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Small High Schools on a Larger Scale

The First Three Years of the Chicago High School Redesign Initiative

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Executive Summary

For the past three years, the Consortium on Chicago School Research, in partnership with Mills College in Oakland, California, has been studying the implementation and impact of the Chicago High School Redesign Initiative (CHSRI). This partnership between the Chicago Public Schools (CPS), the Gates Foundation, and local Chicago foundations began in 2001. More than $26 million has been dedicated toward the goal of opening approximately two dozen small high schools across the city.

The Need for Reform in Urban Public High Schools

Urban public high schools, particularly those serving low-income students of color, frequently fail to prepare their students for college, work, or life as productive citizens. In Chicago, for example,

- Only 54 percent of the 2000-01 freshman cohort graduated in four years.[1]
- The percentage of Chicago's eleventh-graders who met the 2004 Prairie State Achievement Exam standards was much lower than in the state of Illinois (36 percent vs. 57 percent in reading, and 28 percent vs. 53 percent in math).[2]
- Only 6.5 percent of those who started as thirteen-year-olds in Chicago's public high schools in 1998 or 1999 had earned a bachelor's degree by the time they were 25. Only about 3 percent of male African-American and Latino students did so.[3]

Our Study

This report details our quantitative analysis of how small schools compare to the rest of Chicago public schools, taking into account individual- and school-level characteristics. We used survey data to study the experiences of students and teachers in these schools and school district records to analyze a variety of educational outcomes.

- **Student Experiences:** We examined students' perceptions of instructional experiences, of teachers' expectations for them, and of the nature of the academic and personal support they received.

- **Teacher Experiences:** We examined indicators detailing teachers' perceptions of whether their school context might support reform, whether they experienced opportunities that facilitated instructional improvement, and the nature of the quality of student discussion in their classrooms.
- **Student Outcomes:** We examined student absences; whether students were on-track to graduate after freshman year; one-, two-, and three-year cumulative dropout rates; and scores on the Prairie State Achievement Exam.

Findings

Mixed results regarding teacher and student experiences

- Teachers in CHSRI small schools were much more likely to report working in contexts characterized by teacher influence, innovation, collective responsibility, and teacher-teacher trust than similar teachers in other Chicago high schools.
- CHSRI teachers were slightly more likely to report program coherence and opportunities for reflective dialogue, professional development, and other facilitators of instructional improvement. However, these differences were small and not statistically significant.
- Student and teacher reports of instruction in small schools were generally quite similar to reports in other schools with comparable students. One notable exception is that juniors in small schools reported greater levels of academic press; this difference was statistically significant.
- We saw substantial evidence that juniors experienced moderately higher expectations and that they received more academic and social support than similar students at other public high schools in Chicago. To a more limited degree, this was also true for first-time freshmen.

Mixed results regarding student outcomes

- First-time freshmen attending CHSRI schools were absent fewer days than their peers at other Chicago public high schools, a difference that varied from nine fewer days in 2002-03 to six fewer days during academic year 2004-05. This difference was statistically significant in all three years. Juniors at CHSRI schools were also absent fewer days than similar students, but this difference was only statistically significant in 2002-03. In that year, juniors at CHSRI schools were absent nine fewer days than their peers in other similar Chicago schools; this difference had shrunk to four days by 2004-05.
- First-time freshmen at CHSRI schools were more likely to be on-track to graduate than similar students at similar schools in all three years, but the difference was not large enough to be statistically significant. The difference ranged from about 9 percentage points for academic year 2002-03 to about three percentage points in 2004-05.
- The one-year dropout rate for first-year freshmen at CHSRI schools was not significantly different from the one-year dropout rate for similar students at schools serving comparable students in any of the three years of this study. However, by junior year, students attending the first cohort of CHSRI schools were seven percentage points less likely to have dropped out than similar students at non-CHSRI schools, a difference that is marginally significant.
- Juniors at CHSRI schools did not score differently on the Prairie State Achievement Exam than similar students at non-CHSRI schools in either reading or math in any of the three years of this study.

Implications and Conclusions

Given both the newness of the reform and the fact that only five schools have been operating for three years, it is clearly too soon to make broad claims about the efficacy of small school reform in Chicago. Our findings, however, do provide some reasons for cautious optimism about the reform and also highlight some issues in need of attention.

- It appears that small schools are fostering more personal and supportive contexts for both teachers and students. These differences may be related to the differences in dropout rates and absences that

we found in our analysis, but they do not appear to be spurring increased instructional reform activity, differing instructional practices, or improved student achievement test scores.

- Specifically, the cumulative three-year dropout rate for students attending the first cohort of CHSRI schools is 7 percentage points lower than it is for similar students attending other CPS schools that serve comparable students (20 percent vs. 27 percent). This is a sizable difference. Furthermore, for the second cohort of CHSRI schools, there is already a two-year cumulative dropout rate that is 3 percentage points lower than it is for similar students attending other comparable CPS schools. From some perspectives, if such differences persist in future years, it would go a long way towards justifying small school reform.
- Instructional reform efforts, instructional practice, and academic test scores all appear the same at small schools as at other CPS schools serving comparable students. This represents a sizable shortcoming of the reform effort. In response to this concern, district leaders are now coordinating their efforts with the CHSRI staff to help schools focus more directly and productively on instructional improvement. It will be important to follow these efforts, as we suspect that their success is essential if educators in small schools are to be able to foster improved academic outcomes for their students.

Endnotes

1 Allensworth (2005).
2 Ponisciak (2005).
3 Roderick, Nagaoka, and Allensworth (2006); Roderick (2006).

Introduction

Increasingly, researchers, policymakers, school leaders, and concerned citizens are recognizing that high schools in the United States are in need of major reform—or, as some have put it, in need of being reinvented.[1] Current research shows that high schools are not preparing students for college, work, or life,[2] and that they are leading to increased alienation among students.[3] In a much-noted speech to the National Governors Association, Bill Gates described high schools as "obsolete." He continued, "By obsolete, I don't just mean that our high schools are broken, flawed, and under-funded. Although a case could be made for every one of those points. By obsolete, I mean that our high schools, even when they are working exactly as designed, cannot teach our kids what they need to know today."[4]

Analysis by Greene and Winters indicates that the national graduation rate for the class of 2002 was 71 percent for public school students, and that only 34 percent of students who entered ninth grade in public schools left school with both a regular diploma and the qualifications to attend a four-year college. The problem is especially severe in large urban high schools, which disproportionately serve students of low socioeconomic status and students of color. According to Greene and Winters, of students enrolled as ninth-graders and scheduled to graduate in 2002, only 52 percent of Latino and 56 percent of African-American students ultimately earned a regular diploma. Furthermore, the likelihood of graduating with the abilities and qualifications to even apply to a four-year institution is only 40 percent for white students, 23 percent for African-American students, and 20 percent for Latino students.[5] Chicago's public schools reflect these trends. Only 54 percent of the 2000-01 freshman cohort graduated in four years, by 2005.[6] In addition, eleventh-graders in Illinois scored higher than eleventh-graders in Chicago on the 2004 Prairie State Achievement Exam (PSAE) (57 percent of Illinois students met

standards in reading compared with 36 percent in Chicago, and 53 percent of all students in Illinois met standards in math compared with 28 percent in Chicago).[7] Moreover, Roderick, Nagaoka, and Allensworth found that only 6.5 percent of 13-year-olds in Chicago's public high schools in 1998 or 1999 had graduated from high school and earned a bachelor's degree by their mid 20s (within six years). And only about 3 percent of male African-American and Latino students did so.[8] As Daniels, Bizar, and Zemelman write, "America's high schools are failing all of our kids some of the time and some of our kids all the time."[9]

Spurred by these concerns, many educational reformers have proposed that the creation of small schools provides a possible response to Powell, Farrar, and Cohen's characterization of comprehensive "shopping mall" high schools as impersonal, incoherent, and ineffective.[10] This focus reverses a trend often associated with James Bryant Conant who, roughly 50 years ago, argued that small rural schools were less effective than larger comprehensive high schools that could provide students with greater opportunities through an appropriately differentiated curriculum.[11]

Reform focused on smaller, more personal schools has been spurred by educators such as Deborah Meier, researchers such as Fred Newmann and Gary Wehlage, and by foundation funding.[12] Most notably, the Bill and Melinda Gates Foundation has committed over $900 million to high school reform, most of it committed to improving schools through the creation and replication of small high schools.[13] Energized by these efforts, the city of Chicago and numerous other urban districts are emphasizing the creation of small schools as a key part of their high school improvement strategies.

Studying Small School Reform in Chicago

For the past three years the Consortium on Chicago School Research, in partnership with Mills College, has been studying the implementation and impact of small school reform in Chicago. A major goal of this work has been to assess whether students attending small high schools had improved academic performance and lower dropout rates when compared with similar students attending other schools in the district. In particular, we wanted to know: Are students absent less often? Are they more likely to be on-track to graduate by the end of their freshman year? Are they less likely to drop out? Are they performing better on state achievement tests?

In addition, in an effort to understand why there might or might not be differences in these outcomes, we assessed whether small schools fostered environments for teachers and students that differed from the environments in larger schools serving similar students. We were especially interested in whether small schools created work environments for teachers that spurred instructional innovation and, ultimately, improved classroom opportunities for students to learn, as well as whether small schools promoted more academically and personally supportive settings for students.

We begin by reviewing some pertinent research on small high schools and why they may hold promise for improving high school outcomes. Drawing on this review, we will next describe the theory of action underlying Chicago's small school reform. We then detail the methods associated with our quantitative inquiry, the key findings, and potential implications.

Endnotes

1 Harvey and Housman (2004).
2 American Diploma Project (2004)
3 American Youth Policy Forum (2001).
4 Gates (2005).
5 Greene and Winters (2005).
6 Allensworth (2005).
7 Ponisciak (2005).
8 Roderick, Nagaoka, and Allensworth, (2006); see also Roderick, (2006).
9 Daniels, Bizar, and Zemelman (2001), 22.
10 Powell, Farrar, and Cohen (1985).
11 Conant (1959).
12 Meier (1995); Newman and Wehlage (1995).
13 Bill and Melinda Gates Foundation (2006); Hendrie (2004).

Chapter 1

Prior Research on the Impact of Small Schools

Are Small Schools Associated with Improved Outcomes?

Findings regarding the impact on students of small school reform efforts are not consistent. Several studies have found that small elementary and secondary schools are associated with improved student achievement.[1] There is also evidence that small schools promote more equitable access to academically demanding courses,[2] more equitable gains in achievement,[3] and lower dropout rates.[4] In addition, Barker and Gump's seminal study demonstrated that small schools tend to provide students with more opportunities for participation and leadership in a wide range of extracurricular activities.[5]

Not all findings regarding the impact of small schools are positive, however. Wasley et al., as well as Hess and Cytrynbaum, studied small schools in Chicago and found enhanced engagement, but no consistent impact on student achievement.[6] Similarly, preliminary results from the national evaluation of the Gates small schools initiative are mixed. While researchers found evidence of a more positive school climate, especially in terms of increased personalization for students and increased common focus for teachers, they also found continuing deficits in teacher capacity two or three years into the reform.[7] In addition, as part of their 2004 evaluation, researchers also collected teacher assignments and student work from 16 schools. They found some evidence of more rigorous teacher assignments and higher-quality student work in English/Language Arts. However, they also found that student work in mathematics was actually of lower quality in small schools than in the schools with which they were compared.[8] The

national study also compared improvement trends in the test scores of small schools in three districts with those of the rest of the schools in those districts. The results of these comparisons are mixed and therefore inconclusive.[9]

Which Characteristics Are Associated with Successful Small Schools?

Just as the evidence regarding outcomes in small schools is equivocal, so is the evidence regarding which small school components are most essential or most highly related to improved achievement. Some scholars have sought to identify these factors, indicating that the beneficial value of small schools depends on the degree to which they promote factors such as personalization, interactive and authentic instruction, and challenging curriculum, while also promoting equitable student learning opportunities.[10]

Unfortunately, promoting these characteristics appears to be quite difficult. Research on small learning communities and instructional practices finds that changes in teachers' professional environment are more common than changes in curriculum and instruction. For example, a study of initiatives to create small learning communities in Cincinnati and Philadelphia found that they improved the communal culture of teacher communities, but did not alter the instructional focus.[11] The qualitative work we have been doing in Chicago, which examines efforts to promote instructional change in small schools, has come to similar conclusions. Teachers report a more collaborative context, but do not report that this is altering their instructional practices in a significant way, unless there is evidence of strong instructional leadership.[12]

Adding to the uncertainty is the question of scale. Many current reform efforts, including Chicago's, go far beyond launching a few idiosyncratic small schools; instead these initiatives aim to promote small schools on a large (or at least larger) scale. This more expansive reform strategy is worthy of attention. To date, many small schools have been launched in a relatively idiosyncratic way. Their leaders may have had particular insights or vision; special connections; or a great deal of charisma, resources, drive, etc. For example, several of the small high schools that existed in Chicago prior to the Chicago High School Redesign Initiative (CHSRI) raised hundreds of thousands of dollars in addition to the funds provided by the district. Even if these smaller schools outperformed other high schools serving similar students, it does not mean that efforts to launch small schools on a large scale will be as effective.

Given the scant evidence base, how can replicators be sure what factors must be present for small schools to succeed? Indeed, although much has been written about small high schools, and although many in the foundation community and some reformers believe that this strategy can improve the life chances of high school students, the research supporting these beliefs is limited. Moreover, while current studies indicate that small schools are sometimes associated with improved outcomes, neither the magnitude nor the consistency of these effects is clear, and the factors that can lead small schools to produce improved outcomes are not well understood.

Our study aims to deepen understanding of these issues. We examine one particular districtwide effort in the Chicago Public Schools (CPS) to promote small school reform on a larger scale. In addition, to the extent that small schools are associated with outcomes that differ from outcomes in larger schools serving similar students, we hope to understand why. We therefore examine whether small schools create more academically and personally supportive contexts and improved instructional opportunities for students.

Endnotes

1 Cotton (1996); Darling-Hammond, Ancess, and Ort (2002); Lee (2002); Holland (2002); Haller (1993); Howley (1989).
2 Bryk, Lee, and Holland (1993)
3 Lee and Smith (1995); Darling-Hammond, et al. (2002)
4 Darling-Hammond, et al. (2002); Holland (2002); Pittman and Haughwout (1987).
5 Barker and Gump (1964).
6 Wasley, et al. (2000); Hess and Cytrynbaum (2002).
7 Shear, et al. (2005).
8 Mitchell, et al. (2005)
9 Rhodes, et al. (2005).
10 Darling-Hammond, et al. (2002); Lee (2002).
11 Supovitz and Christman (2003).
12 Stevens (2006).

Chapter 2

Small School Reform in Chicago

Chicago provides a valuable setting for considering the challenges and possibilities of small school reform. It is the third-largest district in the United States, serving some 427,000 students. Slightly more than 106,000 of these students are in grades 9 through 12, attending one of 107 high schools, including roughly two dozen small schools and charter schools. In addition, overall student performance in high schools is unacceptably low. As noted earlier, on average, high school students in Chicago significantly underperform the rest of the state on the PSAE, and CPS has an overall graduation rate of just 54 percent. In response to these problems, the district has instituted a wide range of policies to improve educational opportunities and outcomes for students. CPS has made schools accountable for student performance, sanctioning those that do not meet test-score performance targets and rewarding those that do; created a system of selective-enrollment schools intended to attract and retain high-achieving students; strengthened the list of courses required for graduation; and created both opportunities and requirements related to professional and curricular development.[1]

In addition to the above strategies, the creation of small high schools is an important component of Chicago's school reform strategy.[2] This approach has been adopted by other districts, and sometimes by individual schools, leading to small schools of different forms. For example, some small schools exist as autonomous units within larger school buildings, while others are smaller learning communities with a common administrative team. Still others are newly created, freestanding, autonomous schools (some of which may be charter schools). Some small schools were created

by breaking up poorly performing large schools, and some were created to serve smaller student bodies because they have highly specialized foci or admission requirements. All of these forms can be found within Chicago's public high schools. While Chicago has a history of small school creation, we will focus on one prominent strategy for high school reform, the Chicago High School Redesign Initiative (CHSRI). In partnership with CPS, the effort was launched by the Bill and Melinda Gates Foundation and local funders. It began in September 2001 with a $12 million grant from the Gates Foundation, matched by $6 million from foundations in Chicago, and ultimately will develop and support approximately 25 new small high schools.

The goal of the first phase of this initiative was to convert up to five large high schools into 15 to 20 autonomous small schools over five years. CHSRI published a formal request for proposals (RFP) in 2001, indicating that large high schools would be selected based on criteria including having a history of small school activity; being a neighborhood school with high need factors (poverty and low academic achievement); submitting a high-quality proposal with a governance plan; and demonstrated support from all stakeholders of the school community.[3] Teachers and other interested parties were invited to apply for foundation funds and the right to convert a large school into a group of autonomous small schools. These schools would share the building, but not administrative staff or discretionary funds.[4] The CHSRI board and CPS administrators selected three large, underperforming high schools, and from the individual proposals from these schools selected five small high schools to open in the fall of 2002. An additional four schools in the same buildings opened in 2003, and a final set of three schools opened in 2004. Participating teachers for these twelve small schools came largely (although not solely) from the teaching force that was already at the three large schools. Indeed, teachers knew that they needed to join one of the small schools by the time the school's conversion was completed or they would lose their job.

In April 2003, CHSRI received a second grant of almost $8 million from the Gates Foundation to open twelve new (rather than converted) small high schools over five years.[5] So, in addition to opening conversion schools, starting in the fall of 2004 CHSRI adopted a second strategy, namely starting new schools from scratch. In that year, CHSRI helped fund and support the creation of two new small schools that were part of the Big Picture network and also worked with other stakeholders in Chicago to respond to additional RFPs. In 2005, CHSRI opened two additional new (not converted) schools. In these cases, faculty were recruited from other schools and from the general hiring pool.[6]

The Initiative's Theory of Change

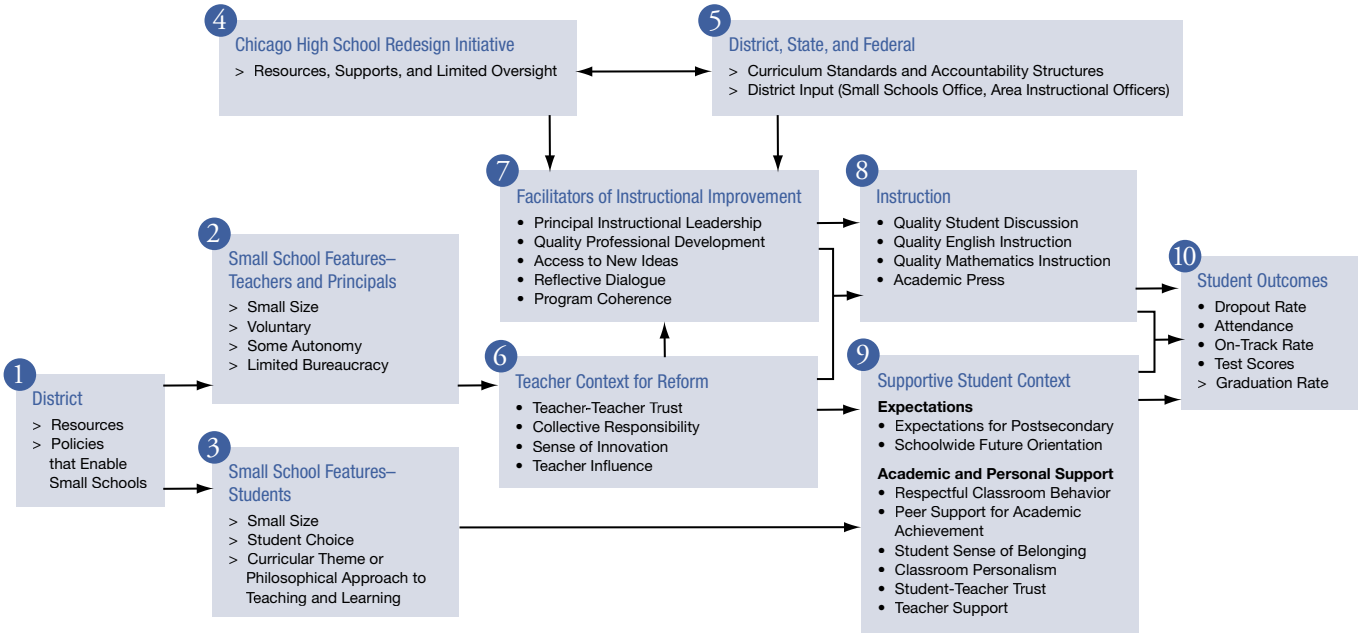
Like many current evaluative studies of educational interventions, we have adopted a theory-driven strategy.[7] Rather than focusing only on whether the intervention promoted improved student outcomes, this strategy also examines the assumptions the architects of the initiative made regarding why or how the reform would achieve improved outcomes. For instance, as we will detail below, proponents of small school reform often assume that small schools are a good way to create more collegial environments for teachers, which in turn will prompt instructional innovations. They also often assume that efforts to reform teaching will lead to better instruction and this, in turn, will promote student learning.

An outcome-driven study might focus solely on whether students in small schools learned more than similar students who did not attend small schools. In contrast, a study that employs a "theory of change" approach will examine whether teachers who work in small schools do, in fact, experience more collegial settings and whether they teach differently than those in larger schools serving similar students. Such a study will also examine student learning outcomes. The hope is that by focusing on central assumptions regarding why and how a given reform promotes desired results, researchers gain a better understanding of why a reform succeeded (or failed). They also discover which assumptions might be in need of revision and whether modifications to the reform strategy or its implementation might be necessary.

Therefore, an early priority in our study of CHSRI was to map out the reform's theory of change or, as we

FIGURE 1

Theory of Action



• Bulleted text is the focus of this report, measured through student and teacher surveys and administrative records.

called it, theory of action. We conducted interviews with key stakeholders: funders, district leaders, reform staff, teachers, and principals. We also examined written documents associated with the reform agenda (such as the RFP to create small schools and district statements regarding the initiative). Finally, we looked at the broader literature on small schools as well as statements by the Gates Foundation, which local actors drew upon to explain what they were hoping to accomplish and how they were going to do it. We then drafted a memo that outlined a theory of action, shared it with key stakeholders, and made minor revisions. Although this theory has undergone modest revision since then to reflect clarifications and revised thinking on the reform, it has stayed largely the same and has served as an organizing framework for our analysis.

Below, we describe this theory. This framework portrays the mechanisms through which various features of small school reform are thought to promote desired contexts for students and teachers. It also details how these contexts, in the presence of district, state, and federal influence, can promote both curricular change and desired outcomes. See Figure 1.

The theory, as outlined in Figure 1, suggests that improved student outcomes result from numerous factors both inside and outside the small school. First, and primarily, the theory and its advocates assume that if a district (Box 1) provides appropriate resources and policies then this will lead to the creation of small, voluntary schools, in which teachers and principals experience limited bureaucratic regulation (Box 2). This, in turn, will help create a desirable context for reform (Box 6) characterized by trust, collective responsibility, and teacher influence, for example. Moreover, it assumes that creating such contexts for teachers and principals is fundamentally important as a means of fostering a setting where meaningful instructional improvement activities can occur (Box 7). Clearly, the creation of a context conducive to instructional improvement activities is also shaped by the provision of resources and supports from both the CHSRI staff and the district (Boxes 4 and 5). Those helping to shape and implement this initiative must deftly balance their need to provide support and direction with their need to protect the small schools' autonomy. The primacy of small school autonomy and flexibility must also be balanced with the need for accountability and bureaucratic structures, so that the reform can function effectively and responsibly

on a large scale. Ideally, this combination of internal vision and external support and direction will lead to meaningful and coherent instructional improvement activities (Box 7), which should lead to higher quality instruction (Box 8).

Proponents of small school reform also believe that it will enable creation of school communities in which all students are held to high expectations and receive both personal and academic support. In large part, this hope rests on the assumption that smaller environments will spur more personal relationships between students and teachers. Commitment to the school community should be further enhanced by the fact that both students and teachers have chosen to be part of a school and share an interest in a common curricular theme (Box 3). These more personal relationships and shared sense of community, combined with the ability to keep track of all students, are expected to help teachers provide greater academic and personal support, while holding all students to higher expectations (Box 9). This supportive context, both on its own and combined with high quality instruction, will, if reformers' assumptions hold, make desirable student outcomes more likely (Box 10).

Although our broad study aims to examine the entire theory of change described above, this report concentrates on those aspects of the theory of change that we can assess quantitatively. In particular, drawing on Consortium surveys and administrative data from CPS, this report examines those aspects of the theory outlined in Boxes 6, 7, 8, 9, and 10. Qualitative work carried out as part of this project has also examined Boxes 1, 2, 3, 4, and 5, but we do not detail that research here.[8]

Students and Teachers in the CHSRI Schools

As previously stated, the three high schools where the conversions took place were among the lowest performing in the city. In comparison with students who attend other high schools in Chicago, CHSRI students' achievement scores are lower, they are more likely to receive special education services, more likely to be old for grade, more likely to have been mobile in elementary school, and they are more likely to be students of color (see Table 1).[9]

TABLE 1

Performance and Demographic Characteristics of First-Time Freshmen, 2004-05

	CHSRI	All Other High Schools	All Other Nonselective High Schools
Incoming Eighth-Grade ITBS Reading*	228	246	240
Racial Composition Percentage			
African-American	85.6	50.9	53.0
Latino	11.5	35.9	36.8
White	2.2	9.2	7.3
Percentage Receiving Special Education Services	25.5	17.0	18.2
Percentage Old for Grade	34.9	23.7	25.9
Percentage with Two or More Moves in the Three Years Prior to High School	20.1	12.8	13.7

The national average Iowa Tests of Basic Skills (ITBS) score for an eighth-grader is 250, for a seventh-grader is 239, and for a sixth-grader is 227.

As detailed in Table 1, the CHSRI freshman class of 2004-05 (the most recent year for which we have data) came into high school with an average Iowa Tests of Basic Skills (ITBS) score in reading of 228. To put this in perspective, a sixth-grade student reading at the national average would score 227 at the end of the year, which means that the 2004-05 CHSRI freshman class scored roughly two years below grade level.

CHSRI schools serve a population of students that is overwhelmingly minority; 85 percent of students in CHSRI schools are African-American. In addition, one-quarter of the students received special education services and more than one-third of the students started ninth grade at least one year older than students who progressed regularly through school; in other words, these students had been retained at least once in their elementary school career. One-fifth of these students changed elementary schools at least twice in the middle school years (most of Chicago's elementary schools extend through eighth grade).

Although Table 1 presents student characteristics

for 2004-05, the first two CHSRI cohorts (2003-03 and 2003-04) are very similar in terms of achievement and demographic characteristics.

To examine the teaching force in CHSRI schools, we looked at self-reported background information from teachers who took the 2005 Consortium survey (see Appendix A for details on the overall survey response rates). CHSRI schools tend to have a larger population of novice teachers with less than three years of experience (36 percent vs. 26 percent in other high schools) and a smaller population of veteran teachers with more than 11 years of experience (33 percent vs. 44 percent). In addition, a slightly higher percentage of teachers at CHSRI schools entered the profession through alternative certification.

In short, CHSRI schools admit some of the lowest-performing students in the system who bring with them significant challenges such as high mobility, and they must serve these students with teachers who are less experienced than those in the rest of the system.

Endnotes

1 Lee (2002).

2 Although this effort received a major push in late 2001, the focus is not new to Chicago. In 1995, the Chicago Board of Education endorsed a resolution (95-0829-RS2) that affirmed the value of developing small schools, and five small charter schools as well as one district small school were in operation prior to 1999.

3 Chicago High School Redesign Initiative Request for Proposals, issued December 3, 2001, Section IV. Available from authors.

4 Ibid.

5 Chicago Public Schools, Office of Small Schools (n.d.).

6 The conversion schools opened with a variety of grade level configurations due to particularities within each converting school. Of the 12 conversion schools, four opened with ninth-graders only, one opened with ninth- and tenth-graders, one with grades 9 and 11, and six schools opened with grades 9 through 12. All four of the new starts opened with freshmen only.

7 Weiss (1995); Chen (1990); Connell, et al. (1995).

8 Stevens (2006); Sporte, Correa, Kahne, and Easton (2003); Sporte, Kahne, and Correa (2004).

9 This appears to be true of Gates-supported small schools in general. In the four districts where SRI International and the American Institutes for Research examined such data, the Gates-supported small schools were more likely than other schools to have students with lower academic achievement, students eligible for free and reduced-price lunch, students who were members of minority groups, students receiving special education services, and students of limited English proficiency. See Rhodes, et al. (2005).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Chapter 3

Sample and Methods Used in Our Research

In order to address the research questions in this study, we relied on students' and teachers' survey responses and student administrative and test score data. For the analysis of student and teacher contexts, we studied responses from the Consortium's biannual districtwide survey, administered in April and May of 2005.[1] For the teacher survey there were 10 CHSRI schools representing 190 teachers and 42 non-CHSRI schools representing 3,083 teachers. Among first-time freshmen, 865 students in 12 CHSRI schools responded, as did 15,064 students in 59 non-CHSRI schools. Finally, we also analyzed the responses from 244 juniors in 6 CHSRI schools and 9,016 juniors in 48 non-CHSRI schools. Additional details about the analytic samples can be found in Appendix A. Using Rasch scaling of the survey data, we constructed measures of the concepts described in Boxes 6, 7, 8, and 9. Appendix B describes the Rasch methodology.

For the analysis of student outcomes, we examined annual data from CPS administrative records including grades, attendance, and scores on the PSAE. This permits us to look at student outcomes during the three years the reform has been in place. Details on sample sizes can be found in Appendix A.

When analyzing teacher survey data we used responses from all high school teachers in our sample because most teachers, both in CHSRI schools and in other high schools, teach more than one grade level of students. Our analysis of student data—both context and outcome—focused on first-time ninth-graders as well as on eleventh-graders. There are two main reasons for analyzing ninth-graders' data. First, because CHSRI schools are only one to three years old, ninth grade is the only grade that all CHSRI

schools have in common, and we wanted to compare similar students while maximizing our sample size. Second, we know from prior studies that what happens during freshman year is of crucial importance to students' future educational trajectories.[2] Indeed, one of our outcome indicators, on-track to graduate, is defined specifically for first-time freshmen.

We also have two reasons for analyzing eleventh-grade student data. First, one of our key outcome measures, standardized test scores, is based on the PSAE, which is only given to eleventh-graders. In addition, it seems plausible that some of the benefits (or possibly costs) of small schools, such as strong social bonds that result from multiple years in a small school community, may take several years to develop. Thus, despite the smaller sample size, we decided to also compare the experiences of eleventh-graders attending small schools with the experiences of similar students attending large high schools.

As noted above, there are some differences between CHSRI students and teachers and those in the rest of the district. Differences in survey measures or student outcomes could arise from the differences in the populations of CHSRI teachers and students versus the populations of other Chicago public high schools. For this reason, when considering how student outcomes, school contexts, and instruction in CHSRI schools compare to those in the rest of Chicago's high schools, it is necessary to be sure that our comparisons are of similar students and teachers. Controlling for these characteristics allows us to estimate differences among students who are similar in terms of demographic and academic factors such as gender, race, prior achievement, mobility, economic status, and age relative to grade. Similarly, we control for the impact of teacher outcomes that might result from differences that exist among teachers in terms of gender, race, education level, teaching experience, and certification.

When making comparisons between CHSRI and the rest of the system, it is also important to consider how the concentration of particular student characteristics in a school could affect the differences between CHSRI schools and other schools, beyond the effect of individual student attributes. Therefore, in our comparisons we introduce statistical controls for concentration effects of the academic performance of the students and the demographic and socioeconomic mix of the student body in each high school. Finally, to account for the fact that students (or teachers) are nested within schools, we used hierarchical modeling.[3]

How We Make Comparisons

In the remainder of this report we will be looking at differences in measures and outcomes between students and teachers in CHSRI schools and those in other Chicago public schools. These comparisons take individual and concentration effects into account, as described above. Therefore we will be comparing similar students and teachers under similar circumstances. We will not repeat this fact in the following sections, but the reader should keep in mind that all comparisons are between similar students or teachers in schools serving similar populations of students.

Our models differed slightly depending on the outcome analyzed. The survey analyses used three-level hierarchical linear models, where the first level provided a latent measure score after adjusting for survey measurement error. At the individual teacher level, we controlled for race, gender, education level, years of experience, and whether teachers entered the profession through alternative certification. At the individual student level, we controlled for prior academic achievement, race, gender, socioeconomic status, special education status, age relative to grade, and mobility prior to entering high school. At the school level we included whether the school was a CHSRI school as well as indicators of the aggregate incoming achievement level of the student body, the aggregate socioeconomic status of the student body, and the racial composition of the school.

The analyses of student outcomes used two-level hierarchical models, employing similar controls at the individual student level as well as a set of dummy variables indicating the academic year. At the school

level, for each year we controlled for whether the school was a CHSRI school, the aggregate incoming achievement level of the student body, and the aggregate socioeconomic status of the student body. Appendix C provides a complete description of the variables and the models we used.

When describing differences that might exist between CHSRI and non-CHSRI schools on the survey measures of school context and instruction, we state whether the difference is statistically significant and provide the estimated effect size of the difference. To say that a difference is statistically significant means that we are at least 95 percent confident that there is a difference between CHSRI and non-CHSRI schools on a given indicator. The effect size tells us how large the difference is.[4] Whether an effect size is "large" or important or meaningful often differs depending on the phenomenon being studied.[5] A general rule of thumb is that effect sizes between 0.20 and 0.50 are "slight," those between 0.50 and 0.80 are "moderate," while those above 0.80 are "substantial," although in educational reform efforts the effects may tend to be slight to moderate but important nonetheless.[6]

The way we describe varying student outcomes is somewhat different. While we do state whether the difference is statistically significant, we do not report effect sizes. Instead, we provide an estimate of the magnitude of the difference between students at CHSRI schools and similar students at other schools on the given outcome (dropout rates, achievement test score, etc.).

Interpreting Effect Sizes

Statisticians calculate effect sizes, measured in standard deviation units, as a way of describing the impact of a given characteristic of a school or classroom or student on an outcome of interest. For example, if a given characteristic of a school, such as being a CHSRI small school, has an impact on a given outcome, such as *Program Coherence,* then we can describe the size of that impact in terms of its effect size.

For those not familiar with this convention, it might be helpful to think of effect sizes in terms of where it puts one group of schools—for example, CHSRI schools—in relation to another group of schools—in this example, non-CHSRI schools. The size of the effect will determine how far apart the averages of the two groups are. An effect size of zero means there is no difference between the average CHSRI and the average non-CHSRI school on the outcome of interest (in this example, Program Coherence).

To help understand the magnitude of these effect sizes, suppose we found find that the CHSRI effect on *Program Coherence* was 0.25. This would mean that the average CHSRI school would have a score that would place it above 60 percent of non-CHSRI schools. If the size of the effect were 0.50, then the average CHSRI school would have a score on that measure that would place it above 69 percent of non-CHSRI schools. A CHSRI effect size of 1.0 for *Program Coherence* would mean that the average CHSRI school would score higher than 84 percent of non-CHSRI schools. Finally, if the CHSRI effect size were 2.0, then the average CHSRI school would have a score that would place it above about 98 percent of non-CHSRI schools.

Endnotes

1 We had usable survey data from three CHSRI schools in 2003. Results from that very preliminary analysis can be found in Kahne and Sporte (2004).

2 See for example Allensworth and Easton (2005); Kemple, Herlihy and Smith (2005); Miller, Allensworth, and Kochanek (2002).

3 Raudenbush and Bryk (2002).

4 We measured the effect sizes in standard deviation units, and we computed them by dividing the estimate of the CHSRI coefficient by the standard deviation of the measure, determined by taking the square root of the sum of the level two and level three variances from the unconditional model for each measure.

5 Thompson (2002).

6 Cohen (1988); Konstantopoulos and Hedges (2005).


og Anatomy

Chapter 4

Findings

We organize our discussion of findings around the Theory of Action (See Figure 1 on page 11). For those findings related to survey measures, a summary of the measures, their reliabilities, and between-school variability can be found in Appendix D.

Is the context in which CHSRI teachers work more conducive to reform than at other Chicago public schools?

Overall, we found that teachers in CHSRI schools reported a more supportive context for reform than teachers at other Chicago public schools. Specifically, once we controlled for the academic and demographic qualities of students, teachers, and their schools, we found that CHSRI teachers had significantly higher scores on all of the indicators of Box 6, Teacher Context for Reform, than similar teachers at other schools. Specifically, teachers at CHSRI schools reported slightly higher levels of *Teacher-Teacher Trust* than similar teachers at other schools (effect size = 0.37). High scores on this measure indicate that teachers trust other teachers, that they care about each other, and that they feel it is appropriate to discuss worries and frustrations with other teachers. Furthermore, they accord respect to other teachers who are considered to be leaders in school improvement or experts in their craft.

CHSRI teachers also reported a higher sense of *Collective Responsibility* than similar teachers at other schools (effect size = 0.47). This measure asks teachers to estimate how many of their colleagues take responsibility for improving their school and for setting high standards for themselves. In addition, teachers are asked to estimate others' sense of responsibility for all students in the school—for helping them learn, helping them develop self-control, and maintaining discipline.

In addition, CHSRI teachers also indicated a greater level of *Commitment to Innovation* and engagement with learning than teachers at similar school (effect size = 0.52). This measure contains items asking teachers to reflect on whether teachers in the school are continually learning, that they have a "can do" attitude, and that all teachers are encouraged to stretch and grow.

Finally, teachers at CHSRI schools reported greater levels of *Teacher Influence* than similar teachers at other schools, a finding that is consonant with one of the founding principles of the initiative—that it should be a teacher-led reform. The difference between CHSRI and non-CHSRI teachers on this measure was a "substantial" difference, with an effect size of 0.83.

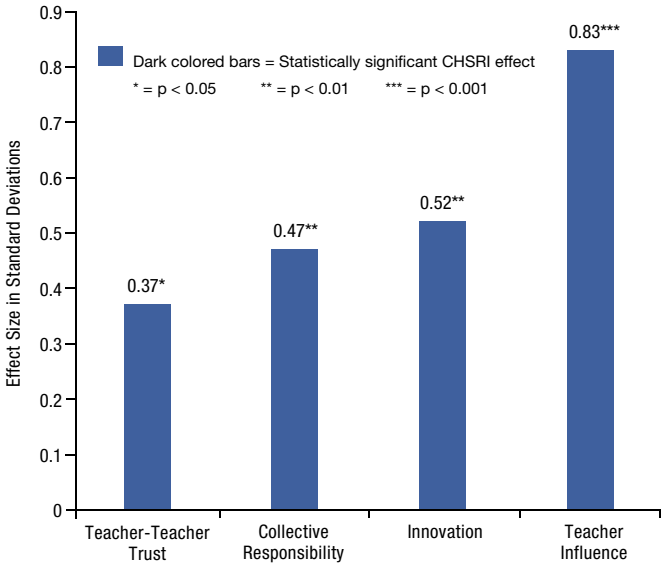
6

Teacher Context for Reform

- Teacher-Teacher Trust
- Collective Responsibility for Student Achievement and School Improvement
- Commitment to Innovation
- Teacher Influence on Instruction, Discretionary Spending, In-service Content, and Other School Decisions

FIGURE 2

CHSRI Effect Size and Significance Level
Box 6: Teacher Context for Reform



Items ask teachers to rate the amount of influence they have in decisions about instructional and curricular materials and programs, in setting standards for student behavior, in forming the content of in-service programs, and in administrative matters such as hiring new personnel and planning how to spend discretionary school funds.

Figure 2 summarizes the results for Box 6, Teacher Context for Reform.

Do CHSRI teachers and principals engage more heavily in practices that facilitate instructional improvement than staff at other Chicago public schools?

As reported above, CHSRI teachers were more likely to report having trusting and collegial relationships, a commitment to innovation, a sense of collective responsibility for school improvement, and a belief that they had a stronger influence than teachers at other schools. That is, we observe a very favorable context for reform. When we look at a set of more specific practices thought to facilitate instructional improvement, however, CHSRI teachers reported that they (and their principals) were only slightly more engaged with these practices than other teachers. Although all differences between CHSRI teachers and other teachers on measures related to instructional improvement activities were positive, only one was even marginally significant.

The level of *Principal Instructional Leadership* reported by CHSRI teachers was no different from the level reported by teachers at other schools (effect size = 0.09). This measure contains items asking teachers whether their principal has communicated expectations for meeting instructional goals and has a clear vision for the school. In addition, teachers are asked whether their principal understands how children learn, sets high standards for teaching and learning, presses teachers to implement what they have learned in professional development, tracks student academic progress, and knows what is going on in classrooms.

Furthermore, CHSRI teachers' reports about the quality and quantity of professional development they received were not statistically different from the responses of other similar teachers. High scores on *Quality Professional Development* indicate that teachers' professional development experiences are coherent and sustained, include enough time to try and evaluate new ideas, are connected to the school's improvement plan, and include opportunities to work with colleagues. CHSRI teachers' responses to this measure were similar to the responses of other teachers (effect size = 0.13). In addition, there was not a statistically significant difference between CHSRI teachers and similar teachers

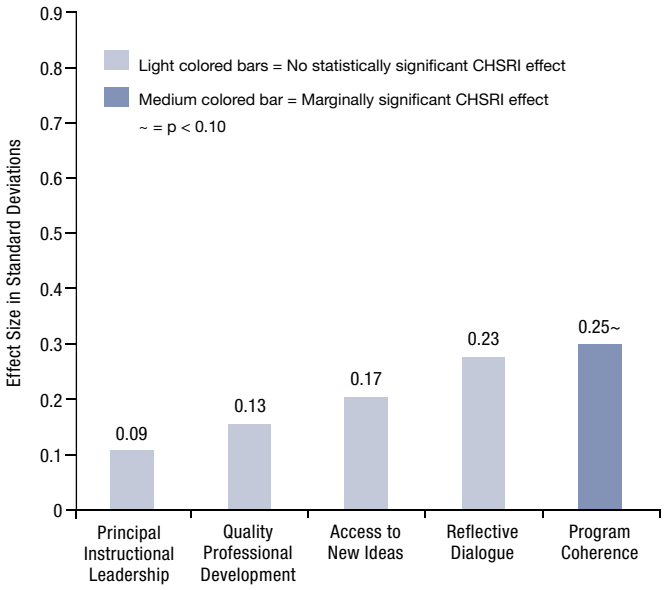
7

Facilitators of Instructional Improvement

- Principal Instructional Leadership
- Quality Professional Development
- Access to New Ideas through Participation in Professional Development
- Reflective Dialogue
- Program Coherence

FIGURE 3

CHSRI Effect Size and Significance Level
Box 7: Facilitators of Instructional Improvement – Teachers



on *Access to New Ideas through Professional Development* (effect size = 0.17). This measure asks teachers how often they participate in a network of teachers outside of their own school; how often they attend professional development activities sponsored by their school, CPS, or the teachers union; whether they have taken college courses related to improving their school; and how often they discuss curriculum and instruction with an outside organization.

The largest CHSRI effects in Box 7, Facilitators of Instructional Improvement, occurred on the measures that were most closely tied to teachers' in-school practices—our measures of teacher participation in *Reflective Dialogue* and of *Program Coherence.* CHSRI teachers' scores on *Reflective Dialogue* were not statistically different from the responses of other teachers (p = 0.15), but the effect size was 0.23, indicating

a slight effect. This measure asks whether teachers regularly discuss assumptions about teaching and learning and whether they share and discuss student work. It also asks teachers how often they discuss what helps students learn, school goals, developing new curriculum, and managing classroom behavior. CHSRI schools have instituted several practices that aim to facilitate reflection. For example, their teaching teams have supports for instructional improvement activities such as schedules that enable common planning time and small groups of teachers working together on action research. Although the difference in *Reflective Dialogue* did not reach statistical significance, these efforts may be facilitating teachers' reflective practices at CHSRI schools.

Finally, we found marginally significant differences ($p = 0.08$) in the reports of CHSRI teachers and teachers between other Chicago public schools when it came to *Program Coherence*. This measure asks teachers whether there is continuity between programs at the school; whether new programs are followed up; and whether there is coordination in curriculum, materials, and instruction both within and across grade levels. CHSRI teachers scored higher on this measure than similar teachers at other schools, with an effect size of 0.25. A substantial body of evidence suggests that *Program Coherence* is an important factor in improving student performance.[1]

Figure 3 provides details on the size and significance of the CHSRI effect.

Do students at CHSRI schools experience classroom instruction differently than similar students at other Chicago public schools?

As explained in our methods section, we examined the instructional experience of first-time freshmen and juniors separately. In general, there were few statistically significant differences between the instructional experience of CHSRI students and the experiences of similar students attending other schools. On one of the three student measures there was a marginally significant difference between CHSRI freshmen and other freshmen; on another of these measures there was a significant difference for juniors.

The quality of student discussion as reported by teachers, for example, was no higher in CHSRI schools than in other schools.[2] CHSRI teachers' reports of the degree to which students build off each others' ideas, show respect for each other, and use data and text references to support their ideas were no different from the reports of teachers at other similar schools.

Furthermore, first-time freshmen at CHSRI schools responded no differently than first-time freshmen at other schools to items asking about the quality of English instruction and the level of *Academic Press* they experienced (effect sizes of 0.01 and 0.04). *Quality English Instruction* includes items asking students about the amount of writing, revision, and attention to elements of literature they experience, while *Academic Press* includes items asking students whether teachers expect everyone to work hard, and whether they find the work hard and are challenged. In both of these cases the responses of first-time freshmen at CHSRI schools were indistinguishable from the responses of similar students at other Chicago public schools. We did find a marginally significant difference between CHSRI freshmen and similar freshmen on items asking them to reflect on their experiences of mathematics instruction (effect size = 0.19). This measure asks students whether they discuss math problems and explain solutions to their classmates, apply math to real-life situations, and have to explain solutions in writing.

8

Instruction

Teacher Measure:

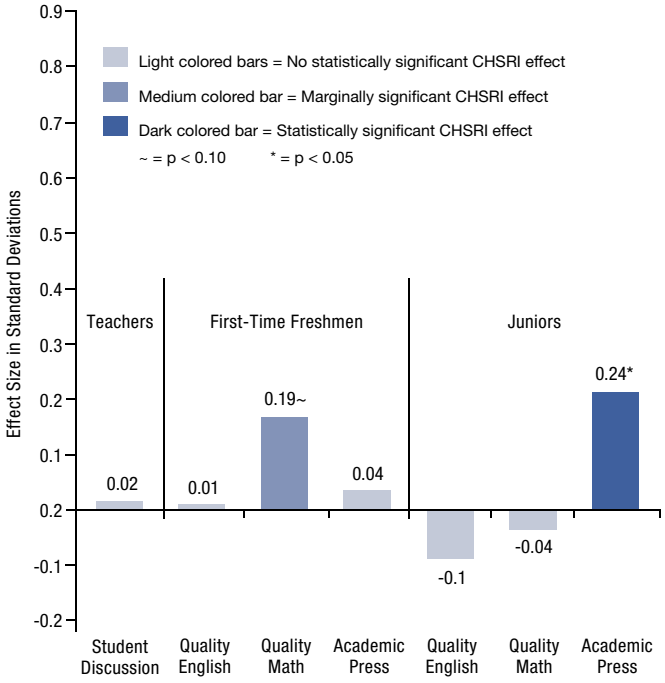
- Quality Student Discussion

Student Measures:

- Quality English Instruction
- Quality Mathematics Instruction
- Academic Press

FIGURE 4

CHSRI Effect Size and Significance Level
Box 8: Instruction – Teachers and Students



Responses of juniors at CHSRI schools were no different from the responses of their peers at other schools in their levels of *Quality English Instruction* and *Quality Mathematics Instruction*. Juniors at CHSRI schools did, however, report significantly more *Academic Press* than juniors at non-CHSRI schools, with an effect size of 0.24.

Figure 4 provides CHSRI effect sizes and statistical significance levels for the one teacher measure used to typify instruction and for the three student measures for both first-time freshmen and for juniors.

Do CHSRI students experience a more supportive context than similar students at other Chicago high schools?

Juniors at CHSRI schools reported that their teachers had higher expectations for them and that their teachers and peers provided more academic and social supports than similar students at other public high schools in Chicago. The picture is more mixed for first-time freshmen at CHSRI schools. Compared to other students, they reported that their teachers had higher expectations for them. Academic and social supports from peers and teachers are inconsistent.

Specifically, our analysis indicates that teachers at CHSRI schools reported higher levels of postsecondary expectations, a measure that encompasses both the expectation that students will continue their education after high school and the willingness to help students plan and prepare for this step. The CHSRI effect for this measure was a moderately sizable 0.60. Furthermore, both juniors and first-time freshmen indicated that they felt higher levels of *Schoolwide Future Orientation* than their peers in other schools, with an effect size of 0.30 for freshmen and 0.34 for juniors. This measure asks students about the degree to which teachers work hard to make sure that all students are learning, staying in school, and planning for their futures, and the degree to which all students are encouraged to go to college. In all three cases related to expectations—whether reported by teachers, freshmen, or juniors—the difference was statistically significant.

The analyses of first-time freshmen indicated that students at CHSRI schools did not report a higher level of *Peer Support for Academic Achievement,* nor a stronger *Sense of Belonging,* nor more *Respectful Classroom Behavior* than their peers at other schools. The measure of peer support asks students about the extent to which they talk about what they did in class, if they help each other with homework, and if their friends think it is important to attend class. *Sense of Belonging* asks students to report on how personally connected they feel to the school—whether they fit in, whether there are people there who care about them and who will help them, whether the school feels like family, and whether they participate in school activities. *Respectful Classroom Behavior* asks students about the norms of classroom behavior—how students treat each other, how often they disrupt class, and whether they help each other learn. In other words, first-time freshmen at CHSRI schools did not report a climate that is different from what is reported by students at other Chicago public high schools with respect to student-student interactions inside and outside of the classroom.

On the other hand, measures that asked freshmen to comment on relationships between students and teachers indicated that these relationships are stronger in CHSRI schools than they are in other schools in Chicago. While there was no statistical difference in *Student-Teacher Trust,* there was a slight difference between first-time freshmen at CHSRI schools and similar first-time freshmen at other schools in measures of teacher-provided personal and academic support. One of the measures, *Teacher Support,* asks students whether there is at least one teacher who cares about how they are doing, would be willing to help with a personal problem, and who would talk with them if they were having problems in class. Freshmen at CHSRI schools were higher than their peers on this measure (effect size = 0.20, marginally significant). The other measure, *Classroom Personalism,* asks students whether their English (or math) teacher helps them catch up and notices if they are having trouble learning. Freshmen at CHSRI schools had statistically stronger responses to these items than similar freshmen at other schools (effect size = 0.21).

9

Supportive Student Context

Expectations (Teacher Measure):

- Expectations for Postsecondary

Expectations (Student Measure):

- Schoolwide Future Orientation

Academic and Personal Support (Student Measures):

- Respectful Classroom Behavior
- Peer Support for Academic Achievement
- Student Sense of Belonging
- Classroom Personalism
- Student-Teacher Trust
- Teacher Support

CHSRI juniors, on the other hand, consistently scored higher than similar juniors. These differences were statistically significant in all but one of the six measures of academic and personal support. Effect sizes for two of the student-to-student relationships, *Peer Support for Academic Achievement* and *Sense of Belonging*, ranged from 0.34 to 0.37. The other measure relating to student-student relationships, *Respectful Classroom Behavior,* was somewhat anomalous. While there was a slight CHSRI effect (0.25), the difference was not statistically significant.

Indicators of student-teacher relationships for juniors (*Classroom Personalism, Student-Teacher Trust,* and *Teacher Support*) all had effect sizes ranging from 0.32 to 0.51. *Classroom Personalism* and *Teacher Support* are described briefly above. *Student-Teacher Trust* has items that ask students whether teachers care about them, keep their promises, try to be fair, listen to students' ideas, and treat students with respect.

Figure 5 summarizes these findings for teachers and first-time freshmen; Figure 6 (see p. 26) summarizes the results for juniors.

FIGURE 5

CHSRI Effect Size and Significance Level
Box 9: Supportive Student Context – Teachers and First-Time Freshmen

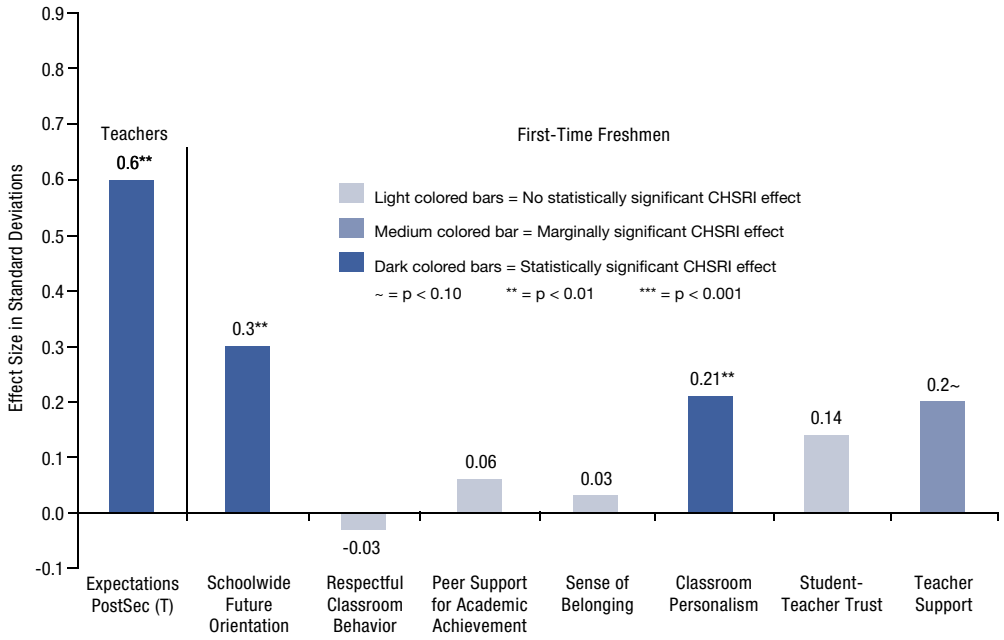
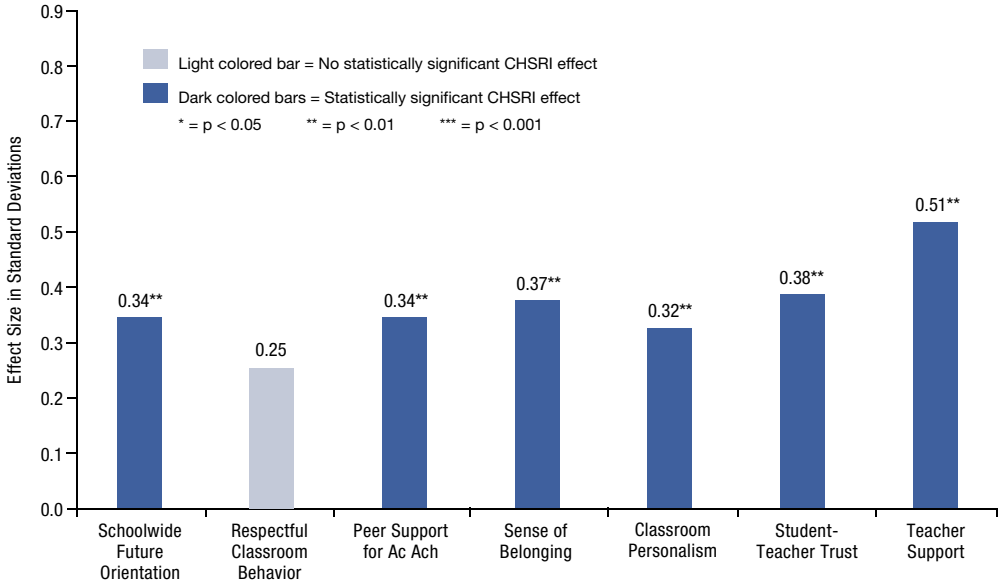


FIGURE 6

CHSRI Effect Size and Significance Level
Box 9: Supportive Student Context – Juniors



Do students at CHSRI schools exhibit more positive educational outcomes than similar students at other Chicago public high schools?

We compared the outcomes of students at CHSRI schools with those of similar students at other Chicago public high schools. We assessed the impact of attending a small school on various student outcomes: student absences, being on-track to graduate after their freshman year, dropout rates, and achievement test results.[3] Readers should keep in mind that outcome comparisons in year one were based on the outcomes of five small high schools. Six more small high schools were added in the initiative's second year, so comparisons of results in year two are based on results from 11 small high schools. Five more were added during the reform's third year (for a total of 16 schools).

10

Student Outcomes

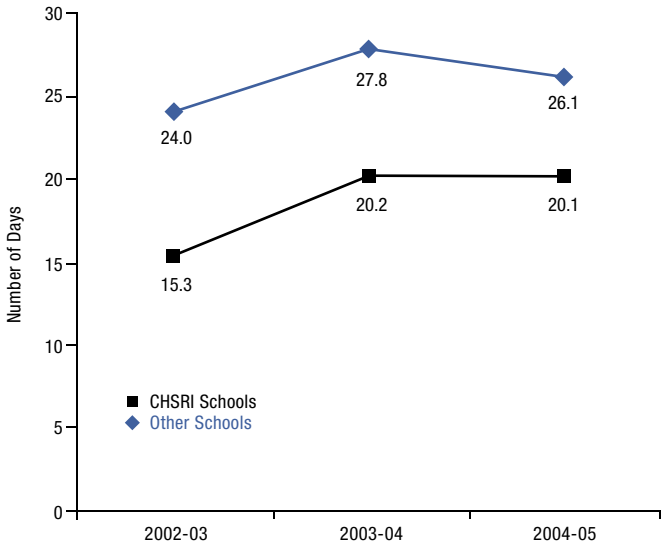
- Absences
- On-Track to Graduate Rate
- Dropout Rate
- Achievement Test Scores
- Graduation Rate

Absences

First-time freshmen in CHSRI schools were absent less often than similar students in other schools for each of the three years in our study (See Figure 7). In all three years, these differences were statistically significant ($p < 0.01$). For example, in 2004-05 CHSRI students were absent 6 fewer days than similar students at other schools (20.1 days vs. 26.1 days). While the absence rates of CHSRI students appear better than those of

FIGURE 7

Average Number of Days Absent During the Year
First-Time Freshmen
CHSRI Students and Similar Students at Other Schools



Note: P-values for significant differences: In year 2002-03, p = 0.00; in year 2003-04, p = 0.02; in year 2004-05: p = 0.02.

Definitions of Student Outcomes

Absences: Absences are measured as the average number of days students were absent from their classes during one academic year. Those who dropped out of school during the year are not included in the sample.

On-Track to Graduate Rate: The on-track to graduate rate measures the proportion of students who have accumulated five credits and have no more than one failing grade in a semester course in a core subject (English, math, science, and social science) by the end of the freshman year.

Dropout Rate: We identify first-time freshmen and follow them over time. Any student with a dropout code in CPS records is counted as a dropout. This number is divided by the initial number of first-time freshman less the number of students who transfer out of CPS.

Achievement Test Scores: Achievement is measured by the scores of eleventh-graders on the Prairie State Achievement Exam in mathematics and English. This test is given to almost all high school juniors during the spring of their junior year and incorporates the ACT as part of their composite score.

Graduation Rate: Since the reform has been in place for less than four years, it is impossible to analyze four-year graduation rates at this point.

their counterparts, on average CHSRI students missed a lot of school—just over four full weeks of classes during the year.

The absence rate of juniors in CHSRI schools also appeared better than for similar students in other schools (see Figure 8). However, these differences were only statistically significant during the 2002-03 school year.

On-Track to Graduate Rate

At the end of freshman year, CHSRI students were a little more likely to be on-track to graduate than students attending comparable schools, though the differences were not statistically significant.[4] In addition, it is notable that the difference in being on-track to graduate appears to have narrowed over the past three years (see Figure 9) and was relatively small (57 percent for CHSRI students and 54 percent for other students) during the 2004-05 school year.

Dropout Rates

There was not a statistically significant difference in dropout rates between first-time freshmen at CHSRI schools and similar students at other schools. However, in subsequent years it appears that meaningful differences in cumulative dropout rates emerge.

We studied the cumulative dropout rates by following cohorts of students starting in their freshman year (see Figure 10). CHSRI students in the 2002-03 cohort had a lower dropout rate in their first and second year than similar non-CHSRI students, but that difference was not very large. However, in their third year, the cumulative dropout rate for CHSRI students was 20 percent, compared with 27 percent for similar students enrolled in other Chicago high schools. This difference was marginally significant (p = 0.056).

Similarly, the difference in the dropout rate at the end of ninth grade for the 2003-04 cohort was small and statistically insignificant, but by the end of tenth grade the cumulative dropout rate was 14 percent for CHSRI students and 17 percent for comparable students attending other schools. This difference was also marginally significant (p = 0.08). Data regarding the 2004-05 cohort were only available through the end of their freshman year. As was the case for the other two cohorts, no statistically significant CHSRI effect was found at the end of the ninth-grade year.

This pattern mirrors data from surveys regarding the degree to which students feel supported and that they belong. Juniors attending CHSRI schools reported

FIGURE 8

Average Number of Days Absent During the Year
Juniors
CHSRI Students and Similar Students at Other Schools

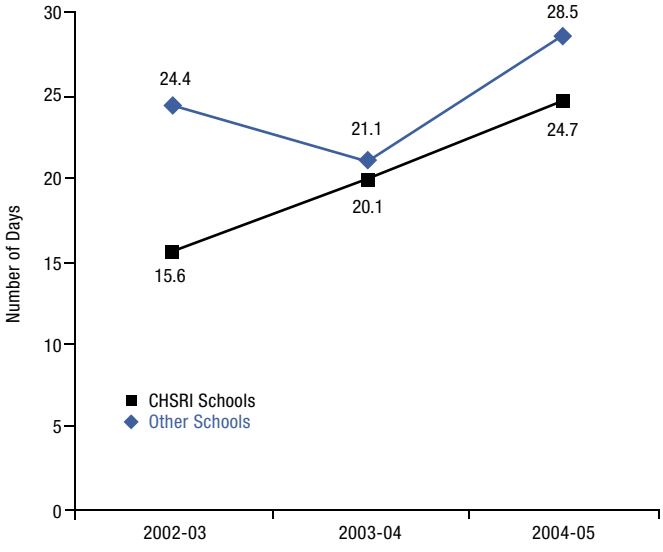
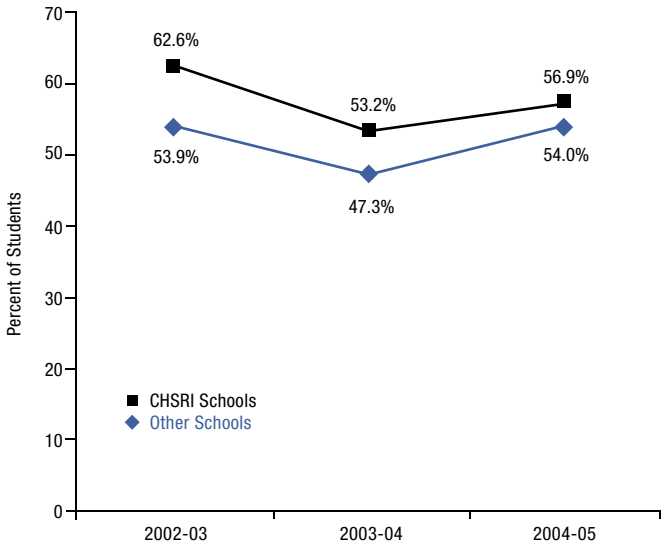


FIGURE 9

On-Track to Graduate
First-Time Freshmen
CHSRI Students and Similar Students at Other Schools



Note: Significant difference in year 2002-03 only: p = 0.00.

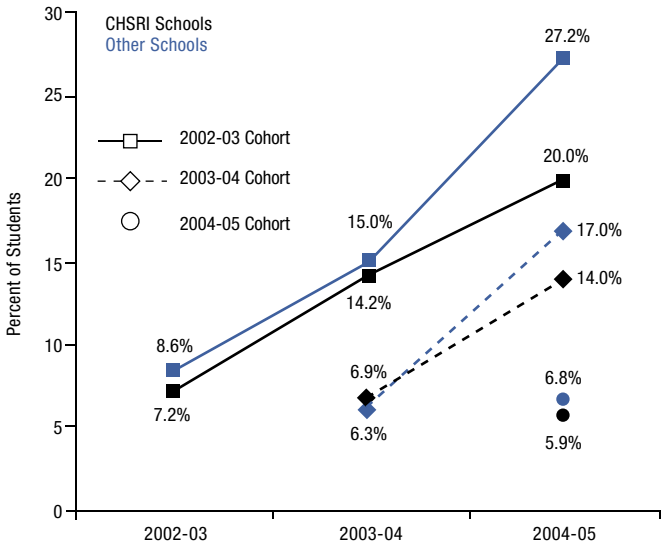
much more supportive contexts than similar students attending other schools, but comparisons of first-time freshmen yielded less sizable and fewer statistically significant differences. Thus, it appears that the relative ability of small schools to provide a supportive context and to hold students in school may become greater the longer the students remain in these settings.

PSAE Scores

Achievement among eleventh-graders, as measured on the statewide standardized achievement test, the PSAE, was no different for students attending CHSRI high schools than it was for similar students at other schools. (See Figures 11 and 12.) We analyzed the test scores for both reading and math portions of the PSAE, and we did not find any differences in performance between students at CHSRI schools and similar students in other schools on either test. In the 2002-03 academic year, three of the CHSRI schools offered eleventh grade, so students who took the PSAE test in that year had the opportunity of being at the CHSRI school for one year. By the 2004-05 academic year, while nine CHSRI schools had eleventh-graders, some of them had been in existence for three years, some for two, and some for one. So the length of time students could have attended a CHSRI school at the time of the PSAE differed depending on which school they attended. Given these added complexities, we tried different ways to incorporate these factors into our analysis. The conclusions of all the analyses are the same; there are no differences in terms of eleventh-grade achievement between CHSRI students and students at other CPS schools.

FIGURE 10

Dropout Rates by Cohort
CHSRI Students and Similar Students at Other Schools



Note: Significant difference in year 2004-05 only. For 2002-03 cohort, p = 0.056. For 2003-04 cohort, p = 0.076.

FIGURE 11

Average PSAE Reading Scores
Juniors
CHSRI Students and Similar Students at Other Schools

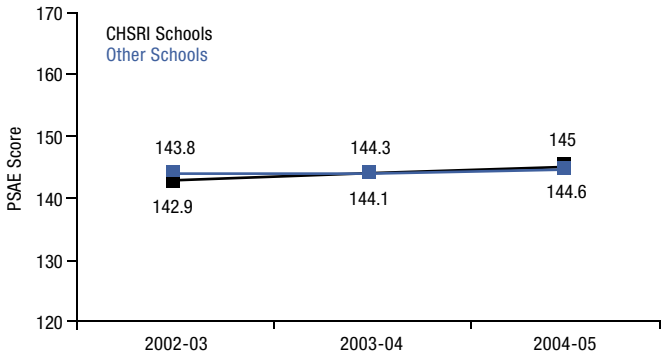
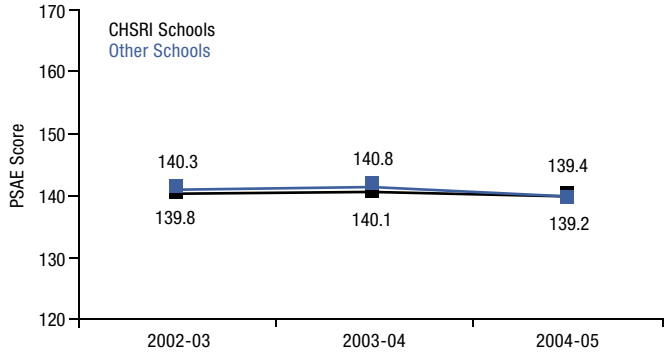


FIGURE 12

Average PSAE Math Scores
Juniors
CHSRI Students and Similar Students at Other Schools



Trends as Schools Mature and New Schools Are Opened

In the literature on small schools and in literature on reforms more generally, there is sometimes discussion of a phenomenon known as a "sophomore slump."[5] The concept refers to the observation that schools or other organizations undergoing major reforms suffer setbacks during their second year of operation. In the evaluation of the Gates-funded small high schools, researchers at SRI International and the American Institutes for Research found that most schools experienced declines during the second year of implementation.[6] They hypothesized that changes in the social dynamics of the schools and the need to incorporate new adults who may not have been part of the original vision could contribute to this occurence, as could changes in district policies, leadership turnover, and teacher capacity.[7] Such a pattern may have emerged in the small high schools being launched in Chicago.

Consider, for example, Table 2, which examines outcomes for first-time freshmen broken down by the year when the school was launched. Schools that began in 2002-03 and in 2003-04 both experienced setbacks in outcomes during their respective second years of operation. By their third year, schools that started in 2002-03 appeared to bounce back somewhat on measures of their one-year dropout rate and of the number of students who were on-track to graduate. Clearly, our ability to determine whether a "sophomore slump" exists will improve in the next year or two when we have data on additional cohorts of new starts.

In addition, it is worth remembering that at every point in time in this study there are CHSRI schools in different stages of development. For example, during the 2003-04 academic year there were two waves of CHSRI schools: the five CHSRI schools that had been operating for a year and the six schools that had just opened. Therefore interpreting the results in 2003-04 is more challenging than interpreting the results in 2002-03, when there was only one wave of schools. It 2004-05 there were three waves of schools, each wave at a different point in its developmental trajectory.

TABLE 2

Freshman Outcomes for Different Groups of CHSRI Schools

		2002-03	2003-04	2004-05
Number of Days Absent	2002-03 Start-ups	15.3	20.6	21.0
	2003-04 Start-ups		19.9	24.2
	2004-05 Start-ups			15.6
	ALL SCHOOLS	**15.3**	**20.2**	**20.1**
On-Track to Graduate Rate (percentage)	2002-03 Start-ups	62.6	49.9	58.6
	2003-04 Start-ups		57.3	47.2
	2004-05 Start-ups			63.9
	ALL SCHOOLS	**62.6**	**53.2**	**56.9**
One-Year Dropout Rate (percentage)	2002-03 Start-ups	7.2	8.8	7.4
	2003-04 Start-ups		4.8	6.5
	2004-05 Start-ups			3.9
	ALL SCHOOLS	**7.2**	**6.9**	**5.9**

Endnotes

1 Newmann et al. (2001).

2 The survey asked teachers about a number of their instructional practices, including the nature and frequency of homework they assign, classroom teaching strategies, amount of individualized instruction teachers offer, and the quality of student discussion in their classrooms. In all of the measures there was more variation between teachers within schools than there was between schools. The only measure where more than 5 percent of the variance was between schools was the measure on student discussion. Since this study is mainly concerned with between-school differences, this is the only measure we report here.

3 Recall that we estimate differences using a two-level hierarchical linear model and control for student characteristics and school effects.

4 On-track rates are only computed for first-time freshmen, so we have no comparable finding for juniors.

5 Borman (2005); Shear, et al. (2005).

6 Mitchell, et al (2005).

7 Shear, et al. (2005), pp. 27-28.

Chapter 5

Discussion and Implications

When discussing the findings described above, caution is clearly in order. We have only been able to study small school reform in Chicago for three years. Many of the schools we are studying are just getting started—only five schools have been open for three years—so we can only provide an early assessment of the potential of this small school initiative. Indeed, a reform as complex as CHSRI will require time to fully take shape. We will be able to speak with greater confidence regarding the effects of this initiative as the sample of schools and students who have fully experienced small high schools grows.

At the same time, given the importance of small school reform and of high school reform more generally, we think it makes sense to take a systematic look at what we have found so far. Policymakers, funders, and educational leaders are understandably interested in emerging findings and trends. These early findings can help those implementing small high schools identify issues and questions that deserve greater attention as the reform (and the studies of it) develop.

Mixed Results

Our analysis of results contains some good news as well as some reasons for concern. With respect to outcomes, perhaps the clearest finding is that the attendance rates of first-time freshmen at small high schools are better than for similar students at other Chicago public high schools. Over the course of the first three years, freshmen attending CHSRI small high schools were absent between six and nine fewer days each year than similar students at schools with comparable student populations. Given how often CPS students are absent and the importance of ninth-grade performance, this appears to be a very desirable outcome.

In addition, the lower cumulative dropout rate by the junior year for students in the first cohort compared to similar students at high schools with comparable student populations (20 percent vs. 27 percent) is quite promising. Furthermore,

students in the second cohort of CHSRI schools appear to be following the same pattern, with a marginally significant difference between students in CHSRI schools compared to similar students at non-CHSRI schools (14 percent vs. 17 percent). This clearly signals a tangible benefit of small high schools. If such differences persist in future years, it would go a long way toward justifying small school reform.

Not all the news is good, however. Eleventh-graders' achievement test scores are the same for students attending CHSRI schools as for similar students at non-CHSRI schools. This signals a sizable shortcoming of the initiative. A prime rationale for small schools was that the reform would spur instructional innovation and, ultimately, improve academic outcomes. Neither our survey results from spring 2005 nor our qualitative work in 2004-05 indicate that this is happening.

Assessing Our Theory of Action

Broadly speaking, the theory posits two paths to improved outcomes—one through improved instruction and the other through higher expectations and more personalized academic and social supports. Our findings can help us assess both of these paths.[1]

Assumptions Regarding Expectations and Personalism

Small schools appear to promote higher expectations and greater personal and academic support for students. As the theory of action anticipated, such a context was associated with lower dropout rates. Indeed, eleventh-graders attending CHSRI schools reported a more supportive context than similar students in other schools (Box 9), and the dropout rate of eleventh-graders who started high school at CHSRI schools was lower than those who started elsewhere. Among first-time ninth-graders, differences in the levels of academic and social support between CHSRI and other schools were smaller and less often statistically significant. Consistent with this finding, there were much smaller and statistically insignificant differences in the one-year dropout rates between ninth-grade students attending CHSRI schools and similar students attending otherwise similar high schools.

Assessing the theory's assumption that a more supportive context for students could lead to better attendance is somewhat more complicated. CHSRI freshmen were not significantly different from similar freshmen at other schools on measures related to peer support, nor were they different on measures of student-teacher trust. They did report stronger teacher support, and perhaps it is this dimension that can help explain why they were absent significantly fewer days. Conversely, CHSRI juniors were different from non-CHSRI juniors on both peer-to-peer indicators and on student-teacher indicators. Yet, after the 2002-03 school year, there were not statistically significant differences in the absences of juniors at CHSRI schools and juniors at other schools.

Assumptions Regarding Instructional Improvement

The CHSRI small schools did not appear to promote instructional improvement activity, instructional quality, or improved academic outcomes for students. The theory assumed that small schools would foster an improved context for reform among teachers (Box 6) and that this combined with supports from CHSRI staff (Box 4) and the district (Box 5) would spur instructional improvement activity (Box 7). These improvement efforts, in turn, would strengthen the quality of instruction, which would improve test scores. Although working in a small school did appear to encourage a greater sense of teacher collegiality, trust, collective responsibility, and related contextual features that might enable instructional reform activity (see Box 6), we did not see evidence that these contexts fostered more of the practices thought to facilitate instructional reform (Box 7). We also saw evidence that instruction was the same for similar students in CHSRI and non-CHSRI settings (Box 8). Given that we did not see a CHSRI effect on instruction, it is not surprising that we failed to find evidence that attending a small school promoted higher test scores.

While test scores might be directly linked to instruction, the theory also posited that improved and more engaging instruction might lower dropout rates and increase on-track rates. An interaction between a supportive context and high-quality instruction might have both of these desirable effects. Since we found no differences between instruction in CHSRI schools and instruction in non-CHSRI schools serving similar

populations of students, we do not have any indications of the relation between the quality of instruction and dropout or on-track rates.

Unfortunately, our quantitative analysis does not enable us to pinpoint the factors that are constraining instructional reform efforts. This issue has been a focus of our qualitative work, however, and we have identified some possible explanations. First, like others we have found that instructional leadership is key to meaningful change.[2] It is an important support for mobilizing teacher communities to collectively and coherently improve their classroom practices and for helping them focus and coordinate their improvement efforts. Furthermore, what we have found to date indicates that district leaders, small school reform staff, principals, and teachers have often been distracted from pursuing sustained and systematic instructional reform efforts by pressures associated with the implementation of new schools and the multiple demands placed on individuals working in them. In addition, we found that accountability structures that encourage schools to articulate their academic goals in terms of test scores and basic academic skills often did not lead schools to identify and implement strategies for reaching such goals. When strategies were identified, they often consisted of packaged programs linked to test preparation.[3]

Instructional Improvement: Unanswered Questions

It is not clear why, despite the relatively desirable teacher context for reform that we found in CHSRI schools, we did not see better results on our measures of Facilitators for Instructional Improvement. One possibility, of course, is that the ties between Boxes 6 and 7 are not that strong, or they are heavily dependent on other factors such as Boxes 4 and 5. It may be that whether teachers have access to new ideas, quality professional development, and experience program coherence, for example, depends more on the actions of the principal and of others outside the school (such as CHSRI, CPS, and the state) than on teachers' context. Clearly, these results indicate that those who hope to foster instructional improvement must do more than create small schools of committed, empowered, and collegial teachers. Our continuing qualitative inquiry into instructional reform efforts will look more closely at these issues and will explore the role played by CHSRI staff (Box 4) and by the district (Box 5) in addressing them.

Indeed, the breakdown in the theory of action raises a host of important questions. Chief among them is the question of what actors such as the district or those implementing the reform (CHSRI) should do or not do. Can schools reform from within or does this finding indicate that outside supports and pressures (from Boxes 4 and 5, for example) are needed to foster efforts at meaningful change? Or are there ways in which these outside pressures are the problem rather than the solution? For example, are there ways in which broader systemwide goals and supports for instruction (pressures to implement test preparation programs or to attend to other district or CHSRI initiatives) crowd out school-based reform efforts? It is quite possible that both scenarios have merit. And to some extent, is it a matter of time? Do the particular challenges associated with implementation of small schools limit the time and attention given to meaningful change in classroom practice? Questions such as these deserve careful attention as this reform effort continues.

In response to this concern, district leaders in Chicago are now coordinating their efforts with the CHSRI staff to help schools focus more directly and productively on instructional reform efforts. We are currently studying the implementation and impact of these efforts to see if they enable teachers to build on the sense of teacher collegiality, commitment, and trust in these schools to foster instructional change.

Small School Reform in Chicago

Given both the newness of the reform and the small size of our samples, it is clearly too soon to make broad claims about the efficacy of small school reform in Chicago. These findings however, do provide some reasons for cautious optimism about the reform and also highlight some issues in need of attention. First, as noted above, we see indications that small schools may be able to make a meaningful difference in students' dropout rates. Our data indicate that the three-year dropout rate of students attending small schools is 7 percentage points lower than it is for similar students

attending comparable schools. From some perspectives, a difference of this magnitude would justify the intervention.

Our interest in this finding is strengthened by its alignment with the small schools' theory of action. Central to the initiative's rationale is the belief that smaller schools will foster contexts for students characterized by more personal attention, support, trust, and commitment. Our analysis of surveys indicates that this is happening to a meaningful extent for juniors. Although, as noted above, more research is needed to better understand the relationship between these contexts and desired outcomes (particularly outcomes related to lower dropout rates), the fact that dropout rates appear to be lower is certainly encouraging. Indeed, at this point in time, we feel that the marginally significant ($p = 0.056$) difference we identified between the dropout rates of CHSRI juniors and similar students attending comparable schools warrants giving small school reform more time and support, to see if these benefits persist.

At the same time, this study raises some important concerns about the small school strategy—particularly as it relates to the need for instructional improvement. We see evidence that smaller schools enabled the creation of contexts for teachers (ones characterized by greater trust, commitment, and sense of influence, for example), but these contexts do not appear to be fostering more systematic efforts at instructional improvement, different instructional practices, or improved performance on standardized tests. This kind of context may be desirable, but it is clearly not sufficient.

Small schools appear to be fostering more personalized and supportive contexts for teachers and students. As the initiative continues to develop we will see whether these changes persist and whether schools, in partnership with CHSRI staff and district leaders, can successfully build on these more personalized and supportive contexts in ways that improve high school graduation rates and academic performance.

Endnotes

1 It is important to say at the onset of this discussion that we are limited in our ability to examine the relationship between the various components of our theory of action. It would be better if we could assess whether schools with high scores in a given component of the theory of action (say Box 6) also had higher scores in a related component (say Box 7). Unfortunately, the limited number of schools in our sample constrains our ability to undertake such analysis. What we can do is assess whether, overall, small schools showed differences in a given component of our theory of action when compared to non-CHSRI schools serving similar populations and determine whether such differences between CHSRI and non-CHSRI schools appeared to carry over to related components of the theory of action. As the study continues, we will look further at these issues in an effort to develop a deeper understanding of the overall theory of action.

2 Newman, et al. (2001); Sebring and Bryk (2000); Stevens (2006).

3 Sporte, Correa, Kahne and Easton (2003); Stevens and Kahne (2005); Stevens (2006).

Commentary

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This careful, thoughtful study of school reform in Chicago has sparked for this reader three related ideas on which I hang the following commentary. The first has to do with the nature of the phenomenon under study. The second has to do with how the researchers studied it. And the third has to do with what additional study seems needed.

What Is the Phenomenon under Study?

It is possible that what we learned to call *high school* in the 20th century may be changing back to what we thought of as *high schooling* throughout most of the 19th century. Schooling for youth then was organized within multiple institutional designs. There was no normative design. Although it may not be obvious to the reader at the level of analysis the authors provide here, the 16 schools they studied are varied in their institutional designs. The 12 that "converted" from some version of the "big" or normative high school design did so under the religious sway—so to speak—of different design ideas. In New York, where I live, one can visit small high schools that follow the Urban Assembly design, the Knowledge is Power Program (KIPP) design, the Coalition of Essential Schools design, the Expeditionary Learning design, the Cristo Rey design, and many others. The same is true in Chicago. For example, the authors report that two of the four started-from-scratch high schools they studied were Big Picture schools. The Big Picture high school design is starkly different from the normative one: substituting advisories and projects for courses, and placing students in community internships for two full days a week.

"Wow," we might say, stepping back from this study. "This is not just about small or big. High schools are getting to be different in the way that churches are different, or restaurants are different." In the same instant, we might remember that adolescents differ too—easily as much as Episcopalians and Seventh-Day Adventists do in general, or McDonald's and Spiaggia. Providing all youth an intellectually powerful education suitable for a 21st century society and economy will likely require multiple designs.

Of course, the different small high school designs now proliferating in Chicago, New York, and other places have some overlapping features like intimacy, the deliberate cultivation of communities of practice, and a relative absence of bureaucracy. Reformers and funders promoting small high schools in Chicago, New York, and elsewhere often emphasize these overlapping features. The emphasis sometimes suggests that they mean to invent a new and better normative design, wherein something called "small high school" replaces something called "comprehensive high school." One of the things I like about this study is that while its findings, in my view, encourage continued experimentation in high schooling, they also discourage expectation that a new one-best-model may be at hand. Something is happening, the researchers seem to say, as the result of the experimentation in Chicago to date. This is discernible, for example, in what juniors in the small high schools studied there report about their education. On the other hand, it's not exactly clear from

the data what is happening. For example, while these schools do tend to have communities of practice—that is, their faculties do not operate in entirely cellular fashion—the communities of practice do not tend to alter ordinary instructional habits. In the words of a previously published report from the Consortium on Chicago School Research, they tend to be more supportive than developmental.[1]

Why is developing new kinds of instructional practice rather than supporting ordinary practice so important in Chicago high schooling? Consider the researchers' finding that the CHSRI freshman class came into high school with an average reading score equal to the national average for sixth-graders. This means that many of these freshmen had a reading speed incapable of tracking what is ordinarily considered to be high school content. Many had word attack skills too undeveloped to read even many words that they know from listening, as well as many words they may never have heard but that are crucial to high school content: for example, photosynthesis, congruent, causality. This is a big deal. To educate such students well, high schools have to be prepared to do two things that hardly any are prepared to do. They have to mount intensive literacy interventions, and they have to immerse their students in intensive intellectual apprenticeships in real-world contexts. Without the second, the first will feel to the students like prison. Without the first, the second will be bewildering. Yet, whether small or large, most high schools are not organized for such instructional transformation—in terms of their use of space and time, in terms of the teaching skills they have on staff, in terms of their conceptions of curriculum. Still, as this study indicates, at least the small high schools are organized so that the adults in the building could put their heads together and figure out what they really need to do. It is just that the size and structure of their schools do not by themselves compel them to do so. As the researchers put it, "Clearly these results indicate that those who hope to foster instructional improvement must do more than create small schools of committed, empowered, and collegial teachers." This is very important for reformers at all levels to know and accept.

It is important also for the reformers to take note of a related warning from the researchers, one that has to do with how communities of practice might come to take bold steps to revise instructional habits. Do they need outside supports and pressures? Maybe, the researchers suggest. But outside supports and pressures can also be problematic. "Are there ways," the researchers ask, "in which broader systemwide goals and supports for instruction (pressures to implement test preparation programs or to attend to other district or CHSRI initiatives) crowd out school-based reform efforts?"

How Do the Researchers Study the Phenomenon?

In studying the Chicago experiment in high school redesign, the researchers have adopted a theory-based research design. Instead of treating the initiative they are studying as a unitary intervention based on clear intentions and predicted outcomes, they treat it as a complex intervention whose intentions have to be constructed before its outcomes can be charted and measured. In a 1998 monograph, Donald Schon and I referred to this process as asking reformers what they mean to do, then ascertaining whether they actually do what they mean.[2] We wrote that this is not merely the obligation of researchers, but of reformers too who have to work together with the researchers in order to accomplish it. A theory of action is never given, Argyris and Schon argued in their seminal work on theory-based evaluation.[3] It must be pieced together through continuous and collaborative inquiry. And at any point, it is inherently unstable. The political character of an initiative like CHSRI, and the range of actors and levels of operation involved, practically ensure that what reformers mean to do, and also what they actually do, will vary across the initiative. It is the collective responsibility of the reformers and the researchers to strive over time to make the reform coherent. Schon was fond of describing the researcher's task in this regard as running downhill, trying to get ahead of the reformer, holding up snapshots and asking, "Is this still what you mean? Do you know that you're actually doing something else? Do you mean to do something else? Does the change make sense to you?"

A theory of action is just a hypothesis constructed in order to account for a highly dynamic phenomenon.

We can see the implicit dynamism of the CHSRI theory of action that the researchers helped construct by engaging in a little close reading of just its verbs. So small school reform *will enable* creation of school communities. Students and teachers who *have chosen* to be part of the school will act to enhance the community. What does *enable* mean in this context? Isn't it likely to mean different things to different people, and to embed perhaps even contradictory theories whose contradictions have to be unearthed and confronted in order for the initiative to stand any chance at all of improving students' lives? And what about *have chosen*? What does this verb phrase mean in the context of a 14-year-old and his or her parents picking, say, a Big Picture school versus some other design? And we can, of course, ask the same thing about the nouns that we do about the verbs: What does *community* mean?

One of the great benefits of this study is that it does not stand alone. It is part of a now long and famous series of studies of school reform in Chicago undertaken by the Consortium on Chicago School Research in collaboration with the Chicago Public Schools. That is, it enjoys the great advantage—both in terms of validity and in terms of usefulness—of serving not some hopelessly summative purpose, but an ongoing formative one. It is one of those snapshots taken running downhill, as Schon put it—meant to engage respectful dialogue, meant to provoke possible tweaking or even substantial rethinking, raising hard questions that aim to strengthen efforts rather than shut them down. Chicago is very lucky to have the Consortium.

What Other Studies Are Needed?

Among the encouraging findings of this study is that CHSRI students have lower absence rates on average than similar students in other schools. But the discouraging counterpart finding is that "on average, CHRSI students missed a lot of school—just over four full weeks of classes during the year." It's a finding that begs some more study—more snapshots running downhill, more material for the city's dialogue. Why are these students missing so much school? For some kids who find themselves in schools full of bullying or other varieties of inhumane treatment including mindlessness, being absent a lot or even dropping out is a rational act. But the kids involved in this study, who miss on average a whole month of school each year, also report on average significantly more positive school experiences (than similar students in other schools). So why are they staying out so much? Is it about asthma, working, taking care of siblings, taking care of their own children, family problems, neighborhood problems, housing problems, immigration status, depression? What factors show up in in-depth interviews of such kids? Is there anything that schools can do about the factors? Do they even fall within the scope of what the schools notice and talk about within their communities of practice?

And this is only one of many other kinds of possible studies that would go below the surface of the data the researchers are continuing to collect, and likely prove valuable to the reform conversation in Chicago as elsewhere. Maybe some of these other studies are already in progress. I would obviously like to know a lot more than what I have been able to infer concerning the different "curricular themes or philosophical approaches to teaching and learning" that guide these schools or *mean* to guide them. And, of course, every reader of this paper will want follow-up study of what the researchers report as "a sizable shortcoming of the reform effort" to date, namely that instructional reform, instructional practice, and test scores all appear the same at the study schools as at other CPS schools serving comparable students. Will the snapshots running downhill manage to make a difference in this over time? Tune into the continuing dialogue.

Endnotes

1 Stevens with Kahne (2006).
2 Schon and McDonald (1998).
3 Argyris and Schon (1996).

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Education researchers have an informal responsibility to be conservative in their interpretations of results from their own research. I feel that the authors of this report have been justifiably conservative. Nevertheless, I take the liberty of being much less conservative in the following commentary because I feel that these early results demonstrate great potential for the Chicago High School Redesign Initiative (CHSRI) to show more dramatic effects in the years to come.

To summarize, the present study produced the following results. The CHSRI schools showed much higher levels of teacher influence (effect size = 0.83) and considerably higher levels of teacher trust, collective responsibility, and innovation (effect sizes ranging from 0.37 to 0.52). There were few differences in teachers' activities related to instructional improvement (e.g., quality of professional development, access to new ideas) and mixed results with regards to students' perceptions of instruction, expectations, and support. Effects on student outcomes included lower absenteeism for freshman (20 vs. 26 days) and a lower dropout rate for juniors in CHSRI schools (20 vs. 27 percent). There were no detectable effects on student achievement scores.

Although these results are mixed, other research suggests that the large effects on teachers' work environments and their influence on instructional and social decisions may be a very important first stage in the reform's development. Consider research by Ingersoll in which he shows that greater levels of teacher control (especially control over social and disciplinary issues in the school) are associated with lower levels of teacher turnover and lower levels of conflict among teachers and between teachers, students, and principals.[1] This suggests that teachers in CHSRI schools may have lower turnover rates in the coming years as a result of a more desirable work environment.

Although the Consortium study found very few effects on instructional improvement efforts, one must keep in mind that nearly every school affected by the No Child Left Behind Act (NCLB) is working feverishly to improve. While it may have been better to find positive differences associated with CHSRI, it is important to recognize that CHSRI schools showed the same reported level of activity and effort as comparison schools. Assuming these activities and efforts are worthwhile, teachers will be able to improve their instruction.

So consider this possibility: teachers in CHSRI schools work just as hard to build their skills as effective educators, but while teachers in other schools move on to more desirable teaching positions after they gain a certain number of hours of professional development or earn a Masters degree, teachers in CHSRI schools stay at their school because they enjoy their job and have more influence over how their school functions. That sounds a lot like a recipe for sustained improvement.

There is also the possibility of an interesting interaction between student dropout rates and achievement scores––the lower dropout rate for juniors in CHSRI schools may be masking positive effects of CHSRI on student performance. It is well known that the simplest and easiest way to improve a school's standardized test scores is to avoid testing the worst-performing students in the school. This is essentially what happens when students drop out of school: the worst-performing kids leave, causing the school's average scores to increase.

The implications for this study are relatively straightforward. The comparison schools have an advantage because a greater proportion of their lower-performing students dropped out of school before the statewide achievement test was administered, so the estimates of effects on student achievement from this study are probably conservative. The authors of this report have included controls for prior achievement, and this is likely to have mitigated the problem to some extent. Unfortunately, this is one of the most complicated statistical problems to solve. The sidebar below presents some additional statistical methods that might be used.

To the extent possible, future research on the effects

of CHSRI should attend to issues of teacher turnover and student dropout rates. For example, effects on teacher turnover rates could be estimated by monitoring the proportion of teachers who switch schools or leave teaching completely. This extension of the CHSRI study might even allow for comparisons in reasons for turnover by surveying teachers who move or leave. Future analyses of CHSRI data might also explore alternative ways for estimating effects on student achievement after controlling for differences in student dropout rates as described in the sidebar.

Overall, this report is an excellent example of a theory-driven evaluation, and the importance of capturing each outcome identified in the theory is clear in these early results. While there may not be strong evidence that the CHSRI initiative is producing positive effects on student achievement, there is strong evidence to support the claim that the CHSRI schools are producing positive change in areas that are likely to lead to sustained improvement in instruction and ultimately, improved student achievement.

The problem of taking prior dropouts into account when estimating school achievement is analogous to having a large amount of non-ignorable missing data.[2] Including a fixed effect at the school level for dropout rate is probably the simplest approach to addressing the problem, though doing this may produce an over-adjustment. A more statistically defensible approach might be to use multiple imputation or Bayesian estimation, although this is relatively complicated.[3] Still another option is to match each CHSRI student to a comparison student based upon eighth-grade characteristics. If either student in a pair drops out of school, then the pair is excluded from analyses. Regardless of the method used, it would be difficult to adequately control for the differences in dropout rates without having enough information to predict with high accuracy each student's propensity to drop out of school.

Endnotes

1 Ingersoll (1996, 2003).
2 Rubin (1987).
3 See Dunn, Kadane, and Garrow (2003) for an example.


$(c+\frac{2}{3})(c+\frac{3}{2})$
$\Rightarrow (3c+2)(2c+3)$
$b=-13$
$a=6$
$ac \quad c=6$
$c=\frac{-13\pm\sqrt{25}}{12}$
$c=\frac{-13\pm5}{12}$
$c=\frac{-13-5}{12}$
$8m^3-125$
$2^3m^3-(5$
$(2m)^3-(5$
$(2m-5)(4m^2$
$8m^3+20m$
$-50m$

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Blaze

Appendix A

Description of the Sample

Teacher and Student Surveys

Teachers and principals in all 104 non-alternative high schools were invited to participate in the Consortium survey, as were students in grades 9 through 12. A common core of items formed part of the survey for students in grades 9 through 12. In addition, there were some items that were answered only by students in grades 9 and 10, some items that were answered only by students in grade 11, and a large number of items that were unique to the twelfth-grade survey. Approximately 4,150 teachers in 87 schools responded, as did approximately 35,600 students in grades 9 through 10, and 10,600 students in grade 11.

In all cases, only schools with at least a 50 percent survey response rate were included in our sample. We also chose not to include eight CPS achievement academies. Achievement academies are separate schools within a larger high school for students who did not meet the promotion criteria to attend a high school and are too old to remain in elementary school. Since their population, curriculum, and supports are radically different than what first-time freshmen experience, they are not part of our sample. Our final analytic sample for survey measures included approximately 3,400 teachers at 52 schools and 16,000 first-time freshmen at 71 schools. Our analysis of the student context for eleventh-graders included 9,200 students in 54 schools.

TABLE A1

Consortium on Chicago School Research Overall Survey Response Rates

	Number of Schools Surveyed	Number of Schools Responded	Number of Individuals Surveyed	Number of Individuals Who Responded	Response Rate Among Surveyed Schools	Response Rate Among Responding Schools
Teacher Survey	103	87	7,635	4,142	54%	59%
Ninth- and Tenth-Grade Student Survey	101	87	60,615	35,608	59%	64%
Eleventh-Grade Student Survey	84	73	20,372	11,003	54%	62%

TABLE A2

Analytic Sample*

	Number of Schools with Response Rates of 50% or More		Number of Individuals in Those Schools Who Responded	
	CHSRI	Non-CHSRI	CHSRI	Non-CHSRI
Teacher Survey	10	42	220	3,237
First-Time Ninth-Grade Student Survey	12	59	865	15,064
Eleventh-Grade Student Survey	6**	48	244	9,016

** Number of individuals in the sample varied slightly depending on the measure being analyzed. See Appendix D.*

*** A total of nine CHSRI schools served eleventh-graders.*

Student Outcomes

We analyzed outcome data from all CPS high schools except alternative schools and the achievement academies described above.

TABLE A3

Students and Schools Used in Analyses of Cohort Dropout Rates

	Number of Students		Number of Schools	
	CHSRI	Non-CHSRI	CHSRI	Non-CHSRI
2002-03 Cohort	447	23,189	5	74
2003-04 Cohort	1,081	25,013	11	75
2004-05 Cohort	1,615	24,354	16	73

TABLE A4

Students and Schools Used in the Analyses of Number of Days Absent

	Number of Students		Number of Schools	
	CHSRI	Non-CHSRI	CHSRI	Non-CHSRI
First-Time Freshmen				
2002-03	414	21,596	5	68
2003-04	957	23,037	9	67
2004-05	1,427	22,208	14	63
Juniors				
2002-03	202	17,311	3	67
2003-04	271	17,140	5	67
2004-05	441	16,717	9	70

Note: Charter schools and the two Big Picture schools are not included for lack of data.

TABLE A5

Students and Schools Used in the Analysis of On-Track to Graduate Rates

	Number of Students		Number of Schools	
	CHSRI	Non-CHSRI	CHSRI	Non-CHSRI
2002-03	422	21,960	5	68
2003-04	980	23,583	9	67
2004-05	1,482	22,888	14	64

Note: Charter schools and the two Big Picture schools are not included for lack of data.

TABLE A6

Students and Schools Used in the Analysis of Prairie State Achievement Exam Scores in Reading (Math)

	Number of Students		Number of Schools	
	CHSRI	Non-CHSRI	CHSRI	Non-CHSRI
2002-03	200 (200)	15,807 (15,509)	3	72
2003-04	286 (286)	15,896 (15,448)	5	72
2004-05	459 (459)	17,139 (17.010)	9	73

Appendix B

Rasch Analysis

Once the survey data were collected, we produced measures from multiple items on the survey using Rasch analysis.[1] These measures are more comprehensive and reliable than individual items. The Rasch approach permits the creation of a latent variable such as *Collective Responsibility* or *Academic Press* that is conceptually and empirically cohesive. Using items that relate to the same characteristic, a scale was constructed reflecting the relative "difficulty" (the likelihood that respondents will agree with a given item) of each item.

The decision to omit or to include an item in the measure was based on the fit statistic, which has an expected value of 1 and is calculated by taking the mean squared deviations between the expected and observed values for that item. Items for which the fit statistic was greater than 1.3 were excluded. The scales were also evaluated using the person reliability statistic (the ratio of adjusted standard deviation to the root mean square error computed over the persons) which is approximately equivalent to Cronbach's alpha.

After the measures were created, the scores were converted to a 10-point scale for ease of comparison within measures. However, since each measure represents a different latent characteristic, it is inappropriate to compare a score across measures—if a school has a mean score of 5.75 on *Collective Responsibility* and a mean score of 6.25 on *Teacher Influence,* it does not necessarily mean that the school is "better" on *Influence* than it is on *Responsibility.*

Endnote

1 Wright (1977).

Appendix C

Description of Hierarchical Linear Models for Teacher and Student Survey Measures and Student Outcomes

Teacher Measures

To examine whether teachers at CHSRI schools responded differently to survey measures than similar teachers at similar non-CHSRI schools, we used a three-level hierarchical linear model (HLM). At level one we adjusted for measurement error, which is produced by the Rasch analysis. At level two we modeled the teachers' "true scores" by including teacher background characteristics that have been found to be related to measures of teacher context. We included gender, race, years of experience, level of education, and whether a person entered the profession through an alternative certification process. Since the survey was also taken by faculty members without specific classroom responsibility, we also controlled for whether a respondent was a classroom teacher. Slopes for these variables were fixed at level three, meaning that the relationship between each variable and the outcome measure was assumed to be the same across schools. The intercept in the level two equation can be interpreted as the school mean score on the measure after adjusting for teacher background characteristics.

At level three we adjusted for characteristics of schools. We included a dummy variable indicating whether the school was a CHSRI school, and then used additional variables to control for background differences between CHSRI schools and other high schools. These variables included incoming eighth-grade achievement level of the student body, adjusted for current grade level, aggregate student socioeconomic status, and whether the school was at least 70 percent African American.

Level 1

$$\frac{\text{Measure}_{jk}}{s_{jk}} = \pi_{jk}\frac{1}{s_{jk}} + e_{jk},$$

where $e_{jk} \sim N(0,1)$, s_{jk} is the standard error estimated from the Rasch analysis for teacher j in school k and π_{jk} is the teacher's "true score."

Level 2

$$\begin{aligned}\pi_{jk} = {} & \beta_{0k} + \beta_{1k}(\text{Female})_{jk} + \beta_{2k}(\text{Latino})_{jk} + \beta_{3k}(\text{African - American})_{jk} + \beta_{4k}(\text{Asian})_{jk} + \\ & \beta_{5k}(\text{Native American})_{jk} + \beta_{6k}(\text{Other})_{jk} + \beta_{7k}(\text{Classroom Teacher})_{jk} + \\ & \beta_{8k}(\text{Bachelor's Degree})_{jk} + \beta_{9k}(\text{Doctorate Degree})_{jk} + \beta_{10k}(\text{3 or less years} \\ & \text{experience})_{jk} + \beta_{11k}(\text{4 to 10 years experience})_{jk} + \beta_{12k}(\text{Alternative Certification})_{jk} + \\ & \beta_{13k}(\text{No Gender Data})_{jk} + \beta_{14k}(\text{No Race Data})_{jk} + \beta_{15k}(\text{No Data on Experience})_{jk} + \\ & \beta_{16k}(\text{No Data on Education Degree})_{jk} + \beta_{17k}(\text{No Classroom Teacher Information})_{jk} + \\ & \beta_{18k}(\text{No Alternative Certification Information})_{jk} + r_{jk}\end{aligned}$$

A description of these variables can be found in Table C1.

Level 3

$$\begin{aligned}\beta_{0k} = {} & \gamma_{00} + \gamma_{01}(\text{CHSRI})_k + \gamma_{02}(\text{Mean 8}^{\text{th}}\text{ Grade Achievement})_k + \gamma_{03}(\text{Mean Social Status})_k + \\ & \gamma_{04}(\text{Mean Concentration Poverty})_k + \gamma_{05}(\text{70\% or more African - American})_k + u_k\end{aligned}$$

$\beta_{pk} = \gamma_{p0}$, for p = 1 to 18.

A description of these variables can be found in Table C2.

Student Measures

To examine whether students at CHSRI schools responded differently to survey measures than similar students at similar non-CHSRI schools we also used a three-level HLM. As with the analysis of teacher measures, at level one we adjusted for measurement error. At level two we modeled the students' "true score" by including student background characteristics that have been found to be related to differences in student attitudes and educational outcomes. For both first-time freshmen and juniors we included indicators of gender, race, socioeconomic status, and prior academic achievement as measured on the eighth-grade Iowa Tests of Basic Skills (ITBS) reading test, whether a student was receiving special education services, and whether a student was old for grade. For first-time freshmen we also included variables related to students' mobility in elementary school and whether they attended a CPS school immediately prior to becoming a ninth grader. For juniors we included a set of dummy variables indicating how long students had been attending their current school. We again held the slopes of all these variables constant across schools.

We adjusted for the same set of school characteristics at level three in the student measure analyses as we did in the analysis of teacher measures. Those variables included an indicator of whether the school was a CHSRI school, the average incoming achievement level of all current students, its average student socioeconomic status, and whether it was at least 70 percent African-American.

Level 1

$$\frac{\text{Measure}_{jk}}{s_{jk}} = \pi_{jk}\frac{1}{s_{jk}} + e_{jk},$$

where $e_{jk} \sim N(0,1)$, s_{jk} is the standard error estimated from the Rasch analysis for student j in school k and π_{jk} is the student's "true score."

Level 2
a. First-Time Freshmen:

$$\begin{aligned}\pi_{jk} = {} & \beta_{0k} + \beta_{1k}(\text{Female})_{jk} + \beta_{2k}(\text{Latino})_{jk} + \beta_{3k}(\text{White})_{jk} + \beta_{4k}(\text{Asian})_{jk} + \\ & \beta_{5k}(\text{Native American})_{jk} + \beta_{6k}(\text{Social Status})_{jk} + \beta_{7k}(\text{Concentration of Poverty})_{jk} + \\ & \beta_{8k}(\text{Special Education})_{jk} + \beta_{9k}(8^{\text{th}}\ \text{Grade Achievement Reading})_{jk} + \\ & \beta_{10k}(\text{Months Old Began High School})_{jk} + \beta_{11k}(\text{From Other Public School})_{jk} + \\ & \beta_{12k}(\text{From Private Elementary School})_{jk} + \beta_{13k}(\text{Returning to CPS})_{jk} + \beta_{14k}(\text{Moved} \\ & 1\text{ time during Elementary School})_{jk} + \beta_{15k}(\text{Moved 2 times during Elementary} \\ & \text{School})_{jk} + \beta_{16k}(\text{Moved 3+ times during Elementary School})_{jk} + \\ & \beta_{17k}(\text{No Economic Data})_{jk} + \beta_{18k}(\text{No } 8^{\text{th}}\ \text{Grade Score})_{jk} + r_{jk}\end{aligned}$$

b. Juniors:

$$\begin{aligned}\pi_{jk} = {} & \beta_{0k} + \sum_{p=1}^{9}\beta_{pk}X_{pjk} + \beta_{10k}(\text{Old for Grade})_{jk} + \beta_{11k}(\text{Been at school for less than 1} \\ & \text{year})_{jk} + \beta_{12k}(\text{Been at school for 2 years})_{jk} + \beta_{13k}(\text{Been at school for 3 years})_{jk} + \\ & \beta_{14k}(\text{Been at school for 3+ years})_{jk} + \beta_{15k}(\text{No Economic Data})_{jk} + \\ & \beta_{16k}(\text{No } 8^{\text{th}}\ \text{Grade Score})_{jk} + r_{jk},\end{aligned}$$

where $\sum_{p=1}^{9}\beta_{pk}X_{pjk}$ represents 9 of the variables and coefficients common to the analyses of both first-time freshmen and juniors.

A description of these variables can be found in Table C1.

Level 3

$$\begin{aligned}\beta_{0k} = {} & \gamma_{00} + \gamma_{01}(\text{CHSRI})_k + \gamma_{02}(\text{Mean } 8^{\text{th}}\ \text{Grade Achievement})_k + \gamma_{03}(\text{Mean Social Status})_k + \\ & \gamma_{04}(\text{Mean Concentration Poverty})_k + \gamma_{05}(70\%\text{ or more African - American})_k + u_k\end{aligned}$$

$\beta_{pk} = \gamma_{p0}$, for the rest of the variables.

A description of these variables can be found in Table C2.

Student Outcomes

Dropout rates and freshman outcomes

To examine whether student outcomes at CHSRI schools are different from student outcomes at non-CHSRI schools, we used a two-level hierarchical model adjusting for individual students' characteristics and school-level characteristics. Level one represents students and level two represents schools.

At level one we controlled for previous performance in eighth grade, the social status in the census block where the student lives, the concentration of poverty in their block, gender, race, whether the student is receiving special education services, and whether the student is young or old at the beginning of high school. We also included variables related to students' mobility in elementary school and whether they attended a CPS school immediately prior to becoming a ninth-grader. These slopes do not vary randomly at the school level. At level one there are also three dummy variables indicating the year the data represent. These three year variables are a function of school characteristics for that year and they are allowed to vary randomly at level 2. The school characteristics included an indicator of whether the school was a CHSRI school, the average incoming achievement level of all students in appropriate grades, the achievement level squared, and the school's average student socioeconomic status (we tried some other school characteristics in the model that turned out not to have any explanatory power for the student outcomes).

There is no intercept in the model. Therefore each of the three year variables represents the mean for that year for the variable analyzed, adjusted for students' and schools' characteristics. Since we centered all the variables on CHSRI students and CHSRI schools, the means for each year are the means for schools similar to CHSRI schools with similar students.

The models and the variables in each level are described as follows:

Level 1

$$\eta_{ij} = \beta_{1j}(8^{th}\text{ Grade Achievement Reading})_{ij} + \beta_{2j}(8^{th}\text{ Grade Achievement Reading}^2)_{ij} +$$
$$\beta_{3j}(\text{Social Status})_{ij} + \beta_{4j}(\text{Concentration of Poverty})_{ij} + \beta_{5j}(\text{Male})_{ij} + \beta_{6j}(\text{White})_{ij} +$$
$$\beta_{7j}(\text{Asian})_{ij} + \beta_{8j}(\text{Native American})_{ij} + \beta_{9j}(\text{Latino})_{ij} + \beta_{10j}(\text{Special Education})_{ij} +$$
$$\beta_{11j}(\text{No Economic Data})_{ij} + \beta_{12j}(\text{No } 8^{th}\text{ Grade Score})_{ij} + \beta_{13j}(\text{Young Began High School})_{ij} +$$
$$\beta_{14j}(\text{Months Old Began High School})_{ij} + \beta_{15j}(\text{Slightly Old Began High School})_{ij} +$$
$$\beta_{16j}(\text{Moved 1 time during Elementary School})_{ij} + \beta_{17j}(\text{Moved 2 times during Elementary School})_{ij} +$$
$$\beta_{18j}(\text{Moved 3 + times during Elementary School})_{ij} + \beta_{19j}(\text{From Private Elementary School})_{ij} +$$
$$\beta_{20j}(\text{Returning to CPS})_{ij} + \beta_{21j}(\text{From Other Public Elementary School})_{ij} + \beta_{22j}(\text{YEAR } 02-03)_{ij} +$$
$$\beta_{23j}(\text{YEAR } 03-04)_{ij} + \beta_{24j}(\text{YEAR } 04-05)_{ij} + r_{ij}$$

Level 2

$$\beta_{pj} = \gamma_{p0} \text{ for p = 1 through 21}$$

$$\beta_{22j} = \gamma_{220} + \gamma_{221}(\text{CHSRI } 02-03)_j + \gamma_{222}(\text{Mean } 8^{th}\text{ Grade Achievement } 02-03)_j +$$
$$\gamma_{223}(\text{Mean } 8^{th}\text{ Grade Achievement } 02-03^2)_j + \gamma_{224}(\text{Mean Social Status } 02-03)_j + u_{22j}$$

$$\beta_{23j} = \gamma_{230} + \gamma_{231}(\text{CHSRI } 03-04)_j + \gamma_{232}(\text{Mean } 8^{th}\text{ Grade Achievement } 03-04)_j +$$
$$\gamma_{233}(\text{Mean } 8^{th}\text{ Grade Achievement } 03-04^2)_j + \gamma_{234}(\text{Mean Social Status } 03-04)_j + u_{23j}$$

$$\beta_{24j} = \gamma_{240} + \gamma_{241}(\text{CHSRI } 04-05)_j + \gamma_{242}(\text{Mean } 8^{th}\text{ Grade Achievement } 04-05)_j +$$
$$\gamma_{243}(\text{Mean } 8^{th}\text{ Grade Achievement } 04-05^2)_j + \gamma_{244}(\text{Mean Social Status } 04-05)_j + u_{24j}$$

For dropout rates and on-track to graduate indicator,

$$Y_{ij}\left|\varphi_{ij}\right. \sim B(1,\varphi_{ij}) \text{ and } \eta_{ij} = \log\left(\frac{\varphi_{ij}}{1-\varphi_{ij}}\right)$$

For the number of days the student is absent during the year,

$$Y_{ij}\left|\lambda_{ij}\right. \sim P(1,\lambda_{ij}) \text{ and } \eta_{ij} = \log(\lambda_{ij})$$

Eleventh-Grade Outcomes

To examine whether students' absences and test scores in eleventh grade at CHSRI schools are different from students' absences and test scores at non-CHSRI schools, we used a two-level HLM, adjusting for individual students' characteristics and school-level characteristics. As before, level one represents students and level two represents schools.

Level 1

$$\begin{aligned}\eta_{ij} = {} & \beta_{1j}(8^{\text{th}}\text{ Grade Achievement Reading})_{ij} + \beta_{2j}(8^{\text{th}}\text{ Grade Achievement Reading}^2)_{ij} + \\ & \beta_{3j}(\text{Social Status})_{ij} + \beta_{4j}(\text{Concentration of Poverty})_{ij} + \beta_{5j}(\text{Male})_{ij} + \beta_{6j}(\text{White})_{ij} + \\ & \beta_{7j}(\text{Asian})_{ij} + \beta_{8j}(\text{Native American})_{ij} + \beta_{9j}(\text{Latino})_{ij} + \beta_{10j}(\text{Special Education})_{ij} + \\ & \beta_{11j}(\text{No Economic Data})_{ij} + \beta_{12j}(\text{No } 8^{\text{th}}\text{ Grade Score})_{ij} + \beta_{13j}(\text{Old for Grade})_{ij} + \\ & \beta_{14j}(\text{YEAR } 02-03)_{ij} + \beta_{15j}(\text{YEAR } 03-04)_{ij} + \beta_{16j}(\text{YEAR } 04-05)_{ij} + r_{ij}\end{aligned}$$

Level 2

$$\beta_{pj} = \gamma_{p0} \text{ for } p = 1 \text{ through } 13$$

$$\begin{aligned}\beta_{14j} = {} & \gamma_{140} + \gamma_{141}(\text{CHSRI } 02-03)_j + \gamma_{142}(\text{Mean } 8^{\text{th}}\text{ Grade Achievement } 02-03)_j + \\ & \gamma_{143}(\text{Mean } 8^{\text{th}}\text{ Grade Achievement } 02-03^2)_j + \gamma_{144}(\text{Mean Social Status } 02-03)_j + u_{14j}\end{aligned}$$

$$\begin{aligned}\beta_{15j} = {} & \gamma_{150} + \gamma_{151}(\text{CHSRI } 03-04)_j + \gamma_{152}(\text{Mean } 8^{\text{th}}\text{ Grade Achievement } 03-04)_j + \\ & \gamma_{153}(\text{Mean } 8^{\text{th}}\text{ Grade Achievement } 03-04^2)_j + \gamma_{154}(\text{Mean Social Status } 03-04)_j + u_{15j}\end{aligned}$$

$$\begin{aligned}\beta_{16j} = {} & \gamma_{160} + \gamma_{161}(\text{CHSRI } 04-05)_j + \gamma_{162}(\text{Mean } 8^{\text{th}}\text{ Grade Achievement } 04-05)_j + \\ & \gamma_{163}(\text{Mean } 8^{\text{th}}\text{ Grade Achievement } 04-05^2)_j + \gamma_{164}(\text{Mean Social Status } 04-05)_j + u_{16j}\end{aligned}$$

For the number of days the student is absent during the year,

$$Y_{ij}\left|\lambda_{ij}\right. \sim P(1,\lambda_{ij}) \text{ and } \eta_{ij} = \log(\lambda_{ij})$$

and for the analysis of test scores, $\eta_{ij} = \text{PSAE Score}_{ij}$.

Description of the Variables Used in the Models

TABLE C1

Individual-Level Variables Used in Analyses

WHERE USED	DESCRIPTION
Teacher Survey Measure Analysis	**Gender** was indicated by a dummy variable.
	Race/Ethnicity was indicated by a set of dummy variables. Categories included "white, non-Hispanic," "Hispanic," "American Indian," "Asian," and "other" (which combined "biracial/multi-ethnic" and "other").
	Classroom Teachers were indicated by a dummy variable, distinguishing teachers who did not have a specific classroom responsibility from those who did.
	Education Level was indicated by a set of dummy variables. Bachelor's Degree includes those who said their highest level of formal education was a bachelor's degree, while Doctorate Degree includes those who indicated their highest level of formal education was a doctorate. Those with a Master's degree or a Master's degree plus 15 credits or more were combined in a single category.
	Teaching Experience was indicated by a set of dummy variables. The omitted category was teachers who indicated they had 11 to 15 or more than 15 years teaching experience.
	Entering Teaching Through an Alternative Certification Program was indicated by a dummy variable, distinguishing such teachers from those who entered the profession through other programs.
	Missing Background Values were imputed at the sample mean and a dummy variable was assigned.
All Analyses of Students, Surveys, and Outcomes	**Gender** was indicated by a dummy variable.
	Race/Ethnicity was indicated by a set of dummy variables including "white, non-Hispanic," "Hispanic," "African-American," "American Indian," and "Asian."
	Socioeconomic Status included two variables, *Social Status* and *Concentration of Poverty.* Both were based on data from the 2000 U.S. Census information on the census block group in which students lived. Students' home addresses were used to link each student to a particular block group within the city, which could then be linked to census data on the economic conditions of the student's neighborhood. Four indicators were used to construct these variables: 1) log of the percentage of families above the poverty line, 2) log of the percentage of men employed in the block group, 3) the average level of education among adults over age 21, and 4) log of the percentage of men in the block group employed as managers or executives. The first two of these were reverse coded and combined into the variable called *Concentration of Poverty,* while the other two indicators were combined into the variable called *Social Status.* The census data allow for a more accurate indicator of students' economic status than a simple indicator of whether the student qualifies for free or reduced lunch. The vast majority of students in CPS qualify for free or reduced-cost lunch, and there is wide variation in the economic status of students who qualify as low income. Furthermore, by the time students reach high school age, proportionately more parents fail to apply for free and reduced lunch, and different schools treat this phenomenon differently.

DESCRIPTION	WHERE USED
Receiving Special Education Services based on administrative records.	**All Analyses of Students, Surveys, and Outcomes**
Students' Elementary Achievement was constructed based on student reading scores on the Iowa Tests of Basic Skills (ITBS) they took in eighth grade. The analyses of student outcomes included linear and quadratic terms for this variable.	
Missing Values. If students were missing values on the socioeconomic variables or on their eighth-grade achievement, they were given values at the sample mean and assigned a dummy variable.	
Age on Entry into High School was distinguished for first-time ninth graders by a set of variables. Months Old Began High School gave the number of months older than 14 years, 8 months that a student was as of September 1 of the academic year. Students older than 14 years, 8 months should have started school with the previous cohort if they were to follow school-system guidelines. Slightly Old Began High School is a dummy variable that indicates students between 14 years and 9 to 11 months old when they began high school. "Young Began High School" is a dummy variable indicating whether a student was younger than age 14 at the start of high school.	**Additional Variables: Analyses of First-Time Freshmen Only**
School Mobility in Elementary School was included in the models as a proxy of educational stability. Three dummy variables were constructed identifying students who moved once, twice, or three or more times in the three years prior to entering high school.	
New Students (those who did not enter their CPS high school from a CPS elementary school) make up about 10 percent of each cohort and present measurement difficulties. For these students, we do not have information on elementary mobility or incoming achievement. Three dummy variables were used to identify these students, since their attitudes could presumably be influenced by their prior school experience. *From Other Public School* includes those students who had never before attended a CPS school and entered high school from another public school, *From Private Elemntary School* includes those who entered high school from a private elementary or middle school, and *Returning to CPS* includes students returning to CPS after a time away. Sample-wide mean achievement and mobility were then imputed for these students.	
Whether a Student Was Old for Grade was indicated by a dummy variable to show whether a student was older than what would be expected based on school system guidelines.	**Additional Variables: Analyses of Junior Students Only**
Length of Time in Current High School was hypothesized to be a characteristic that could play an important role in student attitudes toward their school. We used a system of three dummy variables to capture this. Students who had been at the school for a year was the omitted category.	
Academic Year was captured by a set of three dummy variables representing the three years of this study.	**Additional Variables: Student Outcome Analyses Only**

TABLE C2

School-Level Variables Used in Analyses

WHERE USED	DESCRIPTION
All Analyses	**Whether a School is a CHSRI School** was indicated with a dummy variable.
	School-Level Achievement. For the analyses of survey measures this variable was computed by averaging the eighth-grade ITBS reading score of all current members of a school's student body, adjusting for current grade level. For the analyses of student outcomes this variable was computed by averaging the eighth-grade ITBS reading score of first-time freshmen or eleventh-grade students at the school depending on the outcome analyzed. The analyses of student outcomes included linear and quadratic terms for this variable.
	School-Level Socioeconomic Status. A description of how this variable was created at the individual level can be found in Table C1.The school-level indicator was an average of the social status of all students in the school based on the census block in which each lived.
Additional Variables: Survey Analyses Only	**School-Level Concentration of Poverty.** A description of how this variable was created at the individual level can be found in Table C1. The school-level indicator was an average of the concentration of poverty of all students in the school based on the census block in which each lived.
	Racial Composition of the School. A dummy variable was included for schools whose student body was at least 70 percent African-American.

Appendix D

Description of Teacher and Student Survey Measures

TABLE D1

Teacher Survey Measure Descriptions and Statistics

Measure	Description	N	Individual Reliability	Between School Reliability	Variation Between Schools
Access to New Ideas	The extent to which teachers participate in professional development. Questions ask teachers how often they attend professional development activities sponsored by the school, district, or union; take continuing education courses at a college or university; and network with teachers from other schools.	3,140	0.67	0.46	4.7%
Collective Responsibility	Teachers' assessment of the strength of their shared commitment to improve the school so that all students learn. Questions ask teachers how many colleagues feel responsible for students' academic and social development, set high standards for professional practice, and take responsibility for school improvement.	3,225	0.92	0.79	9.7%
Commitment to Innovation	Teachers' perceptions of whether they are continually learning and seeking new ideas, have a "can do" attitude, and are encouraged to try new ideas in their teaching.	3,230	0.89	0.83	13.2%
Expectations for Post-Secondary Education	Teachers' reports of the degree to which they expect that most students at their school will go to college. Questions ask if teachers feel it is part of their job to prepare students to succeed in college and if they spend time out of class in helping students plan for college.	3,067	0.82	0.93	35.5%
Principal Instructional Leadership	Teachers' perception of their principal as an instructional leader with respect to the teaching and learning standards, communication of a clear vision for the school, and tracking of academic progress.	3,194	0.86	0.87	16.5%
Program Coherence	The degree to which teachers feel the programs at their school are coordinated with each other and with the school's mission. Questions ask teachers if instructional materials are consistent within and across grades and if there is sustained attention to quality program implementation.	3,181	0.74	0.78	11.2%

TABLE D1–CONTINUED

Teacher Survey Measure Descriptions and Statistics

Measure	Description	N	Individual Reliability	Between School Reliability	Variation Between Schools
Quality Professional Development	Teachers' assessment of the degree to which professional development has influenced their teaching, helped them understand students better, and provided them with opportunities to work with colleagues as well as teachers from other schools	3,135	0.81	0.75	9.3%
Quality Student Discussion	Teachers' reports of how well students interact with each other in classroom discussions. Questions ask whether students build off each others' ideas, show respect, provide constructive feedback, and use data and text references to support their ideas.	2,397	0.72	0.62	11.3%
Reflective Dialogue	Teachers' assessment of how often they talk with one another about instruction and student learning. Questions ask teachers about their discussion of curriculum and instruction, the school's goals, and the best ways to help students learn and manage classroom behavior.	3,253	0.77	0.71	7.9%
Teacher Influence	Measures the extent of teachers' involvement in school decision making. It assesses teachers' influence on the selection of instructional materials, setting of school policy, in-service program planning, spending of discretionary funds, and hiring of professional staff.	3,258	0.84	0.89	21.9%
Teacher-Teacher Trust	The extent to which teachers feel they have mutual respect for each other, for those who lead school improvement efforts, and for those who are experts at their craft. Questions also ask teachers if they feel comfortable discussing their feelings and worries and really care about each other.	3,245	0.82	0.79	11.2%

TABLE D2

Student Measure Descriptions and Statistics for First-Time Freshmen (Juniors)

Measure	Description	N	Individual Reliability	Between School Reliability	Variation Between Schools
Academic Press	Students' views of their teachers' efforts to push students to higher levels of academic performance. Students also report on the degree to which they find their classes to be challenging.	12,481 (7,227)	0.76	0.75 (0.72)	5.0% (5.6%)
Classroom Personalism	The degree to which students perceive that their teachers give individual attention to and are concerned about their students' academic performance	12,376 (7,192)	0.74	0.80 (0.83)	5.5% (9.2%)
Quality English Instruction	Student's reports of the frequency with which they are made to practice English activities such as writing papers of three or more pages, rewriting in response to comments, discussing connections between a reading and real life people, and understanding how authors are influenced and the tools they use to convey meaning.	14,294 (8,443)	0.86	0.84 (0.83)	5.4% (8.6%)
Quality Math Instruction	Student's reports of the frequency that they are made to practice math activities such as writing problems for other students to solve, applying math to situations outside the classroom, and explaining to the class how they solved a problem.	14,590 (8,541)	0.76	0.88 (0.87)	8.9% (10.0%)
Peer Support for Academic Achievement	The norms among students with regard to their peers' support of academic work. Questions ask if students talk about what they did in class, if they help each other with homework and test preparation, and if their friends think it is important to attend class.	15,592 (9,323)	0.84	0.87 (0.84)	6.3% (7.2%)
Respectful Classroom Behavior	Students' assessment of their peers' classroom behavior with regard to how they treat each other, how often they disrupt class, if they have respect for each other, and if they help each other learn.	12,297 (7,143)	0.74	0.80 (0.85)	61.3% (42.1%)
Schoolwide Future Orientation	Student's reports of the degree to which teachers work hard to make sure that all students are learning, are staying in school, are planning for their futures; and the degree to which all students are encouraged to go to college.	15,694 (9,395)	0.83	0.95 (0.91)	17.2% (15.5%)
Sense of Belonging	Students' reports of how personally connected they feel to the school. Students rate the degree to which the people at school feel like family, whether people at school care if they come to school, and whether they participate in activities at the school.	15,619 (9,365)	0.81	0.87 (0.84)	7.6% (9.1%)
Student-Teacher Trust	Students' perceptions about the quality of their relationships with teachers. Questions ask students if teachers care about them, keep promises, listen to their ideas, and try to be fair.	15,829 (9,501)	0.78	0.92 16.5%	16.5% (16.7%)
Teacher Support	Students' reports of teachers' being there to help with personal matters. Students were asked whether there is a teacher who they can talk to about personal problems, who gives extra help with schoolwork, and who cares about how the student is doing.	15,769 (9,459)	0.80	0.92 (0.87)	12.7% (11.0%)

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