grade	Use of school yearbooks	Students who participated in extracurricular activities were more likely to graduate from high school.
Mahoney & Cairns (1997)	392 children from two middle schools who were part of a longitudinal study, 92% of which attended two high schools	Extracurricular involvement data obtained from school yearbooks from the two middle schools and 8 of the 29 high schools that participants attended	16% of the sample dropped out of high school prior to completing 11th grade. Involvement in extracurricular activities was related to substantial reduction in school dropout, especially those who were classified as highest risk.
Randolph, Fraser, & Orthner (2004)	692 youth from low income single-parent families in one urban school district in southeast US	Dichotomous variable – whether or not the student was involved in any extracurricular activity	Students who participated in extracurricular activities were one fifth as likely to drop out of school.

Table A4
School Measures that Consider Some Combination of Caring Relationships, High Expectations, and Opportunities for Participation and Contribution

Author and Date	Population	Measures Used	Findings
Akey (2006)	449 students in an urban high school implementing the First Things First program. Primarily low-income, low-performing Hispanic students	Teacher support Clear, high, and consistent academic and behavioral expectations High quality pedagogy (active learning strategies, making connections and extensions, student-to-student interactions)	Teacher support, high behavioral expectations, and student-to-student interactions were positively correlated with student engagement and perceived academic competence. Student engagement and perceived academic competence were positively correlated with math scores on the Stanford Achievement Test. Measures of school context are only indirectly studied in relation to test scores. Sample was limited so that findings cannot be generalized beyond that sample.
Austin & Bailey (2008)	67,901 professional staff in 2,484 schools in California	California School Climate Survey – included items on meaningful student participation and positive staff-student relationships (including caring relations, high expectations, and fair treatment)	Schools with higher ratings on this survey had students who performed better on the Academic Performance Index. Data was not representative; participation was voluntary; was not correlated with student perceptions of school climate.
Borman & Rachuba (2000)	Data from Prospects Study of 3,891 students in 3rd grade, reduced to 925 students who performed better or worse than expected on 6th grade math test	Measures of peer group characteristics, school resources, effective schools variables, and supportive school environment (safe and orderly environment based on principals' ratings of student problems at schools; positive & supportive relationships with teachers with items such as "Most of my teachers really listen to what I have to say" and "In class I often feel 'put down' by my teachers"; and support for parent involvement)	Supportive school environment (particularly a safe and orderly school environment & positive teacher-student relationships) were associated with academic resilience. Positive teacher-student relationships had an effect size of 0.41 in distinguishing between resilient and non-resilient students. Did not use multilevel modeling techniques but did use a conservative probability level to compensate.
Cefai (2007)	Elementary classrooms in Malta	Participant observation and semi-structured interviews	Classrooms in which students had higher levels of pro-social behavior, autonomy and problem-solving, and motivation and engagement were characterized by a sense

			of classroom belonging and connectedness, teacher attention to and support of students, teachers expressing the belief that all students had the potential to succeed and could learn, activity-based instructional strategies, and recognition of student efforts. No comparison classrooms were studied to determine whether there were any differences between classrooms with different levels of positive student outcomes.
Dalton, Glennie, & Ingels (2009)	Sophomores in Educational Longitudinal Study of 2002	Teacher reports of talking with students outside of class Teachers' expectations of how far in school student would go	Higher dropout rates when neither teacher reported talking with the student outside of class. Higher dropout rates when teachers expected the student to go no further than high school. Did not measure opportunities for participation and contribution. Used descriptive rather than inferential statistics.
Gizir & Aydin (2009)	872 8th grade students living in poverty in Turkey	Resilience and Youth Development Module	School caring relationships and high expectations (as a single variable) was positively related to GPAs in 6th, 7th, and 8th grade. Study was cross-sectional rather than longitudinal.
Hanson, Austin, & Lee-Bayha, 2003	School-level analysis of 636 schools in the aggregated California Healthy Kids dataset and school-level Academic Performance Index data from the California Department of Education	Caring relationships: "At my school, there is a teacher or some other adult who… • really cares about me. • notices when I'm not there. • listens to me when I have something to say." High expectations: "At my school, there is a teacher or some other adult who… • tells me when I do a good job. • always wants me to do my best. • believes that I will be a success." Meaningful participation: "I do interesting activities at school," "At school, I help decide things like class activities or rules," and "I do things at my school that make a difference."	School levels of caring relationships, high expectations, and meaningful participation were positively and significantly related (at the .01 level) to schools' performance on the Academic Performance Index when controlling for race and gender composition of the school, average parental education, percentage of students receiving subsidized meals, percentage of ELL students, and school grade configuration. Only school levels on the Academic Performance Index were available, thus the data reflects relationships only at the school level.
Hanson, Austin, & Lee-Bayha,	School-level analysis of 628	Caring relationships: "At my school, there is a teacher or some other adult who…	School levels of caring relationships and high expectations were consistently and positively associated with the

2004	schools in the aggregated California Healthy Kids dataset and school-level Academic Performance Index data from the California Department of Education	• really cares about me. • notices when I'm not there. • listens to me when I have something to say." High expectations: "At my school, there is a teacher or some other adult who… • tells me when I do a good job. • always wants me to do my best. • believes that I will be a success." Meaningful participation: "I do interesting activities at school," "At school, I help decide things like class activities or rules," and "I do things at my school that make a difference."	schools' annual changes in Stanford Achievement Test scores at the ninth grade level after controlling for baseline scores, racial/ethnic, socioeconomic, and grade composition of the school as well as student socioeconomic status and the percentage receiving subsidized meals. Only school levels of these measures were available in this analysis. Meaningful participation at school, as measured in this study, was not consistently related to changes in test scores.
Hanson & Kim (2007)	Sample of 2,898 students in a large county in Southern California	School support – contains all items from caring relationships and high expectations Meaningful participation – same as above Elementary school version had only four items for school support.	At the secondary level, school support and school meaningful participation was significantly and negatively associated with substance use, being depressed, and truancy. They were positively associated with school connectedness, school grades, and scores on California Standardized Test.
Jennings (2003)	229 7th grade students in Northern California	Used the Caring Relationships and Meaningful Participation scales of the Resilience and Youth Development Module	Moderate levels (not high levels) of meaningful participation related to higher GPAs. Caring relationships with peers (not adults) related to higher GPAs. Small non-random sample, cross-sectional study.
Lee & Burkam (2003)	3,840 students in 190 urban & suburban schools from High School Effectiveness Supplement, NELS, 1988	Academic organization (curricula offered) – measured by whether or not the school offered calculus and the number of distinct mathematics courses offered below Algebra I Social organization (relationships between students and teachers) – series of survey items: "Teachers are interested in students," "teaching is good at this school," "Most teachers listen to me," "When I work hard, teachers praise my effort," "Students get along well with teachers," and "Discipline is fair at school."	Lower school dropout rates in schools that offer calculus and have fewer mathematics courses below Algebra I Lower school dropout rates in schools with more positive student-teacher relationships in Catholic and small and medium sized public schools. With large public schools (over 1,500 students), teacher-student relationships did not influence dropout rates. One strength of this study is the use of multi-level modeling techniques in the analysis.
McNeal (1997)	A random subsample	Student:teacher ratio Problematic climate (% of students unsafe, crime	The student:teacher ratio and the percent of minorities in the student body both directly affected the odds of

	(approximately half of the total sample) of public school students from the High School & Beyond data set (5,772 from 281 schools)	index, & conflict index) Academic press (hours of weekly homework, # of visits by college representatives, AP courses offered, % of teachers with advanced degree, minimum competency test required) Milieu (% of students who are minorities, who are from single parent households, mean SES)	dropping out. Neither school climate nor academic press, as defined in this study, had a significant relationship to the odds of dropping out. Used multilevel logistical regression
Perry, Liu, & Pabian (2010)	285 urban youth in middle and high school	Teacher support – included emotional support and high expectations	Teacher support had direct effects on career preparation and school engagement and indirect effects on grades. Relatively small sample; accounted for only a small variance in grades. Did not include data on opportunities for participation and contribution
Phillips (1997)	5,600 students in 23 middle schools in a single suburban school district serving primarily African American students	Communitarian measures – teachers' perceptions of shared values, democratic governance, & positive teacher relationships as well as students' perceptions of teachers' caring for students Academic press measures – teachers' reports of their expectations of the likelihood of their students completing high school & college, students' estimates of the time spent on homework, & school records of the percentage of eighth graders enrolled in Algebra I	School-level academic press was positively associated with student attendance and mathematics achievement scores while a communitarian climate did not improve either attendance or mathematics achievement. The influence of a communitarian climate on mathematics achievement was negative. The study is limited by the small number of schools and the homogeneity of these schools which are all in a single school district. This limits the generalizability of the findings, particularly for schools serving less-advantaged students. Did not include data on opportunities for participation and contribution. One strength of this study is the use of multi-level modeling techniques in the analysis.
Reis, Colbert, & Hebert (2005)	35 low income high school students	Supportive adults Opportunities to enroll in honors & advanced classes Participation in multiple extracurricular activities	Qualitative study. Supportive adults, opportunities to enroll in honors & advanced classes, and participation in multiple extracurricular activities distinguished students who achieved academically from underachievers.
Sharkey, You, & Schnoebelen (2008)	10,000 7th, 9th, and 11th grade students in California	Supportive relationships – six-item scale from the Resilience and Youth Development Module of the Healthy Kids Survey combining elements of caring relationships and high expectations	Supportive relationships had a positive impact on school engagement for both students with high family assets as well as those with low family assets. Supportive relationships contributed more to internal assets for

			students with low family assets than they did for students with high family assets. Cross-sectional survey which did not use multilevel modeling techniques and did not include data on opportunities for participation and contribution.
Shin, Lee, & Kim (2009)	15 year old students in Korean, Japan, & U.S. (PISA 2003 data)	Student-teacher relationships – students get along well with most teachers; most teachers are interested in students' well-being School disciplinary climate – students don't listen to teacher; there is noise and disorder	Students in all three countries had higher mathematics scores if their school mean on school disciplinary climate was higher. The school mean of student-teacher relationships affected mathematics scores only in Japan. Used multi-level modeling techniques. Did not include data on opportunities for participation and contribution.
Shouse (1995)	a subsample of 398 schools from the NELS First Follow-Up study (the ones in which data was obtained from at least 15 students & 5 teachers)	Communality – measures of shared values, common agenda, & organizational characteristics. Shared values included teacher agreement on goals, consensus on beliefs, belief that students can learn, principal/teacher agreement on school policies & attitudes toward students. Common agenda included proportion of students in extracurricular activities & tracking/course-taking similarity. Organizational characteristics included teacher cooperation with colleagues, cooperative planning, commitment to evaluation, staff support, & student reports of teachers show interest in students as people & really listen to what students say. Academic Press – measures of academic climate, disciplinary climate, & teachers' instructional practices and emphasis. Academic climate measure included perceptions from principals & means of student reports, course requirements in math & foreign language, % of teachers with MA degree or higher, student reports of taking "higher order" non-math courses. Disciplinary climate included school policies on	Positive effects on mathematics test scores for academic press at all schools, however, the effects were strongest for the schools serving students from low socio-economic backgrounds even though those schools had the lowest levels of academic press. In those low-socioeconomic status schools that had weak academic press, communality was negatively associated with mathematics test scores. For both low- and middle-SES schools, the combination of communality and academic press had the greatest effects on student achievement. High-SES schools had the greatest effects for high levels of communality combined with low levels of academic press. Phillips (1997) contends that the constructs of communality and academic press were confounded by the inclusion in the communality index of teacher's beliefs that students can learn, the tracking & similarity of students' course-taking. Academic press was confounded by the inclusion of disciplinary climate. One strength of this study is the use of multi-level modeling techniques in the analysis. Did not include data on opportunities for participation and contribution.

		absenteeism & misbehavior, student and teacher reports of disciplinary climate, and school's response to student absence. Teacher's practices included emphasis on objective standards of achievement, higher order instructional goals, amount of homework assigned, response to poor student performance, time spent preparing, student reports of instructional quality & academic demand.	
Smyth (1999)	5,961 students in 116 secondary schools in Ireland	Caring relationships – teacher-student interaction High expectations • Class Allocation (tracking students in classes with similar ability levels) • Student reports of how far in school teacher expects them to go Opportunities for participation – positions of responsibility such as prefect systems or pupil councils & extracurricular activities	Positive teacher-student relationships were associated with better exam scores, lower absenteeism and lower dropout rates at the individual level but not at the school level. Negative teacher-student relationships were associated with lower exam scores, higher absenteeism, and higher dropout rates at the individual levels and with lower exam scores at the school level. Individuals with little negative interaction are more likely to drop out in schools with higher aggregate levels of negative interaction. Individuals with high levels of negative interaction are more likely to drop out of schools with lower aggregate rates of negative interaction. Students in schools which use tracking have lower exam grades. This effect is mediated by student involvement in school and flexibility in choosing subjects. Students in schools practicing tracking report less involvement in school and have less flexibility in subject choice. School levels of higher teacher expectations are associated with better exam scores, lower absenteeism and lower dropout. Such schools generally have more flexible subject choice, stricter disciplinary codes, and more positive teacher-student interactions. Student involvement has a positive effect on students (positions of responsibility led to better exam scores; extracurricular activity led to lower absenteeism and dropout rates), but these effects lost their significance after school disciplinary climate was considered.

			One strength of this study is the use of multi-level modeling techniques in the analysis.
Wimberly (2002)	14,914 respondents (including 1,685 African American students) who completed all four waves of NELS	Caring Relationships • Students' feelings toward teachers – how students feel about their teachers and the general school climate • Teachers talking with students – teachers' reports of how often they discuss academic, career, and college issues with students outside of regular classroom instruction High expectations • School's academic emphasis – percent of students in college preparatory track, percent of students taking advanced placement courses, percent of students going on to 2- and 4-year colleges • School personnel expectations – students' perceptions of what their counselor, favorite teacher, and coach want them to do after high school Opportunities for participation • School extracurricular participation – student participation in various school-sponsored activities such as athletic teams, academic clubs, and social organizations	For white students, all five independent variables were significantly related at the .05 level to their educational expectations and participation in postsecondary education. For African American students, school personnel expectations, teachers talking with students, and school extracurricular participation were significantly related at the .05 level to their educational expectations and participation in postsecondary education. African American students were less likely than white students to talk with their teachers outside of class and were less likely to attend schools with a stronger academic emphasis. Although the analysis is not explicitly described in this report, the findings appear to be at the individual level only.

Appendix B

Multilevel Regressions for At-Risk Groups

Table B1
The Influence of Caring Relationships on Mathematics Achievement in the Senior Year for Students from the Lowest Quartile of Socioeconomic Status

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
Caring relationships****	0.688586	0.177457	3.880	550	0.000
Negative interactions**	-0.775403	0.284409	-2.726	30	0.011
Talks with English teacher	-0.250011	0.686052	-0.364	20	0.718
Talks with math teacher	1.644860	0.982784	1.674	10	0.128
Level-Two Variables					
Student:teacher ratio	-0.059431	0.095363	-0.623	60	0.535
Parent notification of student absences*	0.069867	0.037942	1.841	290	0.066

Model explains 1.6 percent of the within-unit variance and 2.8 percent of the between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B2
The Influence of Caring Relationships on Mathematics Achievement in the Senior Year for African American Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
Caring relationships	0.349741	0.288353	1.213	10	0.253
Negative interactions	-0.152684	0.282034	-0.541	80	0.589
Talks with English teacher	0.897656	0.949583	0.945	10	0.364
Talks with math teacher	1.266972	1.006266	1.259	10	0.234
Level-Two Variables					
Student:teacher ratio	-0.157766	0.121315	-1.300	80	0.197
Parent notification of student absences	0.009507	0.047539	0.200	400	0.842

Model explains 0.7 percent of the within-unit variance and 0.7 percent of the between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B3
The Influence of Caring Relationships on Mathematics Achievement in the Senior Year for Hispanic Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
Caring relationships	0.176313	0.250438	0.704	30	0.487
Negative interactions**	-1.099928	0.449241	-2.448	10	0.031
Talks with English teacher	0.255757	1.162674	0.220	10	0.831
Talks with math teacher	1.144261	1.133997	1.009	10	0.335
Level-Two Variables					
Student:teacher ratio	-0.061621	0.094879	-0.649	160	0.517
Parent notification of student absences***	0.158064	0.054884	2.880	420	0.005

Model explains 0.8 percent of the within-unit variance and 13.5 percent of the between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B4
The Influence of Caring Relationships on Mathematics Achievement in the Senior Year for At-Risk Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
Caring relationships****	0.862488	0.154561	5.580	20	0.000
Negative interactions***	-0.609878	0.170246	-3.582	40	0.001
Talks with English teacher	-0.117875	0.440677	-0.267	30	0.791
Talks with math teacher**	1.113392	0.498096	2.235	20	0.037
Level-Two Variables					
Student:teacher ratio	-0.014220	0.082031	-0.173	230	0.863
Parent notification of student absences*	0.058619	0.033246	1.763	100	0.081

Model explains 1.4 percent of the within-unit variance and 4.1 percent of the between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B5
The Influence of High Expectations on Mathematics Achievement in the Senior Year for Students from the Lowest Quartile of Socioeconomic Status

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
In college prep program***	1.433741	0.496353	2.889	50	0.006
School personnel recommend college	-0.511406	0.464641	-1.101	140	0.273
School contacted parents about accomplishments*	-0.595298	0.298342	-1.995	30	0.054
English teacher contacted parents about accomplishments	-0.743123	0.461411	-1.611	80	0.111
Math teacher contacted parents about accomplishments**	-1.265117	0.583044	-2.170	10	0.048
English teacher's belief in influence on student success***	-0.752480	0.194520	-3.868	40	0.001
Math teacher's belief in influence on student success**	-0.511558	0.231731	-2.208	10	0.047
How far in school teachers expected student to go****	3.240244	0.127237	25.466	10	0.000
Parent evaluation of high expectations at school	0.129217	0.252055	0.513	10	0.620

*p< .1, **p<.05, ***p<.01, ****p< .001

Table B5 (continued)
The Influence of High Expectations on Mathematics Achievement in the Senior Year for Students from the Lowest Quartile of Socioeconomic Status

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Parents' view of expectations in school discipline***	0.421669	0.113265	3.723	10	0.006
Students' view of high behavioral expectations*	-0.420114	0.181798	-2.311	10	0.059
Students' view of high academic expectations**	-0.513761	0.181082	-2.837	20	0.012
Level-Two Variables					
Academic emphasis of school	0.261867	0.158050	1.657	20	0.114
Learning is not hindered by lack of discipline*	0.753454	0.441601	1.706	90	0.091
Alcohol/drugs not a problem	0.001913	0.009936	0.192	20	0.850
Disrespect not a problem**	-0.018813	0.008986	-2.094	30	0.046
Crime not a problem***	0.030632	0.009527	3.215	540	0.002
Percent of students in college prep program	0.016801	0.010201	1.647	40	0.107
Percent of students receiving academic counseling**	-0.020996	0.008057	-2.606	40	0.013

Model explains 38.6 percent of within-unit variance and 66.3 percent of between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B6
The Influence of High Expectations on Mathematics Achievement in the Senior Year for African American Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
In college prep program	0.295677	0.549435	0.538	50	0.593
School personnel recommend college	0.696591	0.777055	0.896	10	0.385
School contacted parents about accomplishments	-0.480927	0.300121	-1.602	40	0.116
English teacher contacted parents about accomplishments	0.277479	0.643992	0.431	20	0.671
Math teacher contacted parents about accomplishments	-0.984854	0.753822	-1.306	10	0.218
English teacher's belief in influence on student success*	-0.506873	0.268617	-1.887	10	0.081
Math teacher's belief in influence on student success**	-0.515159	0.212102	-2.429	30	0.022
How far in school teachers expected student to go****	2.841555	0.160775	17.674	10	0.000
Parent evaluation of high expectations at school	-0.184945	0.215187	-0.859	20	0.401

*p< .1, **p<.05, ***p<.01, ****p< .001

Table B6 (continued)
The Influence of High Expectations on Mathematics Achievement in the Senior Year for African American Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Parents' view of expectations in school discipline**	0.293604	0.123341	2.380	20	0.031
Students' view of high behavioral expectations	-0.174683	0.122026	-1.432	30	0.163
Students' view of high academic expectations**	-0.498536	0.208502	-2.391	10	0.032
Level-Two Variables					
Academic emphasis of school***	0.759261	0.210488	3.607	30	0.001
Learning is not hindered by lack of discipline	0.229413	0.786626	0.292	10	0.775
Alcohol/drugs not a problem	-0.011971	0.015571	-0.769	10	0.457
Disrespect not a problem	-0.012322	0.011545	-1.067	10	0.304
Crime not a problem	0.015965	0.012928	1.235	80	0.221
Percent of students in college prep program**	0.035659	0.013624	2.617	20	0.016
Percent of students receiving academic counseling	0.017059	0.010643	1.603	80	0.113

Model explains 35.2 percent of within-unit variance and 75.5 percent of between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B7
The Influence of High Expectations on Mathematics Achievement in the Senior Year for Hispanic Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
In college prep program	0.696862	0.660513	1.055	30	0.302
School personnel recommend college**	1.401769	0.588412	2.382	330	0.018
School contacted parents about accomplishments	-0.268141	0.373462	-0.718	100	0.474
English teacher contacted parents about accomplishments	-0.444574	0.797227	-0.558	10	0.586
Math teacher contacted parents about accomplishments	-1.365490	0.845649	-1.615	10	0.130
English teacher's belief in influence on student success	-0.452329	0.264334	-1.711	20	0.102
Math teacher's belief in influence on student success	-0.318851	0.247943	-1.286	20	0.216
How far in school teachers expected student to go****	3.161293	0.129531	24.406	40	0.000
Parent evaluation of high expectations at school	0.383574	0.276195	1.389	10	0.188

*p< .1, **p<.05, ***p<.01, ****p< .001

Table B7 (continued)
The Influence of High Expectations on Mathematics Achievement in the Senior Year for Hispanic Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Parents' view of expectations in school discipline****	0.495612	0.117808	4.207	30	0.000
Students' view of high behavioral expectations	-0.105996	0.187086	-0.567	10	0.580
Students' view of high academic expectations***	-0.984981	0.272739	-3.611	10	0.005
Level-Two Variables					
Academic emphasis of school*	0.358322	0.181487	1.974	20	0.060
Learning is not hindered by lack of discipline*	-1.171581	0.655281	-1.788	20	0.088
Alcohol/drugs not a problem	-0.001585	0.013370	-0.119	10	0.908
Disrespect not a problem	-0.012645	0.008877	-1.425	80	0.158
Crime not a problem	0.005567	0.015860	0.351	20	0.730
Percent of students in college prep program	0.006732	0.011137	0.604	50	0.548
Percent of students receiving academic counseling	0.005179	0.017135	0.302	10	0.770

Model explains 39.3 percent of within-unit variance and 69.7 percent of between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B8
The Influence of High Expectations on Mathematics Achievement in the Senior Year for At-Risk Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
In college prep program****	1.413989	0.320063	4.418	110	0.000
School personnel recommend college	0.006246	0.389765	0.016	20	0.988
School contacted parents about accomplishments*	-0.446347	0.227115	-1.965	10	0.069
English teacher contacted parents about accomplishments**	-0.723805	0.308503	-2.346	70	0.022
Math teacher contacted parents about accomplishments	-0.341209	0.303691	-1.124	130	0.264
English teacher's belief in influence on student success***	-0.550619	0.144190	-3.819	20	0.002
Math teacher's belief in influence on student success***	-0.534301	0.143154	-3.732	20	0.002
How far in school teachers expected student to go****	3.481004	0.060244	57.782	150	0.000
Parent evaluation of high expectations at school	-0.090667	0.195214	-0.464	10	0.658

*p< .1, **p<.05, ***p<.01, ****p< .001

Table B8 (continued)
The Influence of High Expectations on Mathematics Achievement in the Senior Year for At-Risk Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Parents' view of expectations in school discipline**	0.272544	0.082619	3.299	10	0.012
Students' view of high behavioral expectations***	-0.285057	0.077100	-3.697	20	0.002
Students' view of high academic expectations****	-0.602854	0.120530	-5.002	10	0.000
Level-Two Variables					
Academic emphasis of school***	0.474962	0.119271	3.982	20	0.001
Learning is not hindered by lack of discipline	0.592207	0.364270	1.626	70	0.108
Alcohol/drugs not a problem	-0.008375	0.007131	-1.174	30	0.250
Disrespect not a problem***	-0.016762	0.006024	-2.783	140	0.007
Crime not a problem**	0.018086	0.008587	2.106	40	0.041
Percent of students in college prep program	0.010320	0.007817	1.320	30	0.198
Percent of students receiving academic counseling**	-0.013282	0.005802	-2.289	140	0.024

Model explains 41.06 percent of within-unit variance and 68.1 percent of between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B9
The Influence of Opportunities for Participation and Contribution on Mathematics Achievement in the Senior Year for Students from the Lowest Quartile of Socioeconomic Status

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
Sports participation****	-0.684128	0.093429	-7.322	30	0.000
Hours/week in extracurricular activities****	0.474800	0.057909	8.199	80	0.000
Participated in school-sponsored community service	1.148626	1.024736	1.121	10	0.285
Work-based learning***	-2.433930	0.624592	-3.897	40	0.001
Active participation in math class**	-0.261571	0.102942	-2.541	610	0.012
Participation in non-sports extracurricular activities****	2.096622	0.473971	4.424	30	0.000
Level-Two Variables					
Students evaluate teachers	-0.421620	1.577494	-0.267	20	0.792
Number of sports at school***	0.208940	0.072897	2.866	160	0.005
Work-based learning at school	-0.337509	0.359636	-0.938	100	0.351
Percent of students in school-sponsored community service	0.106347	0.134270	0.792	540	0.429

Model explains 8.3 percent of the within-unit variance and 11.3 percent of the between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B10
The Influence of Opportunities for Participation and Contribution on Mathematics Achievement in the Senior Year for African American Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
Sports participation****	-0.728385	0.106037	-6.869	10	0.000
Hours/week in extracurricular activities****	0.370064	0.065162	5.679	30	0.000
Participated in school-sponsored community service*	1.743743	0.977546	1.784	30	0.084
Work-based learning*	-1.797932	0.860080	-2.090	10	0.056
Active participation in math class	-0.102403	0.147736	-0.693	20	0.495
Participation in non-sports extracurricular activities**	1.266365	0.485292	2.609	30	0.014
Level-Two Variables					
Students evaluate teachers	-2.065251	1.569527	-1.316	120	0.191
Number of sports at school***	0.428523	0.104435	4.103	20	0.001
Work-based learning at school	-0.406244	0.401145	-1.013	200	0.313
Percent of students in school-sponsored community service	-0.080379	0.164179	-0.490	180	0.625

Model explains 8.8 percent of the within-unit variance and 21.1 percent of the between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B11
The Influence of Opportunities for Participation and Contribution on Mathematics Achievement in the Senior Year for Hispanic Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
Sports participation****	-0.469572	0.094354	-4.977	60	0.000
Hours/week in extracurricular activities****	0.516433	0.088404	5.842	20	0.000
Participated in school-sponsored community service**	2.231706	1.067685	2.090	40	0.042
Work-based learning****	-4.179549	0.783487	-5.335	90	0.000
Active participation in math class**	-0.336201	0.152798	-2.200	680	0.028
Participation in non-sports extracurricular activities**	1.371607	0.602724	2.276	60	0.027
Level-Two Variables					
Students evaluate teachers	-0.527640	1.572086	-0.336	140	0.737
Number of sports at school**	0.290160	0.119762	2.423	20	0.024
Work-based learning at school	-0.355464	0.426260	-0.834	70	0.407
Percent of students in school-sponsored community service	0.287396	0.181370	1.585	40	0.122

Model explains 8.6 percent of the within-unit variance and 18.7 percent of the between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B12
The Influence of Opportunities for Participation and Contribution on Mathematics Achievement in the Senior Year for At-Risk Students

Variable	Coefficient	Standard Error	T-ratio	Approximate d.f.	P-value
Level-One Variables					
Sports participation****	-0.750632	0.043952	-17.079	260	0.000
Hours/week in extracurricular activities****	0.424229	0.030215	14.040	550	0.000
Participated in school-sponsored community service*	1.025244	0.536141	1.912	30	0.064
Work-based learning****	-3.548068	0.395392	-8.974	80	0.000
Active participation in math class***	-0.306402	0.085337	-3.590	30	0.001
Participation in non-sports extracurricular activities****	3.111413	0.264573	11.760	270	0.000
Level-Two Variables					
Students evaluate teachers	-0.365075	0.986883	-0.370	120	0.712
Number of sports at school****	0.452487	0.053231	8.501	200	0.000
Work-based learning at school	-0.220691	0.271988	-0.811	80	0.420
Percent of students in school-sponsored community service	0.018471	0.103474	0.179	150	0.859

Model explains 10.7 percent of the within-unit variance and 29.3 percent of the between-unit variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B13
The Influence of Caring Relationships on Graduation by Summer 2004
for Students from the Lowest Quartile of Socioeconomic Status

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Caring relationships****	0.127513	0.033493	3.807	200	0.000	1.135999	(1.064,1.213)
Negative interactions****	-0.152326	0.039951	-3.813	440	0.000	0.858708	(0.794,0.929)
Student talks with English teacher	0.183997	0.119854	1.535	70	0.129	1.202012	(0.947,1.526)
Student talks with math teacher	0.174639	0.115589	1.511	110	0.133	1.190817	(0.947,1.497)
Level-Two Variables							
Student:teacher ratio***	-0.038547	0.012476	-3.090	540	0.003	0.962186	(0.939,0.986)
School practices on notification of absences	0.006841	0.006045	1.132	60	0.263	1.006865	(0.995,1.019)

Model explains 3.6% of the variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B14
The Influence of Caring Relationships on Graduation by Summer 2004
for African American Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Caring relationships**	0.114387	0.047362	2.415	30	0.022	1.121186	(1.018,1.235)
Negative interactions***	-0.194010	0.059661	-3.252	50	0.003	0.823650	(0.731,0.929)
Student talks with English teacher***	0.442931	0.146691	3.019	270	0.003	1.557266	(1.167,2.078)
Student talks with math teacher	0.117891	0.146924	0.802	300	0.423	1.125121	(0.843,1.502)
Level-Two Variables							
Student:teacher ratio****	-0.069199	0.018662	-3.708	400	0.000	0.933141	(0.900,0.968)
School practices on notification of absences	0.004947	0.008000	0.618	400	0.536	1.004960	(0.989,1.021)

Model explains 4.7 percent of the variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B15
The Influence of Caring Relationships on Graduation by Summer 2004 for Hispanic Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Caring relationships***	0.133921	0.045416	2.949	70	0.005	1.143302	(1.045,1.251)
Negative interactions****	-0.219960	0.054477	-4.038	250	0.000	0.802551	(0.721,0.983)
Student talks with English teacher	0.088143	0.209655	0.420	10	0.684	1.092144	(0.687,1.735)
Student talks with math teacher	0.073102	0.209852	0.348	10	0.735	1.075840	(0.677,1.710)
Level-Two Variables							
Student:teacher ratio*	-0.032131	0.017402	-1.846	140	0.067	0.968379	(0.936,1.002)
School practices on notification of absences	0.000916	0.011661	0.079	30	0.938	1.000917	(0.977,1.025)

Model explains 4 percent of the variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B16
The Influence of Caring Relationships on Graduation by Summer 2004 for At-Risk Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Caring relationships****	0.143082	0.028234	5.068	20	0.000	1.153825	(1.088,1.223)
Negative interactions****	-0.135202	0.026601	-5.083	220	0.000	0.873539	(0.829,0.920)
Student talks with English teacher**	0.216410	0.082716	2.616	40	0.013	1.241612	(1.051,1.467)
Student talks with math teacher**	0.187740	0.078133	2.403	130	0.018	1.206520	(1.034,1.408)
Level-Two Variables							
Student:teacher ratio***	-0.037331	0.011088	-3.367	100	0.001	0.963357	(0.942,0.985)
School practices on notification of absences*	0.007980	0.004466	1.787	490	0.074	1.008012	(0.999,1.017)

Model explains 3.9 percent of the variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B17
The Influence of High Expectations on Graduation by Summer 2004
for Students from the Lowest Quartile of Socioeconomic Status

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Enrolled in college prep program***	0.352705	0.120028	2.939	220	0.004	1.422911	(1.124,1.802)
School personnel recommended college	-0.069657	0.148504	-0.469	20	0.643	0.932713	(0.686,1.268)
School contacted parents about accomplishments	-0.035059	0.069833	-0.502	50	0.617	0.965549	(0.839,1.111)
English teacher contacted parents about accomplishments	-0.022368	0.126952	-0.176	40	0.861	0.977880	(0.756,1.264)
Math teacher contacted parents about accomplishments	-0.047973	0.154420	-0.311	10	0.761	0.953159	(0.683,1.330)
English teacher's belief in influence on student success	0.000306	0.043968	0.007	90	0.995	1.000306	(0.917,1.091)
Math teacher's belief in influence on student success	-0.033357	0.050480	-0.661	20	0.515	0.967193	(0.871,1.074)
How far in school teachers expected student to go****	0.428118	0.038986	10.981	10	0.000	1.534367	(1.410,1.670)
Parent evaluation of high expectations at school*	0.086027	0.049846	1.726	20	0.099	1.089836	(0.982,1.209)

*p< .1, **p<.05, ***p<.01, ****p< .001

Table B17 (continued)
The Influence of High Expectations on Graduation by Summer 2004
for Students from the Lowest Quartile of Socioeconomic Status

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Parents' view of expectations in school discipline*	0.051947	0.027591	1.883	10	0.084	1.053320	(0.992,1.119)
Students' view of high behavioral expectations	-0.006839	0.027484	-0.249	40	0.805	0.993184	(0.939,1.050)
Students' view of high academic expectations	0.030099	0.035723	0.843	90	0.402	1.030557	(0.960,1.106)
Level-Two Variables							
Academic emphasis	0.009228	0.041755	0.221	10	0.829	1.009270	(0.922,1.104)
Learning is not hindered by lack of discipline*	0.229679	0.123418	1.861	20	0.075	1.258196	(0.976,1.623)
Alcohol/drugs not a problem	0.000553	0.002017	0.274	540	0.784	1.000553	(0.997,1.005)
Disrespect not a problem	-0.001258	0.002029	-0.620	30	0.540	0.998743	(0.995,1.003)
Crime not a problem	-0.001167	0.002169	-0.538	120	0.591	0.998834	(0.995,1.003)
Percent of students in college prep program	0.002339	0.002774	0.843	30	0.407	1.002342	(0.997,1.008)
Percent of students receiving academic counseling	-0.003225	0.001984	-1.626	80	0.108	0.996780	(0.993,1.001)

Model explains 30 percent of the variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B18
The Influence of High Expectations on Graduation by Summer 2004
for African American Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Enrolled in college prep program**	0.331027	0.163600	2.023	70	0.047	1.392397	(1.005,1.929)
School personnel recommended college	-0.138366	0.236344	-0.585	10	0.569	0.870780	(0.521,1.457)
School contacted parents about accomplishments**	-0.216041	0.093003	-2.323	30	0.028	0.805702	(0.666,0.975)
English teacher contacted parents about accomplishments	-0.046988	0.179585	-0.262	50	0.795	0.954099	(0.665,1.368)
Math teacher contacted parents about accomplishments	-0.080151	0.183221	-0.437	20	0.667	0.922977	(0.627,1.358)
English teacher's belief in influence on student success	0.098974	0.080047	1.236	10	0.242	1.104038	(0.926,1.317)
Math teacher's belief in influence on student success	0.061396	0.057701	1.064	60	0.292	1.063320	(0.948,1.193)
How far in school teachers expected student to go****	0.454275	0.071383	6.364	10	0.000	1.575031	(1.345,1.844)
Parent evaluation of high expectations at school	0.043783	0.051174	0.856	100	0.394	1.044756	(0.944,1.156)

*p< .1, **p<.05, ***p<.01, ****p< .001

Table B18 (continued)
The Influence of High Expectations on Graduation by Summer 2004
for African American Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Parents' view of expectations in school discipline	0.053200	0.073172	0.727	10	0.500	1.054640	(0.897,1.240)
Students' view of high behavioral expectations	0.026440	0.033850	0.781	80	0.437	1.026792	(0.960,1.098)
Students' view of high academic expectations	0.049628	0.043806	1.133	920	0.258	1.050880	(0.964,1.145)
Level-Two Variables							
Academic emphasis	0.015548	0.063752	0.244	20	0.810	1.015669	(0.888,1.162)
Learning is not hindered by lack of discipline	0.215390	0.165256	1.303	70	0.197	1.240345	(0.892,1.724)
Alcohol/drugs not a problem	-0.001457	0.003719	-0.392	20	0.698	0.998544	(0.991,1.006)
Disrespect not a problem	-0.001821	0.002896	-0.629	30	0.534	0.998181	(0.992,1.004)
Crime not a problem	0.002641	0.003685	0.717	50	0.477	1.002645	(0.995,1.010)
Percent of students in college prep program	0.005098	0.003139	1.624	400	0.105	1.005111	(0.999,1.011)
Percent of students receiving academic counseling	-0.000908	0.002856	-0.318	90	0.751	0.999092	(0.993,1.005)

Model explains 32.8 percent of the variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B19
The Influence of High Expectations on Graduation by Summer 2004 for Hispanic Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Enrolled in college prep program	0.179094	0.162962	1.099	60	0.277	1.196133	(0.864,1.656)
School personnel recommended college	0.312376	0.220433	1.417	10	0.182	1.366668	(0.846,2.208)
School contacted parents about accomplishments	0.114043	0.162053	0.704	10	0.504	1.120800	(0.784,1.603)
English teacher contacted parents about accomplishments	-0.213514	0.192277	-1.110	20	0.281	0.807741	(0.540,1.207)
Math teacher contacted parents about accomplishments	-0.229061	0.175249	-1.307	50	0.197	0.795280	(0.560,1.130)
English teacher's belief in influence on student success	0.033736	0.062729	0.538	30	0.594	1.034311	(0.910,1.175)
Math teacher's belief in influence on student success	-0.001882	0.067553	-0.028	20	0.978	0.998120	(0.866,1.151)
How far in school teachers expected student to go****	0.512958	0.045073	11.381	20	0.000	1.670225	(1.519,1.836)
Parent evaluation of high expectations at school	0.005364	0.074955	0.072	10	0.944	1.005379	(0.855,1.182)

*p< .1, **p<.05, ***p<.01, ****p< .001

Table B19 (continued)
The Influence of High Expectations on Graduation by Summer 2004
for Hispanic Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Parents' view of expectations in school discipline	0.023163	0.042889	0.540	10	0.601	1.023433	(0.931,1.125)
Students' view of high behavioral expectations	-0.046762	0.044484	-1.051	10	0.316	0.954314	(0.865,1.052)
Students' view of high academic expectations	0.095692	0.058250	1.643	20	0.114	1.100421	(0.976,1.241)
Level-Two Variables							
Academic emphasis	-0.031374	0.044124	-0.711	40	0.481	0.969113	(0.886,1.059)
Learning is not hindered by lack of discipline	0.012915	0.197985	0.065	20	0.949	1.012998	(0.665,1.544)
Alcohol/drugs not a problem	0.001363	0.002461	0.554	290	0.580	1.001364	(0.997,1.006)
Disrespect not a problem	-0.002228	0.002579	-0.864	60	0.391	0.997775	(0.993,1.003)
Crime not a problem	-0.001040	0.002916	-0.357	150	0.721	0.998960	(0.993,1.005)
Percent in college prep	0.004200	0.003124	1.345	70	0.183	1.004209	(0.998,1.010)
Percent of students receiving academic counseling	-0.003056	0.003256	-0.938	30	0.357	0.996949	(0.990,1.004)

Model explains 36 percent of the variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B20
The Influence of High Expectations on Graduation by Summer 2004
for At-Risk Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Enrolled in college prep program**	0.214135	0.093227	2.297	30	0.028	1.238789	(1.025,1.497)
School personnel recommended college	-0.033810	0.093197	-0.363	40	0.718	0.966755	(0.801,1.166)
School contacted parents about accomplishments	-0.069128	0.047305	-1.461	60	0.149	0.933207	(0.849,1.026)
English teacher contacted parents about accomplishments	0.071769	0.090543	0.793	30	0.435	1.074407	(0.893,1.293)
Math teacher contacted parents about accomplishments	0.040148	0.107451	0.374	20	0.714	1.040965	(0.828,1.309)
English teacher's belief in influence on student success	0.036521	0.033598	1.087	30	0.286	1.037196	(0.969,1.111)
Math teacher's belief in influence on student success	-0.025016	0.029211	-0.856	140	0.394	0.975295	(0.921,1.033)
How far in school teachers expected student to go****	0.462134	0.020099	22.993	70	0.000	1.587459	(1.525,1.652)
Parent evaluation of high expectations at school***	0.080976	0.029274	2.766	50	0.008	1.084345	(1.023,1.150)

*p< .1, **p<.05, ***p<.01, ****p< .001

Table B20 (continued)
The Influence of High Expectations on Graduation by Summer 2004
for At-Risk Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Parents' view of expectations in school discipline*	0.029029	0.015144	1.917	110	0.057	1.029454	(0.999,1.061)
Students' view of high behavioral expectations	-0.017774	0.017587	-1.011	100	0.315	0.982383	(0.949,1.017)
Students' view of high academic expectations***	0.073294	0.024949	2.938	110	0.005	1.076047	(1.024,1.131)
Level-Two Variables							
Academic emphasis	-0.002478	0.026629	-0.093	80	0.927	0.997525	(0.946,1.052)
Learning is not hindered by lack of discipline**	0.242755	0.094383	2.572	50	0.014	1.274757	(1.055,1.541)
Alcohol/drugs not a problem	0.000224	0.001746	0.128	30	0.899	1.000224	(0.997,1.004)
Disrespect not a problem	-0.002118	0.001358	-1.559	120	0.121	0.997884	(0.995,1.001)
Crime not a problem	0.000355	0.002259	0.157	20	0.877	1.000355	(0.996,1.005)
Percent in college prep	0.001769	0.001804	0.980	80	0.330	1.001770	(0.998,1.005)
Percent of students receiving academic counseling**	-0.002897	0.001367	-2.119	490	0.034	0.997107	(0.994,1.000)

Model explains 32.9 percent of variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B21
The Influence of Opportunities for Participation and Contribution on Graduation by Summer 2004 for Students from the Lowest Quartile of Socioeconomic Status

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Sports participation	-0.019496	0.016960	-1.150	80	0.254	0.980693	(0.948,1.014)
Hours/week in extracurricular activities****	0.080099	0.018951	4.227	20	0.000	1.083395	(1.042,1.127)
Participated in school-sponsored community service	0.211784	0.172245	1.230	40	0.227	1.235881	(0.872,1.751)
Work-based learning	-0.144053	0.112760	-1.278	640	0.202	0.865842	(0.694,1.080)
Active participation in math class	-0.015314	0.021129	-0.725	150	0.470	0.984803	(0.945,1.027)
Participation in non-sports extracurricular activities****	0.360718	0.088199	4.090	310	0.000	1.434358	(1.206,1.706)
Level-Two Variables							
Students evaluate teachers	-0.182225	0.208430	-0.874	130	0.384	0.833414	(0.552,1.258)
Number of sports at school	0.010005	0.012041	0.831	260	0.407	1.010055	(0.986,1.034)
Work-based learning offered	0.045514	0.066232	0.687	30	0.497	1.046565	(0.914,1.198)
Percent of students in school-sponsored community service	-0.003429	0.021066	-0.163	540	0.871	0.996577	(0.956,1.039)

Model explains 7.2 percent of variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B22
The Influence of Opportunities for Participation and Contribution on Graduation by Summer 2004 for African American Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Sports participation***	-0.070796	0.023971	-2.953	20	0.008	0.931652	(0.887,0.979)
Hours/week in extracurricular activities***	0.092451	0.025123	3.680	30	0.001	1.096859	(1.042,1.155)
Participated in school-sponsored community service	0.454477	0.308497	1.473	10	0.171	1.575349	(0.797,3.114)
Work-based learning	-0.264985	0.214812	-1.234	10	0.246	0.767218	(0.477,1.233)
Active participation in math class	-0.013747	0.029950	-0.459	70	0.647	0.986347	(0.929,1.047)
Participation in non-sports extracurricular activities***	0.357039	0.113471	3.147	110	0.003	1.429091	(1.142,1.789)
Level-Two Variables							
Students evaluate teachers	-0.091924	0.400365	-0.230	30	0.820	0.912175	(0.404,2.059)
Number of sports at school	0.012482	0.017974	0.694	40	0.491	1.012560	(0.977,1.050)
Work-based learning offered	-0.057138	0.084917	-0.673	100	0.502	0.944464	(0.798,1.118)
Percent of students in school-sponsored community service	-0.046122	0.041702	-1.106	10	0.291	0.954925	(0.872,1.046)

Model explains 11 percent of variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B23
The Influence of Opportunities for Participation and Contribution on Graduation by Summer 2004 for Hispanic Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Sports participation	-0.008460	0.019436	-0.435	30	0.666	0.991575	(0.953,1.031)
Hours/week in extracurricular activities****	0.083276	0.018045	4.615	170	0.000	1.086842	(1.049,1.126)
Participated in school-sponsored community service	0.208494	0.196519	1.061	60	0.294	1.231821	(0.831,1.825)
Work-based learning	-0.278799	0.172062	-1.620	30	0.114	0.756692	(0.534,1.073)
Active participation in math class	-0.035889	0.029071	-1.235	60	0.222	0.964748	(0.910,1.022)
Participation in non-sports extracurricular activities	0.007771	0.108147	0.072	60	0.943	1.007801	(0.812,1.250)
Level-Two Variables							
Students evaluate teachers	-0.360086	0.270477	-1.331	60	0.188	0.697616	(0.407,1.197)
Number of sports at school	0.024847	0.017913	1.387	90	0.169	1.025158	(0.989,1.062)
Work-based learning offered	-0.042141	0.068118	-0.619	420	0.536	0.958735	(0.839,1.096)
Percent of students in school-sponsored community service	0.026548	0.029588	0.897	60	0.374	1.026903	(0.968,1.090)

Model explains 5.6 percent of variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

Table B24
The Influence of Opportunities for Participation and Contribution on Graduation by Summer 2004 for At-Risk Students

Variable	Coefficient	Standard Error	T-ratio	Approx. d.f.	P-value	Odds Ratio	Confidence Interval
Level-One Variables							
Sports participation****	-0.043676	0.010519	-4.152	90	0.000	0.957264	(0.937,0.977)
Hours/week in extracurricular activities****	0.085041	0.009867	8.619	140	0.000	1.088762	(1.068,1.110)
Participated in school-sponsored community service**	0.293504	0.114268	2.569	60	0.013	1.341119	(1.068,1.684)
Work-based learning*	-0.157896	0.080205	-1.969	80	0.052	0.853939	(0.728,1.001)
Active participation in math class	-0.006924	0.014354	-0.482	580	0.629	0.993100	(0.966,1.021)
Participation in non-sports extracurricular activities****	0.352065	0.066811	5.270	60	0.000	1.422001	(1.244,1.625)
Level-Two Variables							
Students evaluate teachers	-0.080764	0.169400	-0.477	50	0.635	0.922412	(0.657,1.296)
Number of sports at school*	0.020289	0.010115	2.006	30	0.055	1.020496	(1.000,1.042)
Work-based learning offered	0.014976	0.045500	0.329	80	0.743	1.015089	(0.927,1.111)
Percent of students in school-sponsored community service	-0.014538	0.018103	-0.803	50	0.426	0.985567	(0.950,1.022)

Model explains 9.4 percent of variance.
*p< .1, **p<.05, ***p<.01, ****p< .001

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V I T A

Jean Evelyn Brooks attended Clarkstown High School in New City, New York. She received the Bachelor of Arts degree in psychology at Earlham College in Richmond, Indiana, in 1969, and the Master of Social Work degree at the University of Michigan in Ann Arbor, Michigan, in 1971. She has worked as an instructor and then assistant professor in social work at Jackson State University in Jackson, Mississippi, since 1972, where she is currently employed as Program Coordinator of the Bachelor of Social Work Program.

Permanent Address: 1314 Grand Avenue. Jackson, Mississippi 39203

This manuscript was typed by the author.