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STUDENT CONNECTION RESEARCH: FINAL NARRATIVE REPORT TO THE SPENCER FOUNDATION

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EXECUTIVE SUMMARY

In this current era of standards-based reform, schools are held accountable for the academic progress of *all* students, and are therefore implementing programs and strategies designed to help all students achieve high academic standards. This improvement process is especially critical for schools that serve traditionally disadvantaged student populations. Successful schools are able to mitigate any potentially negative impact on students due to experiences outside the school setting by creating and maintaining within the school what we refer to as effective *conditions for learning*.

Since 2004, AIR has been engaged in promoting the measurement of conditions for learning in schools and the use of these data for student support and school performance management. In 2005 we partnered with Chicago Public Schools to identify the three or four core indicators that schools must actively manage to support student success, and develop an instrument to assess these indicators. The result was what Chicago has called the Student Connection Survey, which was administered to all high school students in 2006 and to all students in grades 6–12 in 2007.

The purpose of this report is to begin a program of research to allow us to better understand how Student Connection constructs related to other educational quality indicators, and how they can be used for school performance management.

The research presented in this report represents a solid first step. We have already begun planning ways to extend the work that has been started with the Spencer Foundation's generous support. For example, AIR is working with an urban school district (with approximately 55,000 students) that has already administered our survey in 2008. We have an opportunity to work with them to explore some of the research questions (such as the relationship between school observations and Student Connection scores) that we were not able to study in Chicago, due to lack of permission or lack of data.

This report begins to explore relations between Student Connection and several student and school characteristics using data from Chicago Public Schools. We learned quickly that the Student Connection constructs related to student and school covariates differently in the middle grades vs. high school. Students in the middle grades (6–8) score higher on all scale scores, but the strength of the association among the constructs and covariates is larger in high school.

We learned that the constructs composing our Student Connection measure: Safety, Academic Rigor, Student Support, and Social Emotional Learning Skills, have each established their validity by correlating significantly with relevant student- and school-level variables. Of the scales, both Safety and Academic Rigor are strongly associated with achievement. Safety is more strongly related to standardized achievement test scores, and Academic Rigor is more strongly related to grade point average. In this report, we explore a variety of intriguing subgroup interactions and effects.

Next steps in our work include preparing a journal manuscript presenting our analyses for peer review as well as submitting these data for presentation at professional conferences. We hope to work with Chicago for another year to extend our database longitudinally, as well as extend our work to other districts.

INTRODUCTION

In this current era of standards-based reform, much attention is paid to the role that schools play in raising students' academic achievement. Schools are held accountable for the academic progress of *all* students, and are therefore implementing programs and strategies designed to help all students achieve high academic standards. This improvement process is especially critical for schools that serve traditionally disadvantaged student populations. Successful schools are those which are able to mitigate any potentially negative impact on students due to experiences outside the school setting by creating and maintaining within the school what are referred to as effective *conditions for learning*. Such conditions typically include high-quality pedagogy, well-trained teachers, adequate resources, and effective leadership. Another equally, if not more important set of conditions is called the social and emotional conditions for learning. Students who feel "connected" to school across these social/emotional indicators are more likely to have improved attitudes towards school, learning, and teachers; heightened academic aspirations, motivation, and achievement; and more positive social attitudes, values, and behavior (Resnick et al., 1997). Recent research emphasizes the view that learning is possible only after students' social, emotional, and physical needs have been successfully met (CASEL, 2003; Learning First Alliance, 2001; Osher, Dwyer, and Jackson, 2004).

The social and emotional conditions for learning include a number of factors that are essential for ensuring that students feel safe and supported in school. Specifically, there are four components that define the social and emotional conditions for learning: (1) school safety, (2) high expectations, (3) student support, and (4) social and emotional skills. Research and practical experience demonstrate that a high level of school safety and student discipline that comes as a result of high expectations and effective supports reduces administrative burdens and allows teachers to spend more time on the task of raising academic performance (Osher, Dwyer, & Jackson, 2004).

First, ***school safety*** refers to an overall school climate in which students feel physically and emotionally safe. There is little to no violence, fighting, bullying, crime, substance abuse, or gang presence. Overall, there is a climate of mutual respect and trust among all members of the school community, and students feel comfortable in taking personal and academic risks. Failure to support academic achievement is related to students' disengagement from school and increased risk-taking behavior (Blum, Beuhring, & Rinehard, 2000). A safe and supportive learning environment fulfills students' basic psychological needs for belonging, autonomy, influence, competence, and physical security. As these needs are met, students tend to become increasingly committed to the school community's norms, rules, and values (Learning First Alliance, 2001).

Research also shows that the physical environment can have a profound effect on the ability of students to learn efficiently (National School Boards Association, 1996). An analysis in schools of such areas as bathrooms, cafeterias, hallways, and isolated areas can determine if safety "hot spots" exist. With this information, a school improvement team can change the environment to minimize opportunities for inappropriate behavior (Dwyer & Osher, 2000). In addition, providing teachers and other staff with opportunities to influence decisions on school safety

policy (as well as other student connection indicators) can help to create a more cohesive, well functioning professional community (Smylie, 1994). Finally, students who participate in structured extracurricular activities are less likely to engage in negative and risky behaviors and have better attendance, lower dropout rates, lower rates of drug use, high academic achievement, and higher aspirations than nonparticipants (Brown & Theobald, 1998; Mahoney, 2000).

A second key component to the social and emotional conditions of learning is ***high expectations***. Schools may be safe and orderly, but if they fail to build a supportive, engaging community and press for high academic expectations, students learn little (Learning First Alliance, 2001). Teachers should have high expectations for students in terms of the level of effort they put forth, as well as the academic and behavioral standards to which they are expected to achieve. Ideally, teachers and other school staff provide rigorous academic support to all students, and work to ensure that the curriculum has direct relevance to students' life goals. In addition, all students have access to high-level, demanding courses, as well as service learning opportunities, extra-curricular activities, and internships that allow them to explore their postsecondary options. Research has shown that when students feel that teachers and other adults hold high expectations for them, they are likely to do better in school (Catalano et al., 2004). Examinations of the NELS: 88 survey, which collects data from students in high school, established that students are more likely to perform well on tests when they believe that their teachers care about them and that this relationship is stronger for students who are judged to be at risk for dropping out of high school (Muller, 2001; Ryan & Patrick, 2001). In the classroom, cooperative learning strategies (e.g., group discussions, presentations, projects) have been shown to promote the development of social skills in students, sense of the classroom as a community, and academic achievement (Johnson and Johnson, 1989; Slavin, 1990). Finally, students who perceived their teachers as warm, caring and supportive had higher classroom participation rates which in turn positively affected their academic achievement (Voelkl, 1995).

In addition to holding high expectations of students, an overall sense of ***student support*** is critical. When coupled with a consistent emphasis on academic performance, a strong sense of support and school community boosts academic achievement. There is also evidence that these effects may be most pronounced for at-risk students (Shouse, 1996). Establishing effective student supports involves ensuring that children's basic needs are met and that the significant adults in their lives work collaboratively to encourage, support, and nurture them. Students work with and receive support from teachers who are able to establish a connection with them, personalize their experience, and engage them in the learning process. For example, examinations of national data have shown that positive student beliefs about how much their teachers support their efforts to succeed in school can reduce the probability of their dropping out by half (Croninger & Lee, 2001). A study of 167 sixth-grade students found that student support was associated with increased grade-point-averages, through its effects on interest in class, interest in school, and social responsibility (Wentzel, 1998). Goodenow (1993) found teacher support to be predictive of a students' expectancy of success, which in turn predicted their class effort and resulting grades. Other studies of interventions designed to build relationships between adults and students in school have also shown a positive impact of these programs on school-related attitudes and motives (Battistich, 2001; Sinclair, Christenson & Thurlow, 2005).

Finally, schools that provide sufficient conditions for learning ensure that students learn and exhibit the ***social and emotional skills*** they need to succeed. Social and emotional learning is the process of developing the ability to recognize and manage emotions, develop caring and concern for others, make responsible decisions, establish positive relationships, and handle challenging situations effectively. Related skills that can be developed and reinforced in schools include relationship building, anger management, and responsible decision-making (CASEL, 2003; U.S. Department of Education, 2000). Students with strong social and emotional skills are able to maintain healthy interpersonal relationships with peers and adults, and have access to a multitude of coping strategies to manage stress and difficult situations. Moreover, social and emotional skills are strongly tied to learning and performance at school. Evidence from social and emotional learning programs suggests that social and emotional skills increase students' capacity to cope with emotional experiences that interfere with learning, to work effectively with other students in the classroom, to face barriers to academic achievement, and to set and strive towards academic goals. Several studies have found that early evidence of pro-social behaviors (e.g., effective problem-solving, effective decision-making, and effective interpersonal relationships) predicts better academic outcomes later on. For example, one study found that good behavioral conduct during late childhood (ages 8–12) had a direct positive impact on academic success during late adolescence (ages 17–23) (Masten, et al., 1995). Another recent study found that higher levels of social and emotional skills in 7th grade significantly predicted higher academic achievement in 10th grade (Fleming et al., 2005). This research strongly suggests that social and emotional learning has an enduring impact on outcomes related to school achievement.

Schools can promote social and emotional skills through regular practice and modeling among adults and students in the school, and by placing a high value on conflict resolution, communication, caring, appreciation for diversity, problem solving, and teamwork. Research on social and emotional programming suggests that maximizing students' opportunities for participation and choice is essential for fostering student decision-making abilities, self-efficacy, self-expression, personal responsibility and accountability (CASEL, 2006; Zins, Weissberg, Wang, & Walberg, 2004). School interventions that have focused on creating a caring learning environment and providing students with the skills and supports to manage school transitions have proven effective in increasing attendance, GPA and stability of self-concept, and decreasing drop-out, emotional and behavioral problems (Felner & Adan, 1988; Reyes & Jason, 1991). Mentoring programs provide the relational context for promoting social and academic competence, and in research have resulted in improvements in school attendance, parental relations, academic performance and peer emotional support, as well as decreases in conduct problems in youth (Catalano, Berglund, Ryan, Lonczak & Hawkins, 2004). Diverse instructional and classroom management practices, including cooperative group learning, service learning strategies and positive behavioral supports, have a significant impact on improving student relations, academic gains, prosocial attitudes and behavior, cognitive problem-solving abilities, empathy, sense of civic responsibility and sense of contributing to the community (Battistich, Solomon, Watson, Solomon, & Schaps, 1989; Billig, 2000; Elias, 2003; Johnson, Johnson, Maruyama, 1983; Yamauchi, Billig, Meyer, & Hofshire, 2006). In addition, social and emotional skills can significantly improve learning in the classroom when they are integrated into different subject matter (CASEL). Involving parents and community members in teaching and reinforcing the development of social and emotional skills appears to be a cornerstone of many effective youth development programs (Zins et al., 2004). Specifically, research suggests that when

parents are involved in implementing social and emotional interventions, students benefit more and the effects of participation are more lasting and pervasive (Elias, 2003).

Building a comprehensive plan for improving student connection across the critical components of safety, high expectations, student support, and social and emotional skills takes time and requires input, planning, and commitment from students, teachers, administrators, school counselors, psychologists, parents, and relevant community agencies (CASEL, 2003). Beyond the presence of caring and committed stakeholders, it requires the presence of developmentally appropriate programs for children that teach and reinforce social and problem-solving skills, and engaging curricula combined with high teacher expectations. Improving the level of student connection in schools requires a long-term school and district commitment to planning, leadership, use of data, and staff development to build capacity for continued student support.

AIR's Survey of the Social and Emotional Conditions for Learning (the Student Connection Survey)

For years, AIR has been actively pursuing the goal of promoting and assisting states' and districts' measurement of students' social and emotional development as part of a performance management plan. Our research and experience tell us:

- Enhancing students' connection to school, their commitment to achieve, and their social, emotional, and civic competencies improves their academic performance and positive development (Greenberg et al., 2003; McNeeley, Nonnemaker, & Blum, 2002; Osher et al., in press; Zins et al., 2004).
- Many students experience individual-level barriers to learning (such as social, economic, or health challenges), and the provision of high-quality instruction alone will not improve these students' performance (Adelman & Taylor, 2000; Osher, Dwyer, & Jackson, 2004).
- Students who attend safe schools are more likely to be academically engaged and are less likely to exhibit problem behaviors such as drug use or violence. Students are less likely to drop out of safe schools (Bekuis, 1995; Bryk & Thum, 1989; Greenberg, Skidmore, & Rhodes, 2004; Osher, Dwyer, & Jimerson, 2005).
- Many barriers, including disinterest, lack of knowledge, and lack of resources, prevent educators from addressing students' social and emotional factors as part of school reform efforts.
- What gets assessed gets addressed; measurement of social and emotional development in schools, whether as part of a performance management strategy or not, will tend to increase educators' attention to the role these factors play.

History of AIR's Work on the Social and Emotional Conditions for Learning

In 2003, AIR identified the importance of assessing the social and emotional conditions for learning and developed a collaboration with the Collaborative for Academic, Social, and Emotional Learning (CASEL) and the Learning First Alliance (LFA) to develop approaches to address these issues. In April 2004, these three organizations co-hosted a meeting of national experts sponsored by the Fetzer Institute titled *Safe, Supportive, and Successful Schools for All Students.* The meeting's purpose was to launch an initiative to foster the development of safe, supportive learning communities as a means to meet high academic standards. Our basic premise was that the approach to standards-based reform, which has been effective in focusing educators on advancing academic achievement—establishing standards, measuring progress toward

meeting those standards, and supporting a continuous improvement process for making corrections and aligning resources to meet standards—should be expanded to explicitly address personal, social, and organizational facilitators of learning, and that doing so will, in turn, support greater academic and life success for more students.

Our initiative progressed substantially in July 2005 when Chicago Public Schools (CPS) asked AIR, on a sole-source basis, to demonstrate that conditions for learning could be assessed and to identify three or four indicators for CPS' high school scorecards that reflect the conditions for learning in a school, such as school climate or student engagement. The indicators had to be (1) practical to measure, (2) scientifically valid, (3) easy to communicate to diverse audiences, and (4) actionable by school personnel.

In August 2005, AIR convened a meeting of national experts in Chicago specifically to address this charge. The group worked with CPS district staff and came to a strong, clear consensus on the most important factors that schools should address if they want to improve student attendance, achievement, graduation, and post secondary success, as well as actionable indicators of these factors. The indicators identified by the meeting participants as most critical, grouped broadly as the *social and emotional conditions for learning*, are (1) students are safe, (2) students are challenged, (3) students are supported, and (4) students are socially and emotionally skilled. Each of these indicators has extensive research to support its importance for schools and its link to students' academic success, graduation, and postsecondary success. For each measure, meeting participants defined what each indicator covered, identified some available measures, and described ways that schools could use these measures to improve the conditions for learning. A table summarizing the conceptual foundation for the survey is presented in Table 1below.

Table 1
Constructs in the Student Connection Survey

Students are safe • Physically safe • Emotionally and socially safe • Treated fairly and equitably • Avoid risky behaviors	**Students are challenged** • High expectations • Strong personal motivation • School is connected to life goals • Rigorous academic opportunities
Students are socially capable • Emotionally intelligent and culturally competent • Responsible and persistent • Cooperative team players • Contribute to school and community	**Students are supported** • Meaningful connection to adults • Strong bonds to school • Positive peer relationships • Effective and available support

From concept to implementation

AIR conducted a series of 22 structured focus groups with students, parents, and teachers to inform the survey with the authentic input of stakeholders. Based on expert consensus and this stakeholder input, the Co-Principal Investigators for the current project, along with Drs. Roger Weissberg and Mary Utne O'Brien of CASEL, conducted a review of school climate surveys to

identify items that were already proven to be reliable and valid. Where extant items did not provide sufficient coverage of the desired constructs, the team wrote new items.

AIR pilot tested candidate items with almost 1,700 students in 24 schools to identify psychometrically strong scales for the operational survey. We administered the operational survey to students in 115 Chicago high schools and attained a response rate (77%; 74,602 valid surveys) approaching the average daily attendance rate of 84%. For the 2006–07 school year, Chicago asked AIR to include students in grades 6–8 in the survey and to modify some of the items to increase the range of responses on items and to attain greater between-school variance. AIR revised items and tested the new scales in cognitive laboratory interviews with diverse students in grades 6–12. We pilot tested the new version in 21 high schools (n=1,359) and 24 elementary schools (n=1,685), resulting in a stronger survey instrument. The 2007 operational administration, which was combined in the same form with the Consortium on Chicago School Research's survey, obtained 60,802 valid surveys from 119 high schools (at a 64% response rate) and 76,187 valid surveys from 484 elementary schools (at an 83% response rate). Chicago Public Schools will be administering the survey again in 2008 on its own.

Surveying the Social and Emotional Conditions for Learning for Performance Management and Continuous Improvement

AIR has done more than develop a survey. Our work for Chicago Public Schools includes two additional components. The second component is an 8 page customized report for each school that provides information on how subgroups of students responded as well as explanations of the significance of the responses (see Figure 1for images of the cover and a sample page of the report). The third component is an online toolkit (www.cpstoolkit.com) available to support schools that use the survey. The toolkit, which is linked to the individual school reports, is designed to help school teams use the survey information by presenting the school's survey results, housing a database of evidence-based programs and strategies for addressing student connection issues, providing advice for how to look at data, implement programs, and take the next steps, and providing a forum for offering comments or quotes about personal experiences with a program or strategy. The programs and strategies identified include universal,

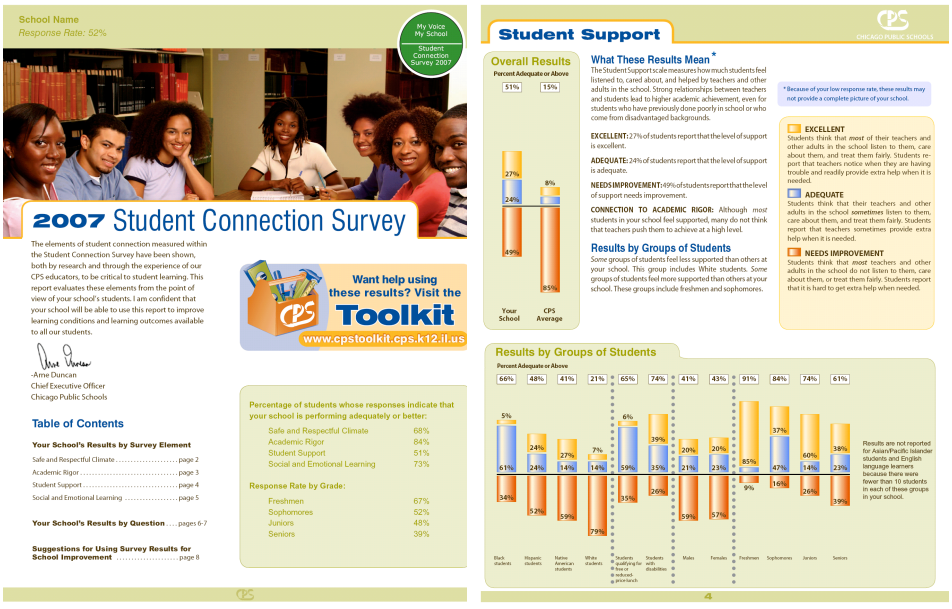


Figure 1
Student Connection Survey Score Report to Schools

selective/targeted, and indicated/intensive programs, which have been demonstrated to work with similar groups of students in similar contexts.

The purposes of implementing these activities includes (1) changing discourse within districts, as school and district staff discuss the conditions for learning; (2) orienting the behavior of principals, school staff, and district personnel to addressing the social and emotional conditions for learning in a strategic manner; (3) monitoring how subgroups of students and schools are doing; (4) providing data for continuous improvement; and (5) creating conditions where schools, districts, and states can learn about the importance of addressing the social and emotional conditions for learning.

The Present Research

In spite of the examples of progress in this area noted above, barriers remain. The first is to demonstrate the importance of social-emotional factors in education. Although more research is accumulating, it is important to assess and demonstrate the impact of the social emotional conditions for learning and of addressing these conditions effectively. The second barrier is financial; doing good surveys and providing support for responding to these surveys is not inexpensive. Paradoxically, as long as social emotional are factors marginalized, it will be hard to generate the resources for such surveys. Therefore, the information produced through the efforts supported by this grant represents a potential vehicle for addressing these barriers.

AIR's specific goal for the current research was to develop a refined understanding of 1) the construct of student connection and how it relates to schools and schooling, and 2) the performance and characteristics of the Student Connection survey itself. We examined the relations between conditions for learning and students' and schools' academic performance and other characteristics, and examined relations by type of student and type of context.

There were eight research questions originally proposed for this grant:

1. How do students' individual ratings of their experience of the conditions for learning in a school relate to individual student achievement? Does the strength of this relation change when we look at different subgroups of students, including those who are on or off track for graduation?
2. Do conditions for learning vary systematically by school characteristics, such as school size, demographics, school type, or principal characteristics?
3. To what extent to student perceptions of the conditions for learning in a school relate to objective data available to principals for decision-making?
    a. How do student perceptions of safety relate to numbers of incidents reported to police or disciplinary data?
    b. How do student perceptions of high expectations relate to schoolwide achievement, grade retention rate, and dropout rate?
    c. How do student perceptions of student support relate to school size (as a proxy for personalization)?
    d. How do student perceptions of the level of social emotional learning skills in a school related to school disruption measures and graduation rates?

4. How do conditions for learning scales align with school climate observations (in aggregate and by subgroup)? [This task was cancelled due to CPS refusal.]
5. For the 2007 survey administration, in a sample of schools, conduct follow up with students who are absent on that school's administration day to determine whether student absenteeism causes selection bias. [This task cancelled due to CPS refusal to allow additional data collection, but we report here the results of a nonresponse analysis CPS conducted in 2007].
6. How do student ratings of their own social emotional learning skills compare to their ratings of other students' skills? Will students rate "students in this school" more negatively than they rate themselves on social skills and self-management? Does each type rating provide different information? Which rating is more highly correlated with teacher reports of social emotional learning, measures of school disruption, and graduation rates? [Chicago has asked that AIR pursue this research question descriptively, without new data collection.]
7. Examination of conditions for learning in high schools with certain programs in place (e.g., character education, social and emotional learning initiatives, violence prevention). Identify schools that have certain programs in place; compare Student Connection ratings for those schools to those of similar schools and to the district overall. To the extent that information on fidelity of implementation exists, factor those data into analyses.
8. Examination of conditions for learning in schools of varying community context, as defined by the CCSR in its September 2006 report, *The Essential Supports for School Improvement.*

Because Chicago Public Schools did not allow work to proceed on questions 4 and 5, with permission from the Spencer Foundation, we replaced that work with an analysis of how the Student Connection scores related to achievement as measured by the National Assessment of Educational Progress (NAEP).

We are excited to note that our work with another urban district (with approximately 55,000 students) that administered the Student Connection survey in February 2008 may allow us the opportunity to conduct some of the analyses and access some of the data that we were unable to obtain from Chicago. Specifically, AIR conducted four site visits to schools in this district and conducted a series of focus groups. The opportunity to explore our original question 4 may yet emerge in this other district.

PART I: THE DATA INCLUDED IN THIS ANALYSIS

To build this report data from different sources and years were combined. At the *student level* the 2007 Student Connection data were combined with demographic characteristics from the same year and obtained from the Chicago Public Schools. These data include variables such as student's race, gender, English language learner (ELL) status, grade level, cumulative GPA, and achievement scores on the EXPLORE, PLAN, and PSAE achievement tests. Additionally, a constructed "on track" variable used to predict timely graduation (the variable indicates whether a student has earned at least five full-year course credits and no more than one semester F in a core course in their first year of high school).

At the *school level*, once again, data were merged from different sources. First, some of the 2007 student level variables were aggregated at the school level, such as achievement test results, to obtain indicators of the context of schoolwide achievement. Second, some 2006 data were

retrieved from the Chicago Public School website.[1] These data included dropout and graduation rates for high school. Third, 2007 enrollment data, suspension, and average class size was obtained. Fourth, 2005 data from Common Core of Data were used to obtain some descriptive characteristics of the schools such as type of school. Finally, some neighborhood data were also obtained from the Consortium on Chicago School Research at the University of Chicago. These variables include various measures of crime from the school or students census block (which summarizes information from November-2005 to October-2007), and poverty indicators from the census.

PART II: CHARACTERISTICS OF THE STUDENT CONNECTION SURVEY PARTICIPANTS

Table 2 presents demographic characteristics for the Chicago Public School students overall, compared to those who completed the survey. Because not every eligible student participated, it is important to understand the ways in which the surveyed sample is different from the district overall.

Results presented in Table 2 indicate that the two groups are very similar on some, but not all, demographic characteristics. Both groups have similar percentage of females, Whites, Asian and Hispanics, students who are classified as having limited English proficiency (LEP), and students in the Free or Reduced Price Lunch Program. In the surveyed sample, however, African Americans are slightly underrepresented (47%) compared to the whole population (52%). Also there is a minor tendency for students in the middle grades[2] to be slightly over-represented and for high school students to be somewhat under-represented. In addition, the proportion of grade 9 students "on track" is overrepresented in the surveyed sample. While in Chicago this percentage is around 53%, in the surveyed sample is 66%. This latter result indicates that the surveyed sample—at least for grade 9—is more representative of "better" or "on track" academic achievement students.

An analysis that Chicago Public Schools conducted in 2007 (Chicago Public Schools, Office of Research, Evaluation, and Accountability, 2007) examining data from the 2006 administration of the survey found that students who participated in the survey represented a better-performing group than non-participants. The GPAs of respondents were 0.6 standard deviations higher than non-participants (1.70 versus 2.36), and participants were absent less than half as often (21 absences in the spring semester versus 9). The number of absences a student had in the spring semester (when the test was administered) was by far the best student factor predicting whether a student participated in the survey. The school characteristic that best predicted whether a student responded was mobility, indicating that schools with more stable student populations had higher participation rates. Therefore, when the survey data are used to estimate schoolwide findings, we should be mindful that such findings tend to under-represent the perspectives of students who are frequently absent and are lower-achievers and tend to over-represent the perspectives of more successful students.

[1] http://research.cps.k12.il.us/cps/accountweb/Reports/download.html
[2] In this report, we refer to "middle grade" students rather than "middle school" students because approximately 80% of the students in grades 6, 7, and 8 who completed the survey were in fact enrolled in K–8 elementary schools.

Table 2
Number and Percentage of Students in the Chicago School District and in the Surveyed Sample by Student Demographics

		All Middle & High School Students		Surveyed Students	
		N	%	N	%
Gender	Male	100,508	50%	63,174	48%
	Female	101,611	50%	68,558	52%
Ethnicity	White	17,946	9%	13,033	10%
	African American	104,190	52%	62,007	47%
	Native American	308	0.2%	210	0.2%
	Asian/Pacific	7,186	4%	5,563	4%
	Hispanic	72,482	36%	50,919	39%
Grade level	Grade 6	32,371	15%	25,088	19%
	Grade 7	32,424	15%	25,074	19%
	Grade 8	30,991	15%	22,883	17%
	Grade 9	38,639	18%	20,301	15%
	Grade 10	30,073	14%	16,074	12%
	Grade 11	24,166	12%	12,633	10%
	Grade 12	20,675	10%	9,679	7%
LEP status	Not LEP	192,916	95%	126,514	96%
	LEP	9,203	5%	5,218	4%
Special Ed	No Disability	166,880	83%	112,721	86%
	With Disability	35,239	17%	19,011	14%
Lunch status	Not in Lunch	33,837	17%	20,326	15%
	In Lunch	168,282	83%	111,406	85%
Track	Off Track*	14,223	47%	6,432	34%
	On Track*	16,169	53%	12,238	66%
	Total	202,339		131,732	

Note: On track information is available only for grade 9 students.
Source: 2007 Chicago School District.

The next table presents descriptive statistics of three achievement tests, EXPLORE, PLAN, and the Prairie State Achievement Examination (PSAE). The EXPLORE test is administered to ninth graders and includes achievements tests in English, Mathematics, Reading and Science Reasoning. The content of the test is consistent with the content of ACT's PLAN assessment administered in grades 9 and 10. The PLAN test measures skills and abilities in English, Math, Reading, and Science, and the test is intended to be a tool in career exploration. Both tests are administered during the fall. Finally, the PSAE measures the achievement of grade 11 students,

relative to the Illinois Learning Standards for Reading, Mathematics, and Science. The PSAE test is administered in late April.

Table 3
Descriptive Statistics of the Test Scores for the Chicago School District and the Surveyed Sample

	All Students			Only Surveyed Students		
Test score name	N	Mean	*SD*	N	Mean	*SD*
EXPLORE (grade 8)						
Composite	27,364	13.5	2.85	21,232	13.7	2.84
English	27,614	12.3	3.56	21,371	12.5	3.55
Math	27,640	13.3	3.71	21,395	13.5	3.64
Reading	27,581	13.0	3.07	21,357	13.2	3.10
Science	27,525	15.0	2.82	21,331	15.2	2.78
EXPLORE (grade 9)						
Composite	28,649	13.8	3.18	17,773	14.3	3.19
English	28,834	12.8	3.90	17,814	13.4	3.94
Math	28,869	13.5	4.18	17,824	14.2	4.10
Reading	28,865	13.1	3.45	17,828	13.6	3.52
Science	28,793	15.1	2.88	17,814	15.5	2.83
PLAN (grade 10)						
Composite	22,630	15.4	3.31	13,541	15.9	3.40
English	22,838	14.6	3.90	13,595	15.2	3.95
Math	22,855	14.9	3.97	13,602	15.4	4.01
Reading	22,814	15.0	4.25	13,586	15.5	4.34
Science	22,759	16.4	3.10	13,572	16.8	3.16
PLAN (grade 11)						
Composite	17,939	16.3	3.64	10,293	16.8	3.76
English	18,071	15.6	4.23	10,328	16.2	4.30
Math	18,099	15.8	4.26	10,340	16.4	4.36
Reading	18,065	15.8	4.56	10,323	16.4	4.65
Science	18,026	17.1	3.44	10,312	17.6	3.56
PSAE (grade 11)						
Math	18,427	148.2	14.65	11,494	149.7	14.97
Reading	18,416	149.8	14.48	11,489	151.0	14.69
Science	18,417	148.7	13.83	11,492	150.2	14.07
Writing	18,699	150.7	15.48	11,603	152.5	15.49

Note: The EXPLORE scores range from 1 to 25; the PLAN scores range from 1 to 32. Finally, the PSAE scores range from 120 to 200.

Table 3 presents the number of students with data in each subscale for the three achievement tests, the subscale mean values, and the subscale standard deviations. Overall, students in the two groups look very similar in terms the average standardized achievement tests, but there is a tendency for surveyed students to have slightly higher average scores in all the subscales compared to the whole population. This is consistent with the response analysis reported in Table 2.

Within the Chicago School District, approximately 83% of middle grade and high school students participate in the Free or Reduced Price Lunch Program (see Table 4, below). Despite this high percentage, there are still differences by student ethnicity. For example, only 48% and 59% of White and Native American students, respectively, participate in the Free or Reduced Price Lunch Program, 86% and 90% of African American and Hispanic students participate, respectively. In other words, the majority of African American and Hispanic students are in the lunch program, which indicates that in our sample, ethnicity is likely confounded with socioeconomic status.

Table 4
Student Demographics and Poverty

		In Lunch program		
	Student demographics	No	Yes	Total
Ethnicity	White	52%	48%	17,946
	African American	14%	86%	104,190
	Native American	41%	59%	308
	Asian/Pacific	27%	73%	7,186
	Hispanic	10%	90%	72,482
LEP status	Non-LEP	17%	83%	192,916
	LEP	7%	93%	9,203
Special Ed	Non-SPED	16.6%	83.4%	166,880
	SPED	17.4%	82.6%	35,239

PART III: STUDENT CONNECTION RESULTS: OVERALL AND BY STUDENT SUBGROUP

Before addressing each of the questions, we present a descriptive analysis of the Student Connection survey, as well as results by student subgroup.

Table 5 presents the original distribution of the Student Connection Scales for middle grade and high school levels separately. It is important to notice that the constructs have different ranges, including negative values. However, the percentages of students with negative scores are less than one percent for all scales. Additionally, approximately one percent of students scored above 469, 524, 441, and 437 for the School Safety, Academic Rigor, Student Support, and Social Emotional scales respectively. For more information about the distribution of these scales see Appendix A.

Table 5
Descriptive Statistics of the Student Connection Survey for Middle Grades and High School

	Construct name	N	Mean	*SD*	Min	Max
Middle School	School Safety	73,041	307.15	58.09	-41	653
	Academic Rigor	73,038	318.31	79.78	-194	774
	Student Support	73,040	284.93	64.75	-145	710
	Social & Emotional Skills	72,943	272.37	76.13	-91	651
High School	School Safety	58,597	298.04	64.90	-41	653
	Academic Rigor	58,680	293.51	79.31	-232	808
	Student Support	58,679	270.43	66.56	-142	705
	Social & Emotional Skills	58,446	255.76	71.92	-91	651

Correlation Coefficients among the Student Connection Survey Constructs

Correlation coefficients measure the linear association between two variables. These coefficients range from -1 to 1, and provide information about the strength and sign of the linear association between the two covariates. The Table 6 presents the correlations among the Student Connection Survey for middle grade students; Table 7 presents results for high school students.

Table 6
Middle Grade Students: Correlations among the Student Connection Constructs

	Middle level	1	2	3	4
1	School Safety	1			
2	Academic Rigor	0.17	1		
3	Student Support	0.25	0.62	1	
4	Social & Emotional Skills	0.48	0.20	0.34	1
Note: All the correlations are statistically significant.					

Table 7
High School: Correlations among the Student Connection Constructs

	High school level	1	2	3	4
1	School Safety	1			
2	Academic Rigor	0.25	1		
3	Student Support	0.26	0.65	1	
4	Social & Emotional Skills	0.52	0.25	0.32	1
Note: All the correlations are statistically significant.					

As expected, all the scales are positively correlated with each other. In the middle grades, the correlations between School Safety and Academic Rigor and Safety and Student Support are small and equal to .17 and .25 respectively, which suggests that these are separate constructs. The correlation between School Safety and Social Emotional Learning Skills is moderate and equal to .48, suggesting that students who feel safer at school tend to rate the social emotional learning skills of their peers more highly. This makes sense because some of the items on the Safety Scale assess "emotional safety"—the extent to which students are picked on or bullied. Academic Rigor is highly correlated with Student Support (r=.62), which makes sense because both scales ask students to rate teacher or school factors. Academic Rigor is less correlated with Social Emotional Skills (r = .20). Finally, Student Support has a small correlation with Social Emotional Skills (r = .34).

In high school, the correlations among the SCS constructs tend to be slightly higher than those in the middle grades, but show the same patterns.

Mean Student Connection Survey Values for Middle Grades and High School

The following figures present the mean values on the scales by different student demographic characteristics. It is important to remember when examining these figures that the ranges of the constructs to some extent different. Therefore, comparisons are more meaningful when done within the same construct.

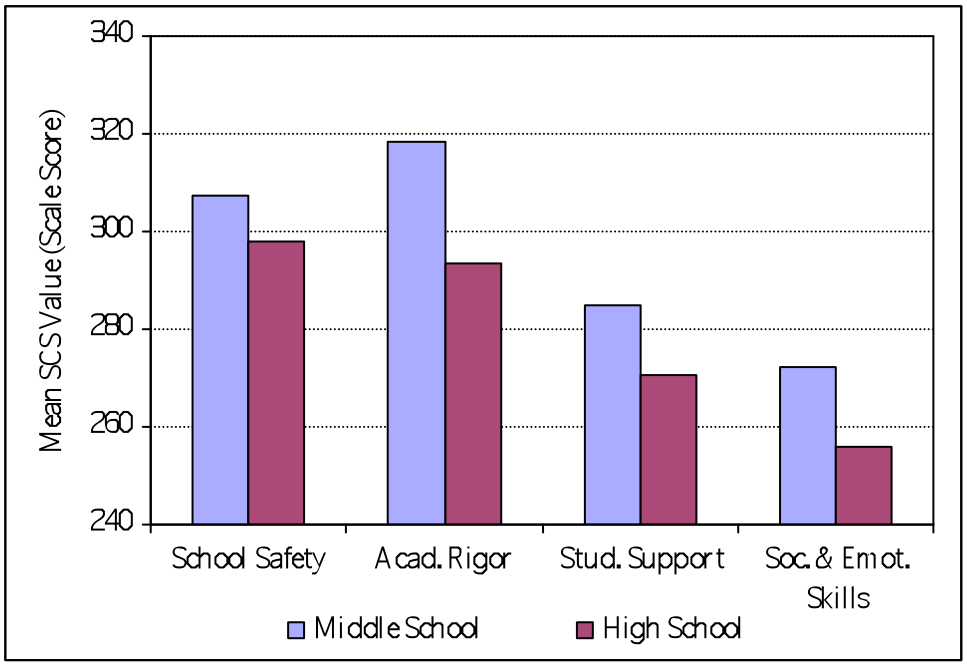


Figure 2
Mean Student Connection Scores for Middle Grades and High School

The results presented above shows that middle grade students tend to provide higher scores on all the Student Connection Scales than high school students. All these differences are statistically significant. For example, of the School Safety scale, while middle grade students scored on average above 300 points, high school students scored below 300 points.

These are very interesting results which can have different interpretations. On one hand, they can suggest that the older the students, the lower their perceptions of Safety, Academic Rigor, Student Support, and Social Emotional Skills. Perhaps older students' perceptions of their surroundings are more realistic or critical than those of their younger peers. On the other hand, it may be the case that the actual conditions for learning get worse in high school. Perhaps high schools in Chicago are less safe, teachers have lower expectations, students receive less support, and they are less likely to have prosocial peers compared to middle grade students. Or maybe both interpretations explain these differences; additional data would need to be collected to explain these effects. Nonetheless, the finding of lower ratings for variables, such as school climate, that are similar to conditions for learning is consistent with a broader body of research and experience that shows that both students and staff report progressively less satisfaction as they advance higher in grade levels (Eccles & Midgley, 1989).[3]

To provide some evidence on how some of the conditions for learning and safety problems (such as disciplinary referrals) change from middle to high school, data on truancy and suspensions

[3] Except for students in alternative or special schools; regardless of grade levels, such schools tend to have school climate and connection scores similar to those of elementary schools (i.e., at the higher end; Spier, Cai, Kendziora, & Osher, 2007).

were analyzed. These variables were highly positively skewed and therefore the range and median are reported instead of the mean values.[4]

Table 8
Number, Median and Range for Truancy and Suspensions

	Number	Median	Min	Max
Middle Grades				
Truancy	454	2	0	180
Suspended students	457	23	0	317
Total suspensions	457	33	0	879
High School				
Truancy	107	39	0	533
Suspended students	119	154	0	822
Total suspensions	119	345	0	2496

By far, behavioral problems are more common in high school than in middle grades. Although in middle grades, truancy ranged from 0 to 180 with a median of 2, in high school this variable ranges from 0 to 533 with a median of 39. Further, in middle grades the number of suspended students ranged from 0 to 317 and the median is 23, while the same indicator in high school ranged from 0 to 822 with a median of 154. Regarding the number of suspensions, this indicator ranged from 0 to 879 with a median of 33 in middle grades, and from 0 to 2496 with a median of 345 in high school. Although suspension data tend to reflect school policy as much as they do the actual incidence of behavior problems, these data suggest that there may be higher rates of school disruption in high schools compared to schools with middle grade students.

Mean Student Connection Survey Values by Grade Levels

Additionally, we examined whether a specific grade levels responded systematically differently compared to other grade levels. We found that overall, grade-eight students showed a tendency to score higher on the School Safety and Academic Rigor scales than the other grade levels. It appears reasonable that the oldest age-group in K–8 schools might feel somewhat safer than students in younger grades. But it is less clear why grade-eight students tend to rate Academic Rigor most highly. The only other pattern to emerge was that for the Social and Emotional Learning scale, students tended to rate their peers more negatively as they moved along to higher grades.

Because of the large differences between middle and high school students in their responses to the survey, we will show results separately for middle and high school students.

[4] In a skewed variable there are more data in the right tails than would be expected in a normal distribution. With skewed variables the mean not longer provides a useful measure of central tendency.

Table 9
Exploring Patterns across Grade Levels

		School Safety			Academic Rigor		
		N	Mean	*SD*	N	Mean	*SD*
Middle	Grade 6	25,085	305.4	56.97	25,085	316.0	79.41
	Grade 7	25,074	304.7	57.28	25,074	312.0	78.27
	Grade 8	22,883	**311.7**	59.90	22,880	**327.8**	80.94
High School	Grade 9	20,262	300.0	61.22	20,300	292.0	77.60
	Grade 10	16,042	295.5	65.50	16,074	293.0	80.79
	Grade 11	12,621	299.0	67.29	12,631	296.0	79.56
	Grade 12	9,672	296.9	67.97	9,675	294.2	80.00

		Student Support			Soc. & Emot. Skills		
		N	Mean	*SD*	N	Mean	*SD*
Middle	Grade 6	25,084	287.6	64.15	25,043	283.0	78.51
	Grade 7	25,074	279.3	64.02	25,044	267.6	75.49
	Grade 8	22,883	288.2	65.78	22,857	266.0	72.88
High School	Grade 9	20,301	263.7	65.40	20,215	254.3	71.87
	Grade 10	16,073	267.3	66.89	15,997	253.9	72.14
	Grade 11	12,631	275.1	66.35	12,591	257.8	72.84
	Grade 12	9,674	283.6	66.39	9,643	259.4	70.26

Mean Student Connection Scores by School Level and Student Gender

Male students showed slightly higher values than females on the School Safety and Social Emotional Skills scales. Female students showed higher scores in the Academic Rigor and Student Support scales. Simple t-test statistics and more complex analyses are presented later to corroborate these tendencies.

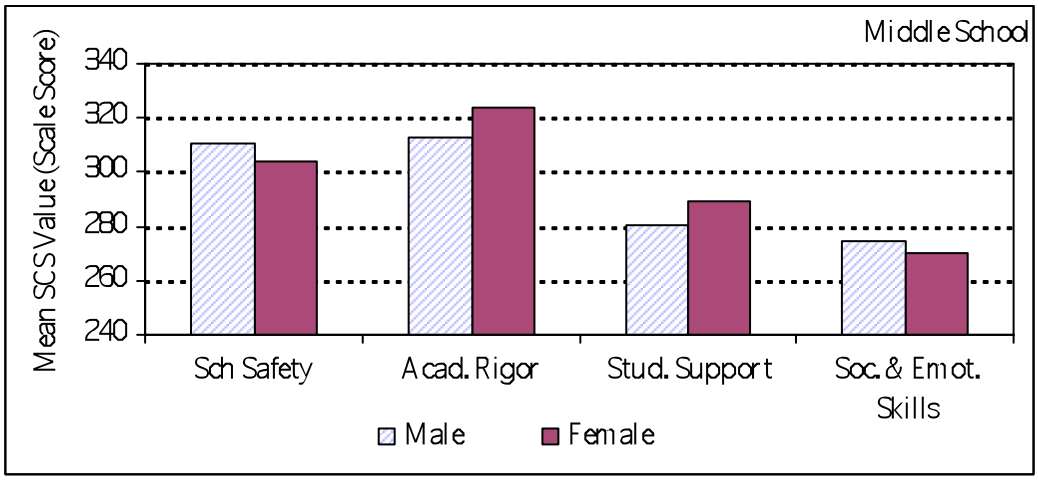


Figure 3
Mean Student Connection Scores for Males and Females (Middle Grades)

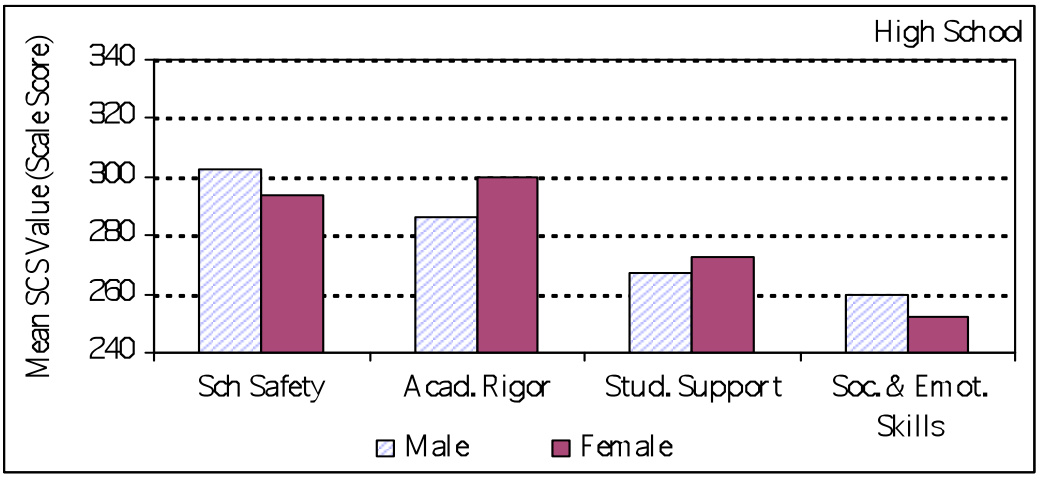


Figure 4
Mean Student Connection Scores for Males and Females (High School)

Mean Student Connection Scores by School Level and Student Lunch Status

The figures below show that students who are in the Free or Reduced Price Lunch Program tend to score lower on the Safety Scale than students who are not in the Program. Because enrollment in the Free or Reduced Price Lunch Program is a commonly used index of poverty, this finding would seem to indicate that poor students tend to score lower on the Safety Scale than non-poor students.

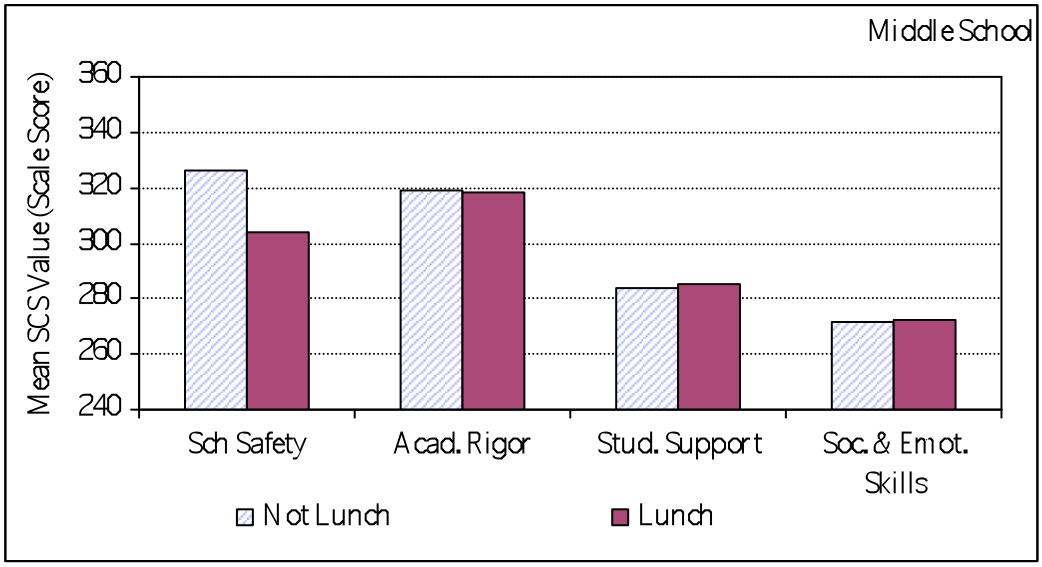


Figure 5
Mean Student Connection Scores by Lunch Status (Middle Grades)

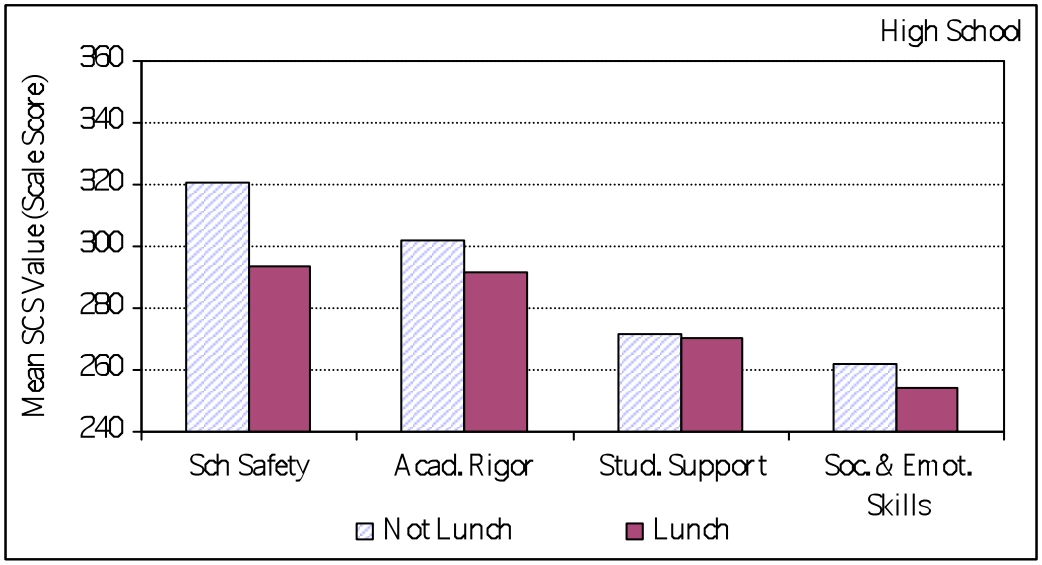


Figure 6
Mean Student Connection Scores by Lunch Status (High School)

One hypothesis for why students in the Free or Reduced Price Lunch Program tend to score lower on the School Safety scale is that their sense of safety may be influenced by factors beyond the context of the school. Alternatively, these students may experience micro-climates within the school that are characterized by greater physical and social threat and victimization.

Mean Student Connection Scores by Gender and Lunch Status

The figures below reveal that the differences previously found between females and males on the School Safety and Social Emotional Scales are likely to occur among Free or Reduced Price Lunch Program students but not among non- Free or Reduced Price Lunch students. For the Safety Scale, the gender differences are very small, with females scoring higher than males. In terms of Academic Rigor and Student Support, female students consistently scored higher than males.

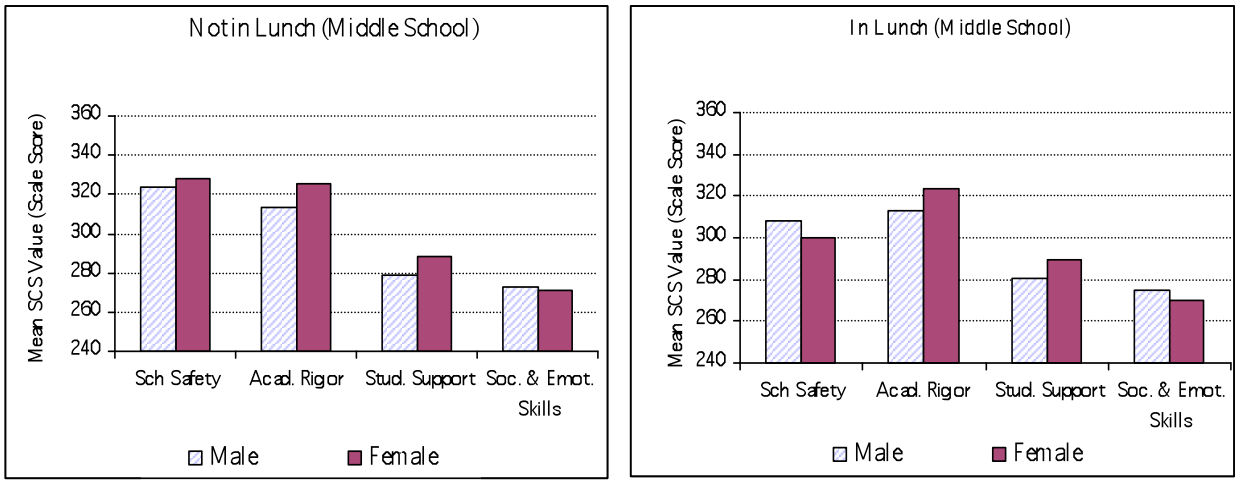


Figure 7
Mean Student Connection Scores by Gender and Lunch Status (Middle Grades)

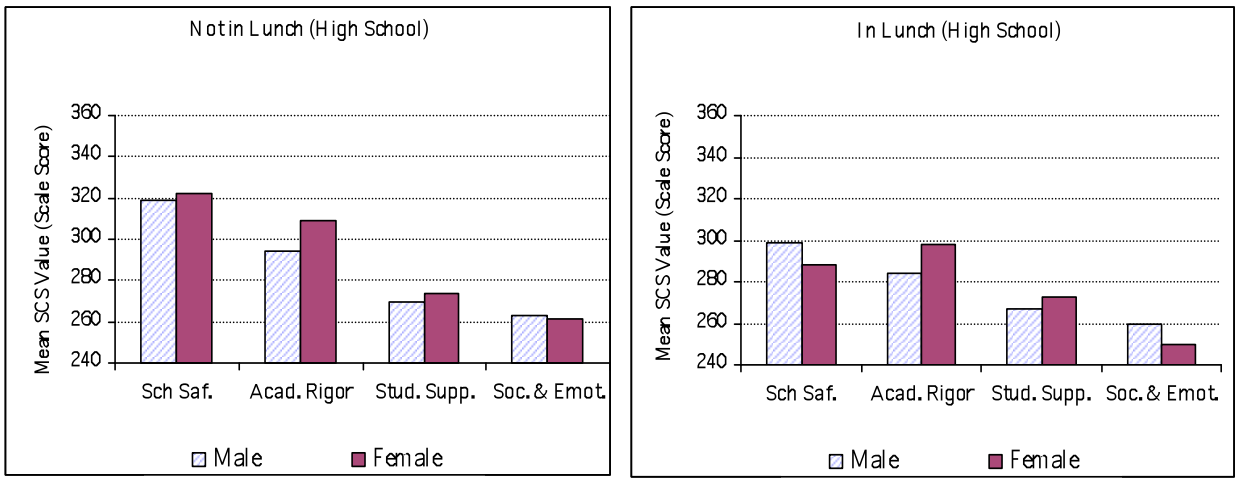


Figure 8

Mean Student Connection Scores by Gender and Lunch Status (High School)

Mean Student Connection Scores by School Level and Student Ethnicity

White and Asian students tended to produce the highest scores on the School Safety scale, while African American students tended to score the lowest on the Safety Scales and the Social Emotional Skills Scales. In the middle grades, students from different ethnicities scored similarly on Academic Rigor and Student Support. In high school, more differences were observed across ethnicity on Academic Rigor, where Asian students tended to score the highest.

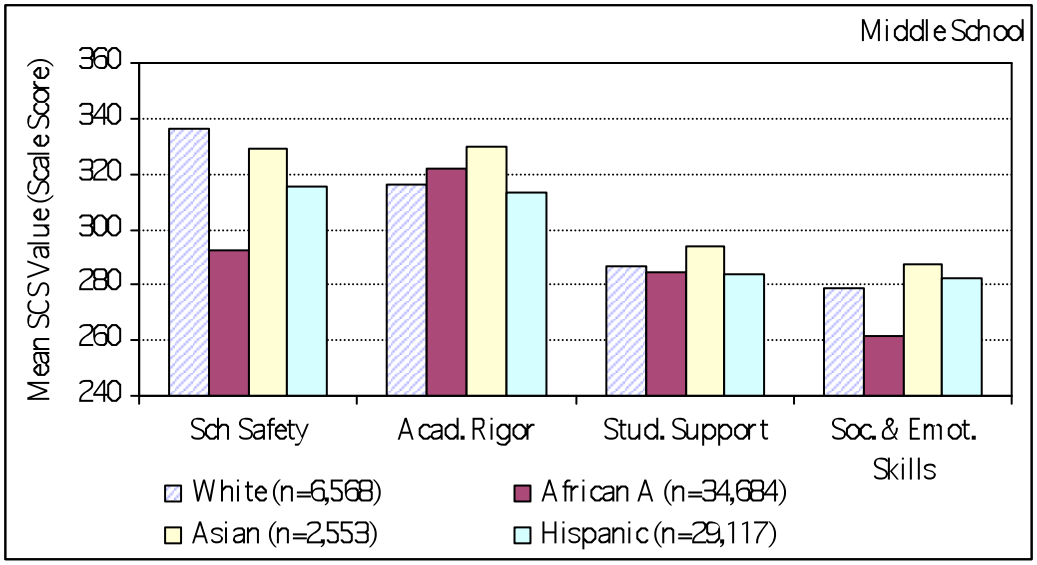


Figure 9
Mean Student Connection Scores by Ethnicity (Middle Grades)

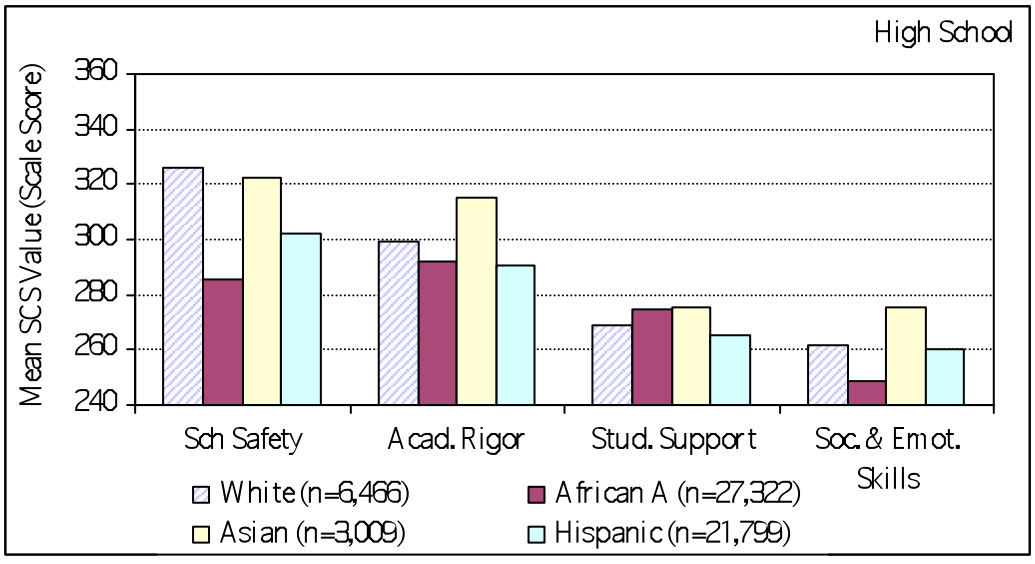


Figure 10
Mean Student Connection Scores by Ethnicity (High School)

Mean Student Connection Scores by Ethnicity and Lunch Status

The figure below illustrates ethnic differences on the pattern of response on the condition for learning scales controlling for the lunch status of the student.

Previously we found that African American students tended to score the lowest on the School Safety Scale. Here we observed in the Lunch or non-Lunch groups, African Americans tended to provide the lowest scores on the School Safety scale.

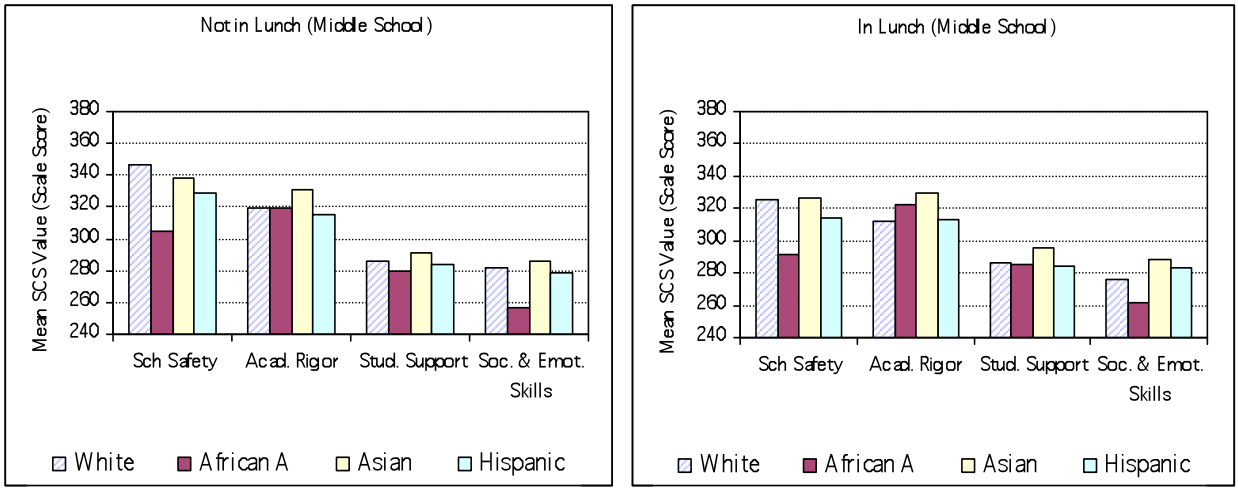


Figure 11
Mean Student Connection Scores by Ethnicity and Lunch Status (Middle Grades)

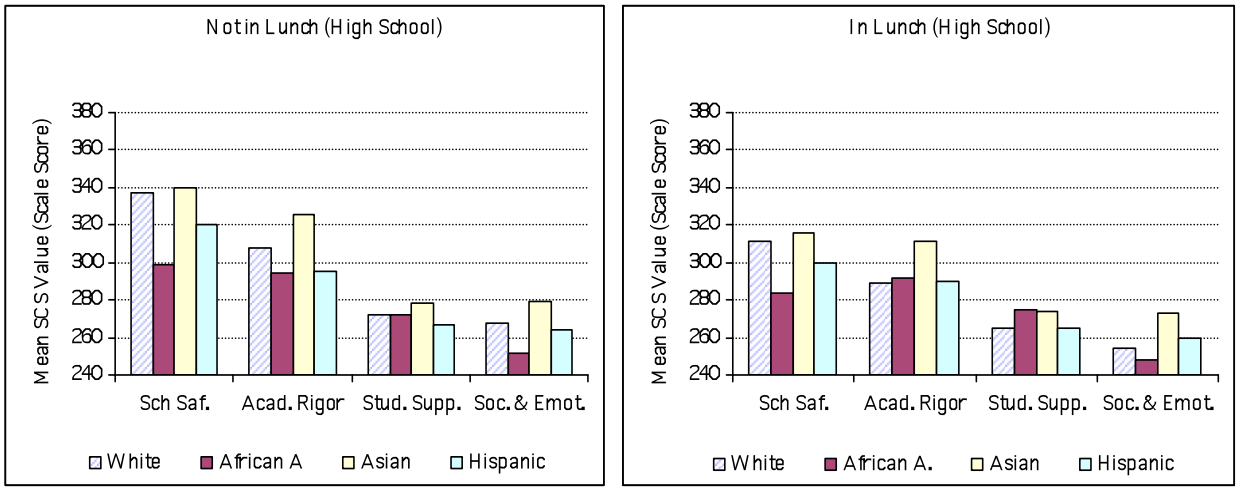


Figure 12
Mean Student Connection Scores by Ethnicity and Lunch Status (High School)

Mean Student Connection Scores by School Level and Student's Language Status

LEP and non-LEP students tended to score relatively similarly across the Safety, Academic Rigor, and Student Support scales. On the other hand, large differences were observed between the two groups in the Social Emotional Skills construct. For the latter scale, LEP student tended to score higher than Non-LEPs.[5]

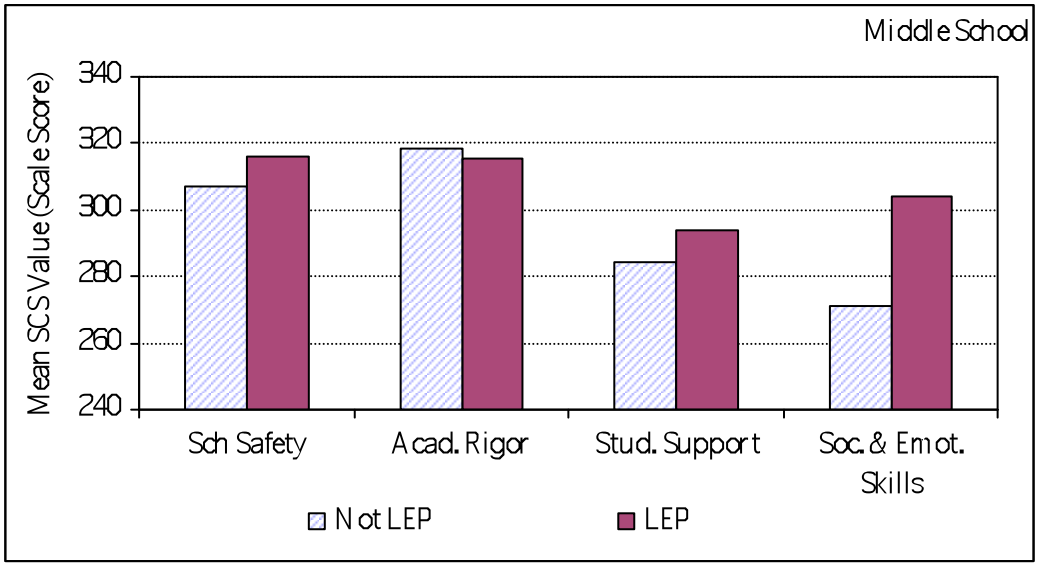


Figure 13
Mean Student Connection Scores by LEP Status (Middle Grades)

[5] The proportions of Limited English Proficient students in middle grades and high school were 5% and 4% respectively.

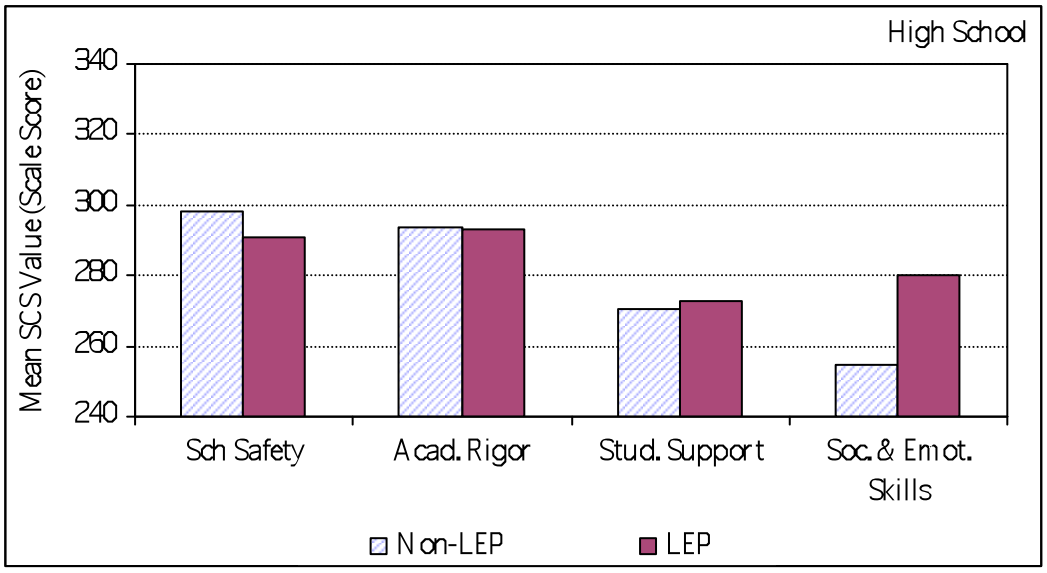


Figure 14
Mean Student Connection Scores by LEP Status (High School)

Mean Student Connection Scores by School Level and Student's Special Education Status

There was tendency for non-special education students to score slightly higher on the School Safety and Academic Rigor Scales and for students in special education to provide higher scores on Student Support and Social Emotional Learning Skills scales. The results for Support were expected because the particular conditions of special education students require that they receive more support and help than other students. However, the finding that students receiving special education services rated the social emotional learning skills of their peers higher than did other groups may be an extension of our 2006 finding that when students with disabilities rated their *own* social emotional learning skills, they tended to rate themselves lower than their peers.

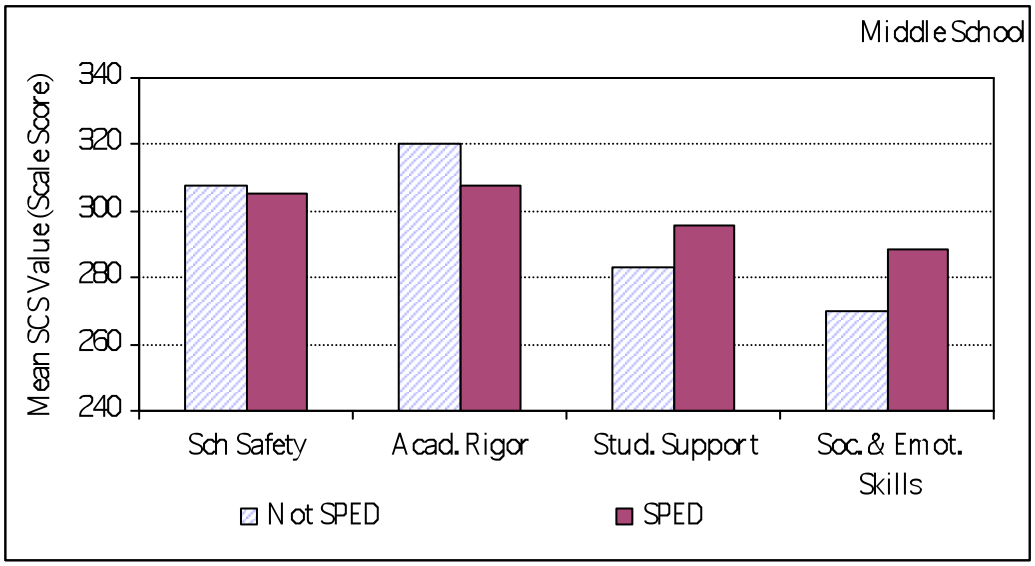


Figure 15
Mean Student Connection Scores by SPED Status (Middle Grades)

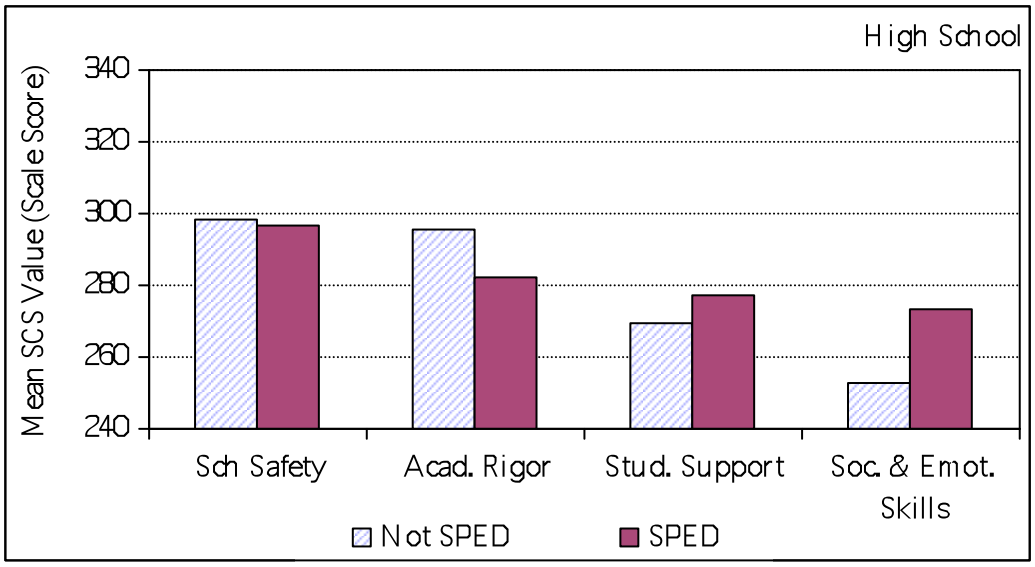


Figure 16
Mean Student Connection Scores by SPED Status (High School)

PART IV: ADDRESSING THE RESEARCH QUESTIONS

In this section, we address each of the research questions posed for this study in turn. The final research questions addressed through this grant were:

1. How do students' individual ratings of their experience of the conditions for learning in a school relate to individual student achievement? Does the strength of this relation change

when we look at different subgroups of students, including those who are on or off track for graduation?
2. Do conditions for learning vary systematically by school characteristics, such as school size, demographics, school type, or principal characteristics?
3. To what extent to student perceptions of the conditions for learning in a school relate to objective data available to principals for decision-making?
    a. How do student perceptions of safety relate to numbers of incidents reported to police or disciplinary data?
    b. How do student perceptions of high expectations relate to schoolwide achievement, grade retention rate, and dropout rate?
    c. How do student perceptions of student support relate to school size (as a proxy for personalization)?
    d. How do student perceptions of the level of social emotional learning skills in a school related to school disruption measures and graduation rates?
4. How do student ratings of their own social emotional learning skills compare to their ratings of other students' skills? Will students rate "students in this school" more negatively than they rate themselves on social skills and self-management? Does each type rating provide different information? Which rating is more highly correlated with teacher reports of social emotional learning, measures of school disruption, and graduation rates?
5. Examination of conditions for learning in high schools using AVID.
6. Examination of conditions for learning in schools of varying community context, as defined by the CCSR in its September 2006 report, *The Essential Supports for School Improvement.*
7. How do Student Connection scores relate to achievement as measured by the National Assessment of Educational Progress (NAEP)?

Question 1: Correlations between Achievement and Student Connection

In the following figures, we present the correlation coefficients between the all the available achievement test scores for Chicago Public School students and the student connection constructs. Each correlation value is illustrated using a bar, where the size of the bar represents the linear strength between the two variables and the vertical axis shows the range of the correlation. Therefore, the taller the bar, the larger the correlation.

Correlations between EXPLORE and Student Connection Scales

The following two figures show the correlation between EXPLORE tests and Student Connection scales for grades eight and nine respectively. For example, in grade eight, the Safety scale has a correlation of .16 with English, .19 with Mathematics, .17 with Reading and 0.18 with the Science component of this test. Overall, all the correlations are below .20 and statistically significant, except for the correlation between the Student Support and Science. In grade nine, the correlations are larger than in grade eight but uniformly below .30. However, several correlations are not statistically significant: the correlations between Student Support and English, Math and Reading are not significant, neither are the correlations between the Social and Emotional Skills and Math, and Reading and Science.

Across constructs, we observed that four tests are more highly correlated with the Safety construct than any other scale.

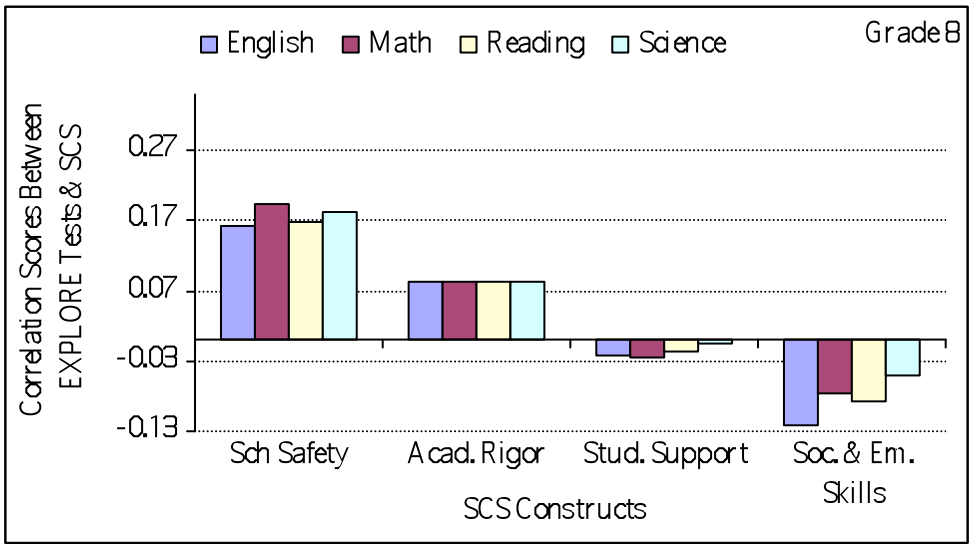


Figure 17
Correlation between EXPLORE subscales and SCS scales (grade 8)

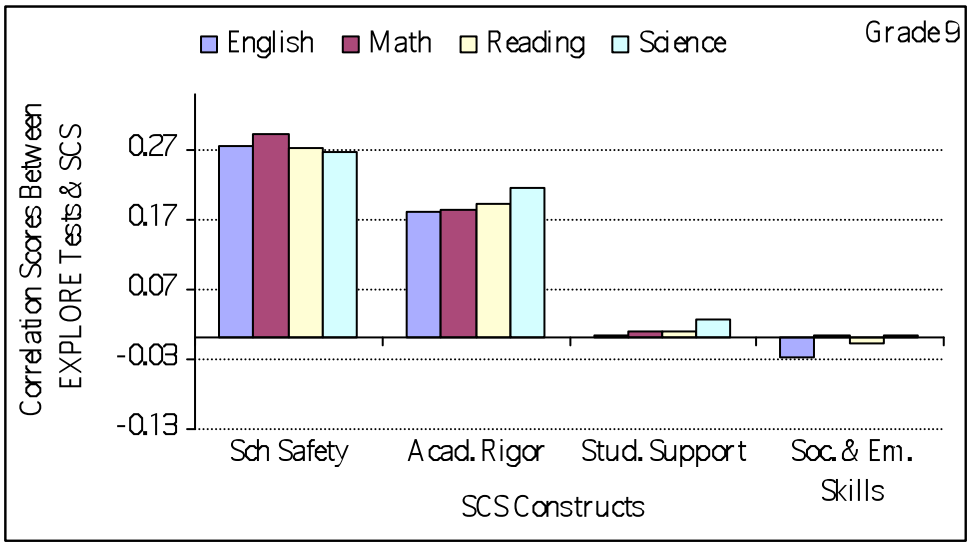


Figure 18
Correlation between EXPLORE subscales and SCS scales (grade 9)

Correlations between PLAN and Student Connection Scales

Correlations among PLAN test scores and the SCS constructs were uniformly below .30, but were nonetheless mostly statistically significant. Only the correlations between Student Support and English, Student Support and Reading in grade 10, and Social Emotional Skills and English in grade 11 were *not* statistically significant.

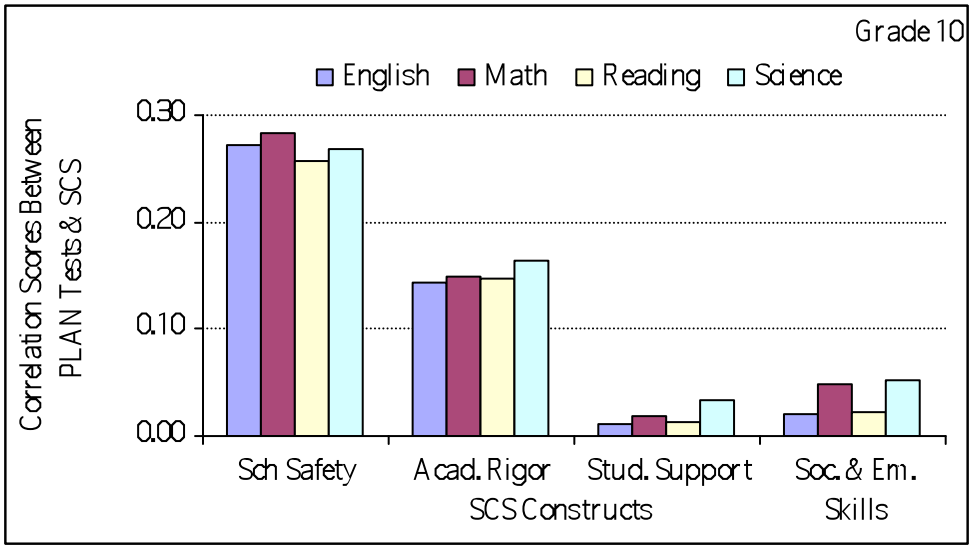


Figure 19
Correlation between PLAN subscales and SCS scales (grade 10)

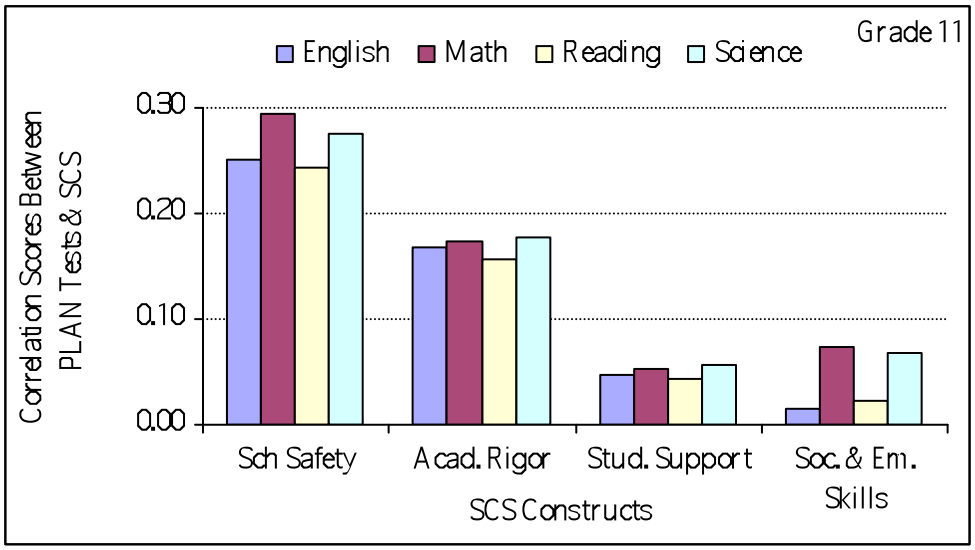


Figure 20
Correlation between PLAN subscales and SCS scales (grade 11)

Correlations between PSAE and Student Connection Scales

The school Safety scale showed the highest correlations with the subscales from the PSAE test. All the correlations were statistically significant.

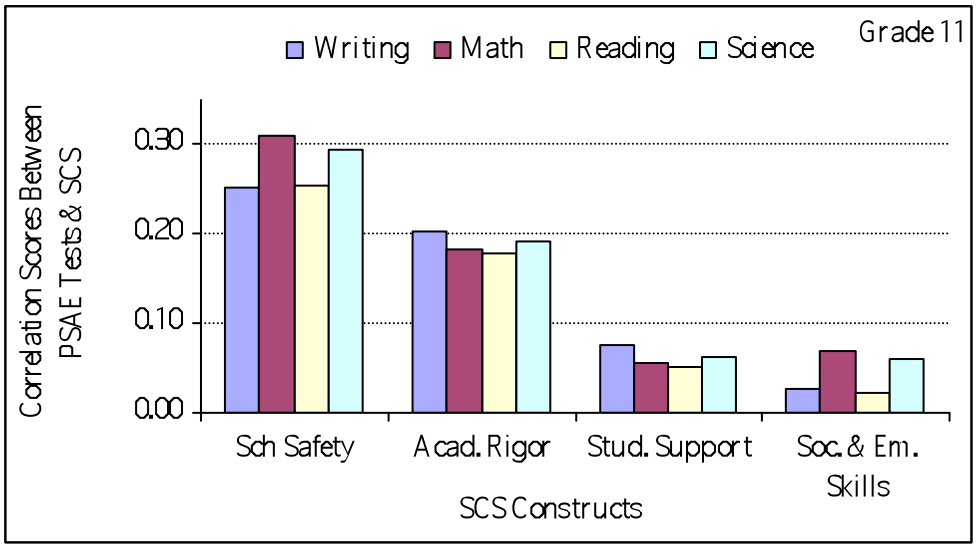


Figure 21
Correlation between PSAE subscales and SCS scales (grade 11)

Exploring Correlations between GPA and Student Connection Scales

Cumulative GPA data from the spring semester of 2007 were obtained to cross with the Student Connection responses. In contrast to the pattern of correlations observed between Achievement scores and the conditions for learning scales, the students' GPAs were highly correlated with the Academic Rigor construct. These correlations were above .23 for the four grade levels, whereas the correlations between the School Safety and GPA across the different grades were approximately .18.

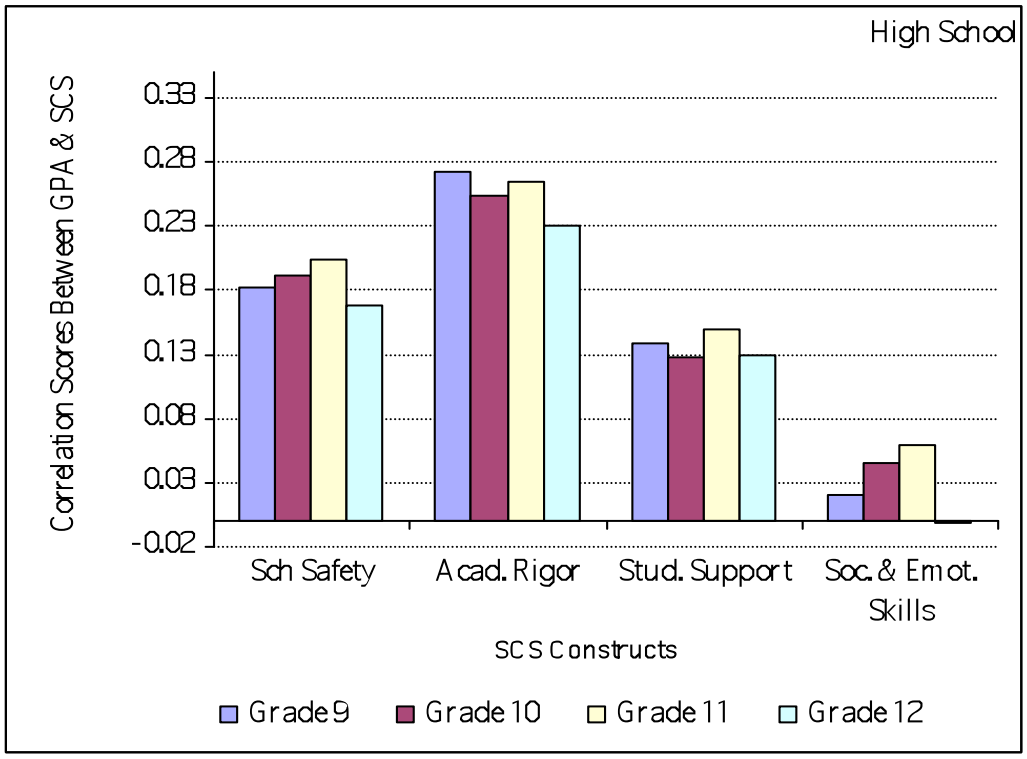


Figure 22
Correlation between SCS and GPA Scores (High School)

It may be the case that GPA was more strongly related to Academic Rigor than achievement test scores because Academic Rigor taps the proximal teacher behaviors that are hypothesized to be associated with greater academic success (e.g., "my teachers often assign homework that helps me learn," "In my classes, we often discuss different interpretations of things we read"). Because grades are a more proximal indicator of teacher ratings of this success than achievement test scores, the higher correlation with GPA may indicate that a student is meeting a teacher's expectations, whether or not these are aligned with the standards assessed on the achievement tests.

Mean Student Connection Scores by On Track Index (9th Grade)

The Chicago on Track to Graduate index is computed for 9th grade students to identify students who are at risk of not graduating on time. The index was developed by the Consortium on Chicago School Research, and is thought to be a better indicator of graduation than achievement test scores or student demographic characteristics. Students are "on track to graduate" if they have earned at least five full-year course credits in their freshman year, and received no more than one semester F in a core course.

Figure 23 shows that "on track" students tended to score higher than "off track" students on the School Safety, Academic Rigor, and Student Support. No differences are observed between the two groups in the Social Emotional Learning Skills scale.

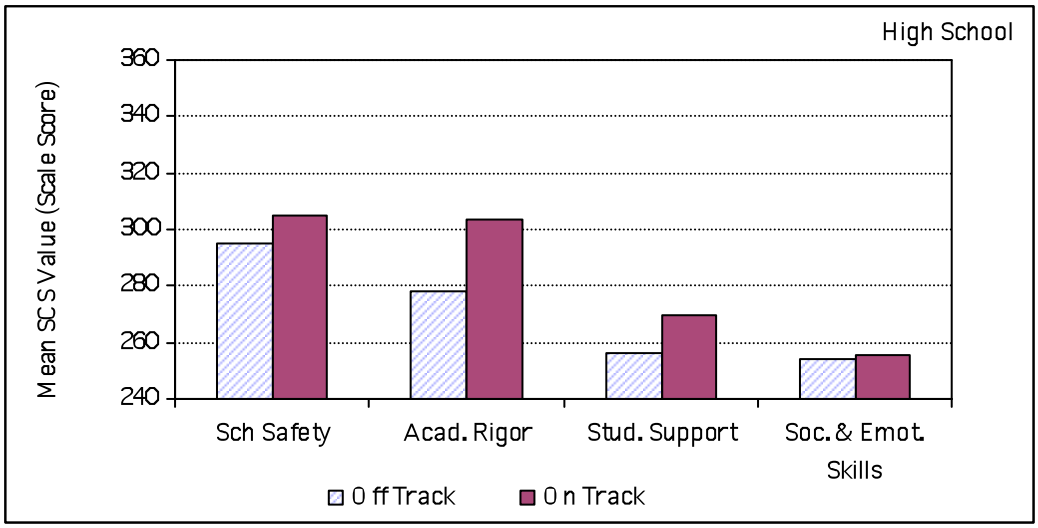
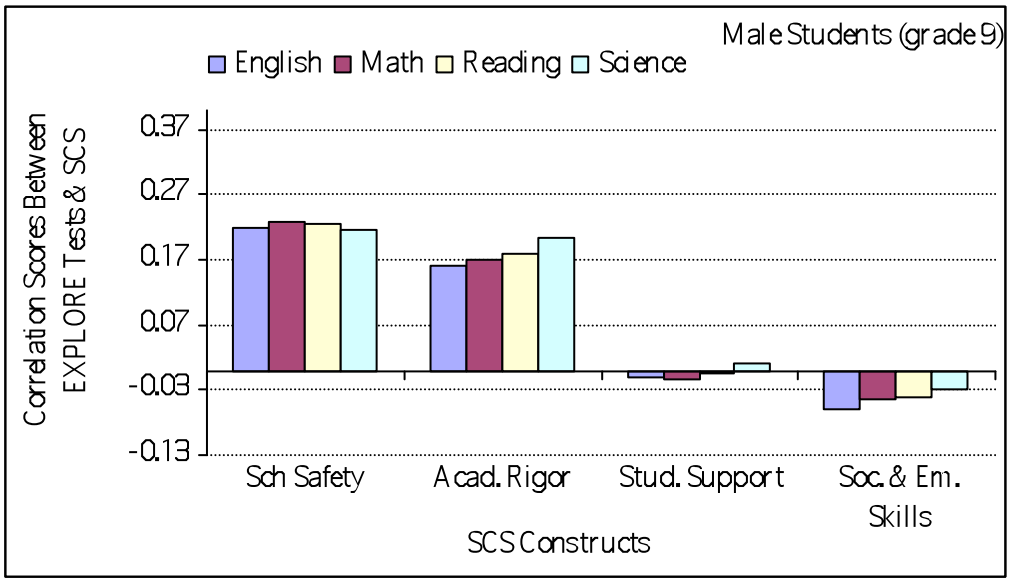


Figure 23
Mean Student Connection Scores by Track Status (Grade 9 Students)

Exploring Correlations between Test Scores and Student Connection Scales by Gender

When exploring the correlations by gender, we found that the level of association between the Safety Scale and the EXPLORE subscales tended to be larger for females than for males.



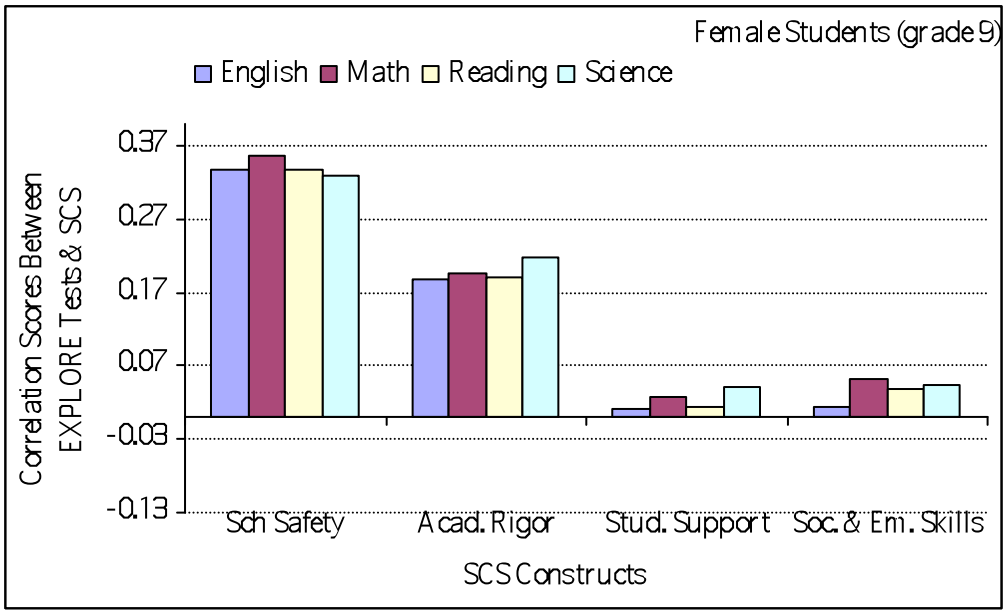
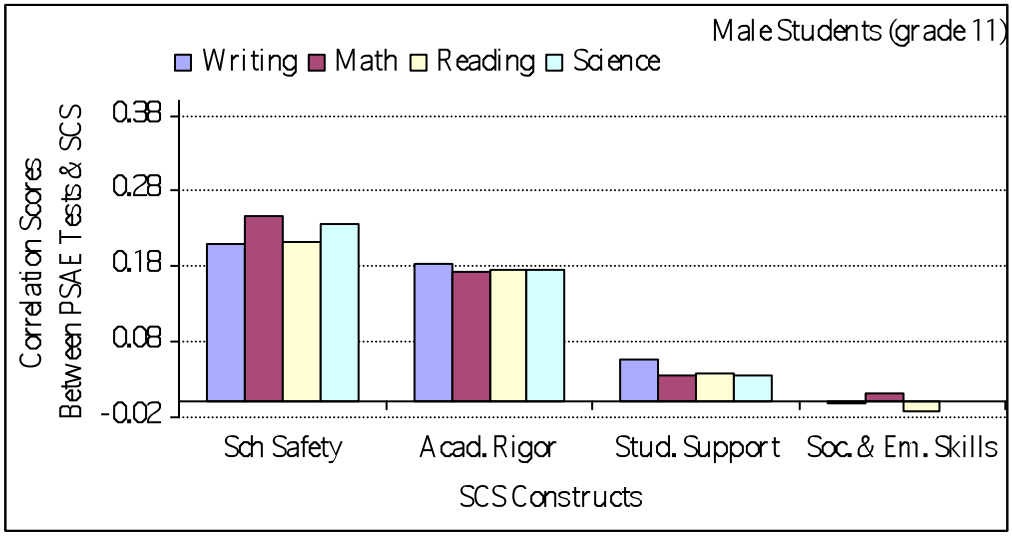
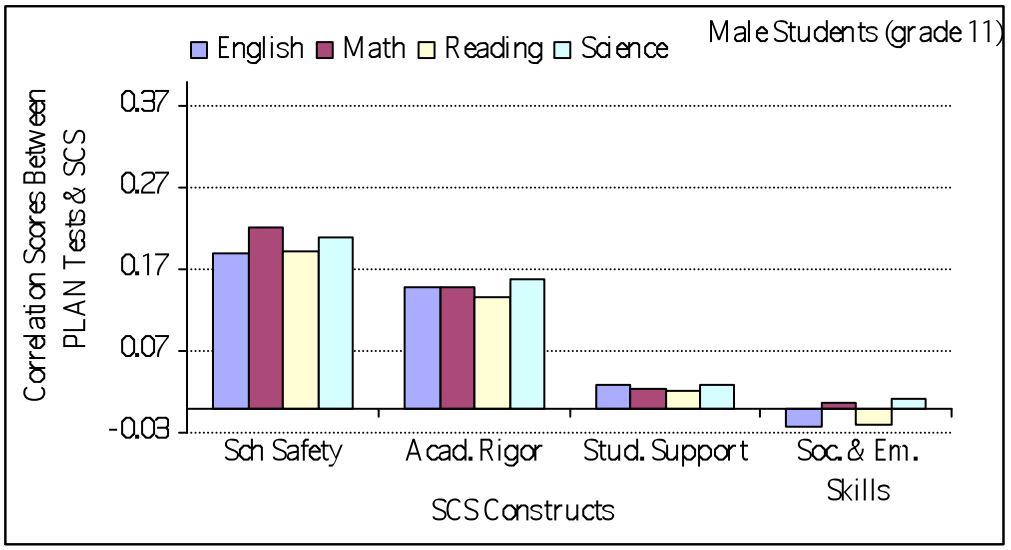


Figure 24
Correlation between EXPLORE subscales and SCS scales by Gender (grade 9)

Similar to the EXPLORE test, the magnitude of the correlations between PLAN subscales and the Safety construct tend to be higher among females than males students.





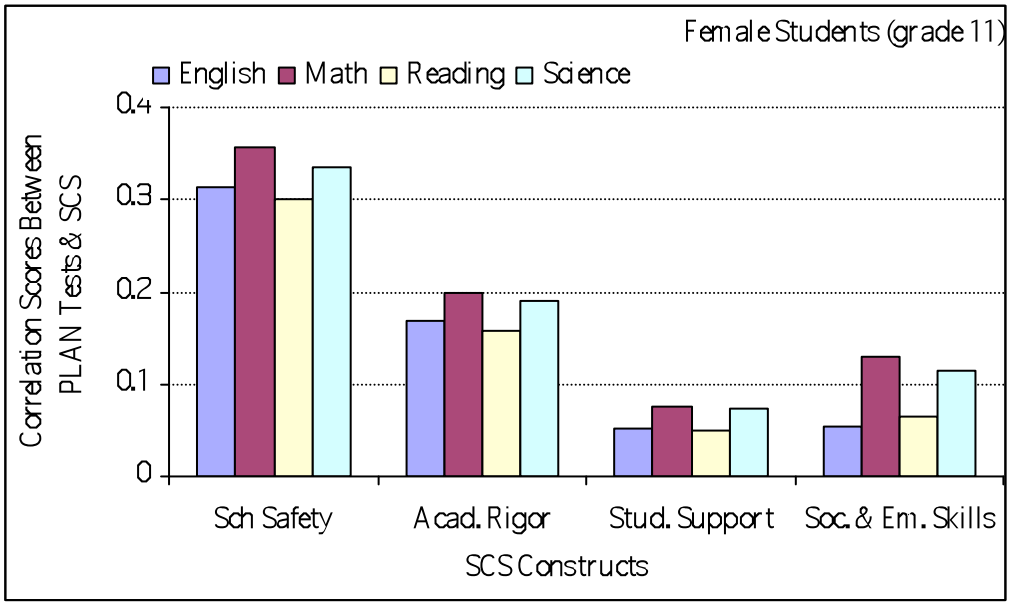


Figure 25
Correlation between PLAN subscales and SCS scales by Gender (grade 11)

The pattern of associations between achievement and Student Connection by gender was also found for PSAE test scores. Correlations between PSAE test scores and SCS scale scores tended to be higher among female than male students.

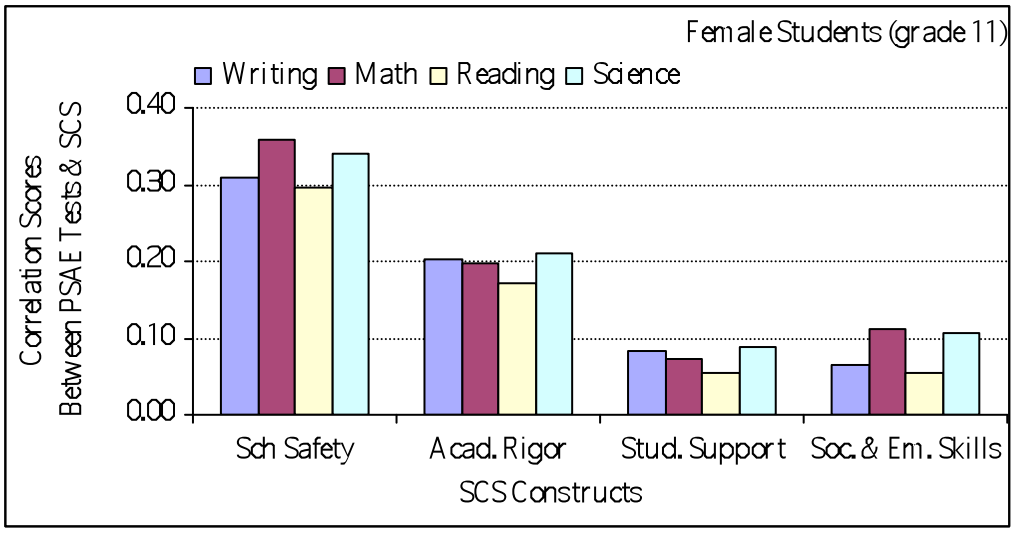
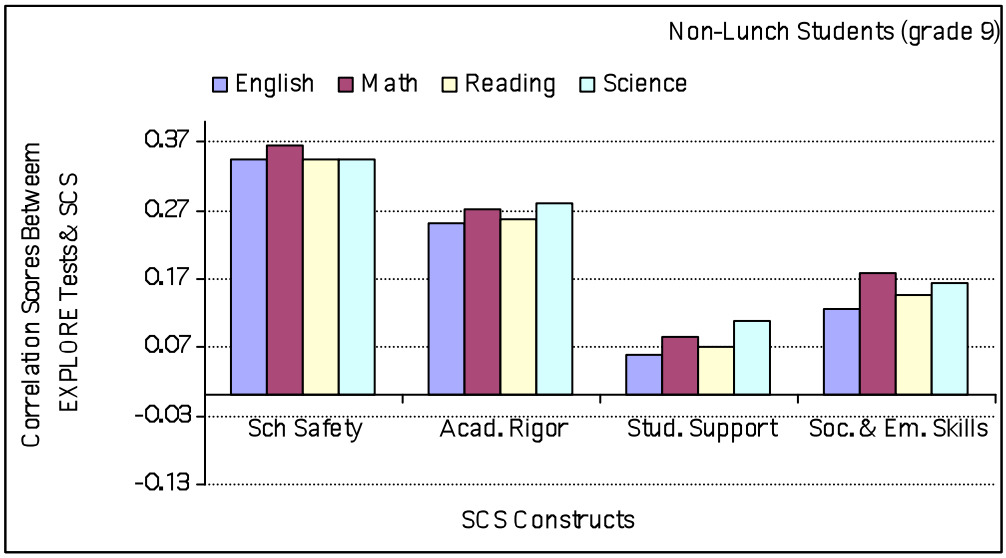


Figure 26
Correlation between PSAE subscales and SCS scales by Gender (grade 11)

Exploring Correlations between Test Scores and Student Connection Scales by Lunch Status

Regardless of the test or grade level, correlations among the Student Connection constructs and the achievement tests are higher for students who are *not* in the Free or Reduced Price Lunch Program than for students who are enrolled in the program. That is to say, that the Student Connection-achievement relationship is moderated by poverty, with students in poverty showing less connection between achievement and Student Connection.



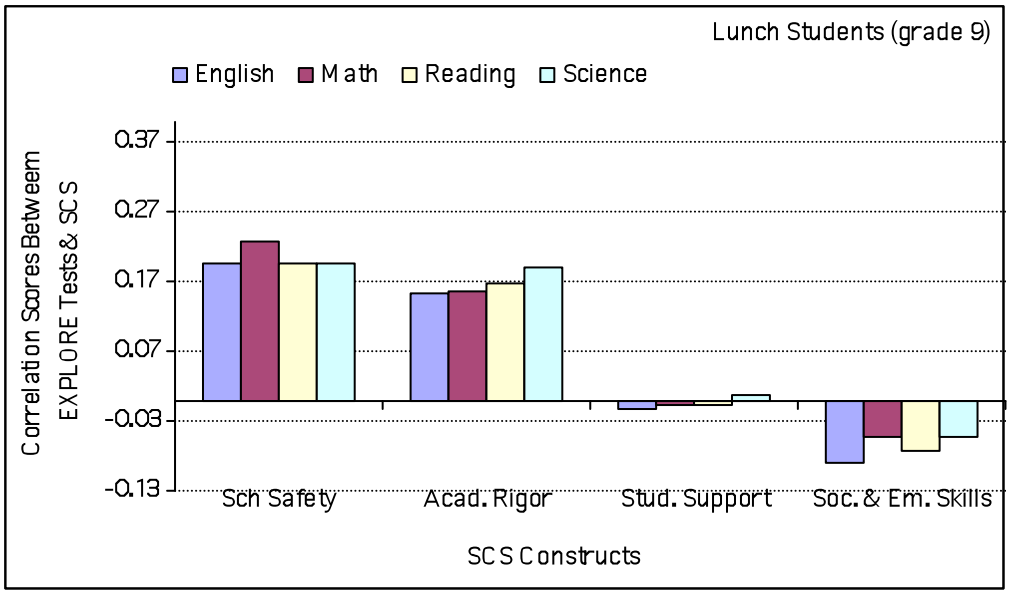


Figure 27
Correlation between EXPLORE subscales and SCS scales by Lunch (grade 9)

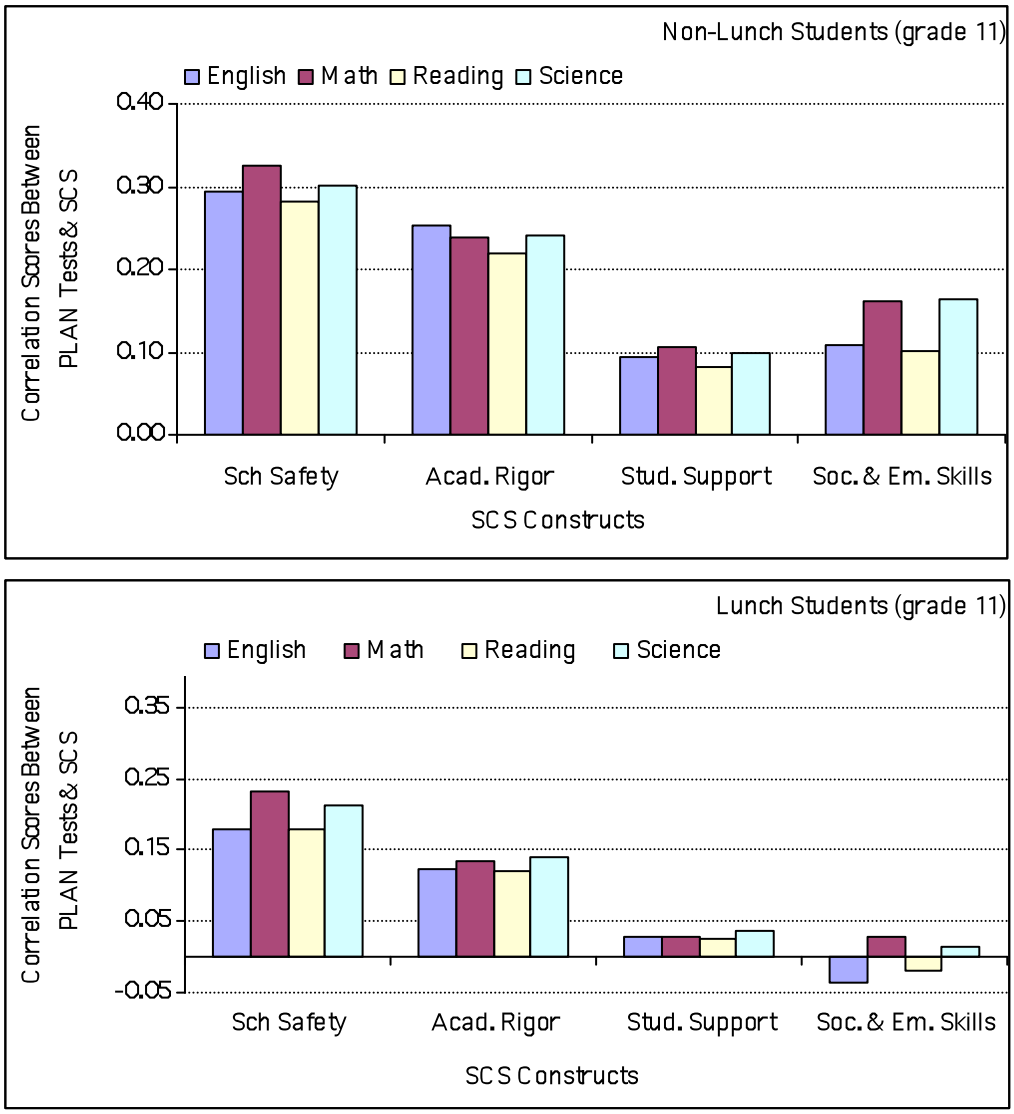


Figure 28
Correlation between PLAN subscales and SCS scales by Lunch (grade 11)

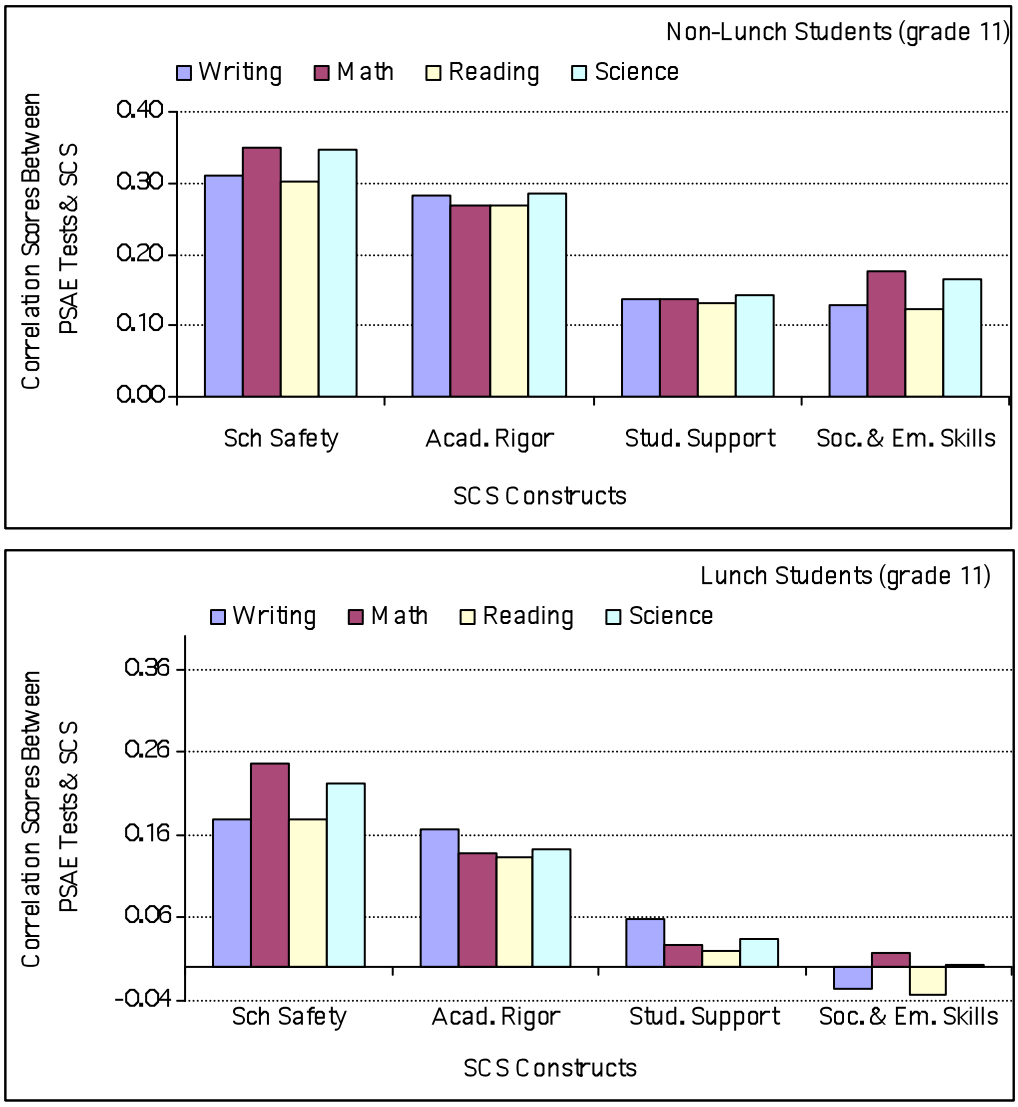


Figure 29
Correlation between PSAE subscales and SCS scales by Lunch (grade 11)

It may be the case that the reason for the constricted relationship between Student Connection and achievement for students in poverty is that for them, there are other variables outside of the school that influence their achievement more strongly (such as poor health, lack of dental or vision care, or other life stressors).

Question 2: Student Connection and School Level Characteristics

Types of Chicago Schools

The first tables of this section describe the general characteristics of the Chicago schools. As shown in the following tables most of the elementary schools (that have middle grades) and high schools in Chicago are regular or magnet schools. Only a few schools are charter or special education schools.

Table 10
Number and Percentage of Sites by Type of School

Type of school	N	%
Regular School	265	47
Charter	12	2
Magnet	277	49
Special Education	11	2
Total	565	100

Source: Common Core 2005.

Table 11
Number of Sites by School Level

	School level				
Type of school	Primary	Middle	Higher	Other	Total
Regular School	185	12	43	25	265
Charter	2	2	3	5	12
Magnet	243	7	27	0	277
Special Education	2	1	6	2	11
Total	432	22	79	32	565

Source: Common Core 2005.

Table 12
Mean and Standard Deviation on Student Connection Survey by Type of School

SCS	Type of school	Mean	*SD*	N Pupils
Sch Safety	Regular	294.78	58.44	60,390
	Charter	319.64	60.70	1,931
	Magnet	309.68	62.90	65,267
	Special Ed	330.12	77.43	722
Acad. Rigor	Regular	303.88	80.06	60,438
	Charter	329.14	82.34	1,932
	Magnet	309.32	80.29	65,293
	Special Ed	339.34	116.00	722
Stud. Support	Regular	278.32	65.55	60,438
	Charter	300.13	70.75	1,932
	Magnet	277.24	65.69	65,294
	Special Ed	319.03	77.14	722
Soc. & Emot. Skills	Regular	261.03	74.81	60,268
	Charter	277.85	64.79	1,926
	Magnet	267.75	74.66	65,152
	Special Ed	304.84	77.12	722

Note that the number of students varies to great extent across type of schools. The type of school with the smallest population, Special Education schools, tended to score higher for all of the Student Connection constructs, followed by students who attended charter schools. Between regular and magnet schools, which are the vast majority of schools in Chicago, magnet sites tended to show higher values on the Safety, Academic Rigor, and Social Emotional Skills than regular schools. In the Student Support scale, magnet and regular schools showed very similar mean values and dispersions.

Table 13
Mean and Standard Deviation on Student Connection Survey by Title I Status

SCS	Title I School?	Mean	*SD*	N students
School Safety	No	326.99	67.73	29,168
	Yes	295.86	57.55	99,142
Acad. Rigor	No	314.01	80.74	29,184
	Yes	305.23	80.43	99,201
Stud. Support	No	280.18	68.02	29,184
	Yes	277.78	65.26	99,202
Soc. & Emot. Skills	No	273.63	75.24	29,111
	Yes	262.39	74.43	98,957

Overall there was a tendency for non-Title I schools to score higher on School Safety, Academic Rigor and Social Emotional Scales than Title I schools.

Student Connection Responses by School Enrollment and Average Class Size

Enrollment size ranges from 41 to 2005 in the middle grades, and from 67 to 4,248 students in high school. The distributions of enrollment in both levels were highly positively skewed; schools with more than 2,000 students were not very common. Because of the skewness or lack of symmetry of this variable, simple Pearson correlations would not be very meaningful. To get a rough proxy of the relation between enrollment size and the responses on the Student Connection Survey, the enrollment distribution was divided into quintile categories: the lowest 20%, between 20% and 40%; between 40% and 60%; between 60% and 80% and above 80%.

The following table presents the average Student Connection Scores for each of the enrollment categories.

Table 14
Average SCS by Schools with Different Enrollment Sizes

		Middle School Level		High School Level	
	Enrollment Groups	Mean	*SD*	Mean	*SD*
School Safety	Lowest 20% of data	310.3	28.70	311.6	31.85
	Between 20% & 40%	303.0	25.00	297.0	33.24
	Between 40% & 60%	303.7	24.54	302.5	30.72
	Between 60% & 80%	303.1	26.62	288.3	31.72
	Highest 20% of data	310.5	19.32	290.0	28.25
Academic Rigor	Lowest 20% of data	320.5	22.18	308.4	26.80
	Between 20% & 40%	320.9	20.25	311.0	36.27
	Between 40% & 60%	320.1	19.89	301.9	23.47
	Between 60% & 80%	320.3	19.09	290.9	21.54
	Highest 20% of data	314.7	15.52	286.1	12.39
Student Support	Lowest 20% of data	289.7	18.96	297.1	25.08
	Between 20% & 40%	288.8	16.58	290.7	25.59
	Between 40% & 60%	286.2	15.51	279.0	14.10
	Between 60% & 80%	284.8	13.84	270.8	10.43
	Highest 20% of data	282.9	12.03	263.2	11.19
Social Emotional Skills	Lowest 20% of data	275.3	21.78	277.0	21.23
	Between 20% & 40%	270.7	20.38	264.3	26.02
	Between 40% & 60%	269.5	17.60	260.3	21.15
	Between 60% & 80%	269.9	20.19	249.8	22.13
	Highest 20% of data	276.7	15.45	249.2	18.46

Especially in high school, there seemed to be a tendency for Student Connection values to be negatively associated with enrollment. These negative relations were more evident for the Academic Rigor, Student Support Scales, and Social Emotional Skills scores. In the multilevel analyses we explore in more detail the relation between school enrollment and the Student Connection responses by using a logarithmic form for enrollment that corrects its asymmetrical distribution. The correlations between the Student Connection constructs and the logarithm of enrollment are shown in the following table.

Table 15
School Level Correlation between Student Connection Construct and the Logarithm of Enrollment

		Middle Grades	High School
		log(enrollment)	log(enrollment)
1	log(enrollment)	1	1
2	Sch Safety	0.01	-0.21
3	Acad. Rigor	-0.07	-0.35
4	Stud. Support	-0.15	-0.59
5	Soc. & Emot. Skills	0.02	-0.37

Note: Bold numbers are statistically significant.

Question 3: Specific Correlations for Student Connection Scales

To examine the utility of Student Connection for performance management, we investigated the extent to which student perceptions of the conditions for learning in their school related to objective data available to principals for decision-making. Answering this question involved testing the distributions of variables (and transforming where necessary) and calculating bivariate correlations. Results for each of the scales follow.

School Safety, School Disruption and Neighborhood Crime

Students' ratings of perceived Safety in their schools should be associated with objective measures of school disruption. Results for correlations with school suspensions and number of suspended students are presented below. Both suspension variables needed to be logarithmically transformed. The high school variable was still somewhat skewed, which likely attenuated the very high correlations presented below.

Table 16
Correlations between School Safety, School Suspensions, and the Number of Suspended Students

	Middle Level	1	2	3
1	Sch Safety	1		
2	ln school suspensions	-0.43	1	
3	ln N suspended students	-0.43	0.99	1

Note: All correlations are statistically significant.

	High School	1	2	3
1	Sch Safety	1		
2	ln school suspensions	-0.65	1	
3	ln N suspended students	-0.62	0.99	1
Note: All correlations are statistically significant.				

The numbers of school suspensions and suspended students were almost perfectly correlated; both were very strongly associated with School Safety as assessed on the Student Connection survey.

Additionally, we examined the relationship between School Safety and neighborhood crime, testing the logic that schools in neighborhoods with more crime would feel less safe to students. Crime in students' home census blocks was more strongly related to school safety than crime in the school's own census block ("imported disorder"), supporting the finding by Clark and Lab (2000) the school's neighborhood characteristics do not strongly influence in-school crime. However, Welsh, Stokes, and Greene (2000) have reported findings that the school's surrounding neighborhood is more influential for in-school victimization than students' home neighborhoods.

Table 17
Correlations between School Safety and Neighborhood Crime

	Middle	1	2	3	4
1	Sch Safety	1			
2	logarithm crime_count in school's census block	-0.47			
3	ln of percapita crime in school's own census block	-0.61	0.65	1	
4	Average ln of percapita crime from students' census blocks	-0.70	0.58	0.78	1
Note: All correlations are statistically significant.					
	High School	1	2	3	4
1	Sch Safety	1			
2	logarithm crime_count in school's census block	-0.26	1		
3	ln of percapita crime in school's own census block	-0.39	0.56	1	
4	Average ln of percapita crime from students' census blocks	-0.45	0.46	0.70	1
Note: All correlations are statistically significant.					

Academic Rigor and Grade Retention and Dropout

To examine the strength of the relationship between perceptions of high expectations and school variables, we sought to correlate Student Connection scores for Academic Rigor with grade retention and dropout. Grade retention data were not available from CPS, but we were able to look at dropout for high schools. Our hypothesis was that the schools that are perceived as the most challenging and engaging would have the lowest levels of dropout. This is in fact what we found. We log-transformed the dropout variable to improve its distribution. We found that dropout correlated significantly with Academic Rigor, but correlations between dropout and other Student Connection scores (Safety and Social Emotional Learning Skills) were also significant. Results are presented in the table below.

Table 18
Correlations between Academic Rigor (and other Student Connection Constructs) and Dropout

High School	ln dropout percent
ln dropout percent	1.00
Sch Safety	**-0.31**
Acad. Rigor	**-0.33**
Stud. Support	-0.13
Soc. & Emot. Skills	**-0.32**
Note: Only bold numbers are statistically signifi	
Note: Dropout percent from 2006 dataset.	

Student Support and Class Size

In the previous section on school characteristics, we explored the relationship between Student Connection constructs and school enrollment. We found that Student Support was significantly related to the log-transformation of student enrollment in both middle grades and in high schools (-0.15 for middle grades and -0.59 for high school). This indicates that smaller enrollment is strongly associated with higher perceptions of support, especially in high school.

The Student Support construct did not covary with many other educational variables, but it related strongly to proxy measures of personalization (as it should). We had data on average class size for high schools; the only Student Connection construct with which it was significantly associated was Student Support.

Table 19
School Level Correlation between Student Connection Construct and the Average Class Size in High School

		Average Class Size HS
1	Average Class Size HS	1.00
2	Sch Safety	0.15
3	Acad. Rigor	0.01
4	Stud. Support	-0.24
5	Soc. & Emot. Skills	0.13

Note: Bold numbers are statistically significant.

Social Emotional Learning Skills and Graduation

For the 2007 Student Connection survey, students rated their peers' levels of social emotional learning skills, rather than their own. We hypothesized that students' collective social emotional learning skills should be associated with measures of persistence in school, which could be indexed by the graduation rate. Graduation rates for high schools ranged from 21 to 100 and were distributed as seen in the figure below.

Figure 30
Distribution of Graduation Rates across High Schools, 2006

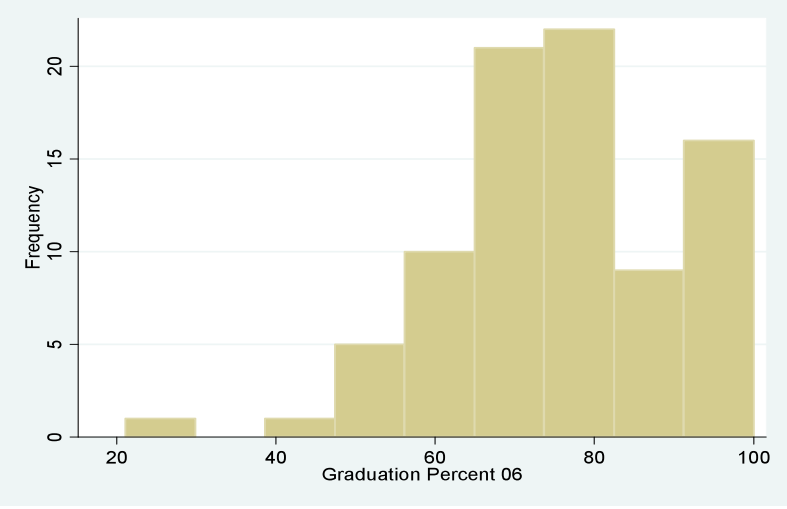


Table 20
Correlations between Graduation Rates and Student Connection Constructs

High School	Graduation rate	
Graduation rate	1.00	
Sch Safety	**0.41**	
Acad. Rigor	**0.25**	
Stud. Support	-0.03	
Soc. & Emot. Skills	**0.36**	
Correlations obtained for graduation rates higher than 40		
Note: Graduation percent from 2006 dataset.		
Note: Only bold numbers are statistically significant.		

As expected, the correlation between social emotional learning and graduation was significant. It was not quite as high as the correlation between safety and graduation, however.

Overall, the constructs that compose the Student Connection survey have demonstrated evidence of validity. They are associated with variables that they should be associated with, and are not associated with variables that they should not be.

Question 4: Self- vs. Other- Ratings of Social Emotional Learning Skills

The major impetus behind revising the survey for 2007 was to make it harder for students to blindly agree that everything was OK in their schools. We wanted to push for lower scores, with greater discrimination. One aspect of this change was altering the way that students rated social emotional learning skills. In 2006, students gave quite high ratings of their own social emotional learning skills; so high that we feared they were contaminated by social desirability effects.

For 2007, we asked students to rate "students in your school," thus removing the veil of social desirability. Did it work? We posed an original research question that would have involved administering a set of surveys with both last year's wording (self-ratings), as well as a set with this year's wording (other-ratings) to compare results. CPS did not allow the collection of new data, but we can compare the scale scores from last year to this year. Results are presented in Table 21 below.

Table 21
Change in Student Connection Scale Scores from 2006 to 2007

Student Connection Construct	2006	2007	Difference
School Safety	296	299	3
Academic Rigor	308	298	-10
Student Support	312	279	-33
Social Emotional Learning Skills	309	260	-49

As we expected, the average scale score for social emotional learning dropped markedly for 2007. Although comparisons across scales are inexact due to distribution differences, with caution we note that whereas in 2006 it was (along with Academic Rigor) the highest-rated scale; in 2007 it was by far the lowest.

It appears that shifting from self-ratings to other-ratings had quite a profound effect—and the intended effect—on student perceptions of Social Emotional Learning Skills in their school.

Question 5: Student Connection and AVID

We sought to examine whether Student Connection scores could be used for program evaluation purposes by looking at conditions for learning in high schools with certain programs in place (e.g., character education, social and emotional learning initiatives, violence prevention). We planned to identify schools that had certain clearly defined programs in place (AVID, PBIS), and compare Student Connection ratings for those schools to those of other schools in the district. We proposed that information on fidelity of implementation might exist, and that we might factor that into our analysis.

We learned that it is challenging for the CPS central office to maintain accurate data on which schools are implementing which programs. We were able to secure a list from the Office of Postsecondary Education of the schools that were implementing Advancing Via Individual Determination (AVID). AVID is a school-wide, in-school academic support program for students in Grades 4–12 without a college-going tradition in their families. AVID targets students with GPAs of 2.0 to 3.5 who want to go to college and are willing to work hard. AVID requires that students enroll in their school's toughest classes, such as honors and Advanced Placement (AP), and also in the *AVID elective*. For one period a day, students learn organizational and study skills, work on critical thinking and asking probing questions, get academic help from peers and college-student tutors, and participate in enrichment and motivational activities that make college seem attainable. AVID aims to improve students' self-image and help them become academically successful leaders and role models for other students.

Many of the schools implementing AVID are "evening high schools" and were not included in the survey sample. The 27 high schools implementing AVID were compared to the remainder of high schools, and the results are presented in

Table 22 below.

Table 22
Comparison of High Schools with and without AVID Programs

	Avid	N	Mean	Std. Deviation	Std. Error Mean
Safe & Resp. Climate	Avid HS program	15536	288.32	59.506	0.477
	no Avid	43061	301.54	66.387	0.32
Academic Rigor	Avid HS program	15557	288.62	78.103	0.626
	no Avid	43123	295.27	79.672	0.384
Student Support	Avid HS program	15557	268.97	67.915	0.545
	no Avid	43122	270.96	66.061	0.318
Social & Emot. Skills	Avid HS program	15494	248.42	71.508	0.574
	no Avid	42952	258.41	71.89	0.347
EXPLORE English scale score	Avid HS program	4754	12.89	3.372	0.049
	no Avid	13224	13.51	4.11	0.036
PLAN English scale score	Avid HS program	6673	14.78	3.519	0.043
	no Avid	17414	15.93	4.309	0.033
PLAN composite scale score	Avid HS program	6637	15.41	2.862	0.035
	no Avid	17357	16.59	3.777	0.029
PLAN mathematics scale score	Avid HS program	6675	14.89	3.391	0.042
	no Avid	17431	16.19	4.408	0.033
PSAE mathematics scale score	Avid HS program	3002	146.17	12.591	0.23
	no Avid	8561	150.84	15.516	0.168
PSAE reading scale score	Avid HS program	3000	148.48	12.936	0.236
	no Avid	8558	151.87	15.156	0.164
PSAE science scale score	Avid HS program	3001	147.14	12.013	0.219
	no Avid	8560	151.17	14.561	0.157

	Avid	N	Mean	Std. Deviation	Std. Error Mean
PSAE writing scale score	Avid HS program	3010	150	13.972	0.255
	no Avid	8664	153.29	15.895	0.171
GPA	Avid HS program	14780	2.318	0.96801	0.00796
	no Avid	40315	2.4992	1.03941	0.00518

Note: All differences are statistically significant.

In every single instance, for both the Student Connection survey scores and achievement data, the schools with AVID scored significantly lower than the schools without AVID.

This may be due to the fact that AVID is selectively implemented in lower-performing high schools. It may also be that although the program claims to have a schoolwide component, that the schoolwide elements are not implemented well or at all, and that the only program effects accrue to the specific students enrolled in AVID classes. Future work could potentially secure rosters of students enrolled in AVID, and look at their individual responses; however, such rosters are not currently available to us.

Because of the limited programmatic data we were able to obtain from CPS, we determine that we were not able to fully test the suitability of Student Connection scores for program evaluation. At a minimum we can say that Student Connection scores yield the same kind of information as achievement data.

Question 6: Student Connection and Community Context

Schools in highly challenged neighborhoods can either reflect the problems of that neighborhood or serve as refuges of calm for students with otherwise chaotic lives. The Consortium on Chicago School Research (CCSR) shared data with us on community crime so that we could examine which schools do serve as such refuges, and what characteristics such schools may share. However, due to the timing of our data exchange, we have not yet completed our analysis of this research question. Initial data on school neighborhood vs. students' home neighborhoods were presented in Table 17, above.

Question 7: Student Connection Constructs and NAEP

Because Chicago Public Schools did not grant approval for work to proceed on questions 4 and 5, with permission from the Spencer Foundation, we replaced that work with an analysis of how the Student Connection scores related to achievement as measured by the National Assessment of Educational Progress (NAEP). Our analysis of this question was perhaps the most thorough of all of our research, and also the most disappointing. After tremendous effort merging data sets and strenuously accommodating NAEP's highly selective matrix sampling design (the average number of students per school in Chicago taking the NAEP tests was only 18), we found null

results. The merged data set itself, however, is a product that could be used by others and extended through future research.

NAEP-TUDA is an extension of the NAEP program, which samples students in selected large urban school districts, including Chicago. The unique contribution of NAEP-TUDA to this study was that it provided a wealth of data not only on student academic performance and background characteristics, but also on the characteristics of the schools in which these students were enrolled and their teachers. After merging the CSCS data and NAEP-TUDA data, we ran a series of multilevel models to explore the effect of school climate on student academic performance, net of student, school, and teacher characteristics.

The merged CSCS-NAEP TUDA dataset contained 1,849 students enrolled in 96 schools. Upon inspection of the dataset, we discovered that 20 schools contained no school-level characteristics. Although student-level data were available, school administrators in these schools neglected to complete the NAEP-TUDA questionnaire, resulting in missing data for all of the NAEP school-level control variables. The absence of any information about these schools meant that the missing data could not be imputed and that the schools had to be dropped from the sample.[6] Given the concerns about dropping a large number of schools, we calculated NAEP reading scores for students in the sample and those we were forced to drop. Evaluating the proficiency scores offered one means of assessing the degree of bias associated with dropping the schools. The average reading score of students in schools in the sample was not significantly different from the average reading score of students in schools that were dropped from the sample.

Table 23
Fixed effects of school climate measures

Model			School climate measures	Coefficient	Standard Error	P-value
	Level 1 covariates	Level 2 covariates				
b	None	High expectations and school safety	School safety	13.8	4.53	0.00
			High expectations	-1.0	3.81	0.79
c	Student characteristics	High expectations and school safety	School safety	7.6	3.69	0.04
			High expectations	-1.2	2.72	0.65
d	Student characteristics	High expectations and school safety + other school characteristics	School safety	-1.3	3.42	0.71
			High expectations	3.9	2.55	0.13

[6] We attempted to impute missing data for these schools using data from the 2005 NAEP-TUDA, but no data were available from the same schools in the previous administration of NAEP-TUDA in Chicago in 2005.

The interpretation of the coefficients related to school safety is as follows: In model *b*, the coefficient of school safety is 13.8. This means that, adjusted for the effect of teachers' expectations, the average of the mean NAEP reading score for 8th graders among schools with satisfactory safety conditions is estimated to be almost 14 points higher than the average of the mean NAEP reading scores among schools with poor safety conditions. The difference is significant at the .05 level.

When student characteristics are included (model *c*), the difference remains significant, although the magnitude of the difference reduces to about 8 score points. However, in model *d*, when all other school-level covariates are included, the difference in reading scores between students in schools with satisfactory versus poor school safety is not significant from zero, net of teacher high expectations. In other words, the effect of school safety on reading achievement disappears once both student and school characteristics are factored into the model.

The estimate of teachers' expectations shows different patterns. For all of the models, the coefficient for high expectations is not significantly different from zero; that is, after controlling for the effect of school safety, no significant difference is found in the average of the mean NAEP reading scores at grade 8 between schools with satisfactory teacher expectations and schools with poor teacher expectations.

In addition to estimating coefficients of covariates, HLM also provides a decomposition of the total variance in the models into a between-student, within-school component, and a between-school component. The variance decomposition is useful for understanding how much of the variance in the models is attributable to student characteristics within schools and how much is attributable to difference across schools (related to school-level characteristics). In other words, the results of the variance decomposition enhance the understanding of the likely sources of heterogeneity in student achievement.

Table 3 presents the variance decompositions corresponding to models *a–d*. It also shows the percentage reduction in the variances achieved by each level of the model, treating the variances in model *a* as the baseline.

Table 24
Estimated variance decompositions

Model			Between students, within schools		Between schools	
	Level 1 covariates	Level 2 covariates	Residual variance	Percentage of variance in model *a* accounted for	Residual variance	Percentage of variance in model *a* accounted for
a	None	None	909	N/A	240	N/A
b	None	High expectations and school	909	0	208	13

		safety				
c	Student characteristics	High expectations and school safety	694	24	106	56
d	Student characteristics	High expectations and school safety + other school characteristics	692	24	59	75

Model *a* is an unconditional model and yields the basic decomposition. The total variance is 1,149 (i.e., 909 + 240); that is, about 79 percent of the total variance (909/1,149) is attributable to between-student, within-school heterogeneity, and about 21 percent of the total variance (240/1,149) is attributable to between-school heterogeneity. The inclusion of the school climate measures at level 2 (model *b*) accounts for 13 percent of the between-school variance.

In model *c*, including all student-level covariates accounts for 24 percent of the within-school variance. However, the impact on the variance at level 2 is greater. The introduction of student-level covariates along with the school climate measures accounts for 56 percent of the between-school variance. Finally, when school-level covariates are added (model *d*), an additional 19 percent of the between-school variance (75-56) is reduced. In other words, the inclusion of school-level covariates accounts for 44 percent ((106-59)/106) of the between-school heterogeneity in model *c* or a total of 75 percent of the initial between-school variance in model *a*.

A draft journal manuscript describing our work on the NAEP questions is included in this report as Appendix B.

PART IV: EXPLORATORY HIERARCHICAL LINEAR MODELS (HLM)

In this section we present some exploratory hierarchical linear models that account for the clustering or nested structure of the data. These models are also known as multilevel models, mixed models or random coefficient models (Bryk & Raudenbush, 2002; Snijders and Bosker, 1999). Because students are observed within schools, the responses of students from the same school are likely to be similar to some extent. This is explained because responses on the survey can be influenced by some contextual factors such as the poverty level of the school, the school policies, the school infrastructure, and the principal leadership, among other factors. Further, students attending the same school are likely to come from similar backgrounds and socioeconomic status—especially if students attend a neighborhood (or "regular") school. In these cases, models that account for the dependencies of observations are necessary to obtain correct estimates of the standard errors.

In this section, each of the four constructs—School Safety, Academic Rigor, Student Support, and Social Emotional Skills—is included in the HLM model as an outcome. The goal of this analysis is to explore some of the patterns of responses previously observed after controlling by covariates related to the socioeconomic status of the student or the school. The analyses are centered on investigating the gender and ethnic differences previously found controlling by student socioeconomic status. The analyses here presented should be interpreted with caution. The conditions for learning can be affected by several factors and complete knowledge of these models or the directionality of the effects has not been fully studied.

We also provide some evidence of validity by showing that the relations between the Student Connection responses and some student and school covariates are logically as expected. We hope that these analyses will begin to deepen some of the interesting first-order findings and indicate what might be worthy of exploring in the future with richer, longitudinal data. For example, we expect that covariates such as teachers' characteristics, instructional practices, and principal policies, among others, may account for meaningful variance in Student Connection scores. Similarly, data collected across time points can provide greater information about the direction of effects (although still without establishing formal causality).

To control for poverty at the student level a proxy measure named "lunch status" was used. This is not the best measure of poverty especially in contexts where the majority of students are poor. In Chicago middle grades and high schools, 86% and 83% of the students receive the free or reduced price lunches. However, this was the only student level measure available for this study.

We begin by presenting the partition of each scale variances across students (within) and across schools (between) for middle grades and high schools separately. This model is also known as the Null Model or Model without predictors.

$Y = \beta_{00} + R_{00}$ …….Level-1 or Student-Level

$\beta_{00} = \gamma_{00} + U_j$ …….Level-2 or School-Level

The tables below show the estimates of the within and between school variance and their proportions of the total variance.

Table 25
Variance Components Within and Between Schools (Middle Grades)

Middle School	School Safety		Academic Rigor		Student Support		Social Emotional Skills	
Constant	306.099	***	319.065	***	285.976	***	272.003	***
	(1.153)		(0.887)		(0.711)		(0.906)	
Variance (constant)	604.071	***	320.308	***	205.223	***	341.212	***
	(41.12)		(24.53)		(15.82)		(25.57)	
Variance (residual)	2831.207	***	6078.900	***	4012.688	***	5492.096	***
	(14.86)		(31.92)		(21.07)		(28.85)	
Total Variance	3435.278		6399.208		4217.911		5833.308	
% Between Schools	18%		5%		5%		6%	
% Within Schools	82%		95%		95%		94%	
N Schools = 475								

Table 26
Variance Components Within and Between Schools (High Schools)

High School Level	School Safety		Academic Rigor		Student Support		Social Emotional Skills	
Constant	297.937	***	298.381	***	278.974	***	259.513	***
	(2.995)		(2.436)		(1.989)		(2.223)	
Variance (constant)	998.7901	***	644.7083	***	428.5487	***	537.3821	***
	(135.26)		(89.73)		(60.45)		(74.74)	
Variance (residual)	3185.015	***	5817.965	***	4174.038	***	4682.202	***
	(18.63)		(34.00)		(24.39)		(27.42)	
Total Variance	4183.805		6462.673		4602.587		5219.584	
% Between Schools	24%		10%		9%		10%	
% Within Schools	76%		90%		91%		90%	
N Schools = 113								

First, note that the proportion of the total scale variance explained by differences across schools is larger in high school than in middle grades. For example, the proportion of the between-schools variance for the School Safety scale is 18% in middle grades and 24% in high school. In the case of the Academic Rigor, Student Support, and Social Emotional Skills constructs, these proportions are about 5% in middle and 10% in high school.

Second, in middle grades, the Safety scale's between-schools variance is four times larger than those of the Academic Rigor, Student Support, and Social Emotional Skills (18% for Safety, compared to 5% for the other three constructs).

The same phenomenon was found for high school but at a smaller magnitude. The Safety scale between-schools variance component was about two times larger than those of the other three scales (24% vs. 10%). In other words, there are many micro-environments within a school that

produce very large within-school variation for Academic Rigor, Student Support, and Social Emotional Learning Skills. School Safety does not vary quite as much within schools; it has by far a larger between-school component, meaning that the factors that drive perceptions of Safety are more different from one school to the next.

For simplicity, in the subsequent models when covariates or fixed effects are added to the model, their potential random effects are not included. Student covariates are included in the Level-1 or student level, and school covariates and included in the level-2 or school-level.

Gender Differences Controlling by Lunch Status

The following HLM analysis presents the estimates for Female, Lunch, and the interaction term between Female and Lunch. The interaction terms aim to capture the differential effect of being a Female in the Lunch and non-Lunch conditions. By having the three terms in the model, the coefficient of Female directly captures the effect of being a female who is not in the lunch program and the coefficient of the interaction captures the effect of being a female and in the lunch program. The constant represent the estimate for Males who are not in the Lunch program, while the coefficient of Lunch measures the effect of being a non-lunch male student.

Table 27
HLM Results: Exploring Gender Differences Controlling by Lunch Status (Middle)

Middle School	School Safety		Academic Rigor		Student Support		Social Emotional Skills	
female vs male	3.299	**	11.883	***	9.737	***	-1.958	
	(1.064)		(1.558)		(1.265)		(1.484)	
lunch vs. no lunch	1.660		2.292		3.316	**	8.983	***
	(0.884)		(1.282)		(1.041)		(1.224)	
female*lunch	-10.315	***	-0.998		-0.903		-2.302	
	(1.145)		(1.677)		(1.362)		(1.597)	
Constant	307.501	***	311.527	***	278.602	***	266.271	***
	(1.378)		(1.443)		(1.168)		(1.427)	
Variance (constant)	582.523	***	320.635	***	207.420	***	357.729	***
	(39.90)		(24.55)		(15.96)		(26.79)	
Variance (residual)	2819.968	***	6048.433	***	3991.773	***	5481.663	***
	(14.81)		(31.76)		(20.96)		(28.80)	

On the Safety Scale, and within the population of non-Lunch students, female students scored 3.29 higher than males. In contrast, within the population of students receiving the Lunch program, female students scored 7.01 (3.29 -10.3) points less than Males.

No interaction between Female and Lunch was found for the other three outcomes.

For Student Support and Social Emotional Learning Skills the interaction between Female and Lunch were not significant. But the student-level covariate "lunch status" is positive and significantly related to those constructs, suggesting that students in the lunch program scored higher in those constructs than non-lunch students. This result should be studied in more detail

with richer data to understand better the implications of this finding or if this variable is picking up some other unobserved student characteristic.

Table 28
HLM Results: Exploring Gender Differences Controlling by Lunch Status (High School)

High School Level	School Safety		Academic Rigor		Student Support		Social Emotional Skills	
female vs male	-1.751		11.587	***	2.739	*	-4.572	***
	(1.114)		(1.505)		(1.278)		(1.354)	
lunch vs. no lunch	3.784	***	1.13		-1.122		8.902	***
	(0.939)		(1.268)		(1.077)		(1.141)	
female*lunch	-9.644	***	1.622		3.099	*	-4.648	**
	(1.226)		(1.656)		(1.407)		(1.490)	
Constant	300.107	***	290.437	***	277.032	***	256.46	***
	(3.095)		(2.686)		(2.209)		(2.466)	
Variance (constant)	991.133	***	649.8733	***	432.0766	***	553.0538	***
	(134.31)		(90.42)		(60.92)		(76.85)	
Variance (residual)	3158.481	***	5776.316	***	4166.905	***	4659.984	***
	(18.47)		(33.76)		(24.35)		(27.29)	

In high school and for the Safety scale, non-lunch females scored 1.75 points less than non-Lunch males (but this coefficient was not significant). The gender differences were even larger within the population receiving the Lunch program: Females scored 11.39 (-1.75-9.64) points less than males.

Fr the Social Emotional Learning Skills scale and among the population not receiving the lunch program, females scored 4.6 points less than males. Again, the gender gap was larger within the lunch program population: females scored 9.22 (-4.57- 4.65) points below male students

Ethnic Differences Controlling by Lunch Status

For the Safety and Social Emotional Skills constructs, Whites, Asian, and Hispanics scored significantly higher than African American students, holding constant their Lunch status. In the case of Academic Rigor and Student Support scales, African American students provided higher scores than Hispanic students, holding constant their Lunch status.

Table 29
HLM Results: Exploring Race Differences Controlling by Lunch Status (Middle Grades)

Middle School	School Safety		Academic Rigor		Student Support		Social Emotional Skills	
White vs African A	9.043	***	-5.064	***	-1.893		4.120	**
	(1.018)		(1.424)		(1.158)		(1.350)	
Asian vs African A	8.452	***	7.844	***	3.364	*	12.818	***
	(1.378)		(1.964)		(1.596)		(1.862)	
Hispanic vs African A	5.155	***	-5.141	***	-2.217	**	13.094	***
	(0.780)		(1.052)		(0.855)		(0.995)	
lunch vs. no lunch	-2.962	***	1.913		3.061	***	6.637	***
	(0.693)		(1.003)		(0.815)		(0.952)	
Constant	306.028	***	319.273	***	284.121	***	261.308	***
	(1.257)		(1.320)		(1.073)		(1.241)	
Variance (constant)	500.426	***	313.852	***	207.822	***	269.246	***
	(35.72)		(24.21)		(16.10)		(21.98)	
Variance (residual)	2830.327	***	6073.982	***	4010.820	***	5480.581	***
	(14.86)		(31.89)		(21.06)		(28.81)	

Table 30
HLM Results: Exploring Race Differences Controlling by Lunch Status (High School)

High School Level	School Safety		Academic Rigor		Student Support		Social Emotional Skills	
White vs African A	4.181	***	0.429		-7.503	***	-4.489	***
	(1.020)		(1.373)		(1.162)		(1.234)	
Asian vs African A	-1.682		10.737	***	-4.894	***	3.348	*
	(1.260)		(1.698)		(1.436)		(1.526)	
Hispanic vs African A	0.689		-0.607		-11.221	***	1.257	
	(0.756)		(1.015)		(0.858)		(0.912)	
lunch vs. no lunch	-1.037		2.564	**	0.899		4.992	***
	(0.711)		(0.959)		(0.812)		(0.862)	
Constant	298.416	***	296.02	***	282.084	***	255.038	***
	(3.041)		(2.600)		(2.147)		(2.400)	
Variance (constant)	978.2895	***	643.0535	***	434.7337	***	553.5022	***
	(132.77)		(89.59)		(61.38)		(77.07)	
Variance (residual)	3183.555	***	5812.309	***	4161.657	***	4675.301	***
	(18.62)		(33.97)		(24.32)		(27.38)	

In high school, White students scored significant higher than African Americans on the Safety scale. In the middle grades, no other ethnicity scored significantly higher than African American students. For Student Support, African Americans provided significantly higher scores than

Whites, Asians, and Hispanics respectively, after controlling by Lunch status. For Social Emotional Learning Skills, African Americans provided scores 4.49 points higher than Whites.

Ethnic Differences Controlling by Student Lunch Status and School Level Poverty Characteristics

In the following models, three school-level predictors were included: the logarithm of per capita crime in school's own census block which collect crime data since November 2005–October 2007; the concentration of poverty in school's own census block, and the logarithm of school enrollment. These variables aim to capture some of the "contextual" characteristics of the schools in terms of crime and poverty as well as school size. The logarithm form was used to correct for the skewness of these variables.

Table 31
HLM Results: Exploring Race Differences Controlling by Lunch Status and School Contextual Characteristics (Middle Grades)

Middle School	School Safety		Academic Rigor		Student Support		Social Emotional Skills	
White vs African A	7.732	***	-5.389	***	-2.320		1.875	
	(1.033)		(1.492)		(1.208)		(1.407)	
Asian vs African A	7.328	***	8.193	***	3.151		10.891	***
	(1.399)		(2.029)		(1.644)		(1.917)	
Hispanic vs African A	3.907	***	-5.317	***	-2.522	**	11.271	***
	(0.796)		(1.131)		(0.915)		(1.061)	
lunch vs. no lunch	-2.793	***	2.067	*	3.324	***	7.088	***
	(0.701)		(1.020)		(0.827)		(0.966)	
lncrimesc	-12.875	***	-1.200		-3.604	**	-6.966	***
	(1.295)		(1.410)		(1.123)		(1.228)	
povnojob	-8.404	***	-0.033		-0.154		-3.832	***
	(1.001)		(1.084)		(0.862)		(0.942)	
lenroll	-6.783	***	-2.999		-6.476	***	-6.491	***
	(1.591)		(1.731)		(1.378)		(1.507)	
Constant	334.452	***	336.949	***	320.575	***	294.697	***
	(10.094)		(11.018)		(8.773)		(9.600)	
Variance (constant)	293.805	***	313.685	***	197.035	***	227.456	***
	(21.80)		(24.62)		(15.60)		(18.85)	
Variance (residual)	2820.437	***	6064.246	***	3990.053	***	5461.133	***
	(14.99)		(32.22)		(21.20)		(29.04)	

No major differences were observed compared to the previous model and after controlling by contextual neighborhood and enrollment size. For the Safety scale, these results suggest that even after controlling the student's lunch status, and for the school size and poverty characteristics of the school's vicinity, African American students consistently scored lower than all the other ethnicities. These results should be explored in more detail in future work.

For Social Emotional Learning Skills, the differences between White and African American students were no longer significant after controlling for these contextual characteristics.

Table 32
HLM Results: Exploring Race Differences Controlling by Lunch Status and School Contextual Characteristics (High School)

High School Level	School Safety		Academic Rigor		Student Support		Social Emotional Skills	
White vs African A	4.003	***	0.091		-7.567	***	-4.424	***
	(1.038)		(1.400)		(1.180)		(1.259)	
Asian vs African A	-1.764		10.388	***	-4.853	***	3.451	*
	(1.278)		(1.725)		(1.454)		(1.551)	
Hispanic vs African A	0.54		-0.946		-11.152	***	1.206	
	(0.774)		(1.043)		(0.878)		(0.937)	
lunch vs. no lunch	-0.957		2.717	**	0.99		5.051	***
	(0.726)		(0.980)		(0.826)		(0.881)	
lncrimesc	-15.37	***	-10.826	**	-8.593	***	-11.76	***
	(4.053)		(3.362)		(2.456)		(2.930)	
povnojob	-6.742	*	-0.38		0.035		-5.367	*
	(3.419)		(2.813)		(2.047)		(2.450)	
lenroll	-9.819	**	-11.357	***	-13.776	***	-11.264	***
	(3.070)		(2.543)		(1.858)		(2.216)	
Constant	350.829	***	361.56	***	365.012	***	320.126	***
	(20.921)		(17.412)		(12.748)		(15.179)	
Variance (constant)	803.2945	***	525.8867	***	273.812	***	397.4193	***
	(115.71)		(78.39)		(41.99)		(59.20)	
Variance (residual)	3188.687	***	5832.112	***	4150.901	***	4699.188	***
	(19.02)		(34.76)		(24.74)		(28.06)	

In high school and compared to the previous model, results remain consistent after controlling by the school contextual characteristics.

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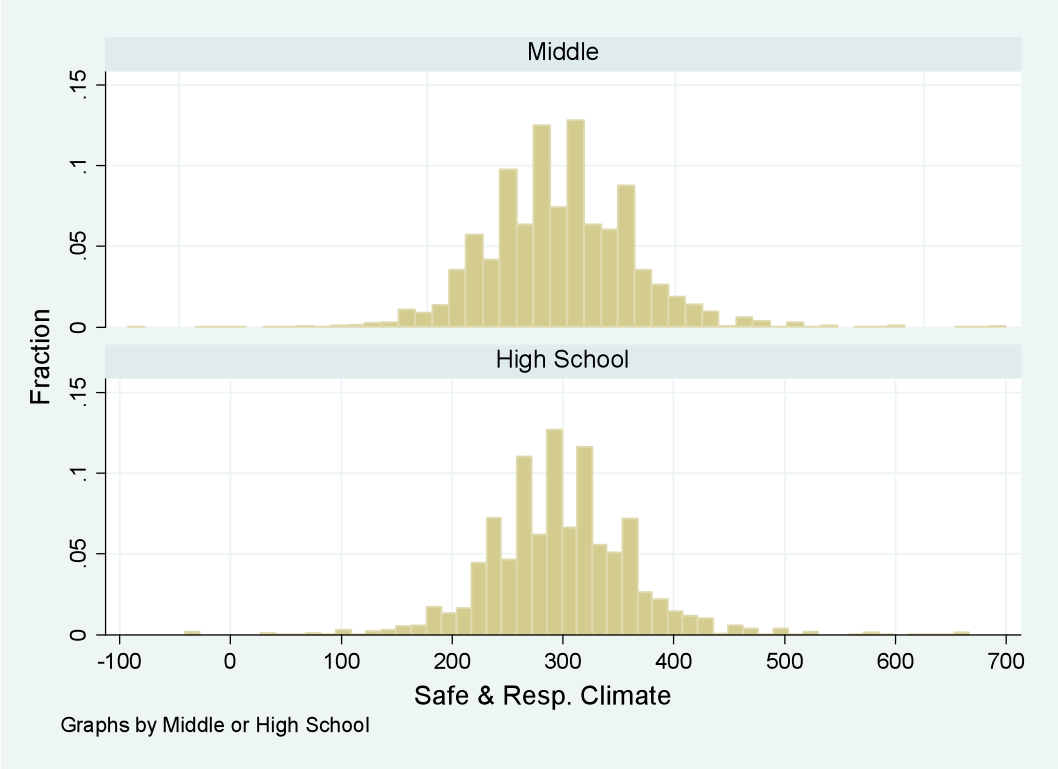
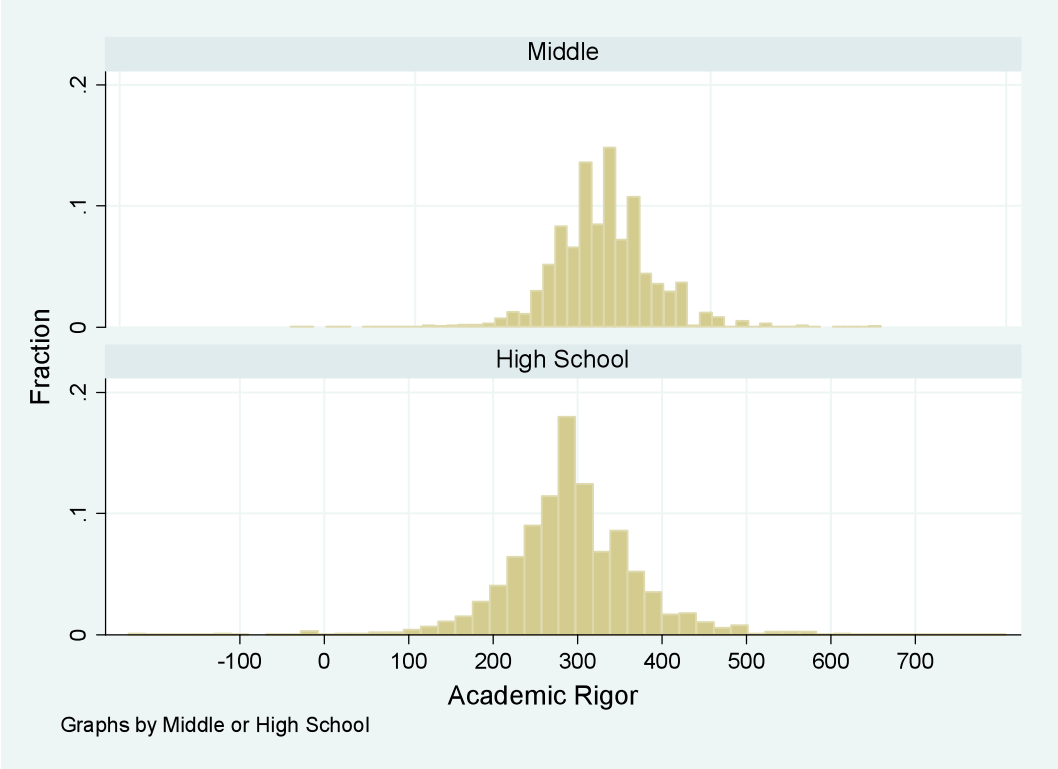
APPENDIX A

Distributions of the SCS Scales by Type of School

Table A1
Upper bound value for different percentiles by construct

	Upper bound percentile value					
Percentiles	School Safety	Emotional Safety	Physical Safety	Academic Rigor	Student Support	Social & Emotional Skills
p1	157	85	148	108	105	47
p5	209	167	205	187	172	143
p10	236	214	221	222	203	174
p25	263	252	253	259	243	228
p50	304	304	306	306	281	266
p75	341	359	349	347	317	308
p90	377	398	377	405	353	350
p95	403	420	412	441	378	375
p99	469	505	548	524	441	437


Middle
High School
Fraction
0
.05
.1
.15
-100
0
100
200
300
400
500
600
700
Safe & Resp. Climate
Graphs by Middle or High School


Middle
High School
Fraction
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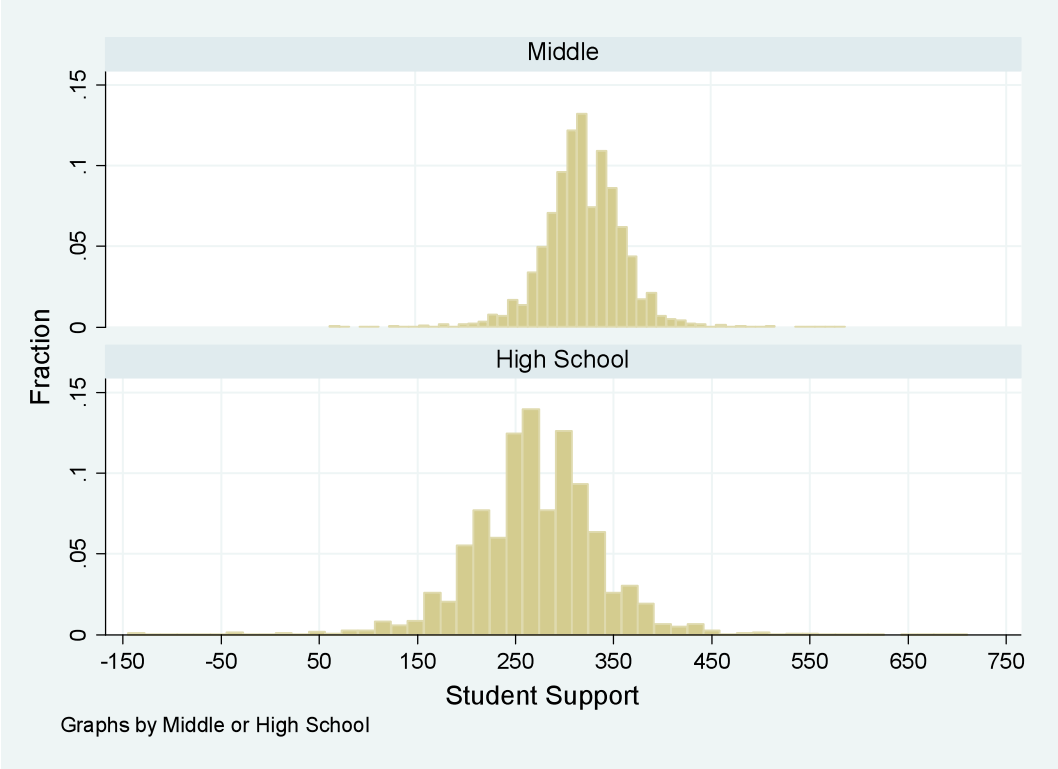
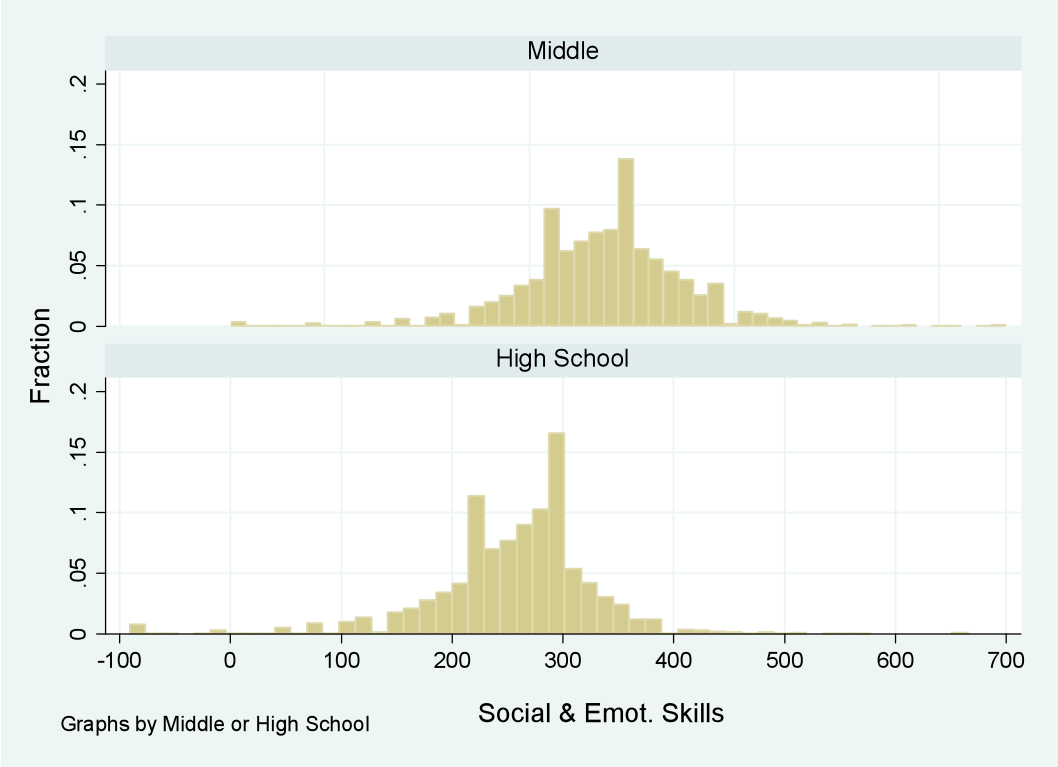
.1
.2
-100
0
100
200
300
400
500
600
700
Academic Rigor
Graphs by Middle or High School


Middle
High School
Fraction
0
.05
.1
.15
-150
-50
50
150
250
350
450
550
650
750
Student Support
Graphs by Middle or High School


Middle
High School
Fraction
0
.05
.1
.15
.2
-100
0
100
200
300
400
500
600
700
Social & Emot. Skills
Graphs by Middle or High School

APPENDIX B: NAEP JOURNAL MANUSCRIPT

The Role of School Safety and High Expectations on 8th Graders' Reading Proficiency: Linking the Chicago Student Connection Survey with the NAEP Trial Urban Data Assessment

The Chicago Student Connection Survey (CSCS) and the National Assessment of Educational Progress—Trial Urban District Assessment for Chicago (Chicago NAEP-TUDA) capture a wealth of information about educational achievement and the conditions for learning in Chicago. Using multilevel models, we explore the relationship between two key measures of school climate – student perceptions of school safety and the expectations for learning – and the reading proficiency of Chicago 8th grade students. The results reveal both strengths and limitations of the merged CSCS-NAEP TUDA data and suggest directions for future research that may extend the analyses beyond Chicago schools to inform the literature on the association between the conditions for learning within a school and student academic achievement.

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Introduction

Of all of the major institutions in the United States, the educational system may be subject to the greatest number of surveys and research projects aimed at documenting, describing, and explaining its operations, products, and performance. The National Center for Education Statistics (NCES), the statistical arm of the U.S. Department of Education, has supported over 15 national and international projects exploring educational outcomes from preschool to adult literacy. The federal government is not alone in surveying students and educational personnel. The passage of the No Child Left Behind (NCLB) Act in 2001 has fueled the rise of state studies of student academic progress, as every school in the nation must provide quantifiable evidence of the degree to which schools, teachers, and students meet specified goals.

The wealth of educational data is a bonanza for researchers who can look to a variety of datasets to address questions about a multitude of educational outcomes. The growth of educational surveys and emphasis on documenting a range of educational practices, however, carries the risk that researchers and policymakers may lose the ability to look across different projects and may ignore opportunities to link complementary studies. The lack of efforts to link educational surveys is understandable, as the complexities of many large educational studies impose startup costs to researchers who must invest significant time understanding what one particular survey can offer and how the data can most effectively be utilized. Moreover, surveys conducted by independent educational authorities (e.g. the federal government and a state) may be challenging to link because of different data structures and the lack of common identifiers for subjects across the surveys.

Yet the promise of projects exploiting the resources of multiple surveys remains, especially as the quality of educational surveys takes steps toward matching their quantity. In

this paper, we report the results of a project merging two rich datasets and explore the unique types of analyses that can be conducted on the linked data. Specifically, we use the Chicago Student Connection Survey (CSCS), a recent survey developed by Chicago Public Schools (CPS) and the American Institutes for Research (AIR), and the National Assessment of Educational Progress - Trial Urban District Assessment for Chicago (NAEP-TUDA) to examine the relationship between student-level and school-level predictors on student academic achievement. While the exploration of factors contributing to student academic achievement is key to this paper, equally significant are the lessons learned in merging the data and how these lessons can be applied to future research endeavors.

The rationale behind linking the CSCS and NAEP-TUDA lay not in a methodological exercise but because of the complementary nature of the data collected by both projects. As described in greater detail below, the CSCS is a comprehensive survey that measures student attitudes about four dimensions of school climate. Although developed in collaboration with CPS, the survey instrument was not designed to be unique to Chicago schools and could be administered to students in any school system. In 2007, valid data were collected from over 135,000 Chicago children in grades 6 through 12. Based on these data, the following four measures of school climate were constructed: 1) school safety, 2) high expectations for learning, 3) student support, and 4) social and emotional skills. These measures offer a composite picture of student perceptions of their school climate, a key contextual measure associated with a variety of student-level outcomes (Lee, Smith, Perry & Smylie, 1999).

NAEP-TUDA is an extension of the NAEP program, which samples students in selected large urban school districts, including Chicago. The unique contribution of NAEP-TUDA to this study was that it provided a wealth of data not only on student academic performance and

background characteristics, but also on the characteristics of the schools in which these students were enrolled and their teachers. After merging the CSCS data and NAEP-TUDA data, we ran a series of multilevel models to explore the effect of school climate on student academic performance, net of student, school, and teacher characteristics.

We begin by outlining the research questions motivating this study and then provide background on the Chicago Student Connection Survey and NAEP-TUDA. Following the discussion of the two surveys, we describe the research question motivating the project in greater detail, the measures used in the analyses, and the analytic strategy. Finally, we present the results and discuss their implications not only for the literature on school climate, but also for future research drawing on CSCS and NAEP-TUDA data.

Research Questions

Three research questions motivated our analyses:

1) What are the issues associated with merging CSCS and NAEP-TUDA data?
2) How can the merged CSCS and NAEP-TUDA data be used to inform studies of the relationship between school climate and student academic performance?
3) What are the unique contributions of the merged data and what can it offer to educational researchers?

The first research question arises because of the unique structures of the CSCS and NAEP-TUDA data and the lack of previous efforts to link them. As noted below, the CSCS and NAEP-TUDA are distinct projects administered by different agencies (Chicago Public Schools and the National Center for Education Statistics, respectively). Moreover, the CSCS is a census of all middle and high school students in Chicago, whereas NAEP-TUDA relies on sampling of students. This raises a series of technical issues which must be considered before any analyses can be conducted.

The purpose behind the second research question is to explore how the merged CSCS and NAEP-TUDA data can be applied to a topic of prime interest to educators and policymakers, the relationship between the conditions for learning within a school and student achievement. This analysis is exploratory, examining how the merged CSCS and NAEP-TUDA data can inform the literature on school climate and positing directions for future research using the data. Finally, we evaluate the unique contributions of the merged CSCS and NAEP-TUDA data in light of the analyses and suggest directions for subsequent research. Taken together, the three questions establish a foundation for a promising research program utilizing merged CSCS and NAEP-TUDA data, one that can be extended both by exploring additional variables available in the datasets and by looking to tie-in additional sources of data.

Chicago Student Connection Survey

In this era of standards-based reform, much attention is paid to the role that schools play in raising the academic achievement of all students. Schools are held accountable for the academic progress of *all* students, and are therefore implementing programs and strategies designed to help all students achieve to high academic standards. Successful schools are those that are able to mitigate any potentially negative impact on students due to experiences outside the school setting by creating and maintaining within the school what are often referred to as effective *conditions for learning*. Such conditions typically include high-quality pedagogy, well-trained teachers, adequate resources, and effective leadership.

Another equally, if not more important set of conditions is called the social and emotional conditions for learning. Students who feel "connected" to school across these social/emotional indicators are more likely to have improved attitudes towards school, learning, and teachers; heightened academic aspirations, motivation, and achievement; and more positive social

attitudes, values, and behavior (Resnick et al., 1997). Recent research emphasizes the view that learning is possible only after students' social, emotional, and physical needs have been successfully met (CASEL, 2003; Learning First Alliance (2001); Osher, Dwyer, and Jackson, 2004).

In 2005, Chicago Public Schools contracted with the American Institutes for Research, a non-profit social research organization, to develop a survey instrument that would be administered to all high school students enrolled in CPS schools. The survey, called the Chicago Student Connection Survey, was designed to capture information from students about the degree to which their school promoted a nurturing and supportive environment for learning. The data collected from the surveys would be used to create "scorecards" for each CPS high school comprised of three or four indicators reflecting key conditions for learning. The scorecards could then be used by students, parents, and administrators to understand areas in need of improvement within schools, as well as areas of strength.

Following consultations with national experts on the characteristics of effective schools and a review of the research literature, AIR and CPS identified four major conditions of learning of interest for the survey instrument. The four conditions are illustrated in Figure 1.

Figure 1. Conditions for learning captured in the Chicago Student Connection Survey (CSCS)

Student Safety	**High Expectations for Students**
• Physically safe • Emotionally and socially safe • Treated fairly and equitably • Avoid risky behaviors	• High expectations for student learning • Strong personal motivation • School is connected to life goals • Rigorous academic opportunities

Student Support	**Student Social and Emotional Skills**
• Meaningful connection to adults • Strong bonds to school • Positive peer relationships • Effective and available support	• Emotionally intelligent and culturally competent • Responsible and persistent • Cooperative team players • Contribute to school and community

The dimension of *school safety* refers to an overall school climate in which students feel physically and emotionally safe. There is little to no violence, fighting, bullying, crime, substance abuse, or gang presence. Overall, there is a climate of mutual respect and trust among all members of the school community, and students feel comfortable in taking personal and academic risks. Failure to support academic achievement is related to students' disengagement from school and increased risk-taking behavior (Blum, Beuhring, and Rinehard, 2000). A safe and supportive learning environment fulfills students' basic psychological needs for belonging, autonomy, influence, competence, and physical security. As these needs are met, students tend to become increasingly committed to the school community's norms, rules, and values (Learning First Alliance, 2001). Research also shows that the physical environment can have a profound effect on the ability of students to learn efficiently (National School Boards Association, 1996).

A second key component to the social and emotional conditions of learning is *high expectations*. Schools may be safe and orderly, but if they fail to build a supportive, engaging community and press for high academic expectations, students learn little (Learning First Alliance, 2001). Teachers should have high expectations for students in terms of the level of effort they put forth, as well as the academic and behavioral standards to which they are expected to achieve. When students feel that teachers and other adults hold high expectations for them, they are likely to do better in school (Lee et al., 1999; Catalano et al., 2004). In the classroom, cooperative learning strategies (e.g., group discussions, presentations, projects) have been shown

to promote the development of social skills in students, sense of the classroom as a community, and academic achievement (Johnson & Johnson, 1989; Slavin, 1990). Finally, students who perceived their teachers as warm, caring and supportive had higher classroom participation rates which in turn positively affected their academic achievement (Voelkl, 1995).

Establishing effective *student support* involves ensuring that children's basic needs are met and that the significant adults in their lives work collaboratively to encourage, support, and nurture them. Students work with and receive support from teachers who are able to establish a connection with them, personalize their experience, and engage them in the learning process. For example, examinations of national data have shown that positive student beliefs about how much their teachers support their efforts to succeed in school can reduce the probability of their dropping out by half (Croninger & Lee, 2001). A study of 167 sixth-grade students found that student support was associated with increased grade-point-averages, through its effects on interest in class, interest in school, and social responsibility (Wentzel, 1998). Goodenow (1993) found teacher support to be predictive of a students' expectancy of success, which in turn predicted their class effort and resulting grades. Other studies of interventions designed to build relationships between adults and students in school have also shown a positive impact of these programs on school-related attitudes and motives, especially for at-risk students (Battistich, 2001; Sinclair, Christenson & Thurlow, 2005; Shouse, 1996).

Finally, schools that provide sufficient conditions for learning ensure that students learn and exhibit the *social and emotional skills* they need to succeed. Social and emotional learning is the process of developing the ability to recognize and manage emotions, develop caring and concern for others, make responsible decisions, establish positive relationships, and handle challenging situations effectively. Studies have found a relationship between pro-social

behaviors and academic performance and that school interventions focused on creating a caring learning environment have proven effective in increasing attendance, GPA and stability of self-concept, and decreasing drop-out, emotional and behavioral problems (Felner & Adan, 1988; Fleming et al., 2005; Masten, et al., 1995 Reyes & Jason, 1991).

For our analyses, we elected to focus particularly on the dimensions of *school safety* and *high expectations*. We selected these measures were selected for two reasons. First, previous research has demonstrated the association between aggregated high expectations within a school and student learning (Lee et al., 1999; Lee & Smith, 1999; Ma & Wilkins, 2002). Less work has investigated the relationship between student perceptions of safety and academic performance, though some research has found other non-academic benefits of student perceptions of safety (Sellström & Bremberg, 2006). One of the unique contributions of the merged CSCS and NAEP-TUDA is the ability to examine understudied constructs such as school safety using a dataset in which valid and reliable proficiency estimates can be generated for all students.

Following a pilot test of the survey in 2005, the first CSCS was administered in Spring 2006 to students in 115 Chicago high schools (students enrolled in grades 9 –12). In Spring 2007, CPS extended the administration of the survey to all middle school (grades 6 – 8) and high school students. The results presented in this paper focus on students enrolled in grade 8, which is also sampled by NAEP-TUDA. Among all middle school students, 76,187 surveys were returned, representing 83 percent of all Chicago students in grades 6 – 8. Each survey was comprised of 60 questions related to the four dimensions of conditions for learning. Item Response Theory (IRT) was used to construct the four scales and to identify cutpoints on the scales associated with "adequate" and "excellent" levels of student connectivity.

National Assessment of Educational Progress – Trial Urban Assessment Data

For over 30 years, the National Assessment of Educational Progress (NAEP) has evaluated the academic performance of U.S. students across multiple subject areas. Referred to as "The Nation's Report Card," NAEP is the only educational assessment administered to a representative sample of American students. Administered through the National Center for Education Statistics (NCES) within the U.S. Department of Education, NAEP currently assesses student knowledge in nine subject areas, including mathematics, reading, writing and science (NCES, 2007). NAEP has taken on increased significance over the past decade with the passage of the No Child Left Behind Act, as student performance on the NAEP assessments provide an independent check on state initiatives promoting student learning. In addition to assessing student performance in selected academic areas, NAEP also collects background data from students, teachers, and schools that is used to frame the interpretation of student results.

NAEP draws samples of students at the national, state and district level. Within states, sampled 4th and 8th grade students take assessments in mathematics, reading, science, and writing in alternating years. In 2002, NCES began administration of NAEP to selected large urban school districts located in cities with a population of 250,000 or more. Six districts, including Chicago Public Schools, participated in the first Trial Urban District Assessment (TUDA) in which students were assessed in mathematics and reading. CPS also participated in the 2005 and 2007 NAEP-TUDA administrations, along with 10 other school districts. The design of NAEP-TUDA allows for large urban districts to compare the performance of their schools to other similar schools across the country, fostering collective problem solving to the common issues facing urban school districts.

NAEP measures student aptitude through a series of multiple-choice and constructed response (i.e. open-ended) items (NCES, 2005). Multiple-choice items are scored electronically

while professionally trained scorers evaluate constructed-response answers. In order to estimate the proficiency of students across various domains of a subject in a short period of time, students are administered only a partial set of the full pool of assessment items. This unique study design allows for proficiency estimates to be generated for the sample of students participating in the assessment, but not for individual students.[7] Population weights are then applied to the estimates so that they accurately reflect the population of interest. This differs from state assessments, in which students receive a test score on the basis of the items they complete. Because the concern of NAEP is population estimates instead of individual-level estimates, the analysis procedures for NAEP differ fundamentally from almost all other performance tests.

NAEP data for particular subject matter are scaled using IRT methods and then transformed so that the scores are more interpretable. Scale scores generally range from 0 to 500 for mathematics and reading assessments and 0 to 300 for science and writing assessments. After scale scores are calculated, student performance on NAEP is reported in two ways, as average scale scores and by achievement levels. NAEP uses the performance levels of *Basic, Proficient,* and *Advanced* to describe student performance at various points along the distribution of the NAEP scales and to aid in the interpretation of the NAEP results.

In addition to the assessment, or "cognitive" items, NAEP administers non-cognitive, background questions, which provide context for reporting student performance data. Federal law mandates that NAEP report achievement by race/ethnicity, gender, and disability status. Background questionnaires are also administered to teachers and school administrators. Teachers are asked to report their years of experience, education, certification, and opportunities for professional development. School administrators are asked to provide descriptive

[7] For details about how NAEP estimates student proficiency scores through the use of plausible values, see Allen, Donoghue and Schoeps (2001).

information about their schools, including enrollment size, racial/ethnic distribution of students, measures of poverty (e.g. percentage of students participating in the federal free and reduced price lunch program), staff and student turnover, and student remediation. We draw extensively on the student and school background data in the analyses below.

Method

In this section, we describe the steps for merging the CSCS and NAEP-TUDA data, the measures used in the analyses of the combined dataset, and the analytic strategy for estimating the effect of student and school predictors on student achievement.

Merging CSCS and NAEP-TUDA Data

One of the unique challenges in merging the CSCS and NAEP-TUDA data is the fact that the CSCS is a census of all middle and high school students enrolled in CPS schools whereas NAEP-TUDA samples students within schools. For the CSCS, all students who 1) were at school the day the survey was administered, and 2) agreed to complete the survey, are included in the CSCS dataset. In contrast, NAEP-TUDA uses a two-stage sampling strategy in which schools within the CPS system are sampled in the first stage and students within the schools are sampled in the second stage.[8] Thus, in merging the two datasets, data will only be retained for those students sampled by NAEP-TUDA. The power of the NAEP-TUDA sampling design, however, ensures that the estimates for these students are representative of all students in the selected grade (grade 8) once the sampling weights are applied.

Students are the unit of analysis for both the CSCS and NAEP-TUDA. In merging the data, however, it is only possible to match students at the school level using the common school identifier from the Common Core of Data (CCD). Because the CSCS and NAEP-TUDA use their own unique variables for identifying students, data from students in the two datasets cannot

[8] The sampling procedures used for NAEP and NAEP-TUDA are described in greater detail in Allen et al (2001).

matched. The inability to match the datasets at the student level is not problematic because the data collected from students in CSCS are designed to capture the conditions for learning that exist globally in a school. Consequently, in our analyses, we first calculated average values across *all* students within a school for the four measures of school climate. Next, the four average values were matched to the schools that were sampled by NAEP-TUDA. Thus, each student in our merged dataset has data collected as part of NAEP (e.g. student background measures and assessment data) and four school climate scores that reflect the average impressions of the conditions for learning reported by all of the students in the sampled student's school.

Measures

We examined two sets of measures: 1) student-level measures and 2) school-level measures (figure 2). As noted above, all individual-level measures were taken from the NAEP-TUDA. The measures selected are common control variables used in analyses examining the relationship between student and school effects on learning and reflect students' background characteristics (race/ethnicity, gender, disability status, English language learners), socioeconomic status (number of books in the home and participation in the National School Lunch Program), and time spent in school (number of absences) (Braun, Jenkins and Grigg, 2006a, 2006b).

Figure 2. Student- and school-level variables included in the models.

Student-level variables	**School-level variables**
Gender	Teacher experience
Race/ethnicity	Teacher certification
Students with disabilities	Student absenteeism
English language learners	Teacher absenteeism
Eligibility for National School Lunch	Student mobility

Program Number of books in the home Number of absences	Teacher mobility Percentage of students by race/ethnicity School size Percentage of students eligible for free/reduced-price lunch Percentage of students with a disability Percentage of English language learners Percentage of students held back and repeating School safety High expectations for learning

Two types of school-level measures were included in the models. The first set of school-level variables were collected from school administrators and principals and capture the experience and certification of teachers as well as characteristics of the school in the aggregate (e.g. percentage of students eligible for the National School Lunch Program, student and teacher absenteeism and mobility). The second set of variables is drawn from the CSCS data and relates to the two selected conditions for learning: 1) school safety, and 2) high expectations for students. Both measures were coded dichotomously as either satisfactory or poor. For both measures, scores corresponding to the 25th percentile of the student distribution were used as the cutpoints so that scores at or below the cutpoints were defined as "poor" and scores above the cut points were defined as "satisfactory". Additional information about the measures, including their coding, is described in the technical appendix.

The dependent variable in the models was student performance on the NAEP 8th grade reading assessment.

Analytic Strategy

Given the hierarchical structure of the merged CSCS-NAEP data (i.e., students nested within schools), a two-level Hierarchical Linear Model (HLM) was used in the analysis to take into account the nested nature of the data.[9] Our HLM is comprised of two sets of linear regression equations that incorporate explanatory variables at each level of the data structure. At the student level (level 1), regression coefficients relating student achievement to the set of specified student characteristics (e.g., gender, race, socio-economic status) are estimated for each school. Because this level focuses on differences in proficiency related to characteristics of students within schools, the effect of student background variables on achievement can differ from one school to another.

At the school level (level 2), each school's set of regression coefficients is predicted by a set of school characteristics (e.g., school size, racial composition, and the conditions for learning). In other words, the regression slopes estimated in level 1, which capture the relationship between student characteristics and student performance, are used as dependent variables in level 2 with school-level variables as predictors. The use of HLM allows us to estimate the effect of school safety and high expectations on reading proficiency, net of all other school-level predictors as well as student-level covariates.

The software program HLM6 was used for this study. HLM6 is designed to handle the NAEP data structure, which incorporates plausible values for each student in order to estimate

[9] See Braun et al. (2006a, 2006b) for a discussion of the technical issues related to running HLM models with NAEP data, including sample weights and variance estimation.

proficiency scores.[10] The final HLM estimates are the averages of the results from five analyses (Mislevy, Johnson, and Muraki 1992), one for each set of plausible values. The derivation of the final standard errors follows standard NAEP procedures and combines an estimate of sampling variability based on the first set of plausible values and an estimate of measurement error obtained from the variation in results across the five sets of plausible values. These steps are automated in the HLM program.

Weights were employed in the HLM analysis at both levels. Following the general conventions for NAEP data, the standard NAEP weight was split into a student factor and a school factor (Pfeffermann et al. 1998). The student factor is the product of the design weight components related to students, and the school factor is the product of the design weight components related to schools. In the HLM analysis, the student factor is applied at the student level, and the school factor is applied at the school level.

Specifically, the model used for the HLM analysis was:

Level 1 (student level):

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \ldots + \beta_{pj}X_{pij} + e_{ij}$$

where i indexes students within schools, j indexes schools;

y_{ij} is the reading NAEP score for student i in school j ;

$X_1, \ldots, X_p$ are p student characteristics, centered at their grand means (i.e., the means over all students), and indexed by i and j as above;

β_{0j} is the mean for school j, adjusted for the covariates $X_1, \ldots, X_p$;

[10] Mislevy et al. (1992) caution that NAEP proficiency estimates may be underestimated if variables not included in the conditioning models used to create the plausible values (conducted in the preparation of the NAEP data files by contractors for the National Center for Education Statistics) are subsequently used as predictors of plausible values. Thus, because we use two non-NAEP variables as predictors (school safety and high expectations), our proficiency estimates may be underestimated. The magnitude of this bias is likely to be small (approximately 5 percent) given the number of variables that are used in the conditioning models for the plausible values. Because so many variables are used in the conditioning models, it is likely that some of the same information captured by the non-NAEP variables is also captured by some of the variables in the models used to create the plausible values.

$\beta_{1j}, \ldots, \beta_{pj}$ are the regression coefficients associated with the covariates $X_1, \ldots, X_p$ for school j;

e_{ij} is the random error (i.e., residual term) at level 1, assumed to be independently and normally distributed with mean zero and a common variance σ^2 for all students;

Level 2 (school level):

$\beta_{0j} = \gamma_{00} + \gamma_{01}W_{1j} + \gamma_{02}W_{2j} \ldots + \gamma_{0q}W_{qj} + u_{0j}$

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

...

$\beta_{pj} = \gamma_{p0}$

$W_1, \ldots, W_p$ are q school characteristics, including high expectations and school safety measures for school j;

γ_{00} is the intercept for the regression of the adjusted school mean controlling for the school characteristics;

γ_{01} is the regression coefficient associated with school characteristic *W1*, indicating how much of the variation in adjusted school means can be associated with school characteristic *W1*, after taking into account school differences on the other $q - 1$ school characteristics;

u_{0j} is the random error in the level 2 equation, assumed to be independently and normally distributed across schools with mean zero and variance τ^2; and

$\gamma_{10}, \ldots, \gamma_{p0}$ are constants denoting the common values of the p regression coefficients across schools. For example, γ_{10} is the common regression coefficient associated with the first covariate in the level 1 model for each school.

Results

The merged CSCS-NAEP TUDA dataset contained 1,849 students enrolled in 96 schools. Upon inspection of the dataset, we discovered that 20 schools contained no school-level characteristics. Although student-level data were available, school administrators in these

schools neglected to complete the NAEP-TUDA questionnaire, resulting in missing data for all of the NAEP school-level control variables. The absence of any information about these schools meant that the missing data could not be imputed and that the schools had to be dropped from the sample.[11] Given the concerns about dropping a large number of schools, we calculated NAEP reading scores for students in the sample and those we were forced to drop. Evaluating the proficiency scores offered one means of assessing the degree of bias associated with dropping the schools. The average reading score of students in schools in the sample was not significantly different from the average reading score of students in schools that were dropped from the sample (see the technical appendix for details).

Descriptive statistics for the student-level and school-level variables included in the models are presented in table 1. Consistent with CSCS census data, most students were Black or Hispanic and were eligible for the National School Lunch Program. The descriptive statistics for the school-level variables reveal few differences across schools. Few schools had issues with high student or teacher absences or mobility and less than 12 percent of schools had teachers that were not fully certified. Average school enrollment was approximately 630 students and teachers had an average of almost 14 years of experience. Consistent with student reports, most school administrators (85 percent) reported that students within their schools were eligible for the National School Lunch Program.

Table 1. Weighted student-level and school-level descriptive statistics

Measure	Percentage
Student-level characteristics	
Gender	
Female	50.7

[11] We attempted to impute missing data for these schools using data from the 2005 NAEP-TUDA, but no data were available from the same schools in the previous administration of NAEP-TUDA in Chicago in 2005.

Race/ethnicity	
White	9.8
Black	48.9
Hispanic	37.8
Asian American/Pacific Islander	3.5
American Indian/Alaska Native	0.1
Disability status	
Disabled	18.7
English language learner (ELL)	
Students classified as ELL	6.5
Books in the home	
Students in homes with 26 or more books	51.4
National School Lunch Program (NSP)	
Student eligible for NSP	85.2
Student absences	
No absences in past month	43.3
School-level characteristics	
Teacher Certification	
Not all teachers in school were certified	11.8
Teacher absenteeism	
Over 5% of teachers absent on an average day	3.7
Teacher mobility	
Over 5% of teachers who started last year left before the end of the school year	4.4
Student absences	
Over 5% of students absent on an average day	22.3
Student mobility	
Less than 70% of students enrolled at the beginning of the school year enrolled at the end of the school year	7.3
Students held back and repeating	
Over 5% of students held back and repeating	5.8
Race/ethnicity of school	
White	10.7
Black	53.7
Hispanic	32.7

Asian American/Pacific Islander	2.7
American Indian/Alaska Native	0.2
National School Lunch Program (NSP)	
Student eligible for NSP	85.2
Disability status	
Disabled	20.2
English language learner (ELL)	
Students classified as ELL	6.1
Average enrollment and teaching experience	**Average**
Current enrollment	630.1
Years of teaching experience of teachers	13.8

To examine the relationship between the selected conditions for learning and student achievement, we ran a sequence of four HLM analyses. Estimated regression coefficients and their corresponding estimated standard errors were produced for each fitted model. Because the primary interest of the analyses was the effect of the school safety and high expectations on student achievement, we do not present the coefficients for the numerous student- and school-level control variables included in the models. The final set of explanatory variables was determined by a series of exploratory analyses in which different combinations of variables were examined, as well as in reference to previous NAEP studies (Braun, Jenkins and Grigg, 2006).

Table 2 describes the variables included in each of the four models. Model *a* is referred to as an "unconditional model" and is used in the discussion of variance decomposition below. Models *b* through *d* were used to estimate the effects of student and school characteristics on student achievement.

Table 2. Measures included in HLM models

Model	Level 1 Covariates	Level 2 Covariates
a	None	None

b	None	High expectations and School Safety
c	Student characteristics	High expectations and School Safety
d	Student characteristics	High expectations and School Safety + Other school characteristics

The focal parameters of interest in each model are the coefficients of the two school climate measures. Fitting different models to the CSCS-NAEP TUDA data reveals how the inclusion of different combinations of variables changes the estimates of the focal parameters of interest. In order to see how the focal parameters change depending upon the set of covariates, we show results for models *b* through *d*. Table xxx displays estimates of the coefficients for the two school climate measures for models *b-d*, along with the corresponding standard errors and *p* values[12].

Table 3. Fixed effects of school climate measures

	Model		School climate measures	Coefficient	Standard Error	P-value
	Level 1 covariates	Level 2 covariates				
b	None	High expectations and school safety	School safety	13.8	4.53	0.00
			High expectations	-1.0	3.81	0.79
c	Student characteristics	High expectations and school safety	School safety	7.6	3.69	0.04
			High expectations	-1.2	2.72	0.65
d	Student characteristics	High expectations and school safety + other school characteristics	School safety	-1.3	3.42	0.71
			High expectations	3.9	2.55	0.13

The interpretation of the coefficients related to school safety is as follows: In model *b*, the coefficient of school safety is 13.8. This means that, adjusted for the effect of teachers' expectations, the average of the mean NAEP reading score for 8th graders among schools with satisfactory safety conditions is estimated to be almost 14 points higher than the average of the

[12] The *p* value (two-sided) is the probability that, under the null hypothesis of no average difference between schools with different levels of learning conditions (i.e., school climate measures), a difference as large or larger in absolute magnitude than the observed difference would occur.

mean NAEP reading scores among schools with poor safety conditions. The difference is significant at the .05 level.

When student characteristics are included (model *c*), the difference remains significant, although the magnitude of the difference reduces to about 8 score points. However, in model *d*, when all other school-level covariates are included, the difference in reading scores between students in schools with satisfactory versus poor school safety is not significant from zero, net of teacher high expectations. In other words, the effect of school safety on reading achievement disappears once both student and school characteristics are factored into the model.

The estimate of teachers' expectations shows different patterns. For all of the models, the coefficient for high expectations is not significantly different from zero; that is, after controlling for the effect of school safety, no significant difference is found in the average of the mean NAEP reading scores at grade 8 between schools with satisfactory teacher expectations and schools with poor teacher expectations.

It is also worth noting the size of the standard errors associated with each of the estimates of high expectations. For models *a* and *b*, the standard errors are larger than their corresponding coefficients. This suggests a large amount of imprecision in the measurement of high expectations, which will be elaborated upon in the Discussion section below.

In addition to estimating coefficients of covariates, HLM also provides a decomposition of the total variance in the models into a between-student, within-school component and a between-school component. The variance decomposition is useful for understanding how much of the variance in the models is attributable to student characteristics within schools and how much is attributable to difference across schools (related to school-level characteristics). In other

words, the results of the variance decomposition enhance the understanding of the likely sources of heterogeneity in student achievement.

Table 3 presents the variance decompositions corresponding to models *a–d*. It also shows the percentage reduction in the variances achieved by each level of the model, treating the variances in model *a* as the baseline.

Table 4. Estimated variance decompositions

	Model		Between students, within schools		Between schools	
	Level 1 covariates	Level 2 covariates	Residual variance	Percentage of variance in model *a* accounted for	Residual variance	Percentage of variance in model *a* accounted for
a	None	None	909	N/A	240	N/A
b	None	High expectations and school safety	909	0	208	13
c	Student characteristics	High expectations and school safety	694	24	106	56
d	Student characteristics	High expectations and school safety + other school characteristics	692	24	59	75

Model *a* is an unconditional model and yields the basic decomposition. The total variance is 1,149 (i.e., 909 + 240); that is, about 79 percent of the total variance (909/1,149) is attributable to between-student, within-school heterogeneity, and about 21 percent of the total variance (240/1,149) is attributable to between-school heterogeneity. The inclusion of the school climate measures at level 2 (model *b*) accounts for 13 percent of the between-school variance.

In model *c*, including all student-level covariates accounts for 24 percent of the within-school variance. However, the impact on the variance at level 2 is greater. The introduction of student-level covariates along with the school climate measures accounts for 56 percent of the between-school variance. Finally, when school-level covariates are added (model *d*), an additional 19 percent of the between-school variance (75-56) is reduced. In other words,

the inclusion of school-level covariates accounts for 44 percent ((106-59)/106) of the between-school heterogeneity in model *c* or a total of 75 percent of the initial between-school variance in model *a*.

Discussion

Merging Chicago Student Connection Survey data with Chicago NAEP-Trial Urban District Assessment data yielded a unique dataset comprised of both school climate measures as well measures of student, teacher, and other school characteristics. The CSCS provides insight into student reports about the conditions for learning in their schools, including attitudes toward school safety and the expectations for learning that teachers communicate to students. Because of NAEP's mandate to report student proficiency by a series of contextual variables, NAEP-TUDA contains multiple student, teacher, and school level variables that can be used to explore the predictors of student achievement.

Our analyses revealed effects for school safety on reading achievement, net of high expectations for students as well as individual student characteristics (models *b* and *c*, respectively). When all school-level control variables were added to the model, however, the significant effect of school safety on achievement disappeared. Throughout all of the models, the measure of student perceptions of high expectations for learning failed to demonstrate a statistically significant relationship with reading proficiency. Although the two measures of school climate were not statistically significant predictors in the fully specified model (model *d*), the variance decomposition analyses suggests that this model accounted for a large proportion of the variance explaining reading achievement. The combination of student-level and school-level variables in the full model, including the school-level control variables as well as the two

measures of conditions for learning, explained accounted for three-quarters of the variance in student reading scores.

On the basis of our results from the merged CSCS-NAEP data, we suggest educational researchers should consider the following:

1. Issues with missing data

Missing data is always an issue in social science research. When using large datasets such as the NAEP national sample, missing data can be managed through various imputation techniques, or, in severe cases, by dropping missing cases. Missing data on a smaller scale, such as in the NAEP-TUDA sample, is more problematic. If, as in our dataset, school administrators do not report basic school-level information, there is no clear strategy for imputing missing values. This results in dropping cases, narrowing the sample size. Although our analysis of the reading scores of students in the sample compared to those dropped of the sample indicated no statistically significant differences, we still lost all of the information that these students reported for the other covariates in the model.

2. Issues with lack of sample variation

A glance at the descriptive statistics from our merged sample indicates few sources of variation across schools. For example, over 95 percent of all schools were classified as "satisfactory" for teacher absenteeism and teacher mobility, and nearly 80 percent were "satisfactory" for student absenteeism. In absolute numbers, this means that 3 of the 76 schools in the sample were part of the "poor" category for teacher absenteeism and teacher mobility and 16 were classified as "poor" for student absenteeism. For the two school climate measures, school safety and high expectations, schools at or below the 25th percentile were categorized as "poor;" this translates to18 schools for school safety and 19 schools for high expectations.

The small sample sizes for the school-level variables result in larger standard errors for the estimates and, consequently, decrease the likelihood of detecting statistically significant effects in the HLM analyses. The solution for this issue lies not in reclassifying the school-level variables to include more cases. The cutpoints for the school-level variables were determined substantively and reflect meaningful differences between schools. Schools in which the average school safety rating is below the 25th percentile likely do have a very different school climate compared to those schools where the ratings of school safety are higher.[13] The small number of schools in the sample with low reported levels of school safety and high expectations means that we cannot rule out the possibility that the effects of these measures went undetected because of the lack of variation across schools. Assessing the reliability of our results by replicating the analyses using a larger sample of schools would be a welcome next step in the research on school climate.

Implications for Future Research

The issues of missing data and sample variation should not, however, deter researchers from using the CSCS and NAEP-TUDA data. In fact, should the Student Connection Survey instrument developed for Chicago Public Schools be administered in other urban districts, the data might be put to best use by pooling the CSCS data with the data from those districts. Likewise, the NAEP-TUDA data for Chicago could be combined with data from the other TUDA districts (corresponding to where the Student Connection Survey is administered).

Pooling the Student Connection Survey across districts and merging it with the pooled TUDA data would have several benefits. First, the sample size of the merged data would be expanded, making the dataset less susceptible to problems with missing data. Concomitant with

[13] For context, the average school safety score for students at the 25th percentile was 290.5 (standard deviation equal to 33.4), compared to 339.3 for students above the 25th percentile (standard deviation equal to 21.9).

reducing missing data, variation within the sample, especially for school-level measures would also increase. With more schools and more students, differences between schools might be easier to be detected and hence more likely to be statistically significant.

Finally, utilizing a sample of students and schools drawn from multiple urban districts would make the results more generalizable to all urban districts. Although instructive, the results from this paper are only representative of the population of Chicago students and schools. Results pooled from other urban districts would still be directly representative of the students and schools sampled from specific districts, but the power to argue that the results should hold across other urban districts would increase with each additional urban district added. This would allow researchers to speak more globally about the constructs measuring conditions for learning and how these conditions impact student achievement across a broad and diverse range of urban districts.

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Technical Appendix

Table A1. Average reading scores for students, by sample

	N	Average reading score	Standard error
Students in schools in sample	1459	250	0.9
Students in schools dropped from sample	390	249	1.7

Variable Descriptions
Seven student-level and 14 school-level variables were used in the HLM analysis. Descriptions of the variables are presented below.

1. Student-level variables

Gender: Results are available for male and female students.

Race/ethnicity: Students were, based on the NAEP data, identified as belonging to one of six mutually exclusive racial/ethnic groups: White, Black, Hispanic, Asian/Pacific Islander, American Indian/Alaska Native, or unclassifiable. For the purpose of the HLM analysis, White, Asian/Pacific Islander, American Indian/Alaska Native, and unclassifiable were combined.

Students with disabilities (SD): Students with an Individualized Education Program (IED) or who were protected under Section 504 of the Rehabilitation Act of 1973 were identified in the NAEP data.

English language learners (ELL): Students were identified as English language learners based on the NAEP data. All students identified based on school records as receiving academic instruction in English for three years or more were included in the NAEP assessment. Those ELL students who received instruction in English for less than three years were included unless school staff judged them to be incapable of participating in the NAEP assessment in English.

Eligibility for free/reduced-price school lunch: NAEP collects data on students' eligibility for free or reduced-price school lunch as an indicator of family economic status. As part of the U.S. Department of Agriculture's National School Lunch Program, schools can receive cash subsidies and donated commodities in return for offering free or reduced-price lunches to eligible children. Based on available school records, students were classified as either currently eligible for free/reduced-price school lunch or not eligible. Eligibility for the program is determined by a student's family income in relation to the federally established poverty level. Free lunch qualification is set at 130 percent of the poverty level, and reduced-price lunch qualification is set at between 130 and 185 percent of the poverty level. The classification applies only to the school year when the assessment was administered and is not based on eligibility in previous years. If school records were not

available, or if the school did not participate in the program, the student was classified as not eligible.

Number of books in the home: Students who participated in NAEP were asked about how many books there were in their homes. Response options included "a few (0–10)," "enough to fill one shelf (11–25)," "enough to fill one bookcase (26–100)," or "enough to fill several bookcases (more than 100)." For the purpose of the HLM analysis, the first two response categories were combined, along with any missing responses, and the last two categories were combined.

Number of absences: Students who participated in NAEP were asked how many days they had been absent from school in the last month. Response options included "none," "1 or 2 days," "3 or 4 days," "5 to 10 days," or "more than 10 days." The variable in the HLM analysis was recoded into two categories: students who indicated "none" for the number of days absent over the past month, and students who indicated "1 or more days" along with students who had missing responses.

2. School-level variables

Years of teaching experience: Years of teaching experience was computed as the mean of all of the years of experience of teachers in a school based on the NAEP data. If the value was missing for the entire school, the mean for all schools with data available was substituted.

Teacher certification: Based on the NAEP data, teachers of participating students were asked to indicate the type of teaching certificate they held (choosing from five possible options) or if they held no certificate. Results for students whose teachers indicated having a regular or provisional certificate were categorized as having a "certified" teacher. Students whose teachers indicated having a probationary, temporary, or emergency certificate (or if the response was missing) were categorized as having a teacher who was not certified. The variable was the aggregated value for a school of all students matched with a teacher questionnaire. The variable in the HLM analysis had two categories: "All teachers in the school were certified" and "Not all teachers in the school were certified."

Student absenteeism: The NAEP school questionnaire asked school administrators to indicate the percentage of students absent on an average day. Response options included "0–2%," "3–5%," "6–10%," and "more than 10%." The first two categories and the last two categories were combined, respectively, for the HLM analysis.

Teacher absenteeism: The NAEP school questionnaire asked school administrators to indicate the percentage of teachers absent on an average day. Response options included "0–2%," "3–5%," "6–10%," and "more than 10%." The first two categories were combined, along with Missing responses to form one category. The last two categories were combined to form the other category.

Percentage of students in racial/ethnic groups: The percentage of students by racial/ethnic categories was taken from information provided by school administrators on the NAEP school questionnaire.

Student mobility: The NAEP school questionnaire asked school administrators about the percentage of students who were enrolled at the beginning of the school year and who were still enrolled at the end of the school year. Response categories included "98–100%," "95–97%," "90–94%," "80–89%," "70–79%," "60–69%," "50– 59%," and "less than 50%." For this analysis, response categories were combined into "70% and above" and "less than 70%".

Teacher mobility: The NAEP school questionnaire asked school administrators about the percentage of full-time teachers who started last year and who left before the end of the school year. Response categories included "0%," "1–2%," "3–5%," "6–10%," "11–15%," "16–20%," and "more than 20%." For this analysis, response categories were combined into "0-5%" and "More than 5%".

Percentage of students held back and repeating: The NAEP school questionnaire asked school administrators about the percentage of the assessment-year's eighth graders who were held back and repeating eighth grade. Response categories included "0%," "1–2%," "3–5%," "6–10%," and "more than 10%." For this analysis, response categories were combined into "0-5%" and "More than 5%".

Percentage of students eligible for free/reduced-price school lunch: The percentage of students eligible for free/reduced-price school lunch in each school was based on aggregated data from among the students assessed in NAEP.

Percentage of students with an IEP: The percentage of students with an Individualized Education Program (IEP) in each school was based on aggregated data from among the students assessed in NAEP.

Percentage of students identified as ELL: The percentage of students identified as English Language Learners (ELL) in each school was based on aggregated data from among the students assessed.

School size: School size was based on the number of students currently enrolled as reported in the NAEP school questionnaire.

School safety: Student perceptions of school safety were collected from the Chicago School Connection Survey (CSCS). The continuous measure of school safety from the CSCS data was recoded into two categories—satisfactory and poor. The school safety scale score corresponding to the 25th percentile of the student distribution was used as the cut point so that scores at or below the cut point were defined as "poor" and scores above the cut point were defined as "satisfactory."

High expectations: Student perceptions of the expectations for learning in their school were collected from the Chicago School Connection Survey (CSCS). The continuous measure of high expectations from the CSCS data was recoded into two categories—satisfactory and poor. The high expectations scale score corresponding to the 25th percentile of the student distribution was used as the cut point so that scores at or below the cut point were defined as poor and scores above the cut point were defined as satisfactory.