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Changes in the Social Environment and the School Success of Middle School Students:

A Longitudinal Analysis

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Abstract

In the context of a larger intervention designed to promote the functioning of 11 middle schools as learning organizations, longitudinal data from 2,845 students are used to examine the degree to which changes in the social environments of students are associated with changes in adaptation outcomes associated with school success. Students completed the School Success Profile in both fall 2004 and fall 2005, and the survey data were combined with administrative data from the Education Research Data Center at Duke University for purposes of analysis. Using hierarchical linear modeling to adjust for potential school-level effects, the results align with earlier results from cross-sectional analysis to demonstrate variation in the influence from changes in students perceptions toward social environment dimensions on changes in their personal beliefs and well being and their school attitudes, behavior, and grades. Social environment dimensions associated with the family domain exerted a greater number of effects that met or exceeded the .09 threshold for interpreting standardized beta coefficients than those dimensions associated with the neighborhood, school, or peer group. Other findings suggested little between-school variability in the data, which calls into the question the need for a multilevel framework for modeling the data. Implications of the finding for informing intervention practice are discussed, as well as implications for further research.

Key words: school success, social environment, School Success Profile, middle school students, intervention research

Changes in the Social Environment and the School Success of Middle School Students:
A Longitudinal Analysis

A growing body of research suggests the importance of the social environment as a context for school success. Students' relationships and students' experiences in their neighborhood, school, family, and peer group have been shown to influence specific student-adaptation outcomes associated with school success (Powers, Bowen, & Rose, 2005). Moreover, each of these social environments may affect the individual differently over time (Jessor, 1993). School success is vital to youths' development into competent and productive members of society. Consequently, it is important to identify those features of the social environment that can be leveraged to promote school success.

Using hierarchical linear modeling (HLM), the present research examines how changes over time in the perceptions of middle school students toward their social environments influence changes in adaptation outcomes associated with school success. These outcomes range from students' personal beliefs and well-being to students' school-related attitudes and behavior and their self-reported academic performance.

All student-level data are self-reported and are derived from the administration of the School Success Profile (SSP) in 11 middle schools participating in a larger evaluation. Informed by the eco-interactional developmental perspective (Richman, Bowen, & Woolley, 2004), the SSP is an ecologically oriented survey that focuses on students within the context of neighborhood, school, family, and friends. The focus within these social environments includes attention both to people, in the form of interpersonal relationships, and to places, in the form of safety and satisfaction.

The focus on middle school students has particular merit when examining the relationship between the social environment and school success. Middle school is an important transition period and determinant of the school success trajectory for adolescents (Eccles et al., 1993). Many students find the change from primary school to secondary school particularly difficult, and this transition can result in decreased academic performance (Gutman & Midgley, 2000). Patterns of both academic success and emotional functioning experienced during early adolescence have been shown to carry over into high school (Roeser, Eccles, & Freedman-Doan, 1999), which makes the middle school years a critical design and implementation period for social interventions.

Results of the present investigation have implications for the design and implementation of social interventions to increase the school success of middle school students. The first step in evidence-based practice is to identify the correlates of school-related outcomes that will produce the greatest leverage in achieving the desired outcomes. Social interventions can then be designed or implemented to influence those correlates that are the most consequential for preferred results.

An Earlier Analysis

The present investigation parallels, yet expands, an earlier analysis by Powers et al. (2005). In contrast to that earlier analysis, which included only a single time observation, the present analysis utilizes longitudinal data. Also unlike the earlier analysis, which included students from a broad array of educational sites and programs (351 middle school and high school sites), the present analysis sample focused on a population of students from only 11 middle schools—sites that were participating in a universal social intervention to promote the functioning of the schools as learning organizations (Bowen, 2004).

Consequently, as a prelude to the main analysis of the result of changes in the social environments of students, we first examine whether the data exhibit sufficient between-school variability to warrant the use of multilevel modeling methods. We also test for variability in the social-environment-change scores of students, using baseline group-level data about the school as a learning organization, provided by school employees. This analysis, which includes controls for potential student demographic profile influences, is consistent with the theory of change model that informed the design of the social intervention.

The Context

Rates and Consequences of School Failure

Schools are among the most salient contexts for youths' social, emotional, and academic development (Roeser, Eccles, & Sameroff, 2000), but the rates of school failure in the United States are alarming (Richman et al., 2004). A report by the National Center for Education Statistics (NCES) (2005) estimates that approximately 10% of 16- to 24-year-olds were school dropouts in 2003 (i.e., were not enrolled in school and had not completed a high school program). A report for the Bill and Melinda Gates Foundation describes a more dismal picture and estimates that one-third of all public high school students in America do not graduate with their peers (Bridgeland, Dilulio, & Morison, 2006). Hispanic and Black students experience lower levels of school performance, slower progression through school, and higher dropout rates, and also drop out earlier than either their White or Asian counterparts (Bali & Alvarez, 2004; Education Commission of the States, 2004; Reyes, Gillock, Kobus, & Sanchez, 2000). A recent report on the achievement gap by the Education Commission of the States (2004) confirms that the average Black or Hispanic student performed at the same level as a White student

functioning in the lowest quartile of performance for White students. This gap in standardized achievement test scores has been demonstrated repeatedly (Bali & Alvarez, 2004).

Research has established that students who drop out are at higher risk for numerous negative outcomes, including poverty and incarceration (Bridgeland et al., 2006; Chen & Kaplan, 2003; Janosz, Le Blanc, Boulerice, & Tremblay, 2000). The U.S. Department of Labor (2004) reports that students who drop out of high school are likely to earn 27% less than those who graduate, and are 72% more likely to be unemployed. Moreover, those who drop out in earlier grades are more likely to experience adverse outcomes (Capella & Weinstein, 2001). On the other hand, students who succeed in school are more likely to engage in responsible adult behavior, including the care for and financial support of their own children (Simons, Beaman, Conger, & Chao, 1993).

The School Success Profile

The SSP is a self-report survey that assesses middle and high school students' perceptions about their neighborhood, school, family, and friends, and about their personal beliefs and well-being, school attitudes and behavior, and academic performance (Bowen & Richman, 2001). The 220 multiple-choice survey questions take about 30 to 40 minutes on average to complete, and student participation is voluntary. Twenty-two dimensions are reported on the SSP summary report: 14 social environment dimensions and 8 individual adaptation dimensions associated with school success. These measures have demonstrated high levels of reliability and validity (Bowen, Rose, & Bowen, 2005). Appendix A includes a summary of each profile dimension. More details about the history, development, and scoring of the SSP can be found elsewhere (Bowen et al., 2005).

The SSP is designed to identify students' strengths and concerns for the purpose of informing intervention planning. In devising a logic model for informing social work practice in schools, Bowen, Richman, Bowen, and Woolley (2002) grouped the results from the 22 dimensions into three larger areas: (a) school attitudes and behavior, and academic performance (distal results of intervention efforts); (b) personal beliefs and well-being (intermediate results); and (c) social environmental factors, including the neighborhood, school, family, and peers (proximal results; that is, those most immediately affected by intervention efforts).

In the eco-interactional developmental model that informed the development of the SSP (Richman et al., 2004), the balance of risks and assets in a student's social environment (proximal results) are assumed to influence that student's level of individual adaptation (intermediate and distal results) (see Figure 1). Although past studies using SSP data provide support for this assumption (Bowen et al., 2005), the present study is the first to simultaneously examine how change in each of the 14 social environment dimensions influences change in each of the eight individual outcomes associated with school success.

[Insert Figure 1 about here]

Social Environmental Influences on Student Success

Neighborhood, school, family, and friends are systems in a student's life that influence individual adaptation outcomes associated with success. A great deal of research has been conducted to identify the influential relationships between social and environmental systems and student school success. For purposes of the present study, school success is conceptualized and measured broadly as eight aspects of positive individual adaptation nested in two categories: (a) personal beliefs and well-being (i.e., social support, physical health, happiness, personal

adjustment, and self-esteem), and (b) school attitudes and behavior (i.e., school engagement, trouble avoidance, and academic performance).

In the sections below, we review findings from the earlier research by Powers et al. (2005) within the context of SSP-related and non-SSP-related research. In reviewing findings from the Powers et al. study, which resulted from a two-step linear regression data analysis strategy, we focus attention on the most predictive standardized beta coefficients—those greater than or equal to .09, which approximate the minimum value necessary to account for at least 1% of the variance in the dependent variable (Cohen, 1988). Importantly, in Powers et al.'s (2005) analysis, each social environment dimension was examined for its unique contribution within the context of the other social environment dimensions and demographic controls. Also, it is important to bear in mind that the data on which these earlier analyses were conducted were cross-sectional, and therefore the results from the present analysis will not be directly comparable.

Neighborhood

In the earlier research by Powers et al. (2005), two of the three neighborhood dimensions (support and safety) had effects on one or more outcome dimensions that met or exceeded the .09 threshold. Neighborhood support had a positive influence on students' perceptions of social support (.09), and neighborhood safety had a positive influence on students' perceptions of both physical health (.13) and trouble avoidance (.22). These findings are consistent with other SSP-related research. For example, using a latent measure of neighborhood social disorganization (lack of neighbor support, negative peer behavior, and crime and violence), Bowen, Bowen, and Ware (2002) found middle school and high school students' perceptions of their neighborhoods to be directly and negatively related to their reports of positive educational behavior at school

(trouble avoidance, grades, and attendance). In addition, perceptions of neighborhood social disorganization were indirectly and negatively related to students' reports of positive educational behavior through students' reports of increased parental educational support.

In other SSP-related studies, Woolley and Grogan-Kaylor (2006) found that increased student perception of neighborhood safety was associated with improved grades and the avoidance of problem behavior. A study by Bowen and Bowen (1999) identified a positive relationship between students' perceptions of neighborhood safety and neighborhood peer culture and the degree to which they attend school regularly, avoid getting into trouble at school, and make good grades. SSP-related research by Nash (2002) indicates a positive relationship between students' sense of school coherence (the extent to which students find school meaningful, manageable, and comprehensible) and the degree to which they experience informal social control (i.e., neighbors support youth and monitor their behavior), low crime, and a positive peer culture in their neighborhoods.

The hypothesized link between neighborhood dimensions and both personal beliefs/well-being and school attitudes/behavior also aligns with other non-SSP-related research. Levels of student happiness (lack of life stress) have been positively related to neighborhood support (Allison et al., 1999). School attitudes and behavior also have an empirical relationship with the neighborhood context. Neighborhood support and safety have been shown to promote school engagement (Cook, Herman, Phillips, & Settersten, 2002). Additionally, students' perception of neighborhood safety and neighborhood youth behavior has been tied to both trouble avoidance (Herrenkohl et al., 2000) and academic performance (Leventhal & Brooks-Gunn, 2004; Schwartz & Gorman, 2003).

School

In Powers et al.'s (2005) research, two of the three school dimensions (satisfaction and teacher support) had effects on one or more outcome dimensions at or beyond the .09 lower limit. School satisfaction had a particularly strong effect on students' level of school engagement (.33); teacher support had a positive influence on both students' perceived social support (.10) and trouble avoidance (.13). These findings are consistent with other SSP-related research. For example, supportive teachers have been found to be positively related to middle school students' perceptions of social support (Richman, Rosenfeld, & Bowen, 1998) and to represent a key influence in promoting the school success of middle school and high school students (Rosenfeld, Richman, & Bowen, 2000).

Research by Brewster and Bowen (2004) indicates that teacher support exerted a strong and significant positive influence on the trouble avoidance of a sample of Hispanic middle school and high school students who completed the SSP. Bowen and Bowen (1999) found school safety to be significantly predictive of students' attendance, trouble avoidance, and grades. Work by Woolley and Grogan-Kaylor (2006) also suggests a positive relationship between students' perceptions of school safety and their trouble avoidance.

The hypothesized link between school dimensions and both personal beliefs/well-being and school attitudes/behavior also aligns with non-SSP-related research. Using a sample of middle school and high school students, Whitlock (2006) found that positive perceptions of school safety were related to a sense of school connectedness, which related to students' perceptions of being affirmed and valued by adults at the school. Trouble avoidance (aggressive behavior) also has been linked to school satisfaction and teacher support (Lopez, Olaizola, Ferrer, & Ochoa, 2006). Similarly, academic performance has been tied to school satisfaction

(Bridgeland et al., 2006; Fleming et al., 2005), teacher support (Cook et al., 2002; Lan & Lanthier, 2003), and school safety (Lan & Lanthier, 2003).

Friends

In the earlier research by Powers et al. (2005), two of the three peer dimensions (i.e., peer group acceptance and friend behavior) had effects on one or more positive outcome dimensions that met or exceeded the minimum standard. Peer group acceptance had a positive influence on four of the five dimensions associated with personal beliefs and well-being (i.e., physical health [.13], happiness [.20], personal adjustment [.16], and self-esteem [.17]). In addition, friend behavior was positively associated with physical health (.13) and personal adjustment (.11) as well as with all three dimensions associated with school attitudes and behavior: school engagement (.11), trouble avoidance (.19), and academic performance (.10).

These findings are consistent with other SSP-related research, although the three friend dimensions have received relatively less attention than other social environment dimensions included in the SSP. Nonetheless, research by Walters and Bowen (1997) found peer group acceptance to be indirectly related to academic outcomes, with school-related attitudes and behavior (e.g., avoidance of problem behavior) serving as the moderating link. Similarly, other research has found peer support to be related to middle school students' perceptions of social support, and social support to be linked to positive school outcomes (Richman, Rosenfeld, & Bowen, 1998).

The hypothesized link between peer dimensions and both personal beliefs/well-being and school attitudes/behavior also aligns with non-SSP-related research. The school attitudes and behavior category of positive adaptation for students (i.e., school engagement, trouble avoidance, and academic performance) appears to be greatly influenced by friend behavior, and there is

ample research on this relationship (Battin-Pearson et al., 2000; Fleming et al., 2005; Vitaro, Larocque, Janosz, & Tremblay, 2001). For example, a study by Wentzel, Barry, and Caldwell (2004) found that sixth graders with lower levels of peer group acceptance (reciprocated friendships) scored significantly lower on prosocial behavior and academic assessments.

Family

Powers et al.'s (2005) earlier research found that all five of the family dimensions had effects on one or more outcome dimensions that met or exceeded the .09 threshold. Family togetherness had a positive influence on all five dimensions associated with personal beliefs/well-being: social support (.12), physical health (.11), happiness (.11), personal adjustment (.13), and self-esteem (.23). In addition, parent support had a positive influence on three of the five dimensions associated with personal beliefs/well-being: social support (.20), happiness (.21), and personal adjustment (.17). Social support (.11), school engagement (.13), and academic performance (.09) all were positively linked to home academic environment. Parent education support also had a positive influence on social support (.11), and school behavior expectations exerted a positive influence on trouble avoidance (.14).

These findings align with other SSP-related research. For example, research by Bowen and Chapman (1996) demonstrated a positive link between students' reports of parent support and students' physical health, psychological well-being, and adjustment. Research has found parent (adult caregiver) support to be related to middle school students' perceptions of social support (Richman, Rosenfeld, & Bowen, 1998) and to positive school outcomes such as better attendance, higher grades, and less problem behavior (Bowen & Bowen, 1998; Bowen, Bowen, & Ware, 2002; Rosenfeld et al., 2000). There also is a strong correlation between trouble avoidance and reported levels of family togetherness (Woolley & Grogan-Kaylor, 2006).

Additionally, there is a positive relationship between students' academic performance and home academic environment (Woolley & Grogan-Kaylor, 2006).

The hypothesized link between family dimensions and both personal beliefs/well-being and school attitudes/behavior also aligns with non SSP-related research. Academic and personal adjustment are rated higher as students perceive greater levels of family togetherness and parent support (Lipschitz-Elhawi & Itzhaky, 2005), and happiness (decreased levels of depression) is positively related to family togetherness (Bond, Toumbourou, Thomas, Catalano, & Patton, 2005; Buehler, 2006), parent support (Ackard, Neumark-Sztainer, Story, & Perry, 2006; Buehler, 2006), and school behavior expectations (Cook et al., 2002). Self-esteem also is positively influenced by family togetherness (Bond et al., 2005; Buehler, 2006), parent support (Ackard et al., 2006; Glasgow, Dornbusch, Troyer, Steinberg, & Ritter, 1997), and school behavior expectations (Cook et al., 2002). A strong correlation has been found between trouble avoidance and reported levels of parent support (Lopez et al., 2006) and home academic environment (Buehler, 2006). Additionally, students' academic performance is positively associated with parent support (Steinberg, Elmen, & Mounts, 1989) and parent education support (Bridgeland et al., 2006).

In summary, each of the four identified social environment domains has empirical implications for one or more individual adaptation outcomes associated with school success. Unfortunately, few studies have examined how changes in students' perceptions of their social environment influence their outcomes in either the long term or the short term. The present study aims to address this knowledge gap. Although we do not offer explicit hypotheses for testing, we expect, based on previous research, that changes in the 14 social environment dimensions will vary in the extent to which they exert positive influence on the eight student-adaptation outcomes

associated with school success. We consider such information critical to the implementation of targeted intervention strategies that have the greatest potential to influence one or more adaptation outcomes associated with school success.

Demographic Variations in School Success

In the earlier study by Powers et al. (2005), four demographic controls were entered into the analysis: gender; race/ethnicity (White or other); grade level (6th grade to 8th grade or 9th grade to 12th grade); and lunch recipient (no or yes). The school-lunch variable served as a proxy for socioeconomic status (SES) or poverty, which is consistent with the literature (Bowen & Chapman, 1996). In the sections below, we review findings from this earlier research within the context of SSP-related and non-SSP-related research, although our discussion of grade level centers on middle school—the focus population in the current analysis. In addition, we add to our discussion both the students' age and their prior grade retention. As in the earlier study by Powers et al. (2005), these demographic variables are used as control variables in the present analysis. This is an attempt to help clarify the relationships between features of the social environment and the adaptation outcomes associated with school success.

Age

Age was not specifically included in the Powers et al. (2005) study, nor does it figure in many SSP-related analyses. However, other, non-SSP-related studies have included age in analysis. For example, research has found that being older was a significant predictor of more risk behavior for students in middle school and high school (Mancini & Huebner, 2004), and exhibiting violent behavior at younger ages was predictive of violent behavior for students as they matured (Herrenkohl et al., 2000). However, a variable capturing grade level often is used

interchangeably with student age in analyses utilizing school- and student-level data (see, for example, Lepper, Corpus, & Iyengar, 2005; Peets & Kikas, 2006).

Muschkin, Glennie, and Beck (2006) defined old-for-grade status as students who were above the 75th age percentile for all students in their grade and who had not been retained. These students are approximately one year older than the mean age of their grade peers, and about 12% of middle school students are old for grade. They then found that old-for-grade middle school students were more likely to commit infractions leading to suspension than were their normative-age peers. Given that both variables capture similar constructs, that both are often measured in years, and that both are highly collinear, they are not usually entered together. However, both are entered in the present analysis because we were able to obtain respondents' birth dates (reported in months and years only), giving us age variation at a more refined level and reducing the potential for collinearity between age and grade level.

Grade Level

The sample in the Powers et al. (2005) study comprised both middle school and high school students. Students' grade (school level) did not reach the .09 cutoff for interpretation. The present investigation includes only middle school students, and no prior SSP-related investigations have controlled for grade level within a middle school sample. Yet, non-SSP-related research has identified grade level as an important variable for school outcomes, and the transition to middle school seems to be especially salient. This is commonly a time when students move to larger schools with more complex schedules and have less-frequent interaction with any one teacher, which can compound stress for youth who are simultaneously facing drastic cognitive and biological changes (Gutman & Midgley, 2000).

A study by Lepper et al. (2005) found intrinsic academic motivation in school to significantly decrease between elementary school and middle school. A study by Chung, Elias, and Schneider (1998) on the effects of entering middle school revealed a significant increase in stress (psychological distress) for students and a decrease in academic performance for boys. Peets and Kikas (2006) found students in middle school to be more aggressive (physically, verbally, and indirectly) than students in elementary school.

Other research has indicated that this is an important time for intervention, because patterns in school outcomes remain fairly stable across middle school and high school, particularly for students functioning either very well or very poorly (Roeser, Eccles, & Freedman-Doan, 1999). Similarly, a study by Tobin and Sugai (1999) reported disciplinary referrals for violence in Grade 6 were predictive of similar problem behavior in Grade 9. The present investigation provides an opportunity to examine the relative stability in the adaptation outcomes experienced by students during the middle school years.

Grade Retention

Researchers generally consider grade retention (holding students back to repeat a grade) a risk marker for later educational disengagement and school failure (Randolph, Fraser, & Orthner, 2004). Grade retention was not included as a variable in the analysis for the Powers et al. (2005) article. However, in an SSP-related study utilizing a nationally representative sample of middle school and high school students, Woolley and Grogan-Kaylor (2006) found that repeating a grade was associated with lower grades, a lower sense of school coherence, and a greater likelihood of getting into trouble at school. In a second SSP-related investigation involving middle school students, repeating a grade was associated with lower levels of school engagement (Woolley & Bowen, in press).

Similarly, non-SSP-related studies have found being held back in school to be predictive of negative outcomes. In an investigation of students residing in low-income, single-parent homes, Randolph et al. (2004) reported that first-grade retention increased students' risk of later dropping out of school, especially among students with low extracurricular participation during high school. Moller, Stearns, Blau, and Land (2006) reported that students who had been previously retained had less academic progress in high school than did students who had been typically promoted. Research by Borowsky, Ireland, and Resnick (2002) described youth who had been retained for one or more years as more prone to violence than their nonretained peers. Muschkin et al. (2006) found that middle school students who have been retained are more likely than their peers to commit infractions leading to suspension. Finally, a meta-analysis of grade retention research that reviewed 20 recent studies reported that 80% of the evaluations found negative long-term results from retention, including academic, behavior, and emotional problems (Jimerson, 2001).

Gender

The Powers et al. (2005) study found that gender significantly influenced physical health (.25), happiness (.25), personal adjustment (.21), and self-esteem (.09), and that being male was related to higher levels of each of these adaptation outcomes. Other SSP studies have reported similar findings, although being male has been associated with lower levels of school-related attitudes and behavior, such as lower grades (Bowen & Bowen, 1999; Woolley & Bowen, in press; Woolley & Grogan-Kaylor, 2006).

Findings about gender differences from non-SSP-related research generally align with research from the SSP. Research by Bond et al. (2005) found that one individual risk factor for depressive symptoms in adolescents was being female. A study by Capella and Weinstein (2001)

found that, among other characteristics, being female was positively related to academic resilience during the transition from middle school to high school. Similarly, gender has been linked to differences in academic outcomes (Williams, Davis, Cribbs, Saunders, & Williams, 2002), and females are outperforming males academically (NCES, 2005). One study identified gender (specifically, being female) as being predictive of higher perceptions of social support (Demaray, Malecki, Davidson, Hodgson, & Rebus, 2005). Peets and Kikas (2006) found males to be more aggressive (physically, verbally, and indirectly) than females in seventh grade, and Mancini and Huebner (2004) identified gender (being male) as predictive of more risk behavior among adolescents.

Race/Ethnicity

A great deal of research has been conducted on school outcomes varying by students' race/ethnicity. Much of this research has examined differences in rates of school dropout by race/ethnicity, with White and Asian/Pacific Island students having higher rates of school completion than their Black and Hispanic counterparts (Richman et al., 2004). The Powers et al. (2005) study found that non-Whites, as compared to Whites, reported higher physical health (.12), self-esteem (.18), and school engagement (.23), although Whites reported greater success at trouble avoidance (-.10). Similarly, another SSP-related study of the effects on adolescents of crime and violence in neighborhoods and schools found race/ethnicity (specifically, being Black) to be predictive of a negative relationship between student reports of school and neighborhood danger and school outcomes such as grades and attendance (Bowen & Bowen, 1999).

Non-SSP-related research on school outcomes also has found race/ethnicity to be a correlate of adaptation outcomes, although the nature of these findings in the context of SSP-related research is mixed. A study by Capella and Weinstein (2001) found that being White

(among other characteristics) was predictive of academic resilience during the transition from middle school to high school. Research by Goodman, McEwan, Dolan, Schafer-Kalkhoff, and Adler (2005) found that Black students reported higher levels of stress than did their non-minority peers. A report by the NCES (2005) describes the reading levels of students who are White and Asian/Pacific Islander as being higher than their Black and Hispanic counterparts. However, Van Dorn, Bowen, & Blau (2006) found that Black students were less likely to drop out than were their White peers when specific characteristics such as school and neighborhood were controlled for.

School Lunch

A body of research underscores the considerable threat that growing up in poverty poses to school success and the educational trajectories of children and youth (Orthner, Cook, Rose, & Randolph, 2002; Richman et al., 2004). In school-related studies where youth provide self-report data, students' reports of the receipt of free or reduced-price lunches (school lunch) are often used as a proxy for their household socioeconomic level. The Powers et al. (2005) study found that students who received school lunch had higher school engagement (.09) but lower academic performance (-.11).

Support for the significance of school lunch to the adaptation outcomes of students is mixed in SSP-related research. Qualifying for school lunch was again identified as a statistically insignificant correlate of the self-reported physical health, psychological well-being, or adjustment in a small sample of middle school and high school students at risk of school failure who had taken the SSP (Bowen & Chapman, 1996). On the other hand, Woolley and Grogan-Kaylor, using data from the SSP's nationally representative sample of middle school and high school students, found the receipt of school lunch to be a strong, yet negative, predictor of

students' self-reported academic performance, although it was unrelated to their reports of problem behavior or sense of school coherence. Woolley and Bowen (in press) also found that the receipt of school lunch was associated with lower levels of school engagement among a sample of middle school students who had taken the SSP.

Non-SSP-related research has identified SES or the school lunch proxy variable to be important to school outcomes. In general, low-SES youth tend to score lower on multiple measures of academic competence in school (McLoyd, 1998). Research by Goodman et al. (2005) found that adolescents from low-SES families and students with lower perceived SES reported higher levels of stress than did their more economically advantaged peers. According to a study by Rhodes, Roffman, Reddy, and Fredriksen (2004), low-income youth (particularly White youth) reported lower levels of self-esteem and greater declines during middle school. A report by the NCES (2005) describes school achievement as being negatively correlated with qualifying for free/reduced-price lunch.

Schools as Learning Organizations

A core assumption of the social-intervention model that framed our work with the schools is that students' perceptions about the people and places that make up their social environments are influenced by larger social organizational forces that exist in the schools that students attend. As described by Blalock (1984), these forces "are assumed to have an impact on the individual actor over and beyond the effects of any individual-level variables that may be operating" (p. 354). Although it is possible to capture such contextual effects for each of the social environments in which students are embedded, the present research focused only on the schools' functioning as a learning organization.

The 11 schools participating in the current investigations were participants in a larger longitudinal investigation designed to encourage schools to become learning organizations (Bowen, 2004). Consequently, a baseline measure of the school as a learning organization was developed and administered to employees at each school (the School Success Profile–Learning Organization [SSP-LO]); the results of this measure were entered into the multilevel analysis as a group-level variable. It was hypothesized that employee perceptions toward the school as a learning organization would exert a direct and independent effect on changes in students' perceptions of their social environments beyond the contribution of individual-level demographic controls.

A growing body of literature attests to the more positive outcomes that students experience when they are embedded in schools functioning as learning organizations (Coleman, 1997; Organization for Economic Co-operation and Development, 2004). We define a learning organization as being

associated with a core set of conditions and processes that support the ability of an organization to value, acquire, and use information and tacit knowledge acquired from employees and stakeholders to successfully plan, implement, and evaluate strategies to achieve performance goals. (Bowen, Rose, & Ware, 2006, pp. 98–99)

Recent research by Bowen et al. (2006) suggests that these positive benefits may accrue to students indirectly, a result of the positive influence that participating in a learning organization has on school employees' personal health, job satisfaction, self-efficacy, perceptions of the school's performance and its potential for future performance, and retention intentions.

Methods

Source of Data

Student and employee respondents to the SSP and the SSP-LO surveys were selected using a three-stage quasi-experimental selection method. To be eligible, schools had to be regular public middle schools in a particular Southeastern state with grade ranges of six to eight and with 60% to 80% of students performing at grade level in 2003. In the first stage, several districts containing a pool of eligible schools meeting preevaluation performance criteria were recruited for the study. Two of these districts consented to participate. Second, from these two districts, a group of 11 schools was selected for evaluation. Five schools were available from one district, and all five of these schools consented to the study. Therefore, 6 schools were required from the other district, in which there were 14 eligible schools. District personnel selected these six sites, noting that the other eight schools already had ongoing reform evaluations. Finally, from each of these schools, the population of students and employees was surveyed.

Students

The SSP survey was used simultaneously as an evaluation tool and as an assessment instrument for each individual student. Participating schools received an individual profile for each student that completed the SSP for purposes of intervention planning. Therefore, we surveyed the schools' entire populations rather than samples of students.

School Employees

We surveyed the population of school employees because of the relative small number of total employees at each school and the desire to represent employee subgroups for purposes of analysis. The only employees who were excluded from assessment and evaluation and were therefore not issued SSP-LOs were the bus drivers, because they were understood to have little

ongoing contact with the other school employees. Decisions about who to exclude from the sample population were made in cooperation with the principals of the schools.

Data Collection Procedures

Students

SSP surveys were administered to the population of students enrolled in each of the 11 middle schools in fall 2004 and in fall 2005. All procedures used in data collection received institutional review board approval and also were approved by the principal at each school. Surveys were administered on a single weekday in each school, usually in homeroom classes. Students were encouraged to take the survey but could decline. Parents also could refuse to have their child participate, using a passive consent form.

Methods used in survey administration were slightly different in each year, with SSP personnel monitoring the process more closely at each school in 2005. The overall response rate increased slightly, from 84% in 2004 to 88% in 2005. However, the total population of students in the 11 schools declined slightly, and therefore slightly fewer completed surveys were collected in 2005. There were 6,736 surveys collected in Year 1 and 6,521 collected in Year 2.

These two sets of survey data were merged, using a key that matched students' identities to survey numbers from each year. This key was constructed by the Education Research Data Center at Duke University, using data (names, birth dates, and survey numbers) that were collected separately from the survey. The method of collection differed slightly in each year. In 2004, faculty administering the surveys either (a) recorded student names and survey numbers as the surveys were distributed or (b) distributed surveys according to a preassigned list. In 2005, surveys were packaged with a separate instrument (the Student Information Sheet), which contained bubbles for name, birth date, and survey administration information and which was

scanned separately. The method used in 2005 was more accurate and took less time to complete. Of the 6,736 surveys collected in fall 2004, 411 were discarded from the analytical sample because students' identities could not be matched to academic records.

Between survey administrations, eighth graders advanced to high school and other students moved or transferred to other schools. Consequently, only 2,845 students—those known to have taken the SSP both times—are included in the analytical data set. Time 1 represents data collected in fall 2004 and Time 2 represents data collected in fall 2005.

School Employees

SSP-LO surveys were administered to employees, including administrators, specialists, teachers, teacher assistants, and other employees (e.g., cafeteria workers) during team meetings in April and May 2005. Employees returned the surveys in sealed envelopes. No identifiers were included on the survey, and participation was voluntary but highly encouraged by the principal in each school, who had signed a letter of agreement to participate fully in the evaluation. The overall response rate exceeded 80%, although variation was experienced across the 11 schools (ranging from 61% to 97%). No patterns in nonresponse were discerned within schools when the profiles of respondents and nonrespondents were compared in terms of current position or years of service (less than one year versus one year or more). Coordinators in each school were identified and trained to administer the surveys, which was supported by the school-improvement teams in each school.

*Respondent Profile**Students*

Students in this sample were in middle school during both years of the study. In fall 2004, the mean student was 12 years, 4 months old, with 46% in sixth grade and 53% in seventh grade. One percent were enrolled in eighth grade in fall 2004 (and subsequently retained). Overall, nearly one-quarter of the students (23%) had been retained at least once by fall 2005. Students were evenly divided among boys and girls. Black students comprised 44% of the sample, with 10% Hispanic, 39% White, and 7% other. These students were predominately from lower-income families, with 62% reporting that they received free or reduced-price lunch. At Time 1, these students reported overall SSP dimension scores that were, on average, more than 60% of the possible maximum score. The lowest score was on school engagement (.62), and the highest was on trouble avoidance (.91).

Employees

A total of 761 employees across the 11 schools responded to the SSP-LO. The number of respondents across schools ranged from a low of 51 employees at one school to a high of 95 employees at the largest school. The majority of the respondents (60.3%) were teachers. Other positions included administrators (4.5%), specialists (6.6%), teacher assistants (5.8%), and other employees (19.8%). "Current position" was not reported by 3% of the respondents. More than three-quarters (79.1%) of the employees had been employed at their respective schools for one year or more.

Measures

Students

Demographics. Age and grade level were obtained from administrative records and verified using the self-reported data from the SSP. Age was measured in years and months from date of birth (using the first day of the month) to November 1, 2004. Students' grade level at Time 1 (1 = seventh or eighth grade; 0 = sixth grade), and retention status from fall 2005 (1 = retained at least once; 0 = not retained) were entered as indicator variables. We were able to model age and grade level together, despite their tendency to co-vary, because we were able to measure age differences in months. Using a single date for all respondents to measure age at survey time guarded against artifactual differences due to different survey administration dates at each site.

Using the self-reported SSP data, student gender was entered as an indicator variable (1 = male; 0 = female); race/ethnicity was entered as two indicator variables: Black (1 = Black; 0 = all others) and Hispanic (1 = Hispanic; 0 = all others); and free/reduced lunch status also was included as an indicator variable (1 = received free/reduced lunch; 0 = paid for lunch).

SSP dimensions. There are 22 self-reported dimensions scored on the SSP: 14 dimensions of social environment and 8 dimensions of individual adaptation. Each dimension was scaled from zero to one, representing the proportion of the highest possible score. All dimensions were calculated such that higher scores represent better conditions (i.e., assets). Further information about the coding and computing of each SSP profile dimension is described in Bowen et al. (2005).

Employees

Faculty, staff, and administrators in each school completed the SSP-LO three times—in fall 2004, in spring 2005, and in fall 2005. The SSP-LO contains 36 items, comprising 12 dimensions (of three items each) related to organizational culture: team orientation, innovation, involvement, information flow, tolerance for error, results orientation, common purpose, respect, cohesion, trust, mutual support, and optimism (Bowen et al., 2006). Changes in the survey from the first to the second administration, and incomplete data from the third administration, resulted in use of the spring 2005 data. For each school, an index of organizational learning was created by summing all 12 dimensions from the spring 2005 survey (Cronbach's $\alpha = .99$). This index was added to the student data as school-level measures. On a scale ranging from 12 to 72, the mean score was 52.2, with higher scores being more positive.

Analytical Strategy

The multistage selection method required us to consider using multilevel modeling methods. Hierarchical linear modeling was used in order to account for students being nested within schools. This nesting violates the assumption of independence of observations, which could lead to underestimated standard errors and spurious inferences if modeled using conventional linear methods (Raudenbush & Bryk, 2002). HLM partitions the variance of each model into a within-schools component (indistinguishable from the residual error term) and a between-schools component captured by variation in the conditional mean outcome (i.e., the intercept). We used HLM to answer three questions that were posed in accordance with the three objectives of this study:

1. Are SSP dimension change scores multilevel—that is, is there a significant between-schools component of variability in SSP change scores that must be accounted for, in addition to between-student differences?
2. Are changes in SSP individual adaptation dimensions predicted by changes in social environment dimensions, controlling for Time 1 assessment and demographics?
3. Are changes in SSP social environment dimensions related to organizational learning, controlling for Time 1 assessment, demographics, and district?

Due to the very small number of schools in the sample ($N = 11$), HLM was used in these regressions primarily to prevent spurious inferences in the study of student-level change and only secondarily to attempt to detect school-level effects in the models for Question 3. In addition, we entered district into the models for Question 3. District was the first stage in the selection process and therefore must be considered as a potential confounding effect. During a sensitivity analysis, district was found to be a significant factor for many of the social environment dimensions. The most appropriate method for modeling this would have been as a third level of the model (Snijders & Bosker, 1999), because schools are nested within districts, but two districts were an insufficient number for this to be possible. Instead, district is entered as a school-level fixed effect. One of these districts represented a largely rural county comprising both rural schools and schools in a small urban area (district = 1); the other district comprised a large urban area (district = 0).

Model Fitting

With 22 dependent variables, each model of either the social environment or the individual adaptation type contained the same explanatory measures as all other models of the same type; models were not fit selectively. For the individual adaptation regressions (Question

2), we entered Time 1 assessment, demographics, and social environment change scores. In a sensitivity analysis, a control for district did not contribute to model fit in any of the individual adaptation models. Therefore, all variables appearing in the individual adaptation regressions were Level 1 variables. For the social environment dimensions (Question 3), we entered Time 1 assessment, demographics, district, and organizational learning. These last two variables were entered as school-level factors. Prior to modeling these data, we used the variance inflation factor test to verify that the data were not collinear.

Nearly all of the variables were entered into the HLMs in their raw form, without the use of centering. The only exceptions were age and the organizational learning index, neither of which had a zero point (required in order to correctly interpret the fixed and random intercept parameters) and both of which were recentered at their grand means.

SSP dimensions were entered into the models in three different ways. First, in order to model change, the improvement in each dimension score from the Time 1 to the Time 2 assessment was entered as the dependent variable in each of 22 regressions. Second, each regression also contained the Time 1 assessment for that dimension as a control for regression to the mean (Gillespie & Streeter, 1994). Third, the change scores for the social environment dimensions were entered as regressors into the eight models of individual adaptation, consistent with the SSP eco-interactional developmental model of proximal (social environment) results affecting distal and intermediate (individual adaptation) results (Bowen, Richman, Bowen & Woolley, 2002).

Question 1. In order to answer the first question, of whether SSP change scores differ sufficiently at the school level to require multilevel analysis methods, we modeled null HLMs comprising only a dependent variable regressed on a random intercept. With no regressors,

variance was at its maximum, providing an upper limit for the variance to be accounted for in well-specified conditional models.

The magnitude of between-cluster variability is measured by the intraclass correlation coefficient (ICC). It has been argued that ICCs below .20, or perhaps .30, are small enough that the independence assumption is not effectively violated and multilevel methods may not be necessary (Heinrich & Lynn, 2001; Snijders & Bosker, 1999), although this view is not shared by all (see, for example, Schochet, 2005). An *F* test was preferred for testing the null hypothesis that the ICC was zero (Snijders & Bosker, 1999). The results of this analysis were intended originally to inform the proper method of analyzing the data—either HLM or ordinary least squares (OLS) regression. However, early findings demonstrated that the dimensions vary in a pattern consistent with the constructs they represent. Consequently, we used HLM throughout, although models where the ICC was zero were also tested using OLS, with nearly identical results.

Question 2. To test the SSP logic model (the eco-interactional developmental model) of proximal (social environment) results affecting distal and intermediate (individual adaptation) results, we modeled individual adaptation change scores on Time 1 assessment, demographics, and social environment change scores. The variance-explained statistic indicates what proportion of Level 1 variance is accounted for by (a) the Time 1 assessment alone, (b) the Time 1 assessment and demographics, and (c) the Time 1 assessment, demographics, and social-environment change scores. Differences in the Level 1 variance explained at each iteration are provided. Because no Level 2 regressors were entered, no variance-explained statistic was included for Level 2 variance.

Question 3. To test the independent effects of demographic characteristics and organizational learning on changes in students' perceptions of their social environments, social

environment change scores were regressed on Time 1 assessment, demographics, district, and the organizational learning index. The variance explained at Level 1 statistics indicates the proportion of Level 1 variance explained by the Time 1 assessment and demographics. The variance explained at Level 2 statistics indicates the proportion of Level 2 variance accounted for by district alone, and subsequently, by district plus the organizational learning index.

Missing Data

Missing data are always a problem in survey research and have the potential to cause biased estimates. In this analysis, 16 students (0.5% of the total) were missing the indicator for free/reduced lunch status. All of the Time 1 and Time 2 assessments on the SSP had missing values. The number of respondents with missing data on dependent variables—change scores from Time 1 to Time 2—ranged from 32 (1.1%) to 341 (12.0%); the problem became even greater when entering the social-environment change scores into the models for individual adaptation, because missing data for these explanatory measures had to be taken into account.

We used a two-stage approach to the problem of missing data. First, each dimension was redefined and recalculated to include only valid responses given by each student. Students skip selected items for a variety of reasons, some that may be bias inducing (e.g., sensitivity to certain questions) and others that may be less bias inducing (e.g., not understanding a question). By removing only the offending items from the respondents' scores, and not the entire respondent, we have attempted to minimize this bias.

However, as a second condition, we established a threshold requiring half of the items in a scale for the score to be calculated for any respondent. In most cases when students did not complete half of the items, it was because the students were unable to complete the survey in the allotted time and thus left entire dimensions blank. Evidence for this is that dimensions related to

family and health and well-being, calculated from items appearing at the end of the survey, are missing at a higher rate than are answers from other dimensions. We assume that these dimensions are therefore missing completely at random and that the respondents can be safely excluded with minimal bias.

Results

Univariates and Alpha Reliabilities

As presented in Table 1, means and standard deviations for each change score demonstrate that the mean level of change was often very close to zero (in the case of neighborhood safety, school safety, friend support, social support use, self-esteem, trouble avoidance, and grades). Neighbor support (-.01); teacher support, school behavior expectations (-.02); neighborhood youth behavior, family togetherness, parent support (-.03); home academic environment, parent education support (-.04); school satisfaction, friend behavior (-.05); and school engagement (-.07) had negative changes, on average. In other words, students' scores on most dimensions declined slightly between Time 1 and Time 2. Only peer group acceptance (.04); physical health, happiness (.01); and personal adjustment (.03) had positive changes. However, these modest mean differences may be misleading, as many of the standard deviations are very large for variables with limited ranges running from -1 to 1 (e.g., .36 for personal adjustment), indicating great variability in change among these students between Time 1 and Time 2.

[Insert Table 1 about here]

The alpha reliabilities of the Time 2 scores underlying the change scores also are reported. These reliabilities are very similar to those reported in Bowen et al. (2005). The lowest

is for grades (.66) and the highest are for family togetherness and parent support (.92), which further supports the internal consistency of the SSP measures.

Question 1

Question 1 asked whether change scores in the SSP dimensions varied sufficiently at the school level. Table 2 summarizes these results. In most of the models, the ICC was only slightly and imperceptibly greater than zero; in several (family togetherness, parent support, home academic environment, and personal adjustment) the Level 2 variance parameter was zero (the covariance matrix was “not positive definite,” which in a random-intercept model can only mean a zero variance parameter). The largest ICC was for friend behavior (.018). The *F* test of the null hypothesis that the ICC was zero was significant for neighbor support, teacher support, and friend behavior, indicating that these ICCs, despite their modest size, are significantly different from zero. The methods for Question 2 and Question 3 could have varied on the basis of these findings; in situations where the ICC was zero or not significantly different from zero, we could have reported the results of an OLS regression instead. Nonetheless, for consistency, we have reported the results using HLM; the results of the HLM and OLS were identical or nearly identical in every case.

[Insert Table 2 about here]

Question 2

Question 2 asked whether changes in individual adaptation scores between Time 1 and Time 2 are related to changes in social environment dimension scores, controlling for Time 1 assessment and demographics. The results, which are presented in Table 3 (intermediate results) and Table 4 (distal results), varied greatly by dimension. Consistent with Powers et al. (2005), we focus our attention only on those factors exhibiting a standardized coefficient of .09 or

higher, and we have organized them according to the logic model of intermediate and distal results. We also report variance explained at each level, which is similar to the coefficient of determination R^2 in OLS. Note that in maximum likelihood regressions it is possible for variance explained to go down (i.e., for variance to go up) in poorly specified models. If sufficiently high, these may be interpreted as model misspecification diagnostics, which we consider as variance increasing by 5% or more (Snijders & Bosker, 1999).

[Insert Table 3 about here]

[Insert Table 4 about here]

Intermediate Results: Personal Beliefs and Well-Being

Across all models, the demographic variables accounted for no more than 3% of Level 1 variance explained (Table 3). Changes in the social environment explained 5% of variance at Level 1 for physical health, 8% for self-esteem, and 9% each for social support use, happiness, and personal adjustment. Model fit, after adding all regressors, was significantly improved over the null models.

Changes in these adaptation outcomes were more often related to changes in the friend and family dimensions than to changes in neighborhood or school dimensions. Parent support ($\beta = .10$) and parent education support (.11) were significant and positive predictors of social support use. Family togetherness exerted a significant and positive effect on all of the other dimensions—physical health (.09), happiness (.11), personal adjustment, and self-esteem (both .10). In addition, peer group acceptance (.09) and parent support (.14) were significant and positive predictors of happiness. Parent support (.11) was a significant and positive predictor of personal adjustment, and school behavior expectations (.09) was a significant and positive

predictor of self-esteem. Gender was the only demographic factor rising to the .09 level, with males having scores .10 standard deviations higher than females for happiness.

Distal Results: School Attitudes and Behavior and Academic Performance

Across all models, the demographic variables accounted for no more than 3% of Level 1 variance explained (Table 4). Changes in the social environment explained 14% of Level 1 variance in school engagement, 12% in trouble avoidance, and only 3% in grades. Model fit, after adding all regressors, was significantly improved over the null models.

School satisfaction (.23) was a significant and positive predictor of school engagement. Neighborhood safety (.13) and friend behavior (.09) were significant and positive predictors of trouble avoidance. None of the social environment dimensions was significantly related to grades, although grade retention exerted a significant negative effect on this adaptation outcome (-.10), which is consistent with prior research.

Question 3

Question 3 asked whether changes in social environment scores from Time 1 to Time 2 were related to an index of organization learning—created by summing the scores given by each school’s faculty, staff, and administrators on 36 items related to organizational culture—controlling for Time 1 data, demographics, and district. The results are presented in Table 5 (neighborhood), Table 6 (school), Table 7 (friends), and Table 8 (family).

[Insert Table 5 about here]

[Insert Table 6 about here]

[Insert Table 7 about here]

[Insert Table 8 about here]

Across all models, the demographic variables accounted for no more than 2% of Level 1 variance explained (often it is zero). Family togetherness, parent support, and home academic environment were not two-level models, and these produced identical results when modeled using OLS. Level 2 variance—explained statistics often were very large for either district or organizational learning, but this is in the context of very small Level 2 variance components (the highest ICC was just under 2% of total variance). District accounted for 90% of the between-school variation in neighborhood youth behavior, 77% in neighborhood safety, and 81% in friend behavior. Conversely, for peer group acceptance, district accounted for only 1% of variance but organizational learning accounted for 77%; and for grades, district was a relatively minor 8% of variance, whereas organizational learning accounted for 61%.

Using the .09 threshold in the standardized coefficient as an indicator of significance, being male had a significant and negative influence on friend support (-.10), and being Black had a significant and positive effect on home academic environment (.10). The SES proxy, school lunch status, had a significant and negative influence on both parent education support (-.10) and school behavior expectations (-.09). The organizational learning index did not achieve a standardized coefficient of .09 or higher for any of the social environment dimensions. District was only predictive of neighborhood safety (.11) and friend behavior (.14), and the results favored the district in the small urban area rather than the large urban area. .

Discussion

The current analysis builds upon an earlier effort by Powers et al. (2005) to provide school-based practitioners with a theoretically informed and empirically tested matrix for identifying intervention targets. Unlike this previous analysis, which employed cross-sectional data obtained at a single point in time at each of approximately 350 school and agency sites in

multiple states, the present analyses relied upon data obtained longitudinally from 2,845 students in 11 schools in two counties in a Southeastern state. These longitudinal records were part of two cross-sections obtained one year apart from a total of approximately 10,000 students in these 11 schools. With assistance from the Education Research Data Center at Duke University, and with institutional review board permission, we were able to link the two samples together by student, making it possible to assess individual change on all 22 SSP dimensions. In addition to student data, cross-sectional data were available from employees at the 11 schools who completed the SSP-LO survey.

The present analysis extends the earlier effort by Powers et al. (2005) in three important ways. First, it examines the question of the most appropriate method for modeling these data, which are collected across multiple sites. Second, it examines the question of how changes over time in the perceptions of middle school students toward their social environments influence changes in adaptation outcomes associated with school success. Third, it examines a question important to the SSP intervention model in seeking to determine whether organizational learning, as measured by surveying school employees at each school, predicts changes in students' perceptions of the social environment. Results from the analysis are discussed below in the context of these three questions.

The Choice of Multilevel Modeling Methods

HLM was used to address three questions that reflected three study objectives. The first question addressed a methodological concern about the nested nature of the student-related data within a school. In many cases, investigators simply ignore this aspect of the data-collection strategy in the resulting analysis and treat data as if students were selected randomly across sites. In the present study, the intraclass correlation coefficient measured the proportion of outcome

variability that was attributed to school level, and these ICCs were very small, never rising above 2%.

As noted previously, there is a wide variety of opinion in the multilevel literature regarding the threshold at which multilevel methods must be used in order to have appropriate standard errors for testing and inferring from school-level effects (e.g., Heinrich & Lynn, 2000; Schochet, 2005; Snijders & Bosker, 1999). Question 1 in this analysis was intended to answer the question of whether multilevel methods were appropriate for these data. After considering many potential decision rules based on magnitude or significance of the ICC, we determined that each dimension would be modeled in a multilevel framework in the present study, regardless of the size or the significance of the ICC, unless it was not possible to do so. This meant that only dimensions exhibiting no between-school variability would be modeled as if they were single-level.

However, by any magnitude-based assessment currently available in the literature (e.g., Schochet, 2005; Snijders & Bosker, 1999), there is no mandate for using HLM when working with these data on environment, adaptation, and behavior outcomes—they simply do not exhibit sufficient between-school variability. Consequently, there is little effective difference between the methods used in Powers et al. (2005)—OLS—and the methods used in the present study.

Explaining Changes in Adaptation Outcomes

From the perspective of this investigation, the second analysis question was most central. We were particularly interested in whether the earlier findings from the Powers et al. (2005) study would hold up across a different sample, in the context of longitudinal change data and additional control variables, and using a more rigorous analytic strategy. Especially unique to the current study, however, is that we measure the impact that changes in the social environment

(*SE*) dimensions have on adaptation outcomes associated with school success over time. It is important to recognize that the dependent variables in the Powers et al. study and in the present study were therefore slightly different. In the former, they were measures of the dimension scores themselves, obtained cross-sectionally. In the latter, they were differences between Time 1 and Time 2 scores in the dimensions. Though a direct comparison of the magnitude of the two sets of results is not possible, we should observe relationships between dimensions, exhibited in Powers et al., here as well.

Similar to the Powers et al. (2005) study, we highlighted the demographic control variables and the *SE* dimensions that made the greatest contribution to change in the individual adaptation outcomes for students. We focused on those standardized beta coefficients that met or exceeded .09, as these leverage points may be the most critical for specifying target groups and directing interventions. Results of the analysis identified the demographic variables as contributing (in aggregate) 1% to 3% of variation in each of the individual outcomes. These results are similar to the findings of the Powers et al. (2005) study, which identified demographic variables to explain 2% to 8% of variance in the analysis.

The single demographic variable in the current study to meet or exceed the .09 cutoff was grade retention, which was not included in the Powers et al. (2005) study. Being retained at least once contributed 10% of the variance in the grades outcome. These findings support other research that describes retention as a primary risk factor for future negative school performance and academic problems (Moller et al., 2006; Randolph et al., 2004). This is important for school practitioners to note, because students who previously have been retained are at higher risk for continued academic struggles and therefore need additional assistance. Moreover, it may be

especially important for school professionals to be aware of such findings if they are considering retention as an intervention with students.

Results of the analysis found that changes in the social environment dimensions (in aggregate) vary in their contribution, ranging from 3% to 14% of the variance in each of the individual adaptation outcomes for students over time. Out of the four social environment domains, neighborhood and school were the least influential—each had only one dimension that exceeded the .09 threshold. Higher reports of neighborhood safety predicted trouble avoidance (.13), and school satisfaction was highly influential on school engagement (.23) for students in the sample.

These findings are intuitive, and it is easy to imagine how neighborhood safety problems (e.g., the availability of drugs, or crime) might contribute to early delinquent or risky behavior for youth. Similarly, it makes sense that students who report higher levels of school satisfaction (i.e., I am getting a good education at this school) also would feel a stronger connection to school and be more engaged (i.e., I look forward to going to school). It may be helpful for school practitioners who identify students reporting or exhibiting higher levels of problem behavior and lower levels of school engagement to consider targeting these social environment dimensions with interventions, because they have proven to be influential over time.

The friends' domain of the social environment had two dimensions that met the .09 effect size criteria: friend behavior affected trouble avoidance (.09), and peer group acceptance influenced levels of happiness for students (.09). Both also were significant at the .09 level in Powers et al.'s (2005) results, but in the previous analysis the friends' domain influenced seven of the eight individual adaptation outcomes. These results are not surprising; students may tend to have friends who are like them, so the behavior of individuals in a peer group also may be

similar. Middle school is also a time when friends are very influential, which supports the finding that feeling accepted by peers and a sense of belonging would be significant. It also stands to reason that the two findings are related, because the need to be accepted by peers may promote specific behavior that an individual perceives as being desirable to the group (i.e., a response to peer pressure).

Overall, a greater number of effects that met or exceeded the .09 threshold were associated with the family domain. This finding is more than an artifact of the number of SSP environment dimensions associated with the family domain, as compared to the other three social environment domains. The family domain was the most influential in terms of positive change in the personal beliefs and well-being outcomes. Family togetherness met the .09 cutoff and influenced physical health (.09), happiness (.11), personal adjustment (.10), and self-esteem (.10). Parent support explained a minimum of 1% of variance (β^2) for social support (.10), happiness (.14), and personal adjustment (.11). Parent education support exceeded the beta criteria for social support (.11); school behavior expectations met the threshold criteria for self-esteem (.09). Interestingly, home academic environment did not meet the .09 threshold for any of the adaptation outcomes.

Overall, these findings align with previous findings by Powers et al. (2005), which found a greater number of effects to be associated with the family domain, and it is interesting to note that this proved true even in an analysis capturing change over time. The results suggest that school practitioners working with students to increase personal beliefs and well-being associated with school success would be wise to invest time and resources in interventions that include parents/guardians, given that family was such an influential domain for youth.

Contribution of Organizational Learning

In the final analysis, we attempted to determine whether organizational learning, as measured by the faculty, staff, and administrators at each school, predicts social environment as measured by the students. To do so, we modeled the social environment dimensions on organizational learning, controlling for Time 1 assessment, demographic factors, and the district from which the school was sampled.

Organizational learning did not have a significant impact on the changes in the social environment dimensions. It did appear to account for a substantial portion of the between-group variance (61%) in school behavior expectations, but between-group variation was only three-tenths of one percent of all variation in school behavior expectations, making this a rather trivial finding. Controlling for district, which was the first stage in the sample-selection process, we noted that district is a predictor of change in friend behavior (.14 standard deviations higher in a less urbanized district) and neighborhood safety (.11 standard deviations higher).

Methodologically, there are several modest implications of the social environment analyses results. First, any study or evaluation that is intended to measure and explain variation in social environment outcomes should be conducted using a sampling method that includes a sufficient number of districts to allow for random effects at the district level. Second, a larger number of schools should be included in order to test the association between organizational learning and social environment. Third, changes in the social environment should be measured in order to improve the validation of the logic model.

Study Limitations

In considering the present results, several caveats are particularly important. First, the schools were not selected randomly and therefore may not be representative of middle schools,

even in the districts from which they were selected. Second, though these data were collected for the evaluation of a whole-school intervention, we have largely ignored this context in the present study. The intermediate result of this intervention program—organizational learning—is included as a static measure taken in spring 2005, but the intervention context is overlooked and no effort is made to model change in the organizational learning measure.

The lack of significance of both district and organizational learning was likely affected by the modest school-level sample size of 11. We were constrained by the sample of two districts and 11 schools that consented to participate in the evaluation of the intervention program.

In addition to the small school-level sample size, the students from among these 11 schools—representing the population of students in each school in each year—exhibited substantial attrition between Year 1 and Year 2, with less than half of the students from Year 1 being matched to Year 2 records. Even if all eighth graders progressed to high school, we could have had as many as two-thirds of the Time 1 sample returning for Time 2. No effort was made to collect follow-up data on the eighth-grade sample that moved into ninth grade.

There are several reasons why only about half of the students were matched, and most of these factors were out of the researchers' control, such as movement out of the schools being sampled. One of the districts recently implemented a school choice plan and there were frequent movements around the district, making year-to-year tracking on the basis of school membership difficult. Several hundred longitudinal cases may have been lost, however, due to a poor method of collecting student names and birth dates at Time 1; this information was necessary to match students' Time 1 and Time 2 surveys to each other.

Finally, among the students who do appear in the longitudinal sample, many dimension scores are missing because the student failed to respond to at least half of the items constituting

those dimensions. In addition, if students responded to at least half of the items, missing items were ignored in the calculation of dimensions. Both of these missing-data-handling strategies may to some extent induce bias.

Implications for Research

This was the first study to use multilevel modeling methods on longitudinal SSP data, and it was not known whether these data would exhibit sufficient variability at the school level to warrant their use. Most of the SSP dimensions do not exhibit the between-school variability that warrants the added rigors of multilevel modeling, and several dimensions (family togetherness, parent support, home academic environment, and personal adjustment) would not even model in a multilevel framework. (SAS Proc Mixed, which was used for modeling the HLMs, provided a maximum-likelihood solution equivalent to OLS for these dimensions.)

We caution against interpreting these findings as an artifact of the instrument used. It has been assumed that because academic outcomes tend to have very high ICCs, with some unconditional ICCs in the .60 to .80 range, behavioral and psychological predictors of these outcomes might also have significantly high ICCs, but behavioral outcomes have been shown to have ICCs as low as .01 (Schochet, 2005). The SSP provides additional evidence of this characteristic.

The Question 1 analyses, conducted primarily to inform the appropriate methods for Question 2 and Question 3, were interesting because they demonstrate patterns among common dimensions and provide further evidence of their construct validity. In particular, it is interesting to note that school dimensions and dimensions with school-related items exhibited more between-school variability than did dimensions related specifically to nonschool domains such as family. None of the individual adaptation dimensions, with the exception of grades, demonstrates

between-school variability at or above 0.5% of total variability. Because individual adaptation measures capture students' perception of self and not of the environments in which they live and work, this is promising. However, friend behavior, which has several school-related questions, has a significant ICC, as do teacher support and neighbor support.

Further analysis is needed to explore how the effects of specific social environment dimensions on individual adaptation outcomes associated with school success may vary across sample subgroups. For example, research from the Search Institute (Sesma & Roehlkepartian, 2003) suggests that the influence of particular subgroups of developmental assets (e.g., support) on the school success of youth may vary across racial/ethnic groups. In addition, in the context of the logic model that informs the organization of the 22 SSP dimensions into three larger areas (proximal, intermediate, and distal results), further research should explore the potential that the five dimensions associated with personal beliefs and well-being mediate the relationship between social environment dimensions and school-related dimensions.

Implications for Practice

The most critical lesson learned from the earlier Powers et al. (2005) investigation and from the current study is that social environment has a considerable impact on students' school-related outcomes—even over time—a finding that certainly has implications for practice in schools. With such limited time and resources, school practitioners can utilize the results of this study to more efficiently and effectively guide their practice. Practitioners can begin data-driven intervention planning by identifying and targeting the critical leverage points that most positively influence specific school-related outcomes and promote school success for students at risk of failure.

A useful tool that can be used in conjunction with these current study results is the previously mentioned School Success Profile Web site (www.schoolsuccessprofile.org). The Web site provides easily accessible and user-friendly information about evidence-based practice strategies/programs for each of the 14 social environment dimensions included in the study, including a description of the program, the objectives of the intervention, implementation requirements, cost, evaluation research references, and contact information for further details on the program.

For example, this study identifies the family domain of the social environment to be particularly relevant to the personal beliefs and well-being outcomes for middle school students in our sample. If a school practitioner works with students who have low scores on assessments of the intermediate outcomes associated with personal beliefs and well-being, then this study suggests an intervention with the family may be in order. For example, working closely with family members to create a warm and supportive environment at home would be a beneficial intervention strategy. The school practitioner would log on to the SSP Web site and utilize the search tool to identify interventions that have previously proven to be effective in strengthening SSP social environment dimensions, such as family togetherness and parent support. This important next step in the intervention process supports practitioners' use of current best practices to better promote school success for students. The overall process provides a bridge between research and practice and reinforces the two-step sequence of assessment and intervention associated with evidence-based practice.

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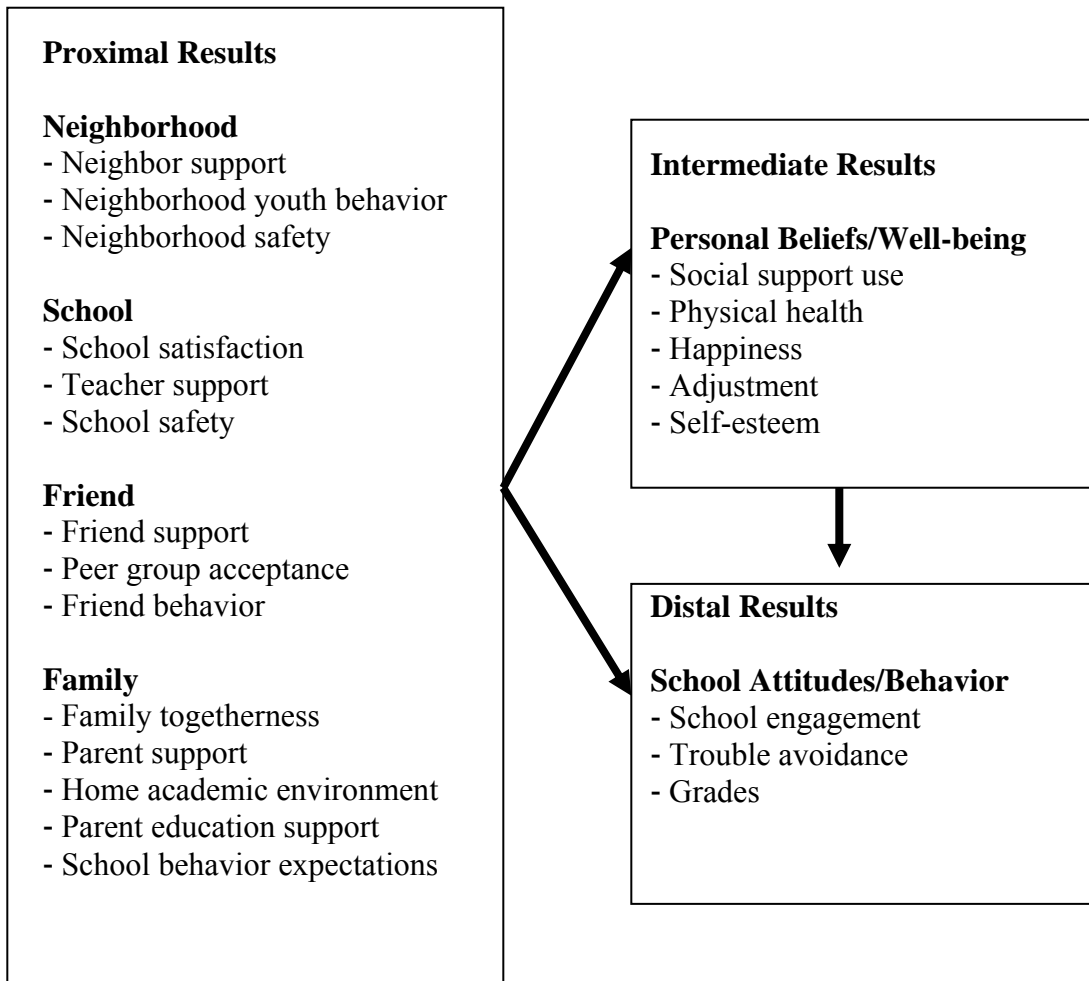


Figure 1. SSP Logic Model

Appendix: School Success Profile Dimensions

Social Environment Profile

Neighbor Support: Youths are satisfied with their neighborhood and perceive their neighbors as interested in their welfare and willing to help them if they have a problem.

Neighborhood Youth Behavior: Youths live in a neighborhood where young people engage in constructive behavior and are unlikely to break the law and get in trouble with the police.

Neighborhood Safety: Youths live in a neighborhood with a low incidence of crime and violence.

School Satisfaction: Youths enjoy going to their school, feel acknowledged and respected at school, and report that they are getting a good education.

Teacher Support: Youths perceive teachers at their school as supportive and caring about them and their academic success.

School Safety: Youths attend a school with a low amount of crime and disruption.

Friend Support: Youths perceive their friends as supportive and responsive to their needs and feelings.

Peer Group Acceptance: Youths feel accepted by their peers and are able to be themselves and resist negative peer pressure.

Friend Behavior: Youths have friends who are unlikely to break the law or get in trouble with the police and who stay out of trouble and perform well at school.

Family Togetherness: Youths report that members of their family feel a sense of emotional closeness and bonding with one another.

Parent Support: Youths report that their parents provide them with loving support and encouragement.

Home Academic Environment: Youths report that their parents show an interest in their courses, experiences, and activities at school and ask them about their plans for the future.

Parent Education Support: Youths report that their parents encourage and support high school performance and limit the time that they can watch TV and go out with friends on school nights.

School Behavior Expectations: Youths perceive their parents as expecting them to do their schoolwork, attend classes, and follow school rules.

Individual Adaptation Profile

Social Support Use: Youths indicate that there are people they turn to for social support and assistance.

Physical Health: Youths evidence good health as indicated by an absence of symptoms of physical illness over the past seven days.

Happiness: Youths report general feelings of psychological well-being over the past seven days.

Adjustment: Youths report that they have not thought about running away from home, felt uncared for, or felt lost or confused over the past 30 days.

Self-Esteem: Youths report a sense of confidence and self-worth.

School Engagement: Youths feel that they are able to understand and manage events at school, and report they find school meaningful.

Trouble Avoidance: Youths report that they have generally avoided getting into trouble and cutting classes or school during the past 30 days.

Grades: Youths report at least average grades at school and report no Ds or Fs on their most recent report card.

Table 1. Univariates for Time 1 Assessment and Change Scores; Alpha Coefficients for Time 2 Assessments.

	Time 1 assessment				Change scores				Time 2 assessment	
	<i>Mean</i>	<i>Std. dev.</i>	<i>N</i>	<i>N(miss)</i>	<i>Mean</i>	<i>Std. dev.</i>	<i>N</i>	<i>N(miss)</i>	<i>Alpha</i>	<i>Standardized alpha</i>
Neighbor support	0.70	0.25	2822	23	-0.01	0.24	2800	45	0.83	0.83
Neighborhood youth behavior	0.80	0.29	2803	42	-0.03	0.32	2785	60	0.88	0.88
Neighborhood safety	0.90	0.15	2828	17	0.00	0.16	2813	32	0.78	0.80
School satisfaction	0.79	0.25	2818	27	-0.05	0.27	2758	87	0.77	0.77
Teacher support	0.81	0.24	2802	43	-0.02	0.27	2724	121	0.86	0.87
School safety	0.67	0.27	2807	38	0.00	0.29	2748	97	0.87	0.87
Friend support	0.78	0.25	2806	39	0.00	0.26	2741	104	0.85	0.85
Peer group acceptance	0.80	0.19	2799	46	0.04	0.20	2732	113	0.75	0.76
Friend behavior	0.87	0.19	2773	72	-0.05	0.22	2709	136	0.90	0.90
Family togetherness	0.83	0.23	2743	102	-0.03	0.24	2646	199	0.91	0.92
Parent support	0.81	0.26	2734	111	-0.03	0.28	2637	208	0.92	0.92
Home academic environment	0.67	0.31	2706	139	-0.04	0.35	2600	245	0.77	0.77
Parent education support	0.71	0.24	2736	109	-0.04	0.27	2642	203	0.74	0.75
School behavior expectations	0.80	0.20	2732	113	-0.02	0.22	2640	205	0.85	0.86
Social support use	0.77	0.26	2668	177	0.00	0.30	2526	319	0.80	0.81
Physical health	0.81	0.18	2714	131	0.01	0.19	2583	262	0.77	0.78
Happiness	0.72	0.22	2659	186	0.01	0.22	2504	341	0.76	0.76
Personal adjustment	0.67	0.35	2673	172	0.03	0.36	2526	319	0.67	0.68
Self esteem	0.85	0.23	2656	189	0.00	0.24	2515	330	0.85	0.86
School engagement	0.62	0.31	2816	29	-0.07	0.29	2764	81	0.81	0.81
Trouble avoidance	0.91	0.13	2831	14	0.00	0.14	2810	35	0.73	0.75
Grades	0.82	0.26	2813	32	0.00	0.27	2786	59	0.60	0.66

Table 2. Question 1: Magnitude of the ICC for Each Change Score.

	<i>Unconditional intraclass correlation</i>	<i>F-test sig.</i>	<i>Not two-level</i>
Neighbor support	0.010	*	
Neighborhood youth behavior	0.004		
Neighborhood safety	0.006		
School satisfaction	0.008		
Teacher support	0.010	*	
School safety	0.001		
Friend support	0.009		
Peer group acceptance	0.003		
Friend behavior	0.018	*	
Family togetherness	0.000		#
Parent support	0.000		#
Home academic environment	0.000		#
Parent education support	0.001		
School behavior expectations	0.003		
Social support use	0.002		
Physical health	0.004		
Happiness	0.003		
Personal adjustment	0.000		#
Self esteem	0.001		
School engagement	0.003		
Trouble avoidance	0.001		
Grades	0.007		

*F-test is significant, $p < .05$.

Model is not two-level because random intercept coefficient is zero.

Table 3. Question 2: Individual Adaptation—Intermediate Outcomes (Personal Beliefs and Well Being)

<i>Fixed effect</i>	Social support use			Physical health			Happiness			Personal adjustment			Self esteem		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Intercept	0.52		***	0.48	0.02	***	0.34	0.02	***	0.38	0.02	***	0.45	0.02	***
Time 1 assessment	-0.61	0.02	-0.53 ***	-0.57	0.02	-0.54 ***	-0.48	0.02	-0.47 ***	-0.50	0.02	-0.49 ***	-0.54	0.02	-0.51 ***
Age at time 1	0.01	0.01	0.02	0.00	0.01	0.00	-0.01	0.01	-0.04	-0.01	0.01	-0.02	-0.01	0.01	-0.02
Grade level at time 1	-0.01	0.02	-0.02	-0.03	0.01	-0.07 **	0.00	0.01	0.01	-0.02	0.02	-0.03	0.01	0.01	0.02
Retained at least once	-0.04	0.02	-0.05 *	0.00	0.01	0.01	-0.03	0.01	-0.06 *	-0.03	0.02	-0.04	-0.03	0.01	-0.05 *
Gender (1=male)	-0.03	0.01	-0.06 ***	0.03	0.01	0.07 ***	0.05	0.01	0.10 ***	0.05	0.01	0.07 ***	0.02	0.01	0.05 **
African American	0.01	0.01	0.02	0.02	0.01	0.06 **	0.04	0.01	0.08 ***	0.01	0.01	0.01	0.04	0.01	0.08 ***
Latino	0.00	0.02	0.00	0.01	0.01	0.02	-0.01	0.01	-0.02	-0.01	0.02	-0.01	0.01	0.02	0.01
Free/reduced lunch recipient	-0.02	0.01	-0.04 *	-0.02	0.01	-0.04 *	-0.02	0.01	-0.05 **	-0.02	0.01	-0.03	-0.01	0.01	-0.01
Neighbor support	0.09	0.02	0.07 ***	0.05	0.02	0.06 **	0.03	0.02	0.04	0.06	0.03	0.04 *	0.00	0.02	0.00
Neighborhood youth behavior	0.00	0.02	0.00	-0.01	0.01	-0.01	0.00	0.01	0.00	0.00	0.02	0.00	0.03	0.01	0.04 *
Neighborhood safety	0.03	0.03	0.01	0.05	0.02	0.04 *	0.00	0.03	0.00	0.10	0.04	0.04 *	0.01	0.03	0.01
School satisfaction	-0.01	0.02	-0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	-0.01	0.02	-0.01
Teacher support	0.04	0.02	0.04 *	0.01	0.01	0.01	0.02	0.02	0.03	0.01	0.03	0.01	0.02	0.02	0.02
School safety	0.02	0.02	0.02	0.05	0.01	0.08 ***	0.05	0.01	0.06 **	0.08	0.02	0.07 ***	0.03	0.01	0.04 *
Friend support	0.03	0.02	0.02	-0.01	0.01	-0.02	0.04	0.02	0.04 *	-0.06	0.02	-0.04 *	0.06	0.02	0.06 ***
Peer group acceptance	0.04	0.03	0.03	0.02	0.02	0.02	0.10	0.02	0.09 ***	0.13	0.03	0.07 ***	0.07	0.02	0.06 ***
Friend behavior	-0.01	0.03	-0.01	0.07	0.02	0.08 ***	0.04	0.02	0.04	0.13	0.03	0.08 ***	0.00	0.02	0.00
Family togetherness	0.08	0.02	0.06 ***	0.07	0.02	0.09 ***	0.11	0.02	0.11 ***	0.14	0.03	0.10 ***	0.11	0.02	0.10 ***
Parent support	0.11	0.02	0.10 ***	0.00	0.01	0.00	0.12	0.02	0.14 ***	0.14	0.03	0.11 ***	0.05	0.02	0.06 **
Home academic environment	0.06	0.02	0.07 ***	0.01	0.01	0.01	0.00	0.01	0.01	-0.03	0.02	-0.03	0.01	0.01	0.02
Parent education support	0.13	0.02	0.11 ***	-0.01	0.01	-0.01	0.01	0.02	0.02	0.04	0.03	0.03	0.05	0.02	0.06 **
School behavior expectations	0.06	0.02	0.04 *	0.00	0.02	0.00	0.02	0.02	0.02	0.00	0.03	0.00	0.10	0.02	0.09 ***
<i>Variates</i>	<i>Estimate</i>	% Total [^]		<i>Estimate</i>	% Total [^]		<i>Estimate</i>	% Total [^]		<i>Estimate</i>	% Total [^]		<i>Estimate</i>	% Total [^]	
Residual	0.05	100%		0.02	100%		0.03	100%		0.08	100%		0.04	100%	
Random intercept				0.00	0%		0.00	0%					0.00	0%	
<i>Level 1 variance explained</i>															
Time 1 assessment	0.32			0.29			0.23			0.27			0.29		
Time 1 & demographics	0.33			0.30			0.26			0.28			0.31		
Difference	0.01			0.01			0.03			0.01			0.02		
Time 1, demo. and social env.	0.42			0.35			0.35			0.36			0.38		
Difference	0.09			0.05			0.09			0.09			0.08		

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

Table 4. Question 2: Individual Adaptation—Distal Outcomes (School Attitudes and Behavior and Grades)

<i>Fixed effect</i>	School engagement			Trouble avoidance			Grades		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Intercept	0.20	0.02	***	0.54	0.02	***	0.53	0.02	***
Time 1 assessment	-0.40	0.02	-0.42 ***	-0.56	0.02	-0.55 ***	-0.58	0.02	-0.55 ***
Age at time 1	0.01	0.01	0.03	-0.01	0.00	-0.06 *	0.00	0.01	0.00
Grade level at time 1	0.00	0.01	-0.01	0.02	0.01	0.06 *	0.00	0.01	0.00
Retained at least once	0.00	0.01	0.00	-0.01	0.01	-0.02	-0.06	0.01	-0.10 ***
Gender (1=male)	-0.03	0.01	-0.05 **	-0.02	0.00	-0.07 ***	-0.03	0.01	-0.06 ***
African American	0.04	0.01	0.07 ***	-0.02	0.00	-0.06 ***	0.01	0.01	0.02
Latino	0.05	0.02	0.05 **	0.00	0.01	0.01	-0.06	0.02	-0.07 ***
Free/reduced lunch recipient	0.00	0.01	0.00	-0.02	0.00	-0.06 ***	-0.03	0.01	-0.06 **
Neighbor support	0.04	0.02	0.03	-0.01	0.01	-0.01	0.00	0.02	0.00
Neighborhood youth behavior	-0.01	0.02	-0.02	0.00	0.01	0.01	0.03	0.02	0.03
Neighborhood safety	0.01	0.03	0.00	0.11	0.02	0.13 ***	0.00	0.03	0.00
School satisfaction	0.24	0.02	0.23 ***	0.03	0.01	0.06 **	0.04	0.02	0.04
Teacher support	0.09	0.02	0.08 ***	0.04	0.01	0.07 ***	0.03	0.02	0.03
School safety	0.00	0.02	0.00	0.03	0.01	0.05 **	0.01	0.02	0.01
Friend support	0.04	0.02	0.03	0.01	0.01	0.01	-0.01	0.02	-0.01
Peer group acceptance	-0.02	0.03	-0.01	0.00	0.01	0.00	-0.01	0.02	-0.01
Friend behavior	0.03	0.03	0.02	0.06	0.01	0.09 ***	0.04	0.02	0.04
Family togetherness	0.06	0.02	0.05 *	0.01	0.01	0.01	0.04	0.02	0.03
Parent support	-0.01	0.02	-0.01	-0.01	0.01	-0.01	0.03	0.02	0.03
Home academic environment	0.06	0.02	0.07 ***	0.00	0.01	-0.01	0.00	0.01	0.00
Parent education support	0.03	0.02	0.03	0.00	0.01	-0.01	-0.02	0.02	-0.02
School behavior expectations	0.08	0.02	0.06 ***	0.03	0.01	0.05 **	0.03	0.02	0.03
<i>Variations</i>	<i>Estimate</i>	<i>% Total</i>	\wedge	<i>Estimate</i>	<i>% Total</i>	\wedge	<i>Estimate</i>	<i>% Total</i>	\wedge
Residual	0.05	99%		0.01	100%		0.05	99%	
Random intercept	0.00	1%	***				0.00	1%	***
<i>Level 1 variance explained</i>									
Time 1 assessment	0.22			0.28			0.27		
Time 1 & demographics	0.23			0.30			0.30		
Difference	0.01			0.02			0.03		
Time 1, demo. and social env.	0.37			0.43			0.33		
Difference	0.14			0.12			0.03		

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

Table 5. Question 3: Changes in Neighborhood Dimensions by the Index of Organizational Learning

<i>Fixed effect</i>	Neighbor support			Neighborhood youth behavior			Neighborhood safety		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Intercept	0.30	0.02	***	0.47	0.02	***	0.53	0.02	***
Time 1 assessment	-0.43	0.02	-0.44 ***	-0.58	0.02	-0.52 ***	-0.58	0.02	-0.56 ***
Age at time 1	-0.01	0.01	-0.03	0.01	0.01	0.02	-0.01	0.01	-0.04
Grade level at time 1	0.00	0.01	-0.01	-0.04	0.02	-0.06 *	0.01	0.01	0.04
Retained at least once	-0.02	0.01	-0.03	-0.05	0.02	-0.07 **	-0.02	0.01	-0.06 **
Gender (1=male)	0.02	0.01	0.03	0.00	0.01	0.01	-0.01	0.01	-0.04 **
African American	-0.02	0.01	-0.04	-0.04	0.01	-0.06 **	-0.02	0.01	-0.07 ***
Latino	-0.01	0.02	-0.01	0.00	0.02	0.00	0.01	0.01	0.01
Free/reduced lunch recipient	-0.04	0.01	-0.08 ***	-0.03	0.01	-0.05 **	-0.01	0.01	-0.04 *
District	0.03	0.02	0.06	0.05	0.01	0.08 **	0.03	0.01	0.11 ***
Organizational learning	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.02
<i>Variations</i>	<i>Estimate</i>	% Total ^		<i>Estimate</i>	% Total ^		<i>Estimate</i>	% Total ^	
Residual	0.05	99%		0.07	100%		0.02	100%	
Random intercept	0.00	1% **		0.00	0%		0.00	0%	
<i>Variance explained</i>									
Level 1 (time assessment)	0.18			0.25			0.27		
Level 1 (time 1 + demographics)	0.19			0.26			0.29		
Difference	0.01			0.01			0.02		
Level 2 (district)	0.30			0.90			0.77		
Level 2 (district + org. learning)	0.40			0.95			0.81		
Difference	0.10			0.05			0.04		

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

Table 6. Question 3: Changes in the School Dimensions by the Index of Organizational Learning

<i>Fixed effect</i>	School satisfaction			Teacher support			School safety		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Intercept	0.36	0.03	***	0.46	0.03	***	0.45	0.02	***
Time 1 assessment	-0.48	0.02	-0.45 ***	-0.58	0.02	-0.50 ***	-0.69	0.02	-0.63 ***
Age at time 1	0.01	0.01	0.04	0.00	0.01	0.01	0.00	0.01	-0.01
Grade level at time 1	-0.01	0.01	-0.02	0.01	0.01	0.02	0.00	0.01	0.00
Retained at least once	-0.02	0.01	-0.03	0.00	0.01	0.00	0.01	0.01	0.02
Gender (1=male)	-0.01	0.01	-0.02	-0.02	0.01	-0.04 *	-0.02	0.01	-0.03
African American	-0.02	0.01	-0.04 *	-0.01	0.01	-0.01	-0.01	0.01	-0.01
Latino	0.01	0.02	0.02	0.00	0.02	0.00	0.00	0.02	0.00
Free/reduced lunch recipient	-0.03	0.01	-0.06 **	-0.03	0.01	-0.05 **	0.00	0.01	0.00
District	0.04	0.02	0.07	0.03	0.02	0.06	0.03	0.01	0.06 *
Organizational learning	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	-0.01
<i>Variations</i>	<i>Estimate</i>	% Total ^		<i>Estimate</i>	% Total ^		<i>Estimate</i>	% Total ^	
Residual	0.06	99%		0.06	99%		0.05	100%	
Random intercept	0.00	1% **		0.00	1% ***		0.00	0%	
<i>Variance explained</i>									
Level 1 (time assessment)	0.19			0.25			0.40		
Level 1 (time 1 + demographics)	0.20			0.25			0.40		
Difference	0.00			0.00			0.00		
Level 2 (district)	0.31			0.38			0.05		
Level 2 (district + org. learning)	0.36			0.36			0.10		
Difference	0.04			-0.02			0.04		

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

Table 7. Question 3: Changes in the Friend Dimensions by the Index of Organizational Learning

<i>Fixed effect</i>	Friend support			Peer group acceptance			Friend behavior		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Intercept	0.52	0.02	***	0.56	0.02	***	0.41	0.02	***
Time 1 assessment	-0.60	0.02	-0.58 ***	-0.64	0.02	-0.60 ***	-0.50	0.02	-0.44 ***
Age at time 1	0.00	0.01	-0.01	0.01	0.01	0.02	0.02	0.01	0.06 *
Grade level at time 1	0.01	0.01	0.02	0.01	0.01	0.03	-0.03	0.01	-0.07 *
Retained at least once	-0.03	0.01	-0.05 *	-0.02	0.01	-0.03	-0.04	0.01	-0.08 ***
Gender (1=male)	-0.05	0.01	-0.10 ***	-0.02	0.01	-0.04 **	-0.01	0.01	-0.03
African American	-0.03	0.01	-0.07 ***	0.02	0.01	0.05 **	-0.02	0.01	-0.05 *
Latino	-0.01	0.02	-0.02	-0.01	0.01	-0.02	-0.01	0.01	-0.01
Free/reduced lunch recipient	-0.02	0.01	-0.04 *	0.00	0.01	0.00	-0.02	0.01	-0.04 *
District	0.02	0.01	0.05 **	-0.01	0.01	-0.02	0.06	0.01	0.14 ***
Organizational learning	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
<i>Variances</i>	<i>Estimate</i>	<i>% Total</i>	\wedge	<i>Estimate</i>	<i>% Total</i>	\wedge	<i>Estimate</i>	<i>% Total</i>	\wedge
Residual	0.05	100%		0.03	100%		0.04	100%	
Random intercept							0.00	0%	
<i>Variance explained</i>									
Level 1 (time assessment)	0.29			0.35			0.17		
Level 1 (time 1 + demographics)	0.31			0.35			0.18		
Difference	0.02			0.01			0.01		
Level 2 (district)	N/A			N/A			N/A		
Level 2 (district + org. learning)	N/A			N/A			N/A		
Difference	N/A			N/A			N/A		

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

Table 8. Changes in the Family Dimensions by the Index of Organizational Learning

<i>Fixed effect</i>	Family togetherness			Parent support			Home academic environment			Parent education support			School behavior expectations		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Intercept	0.32	0.02	***	0.40	0.02	***	0.39	0.02	***	0.38	0.02	***	0.52	0.02	***
Time 1 assessment	-0.42	0.02	-0.41 ***	-0.52	0.02	-0.48 ***	-0.62	0.02	-0.54 ***	-0.55	0.02	-0.48 ***	-0.64	0.02	-0.57 ***
Age at time 1	0.01	0.01	0.03	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.02
Grade level at time 1	-0.02	0.01	-0.03	0.00	0.01	-0.01	-0.03	0.02	-0.04	-0.02	0.01	-0.04	-0.01	0.01	-0.03
Retained at least once	-0.01	0.01	-0.02	-0.02	0.01	-0.02	-0.02	0.02	-0.03	-0.01	0.01	-0.02	-0.03	0.01	-0.06 **
Gender (1=male)	0.02	0.01	0.04 *	0.01	0.01	0.02	-0.02	0.01	-0.02	0.01	0.01	0.02	0.00	0.01	-0.01
African American	0.03	0.01	0.05 *	0.03	0.01	0.05 *	0.07	0.01	0.10 ***	0.02	0.01	0.04 *	-0.01	0.01	-0.02
Latino	0.02	0.02	0.03	0.01	0.02	0.01	0.00	0.02	0.00	-0.01	0.02	-0.01	0.00	0.01	0.00
Free/reduced lunch recipient	-0.02	0.01	-0.05 *	-0.04	0.01	-0.08 ***	-0.05	0.01	-0.06 ***	-0.05	0.01	-0.10 ***	-0.04	0.01	-0.09 ***
District	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.00	0.01	0.01	0.02	0.01	0.04 *
Organizational learning	0.00	0.00	-0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.03
<i>Variances</i>	<i>Estimate</i>	<i>% Total</i>	\wedge	<i>Estimate</i>	<i>% Total</i>	\wedge	<i>Estimate</i>	<i>% Total</i>	\wedge	<i>Estimate</i>	<i>% Total</i>	\wedge	<i>Estimate</i>	<i>% Total</i>	\wedge
Residual	0.05	100%		0.06	100%		0.09	100%		0.05	100%		0.03	100%	
Random intercept				0.00	0%		0.00	0%		0.00	0%		0.00	0%	
<i>Variance explained</i>															
Level 1 (time assessment)	0.16			0.22			0.28			0.23			0.29		
Level 1 (time 1 + demographics)	0.17			0.23			0.29			0.24			0.31		
Difference	0.00			0.01			0.01			0.01			0.02		
Level 2 (district)	0.00			-0.68			0.00			0.25			0.08		
Level 2 (district + org. learning)	N/A			-0.54			N/A			0.33			0.69		
Difference	N/A			0.14			N/A			0.08			0.61		

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