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The Relationship of a Systemic Student Support Intervention to Academic Achievement in Urban Catholic Schools

Katherine A. Shields
Boston College, katletters@gmail.com

Mary E. Walsh
Boston College, mary.walsh@bc.edu

Terrence J. Lee-St. John
Boston College, tj.leestjohn@bc.edu

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Cover Page Footnote

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The Relationship of a Systemic Student Support Intervention to Academic Achievement in Urban Catholic Schools

Katherine A. Shields, Mary E. Walsh, and Terrence J. Lee-St. John
Boston College

Much of the achievement gap between rich and poor students can be attributed to out-of-school factors, yet few schools have a comprehensive, coordinated system for addressing students' nonacademic needs. Within a group of Catholic schools located in one city, this study examined academic achievement on the Stanford Achievement Test battery in mathematics, reading, and language among second- through eighth-grade students participating in such an intervention, and compared the results with those of similar nonparticipating students in nearby cities. Using hierarchical longitudinal growth modeling and adjusting for demographic characteristics, this study found that students in intervention schools outperformed the comparison group on average in sixth-grade mathematics. Intervention students also experienced significantly higher rates of growth in achievement than the comparison group in all three subjects. The results suggest that systemic service provision models have the potential to help urban Catholic schools meet their mission of educating the whole child and serving the poorest families.

Keywords

Catholic education, longitudinal growth analysis, achievement gap

Catholic schools have a long tradition of serving families living in poverty in the nation's cities. Historically, the parochial school sought to meet the needs of its surrounding parish community (Bryk, Lee, & Holland, 1993). In recent decades, as parishioners have dispersed from urban areas, leaving lower-income and increasingly non-Catholic student bodies in urban schools (Goldschmidt & Walsh, 2012), this commitment has broadened to encompass service to urban communities of various faiths. Providing a quality education to disadvantaged urban families aligns with the church's social teachings and mandate to serve the poor (Grace & O'Keefe, 2007). The recent National Standards and Benchmarks for Effective Catholic Elementary

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and Secondary Schools (Ozar & Weitzel-O'Neill, 2012) reinforce this commitment, calling for schools to provide “programs and services aligned with the mission to enrich the academic program and support the development of student and family life” (p. 12). However, private and public schools alike struggle with how best to support families to counteract the myriad ill effects of poverty, particularly those that singly and in combination hinder academic progress. This study examines a whole-child strategy for serving students’ nonacademic needs in urban Catholic schools, and the academic outcomes of participating students.

Out-of-School Factors and the Achievement Gap

Poverty affects children’s development and academic performance through a range of mechanisms. Exposure to parental stress in utero and during early childhood can affect neurological development (Shonkoff et al., 2012). Reduced financial resources and associated stressors affecting lower-income parents may limit their capacity to create a psychosocially rich environment for their children through responsiveness and warmth (Dearing & Taylor, 2007), participation in enriching after-school activities (Dearing et al., 2009), exposure to a wide vocabulary (Hart & Risley, 1995), investment in a cognitively rich environment, and parenting practices that support development (Yeung, Linver, & Brooks-Gunn, 2002; Rothstein, 2004; Sirin, 2005). Placed at risk by societal structures, low-income and historically disadvantaged minority children are more likely than nonpoor and White peers to have poor health status, starting with lower birth weight; greater food insecurity and malnutrition; greater exposure to environmental hazards that impede cognitive development; and more frequent disruptive moves between schools (Barton & Coley, 2009).

These factors outside school may account for as much as two-thirds of the variance in academic achievement, a pattern that emerged in the historic Coleman Report in 1966 (Coleman et al., 1966) and was replicated in more recent studies (Phillips, Brooks-Gunn, Duncan, Klebanov, & Crane, 1998; Rothstein, 2010). The achievement gap related to income has grown as the divide between the income levels of rich and poor families has widened (Duncan & Murnane, 2011; Reardon, 2011). Furthermore, the extent of the gap in the prevalence of risk factors between lower-income and minority children and their peers has largely remained unchanged over recent years (Barton & Coley, 2009). Researchers have thus argued that the achievement

gap at scale cannot be closed without addressing poverty and its effects (Berliner, 2006, 2013; Rothstein, 2004).

The Context of Urban Catholic Schools

Urban families make up close to half of Catholic schools' constituencies. In 2012–2013, 41% of Catholic schools nationwide were located in urban areas; in New England, 15% of elementary schools were further classified as inner-city. Among New England Catholic elementary and middle school students, 8% was Black, 5.1% Asian, and 4.7% multiracial; 8.2% was Hispanic/Latino. As of 2012–2013, the Archdiocese of Boston, the location of the present study, served more than 41,000 students at more than 100 schools in the elementary, middle, and secondary levels across Eastern Massachusetts, including 17 schools in the city of Boston (McDonald & Schultz, 2013). The Boston Archdiocese reported that across all of its schools, urban and nonurban, 5.1% of students received Title I services targeting low-income families in 2012–2013, and 8.2% received federally subsidized lunches; the schools within the city of Boston itself, however, served substantially higher numbers of families in poverty than the average for the Archdiocese.

Urban Catholic schools like those in the Boston area serve relatively high percentages of low-income and historically disadvantaged minority students, facing many of the same barriers as their neighbors attending public schools (Bryk et al., 1993; O'Keefe & Scheopner, 2009). In a 2003 survey of Catholic school staff in a northeastern urban diocese, 72% of teachers and 86% of principals saw nonacademic issues as a barrier to their students' learning (Walsh & Goldschmidt, 2004). This perception is borne out by Catholic school students' scores on the National Assessment of Educational Progress, the "Nation's Report Card," on which lower-income students eligible for free or reduced-price lunch perform substantially lower on average than their middle- and upper-income noneligible peers.¹ Catholic schools are particularly well-suited to offer comprehensive support for out-of-school issues, given their stated mission to educate the whole child and the parish's historical role as a community service provider (Walsh & Goldschmidt, 2004).

¹ NAEP Data Explorer, fourth-grade mathematics and reading, 2011 and 2013, accessed at <http://nces.ed.gov/nationsreportcard/naepdata>.

Interventions to Address Out-of-School Factors

Although most public and private K–12 schools offer some form of support for students' nonacademic needs, these services are often fragmented and uncoordinated, lacking systemic organization (Lean & Colucci, 2010). School counselors, working both within the school bureaucracy and in relationship to external community agencies, are hampered in their work by this lack of structure (Bridgeland & Bruce, 2011). To address these institutional issues, best practice guidelines recommend the development of systematic, comprehensive approaches to meeting students' needs (Adelman & Taylor, 2006; Marx, Wooley, & Northrop, 1998).

Children who receive appropriate, sustained, well-targeted supports face fewer outside-school stressors and develop greater self-regulation of social-emotional and cognitive functions (Shonkoff & Phillips, 2000), thereby allowing students to arrive at school more ready to learn (Ayoub & Fischer, 2006; Noguera, 2011). Research has demonstrated links between improvements in certain noncognitive factors and positive academic achievement outcomes (Duckworth & Seligman, 2005; Heckman, 2008; Heckman, Pinto, & Savelyev, 2012). Various interventions that address those factors directly have demonstrated academic gains (Dignath & Büttner, 2008; Lassen, Steele, & Sailor, 2006; Villares, Frain, Brigman, Webb, & Peluso, 2012). For example, increased family involvement in the child's education has been linked with reductions in the literacy achievement gap (Dearing, Kreider, Simpkins, & Weiss, 2006).

The City Connects Intervention Model

City Connects is an intervention that implements theoretically guided practices for student support in high-poverty, urban schools. Its design is aligned with the principles of best practice in student support (Adelman & Taylor, 2006; Marx et al., 1998; Walsh, & Brabeck, 2006). Developed in 2001 through a collaboration between Boston College, the Boston Public Schools, and area community agencies, the intervention was implemented in 64 public and Catholic schools across three states in the 2014–2015 school year. City Connects began formal implementation in Archdiocese of Boston elementary and K–8 schools in 2008–2009. In the 2014–2015 school year, 17 Catholic elementary schools in the City of Boston were implementing the model.

City Connects's approach is comprehensive, addressing the academic,

social-emotional, health, and family strengths and needs of each and every student in a school. A master's-trained, licensed school counselor or school social worker in each school, the City Connects *school site coordinator*, is at the core of the intervention. Figure 1 illustrates the City Connects theory of change.

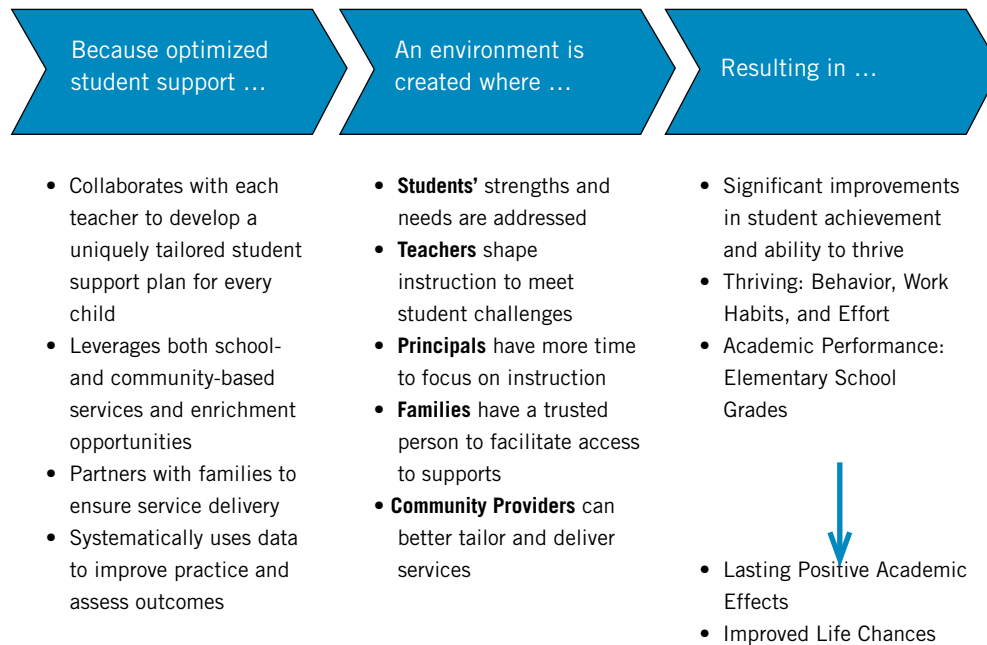


Figure 1. City Connects's theory of change.

Each classroom teacher and the school site coordinator meet to discuss every student in the class using standardized guiding questions. Student strengths and needs across four developmental domains—academic, socio-emotional, health, and family—are electronically documented, and students are grouped into three tiers, with Tier 1 representing strengths and minimal risks, Tier 2 representing strengths and mild to moderate risks, and Tier 3 representing strengths and severe risks. The school site coordinator and teacher collaborate to identify types of services and supports that could promote student strengths and meet needs. Using a computer-based tool designed for the intervention, site coordinators then identify specific service providers based on factors such as service type(s), ages served, location, transportation requirements, and family capacity to support participation (e.g., ac-

cess to insurance). Site coordinators connect children and their families with service providers, monitor service quality and fit, and maintain partnerships with community service providers.

For children identified by teachers, coordinators, or other school staff as having intensive needs, coordinators arrange individual student reviews with a wider team of professionals—school psychologists, teachers, principals, nurses, and community agency staff—to develop specific goals and strategies for the student. Examples of commonly provided services include before- and after-school programs, sports, mentoring, tutoring, social skills interventions, health screenings, family counseling, and food or clothing donations. These services are sometimes available within the school, but are also provided by community agencies.

The coordinator uses a proprietary web-based system to track the service plan for each student. A documented, standardized set of practices, oversight mechanisms, and fidelity tools guide implementation across sites and services. School site coordinators participate in rigorous training in the model and continuous professional development, including biweekly meetings and webinars.

Guiding the City Connects approach is continuous formative and summative evaluation of student outcomes, including rigorous, longitudinal evaluation of academic achievement. In the Boston Public Schools (BPS), evaluation has included tracking student performance on statewide standardized assessments; students in City Connects BPS schools were found to achieve higher report card scores in elementary school and higher grades and standardized test scores in middle schools than comparison students (Walsh et al., 2014). Although private schools in Massachusetts are not required to participate in the statewide assessment, schools in the Archdiocese of Boston administer the Stanford Achievement Test, a nationally normed assessment battery. These test results offer a valid, reliable way to analyze the association between City Connects participation and changes in academic achievement over time.

Research Questions

Using a student-level dataset comprising achievement test scores and demographic data from Catholic schools participating in City Connects as well as nonparticipating Catholic comparison schools, this study contributes to our understanding of how systemic student support interventions can address

the achievement gap in the context of urban Catholic schools. The analysis addressed the following research questions:

- Does academic achievement in mathematics, reading, and language differ between students who participate in a systematic support intervention and those attending comparison schools, after controlling for demographic characteristics?
- Do the rates of growth in achievement differ between intervention and comparison students?
- Among intervention students, does the number of years of exposure to the City Connects program have an association with their rates of growth in achievement?

These questions were considered in the context of four student characteristics that have been linked to academic achievement in the research literature. *Gender* is a perennial subject of study, particularly in relation to mathematics achievement (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006; Robinson & Lubienski, 2011; Spencer, Steele, & Quinn, 1999), although some recent studies have suggested that girls and boys are now performing at similar levels (Hyde, Lindberg, Linn, Ellis, & Williams, 2008). As discussed above, *family income level* has strong links to children's performance in school (Berliner, 2006; Yeung et al., 2002). *Race* is strongly associated with educational outcomes, even after accounting for income, and exhibits interactions with measures of income and wealth (Elliott, Jung, Kim, & Chowa, 2010; Riegle-Crumb & Grodsky, 2010; Zhan, 2006;). Finally, children receiving special education services experience a particular set of educational interventions whose effects on academic achievement vary with the type of disability identified, the quality of interventions, how early the intervention begins, and other factors (Ehrhardt, Huntington, Molino, & Barbaresi, 2013; Reynolds & Wolf, 1999).

Methodology

Data Sources

The analyses reported below were based on a longitudinal student-level dataset comprising 3,628 students from 17 Boston Catholic elementary/middle schools participating in the intervention, and 3,323 students from 10 comparison schools in the Boston Archdiocese. Because all Archdiocese

schools in the City of Boston participated in City Connects, a sample of 10 nontreatment comparison schools was drawn from more than 60 Archdiocese schools serving grades K to 8 located outside Boston. Schools were selected that had similar geographic characteristics (midsize urban centers in surrounding communities) and demographic profiles (percentages of racial/ethnic minority students and lower-income families higher than the state average) to treatment schools.

Data were analyzed for four school years, from 2009–2010 through 2012–2013, for grades two through eight. Data were collected from multiple sources. Intervention schools entered demographic data about students in a proprietary Web-based project database. In addition, all intervention and comparison schools provided City Connects with class lists, including demographic data, annually. The Catholic Schools Office of the Boston Archdiocese provided student Stanford Achievement Test scores and served as an additional source of demographic data. Finally, the Catholic Schools Foundation provided family income data for a subset of students who applied for scholarship aid.

Measures

The Stanford Achievement Test, 10th edition (Stanford 10) is a standardized, norm-referenced assessment of student academic achievement (Pearson, 2004). It offers a battery of multiple-choice tests in mathematics, language, reading, science, and social science for kindergarten through grade 12. Content is linked to state and national standards in each area. The reading assessment includes decoding, vocabulary, and comprehension; the language assessment covers word- and sentence-level skills, mechanics, and expression; and the mathematics assessment tests skills in both computational proficiency and problem-solving. Because the tests are vertically scaled across grades, a student's scale scores can be compared from one grade to another to measure growth in achievement over time. The Stanford 10 was administered each spring during the four years of the study. Stanford 10 mathematics, reading, and language scale scores were analyzed as outcome variables in this study.

Three variables were used to represent participation in the intervention: a dummy variable indicating whether or not the student attended a City Connects in the Catholic Schools (CCCS) intervention school in any year in the study period; a cumulative dosage variable for each year, representing the number of years to date within the study period that the student had attend-

ed intervention schools; and a maximum dosage variable representing the total number of years the student was enrolled in intervention schools during the study period. The 3% of students who switched between intervention and comparison schools during the study period were excluded from analysis; the 1% of students who repeated a grade was retained in the sample.

Student demographic covariates related to achievement were employed as controls. Gender and race (with categories Asian, White, Black, Hispanic, and other/more than one race) were represented in the model. In addition, the analysis included a control variable indicating whether or not the student had an Individualized Education Plan (IEP) in any year of the study, and a control variable designating eligibility for free or reduced-price lunch through the National School Lunch Program in any year of the study.

Missing Data

Gender, race/ethnicity, and IEP status were missing for less than 1% of students, while free/reduced-price lunch eligibility was missing for 18%. Students were excluded from analysis if their records were missing one or more of these four control variables. The resulting analytic sample contained 3,216 intervention school students and 2,403 comparison school students. With a total of 19% of students excluded from the sample due to missing demographic information, any systematic factors related to the absence of these data could bias results. It should also be noted that a higher percentage of comparison students (28%) than intervention students (11%) were excluded on this basis, likely due to more complete record-keeping available through the project database. An alternative set of analyses was run in which cases with missing demographic data were retained and flagged. The direction and magnitude of the treatment coefficients (indicating whether or not students participated in CCNX, and for how many years) were similar to coefficients estimated with the original sample, suggesting that results were not sensitive to the choice of method (see further discussion under results).

Analytic Method

To answer the first research question (*Does academic achievement differ between intervention and comparison students?*), cross-sectional differences between the two groups were estimated for the sixth grade. Although data were included in the analysis for the seventh and eighth grades, sixth grade

was chosen as the endpoint for the cross-sectional analysis because fewer Catholic schools offered upper grades, yielding a relatively small number of student records. To address the second research question (*Do the rates of growth in achievement differ between intervention and comparison students?*), the two groups' longitudinal rates of growth in achievement—that is, the average change in scores per year—were compared. Finally, to respond to the third research question (*Does the number of years of City Connects exposure, or “dosage,” have an association with rate of growth?*), the analyses compared intervention students' achievement growth rates for those who spent longer and shorter periods in City Connects schools. The analysis employed a multilevel longitudinal growth model, which was designed to account for multiple years of achievement data over time for each student, as well as the grouping of students within schools.

Results

Descriptive Statistics

Table 1 shows the demographic characteristics of students in the intervention and comparison groups. Although the comparison schools were selected from communities with relatively high poverty and racial diversity, they still had lower proportions of low-income and historically disadvantaged minority students than the intervention schools. Nearly one third of CCCS students participated in the federally subsidized lunch program, compared to 9% of comparison students.

Table 1

Student Demographic Characteristics

	CCCS N = 3,216 %	Comparison N = 2,403 %
Male*	49	46
Race***		
White	40	55
Black	18	10
Hispanic	16	8
Asian	7	10
Other or more than one race	19	17
Has Individualized Education Plan (IEP)***	4	1
Eligible for free or reduced-price lunch***	31	9

* $p < .05$, ** $p < .01$, *** $p < .001$ for Pearson chi-square statistic

Among CCCS students, 16% was enrolled in a City Connects school for one year during the study period, 20% for two years, 29% for three years, and 36% for all four years. Among all students in the analytic sample, 44% had one year of Stanford 10 mathematics scores available during the study period, 41% had two years, 10% had three years, and 6% had data for all four years (the distributions for the other two subject scores were similar). Based on the intra-class correlation coefficients for scores in each subject, 56%–63% of the variation in academic achievement was attributable to differences between students within schools, while 12%–15% was attributable to average differ-

Table 2

Stanford Achievement Test Scale Scores: Descriptive Statistics for Analytic Sample

Grade		Mathematics		Reading		Language	
		CCCS	Comp.	CCCS	Comp.	CCCS	Comp.
2nd	N	904	434	878	434	904	434
	Mean	591.8	589.6	613.5	616.3	615.6	619.3
	SD	37.4	38.4	36.5	37.0	41.2	42.9
3rd	N	1022	471	988	471	1022	471
	Mean	617.3	618.8	632.5	637.8	624.1	634.6
	SD	38.2	42.4	36.9	37.1	38.6	42.1
4th	N	913	700	883	700	913	700
	Mean	639.0	645.8	648.5	659.3	643.0	658.1
	SD	35.7	35.3	35.8	35.0	38.1	39.5
5th	N	819	726	794	726	819	726
	Mean	657.3	667.7	660.5	671.4	656.3	671.7
	SD	36.6	36.4	32.2	32.1	38.6	38.3
6th	N	843	811	828	811	843	811
	Mean	679.5	682.4	680.1	688.2	668.9	678.3
	SD	40.8	38.7	37.6	33.3	39.0	34.5
7th	N	355	825	348	825	355	825
	Mean	670.8	696.9	673.0	697.4	664.8	694.8
	SD	30.0	36.5	26.1	28.2	29.0	36.7
8th	N	355	818	342	818	355	818
	Mean	684.2	707.0	685.7	704.1	673.0	702.7
	SD	33.4	35.7	28.1	26.9	30.6	37.9

Note. CCNX = students at schools participating in City Connects. Comp. = students attending comparison schools

ences between schools, with the remainder of the variance associated with differences in scores over time for each student.

Before controlling for student characteristics, comparison school students had higher SAT10 scale scores on average than CCCS students in every subject and grade, with the exception of second-grade mathematics, and that difference increased with grade level. Table 2 shows the descriptive statistics.

Academic Achievement Results

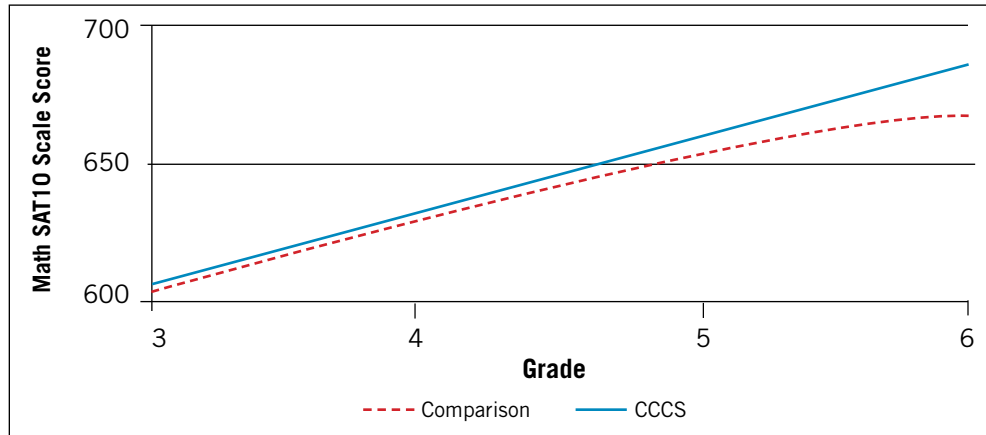
The following section presents the results of cross-sectional, longitudinal growth, and dosage analyses within each academic subject. Appendix A displays the complete model statistics for each of the three subject areas.

Mathematics achievement. The cross-sectional analysis of average mathematics achievement level in sixth grade found that scores were significantly higher for CCCS students than for their comparison school peers with similar demographic characteristics. The average difference between the two groups, controlling for demographic factors (gender, race/ethnicity, having an Individualized Development Plan, and eligibility for free/reduced-price lunch), was 16 scale score points—an effect size greater than half a standard deviation. This difference is one third greater than the size of the achievement gap (12 scale score points) associated with eligibility for free/reduced-price lunch estimated in this analysis.

The longitudinal growth analysis of mathematics achievements indicated that CCCS students also had a significantly higher *rate* of growth. As the slopes of the growth trend lines in Figure 2 illustrate, by 6th grade, CCCS students gained at a higher rate than their comparison peers. Finally, the analysis of *dosage* showed that students who were enrolled in a City Connects school for more years were also more likely on average to experience additional gains in achievement, compared to those with fewer years of CCCS involvement.

Figure 2 illustrates the differences in achievement between comparison students and CCCS students who remained in intervention schools for four years, for a hypothetical group of average students² in grades three through

² All demographic covariates were grand-mean centered; the figure represents students at the grand mean.



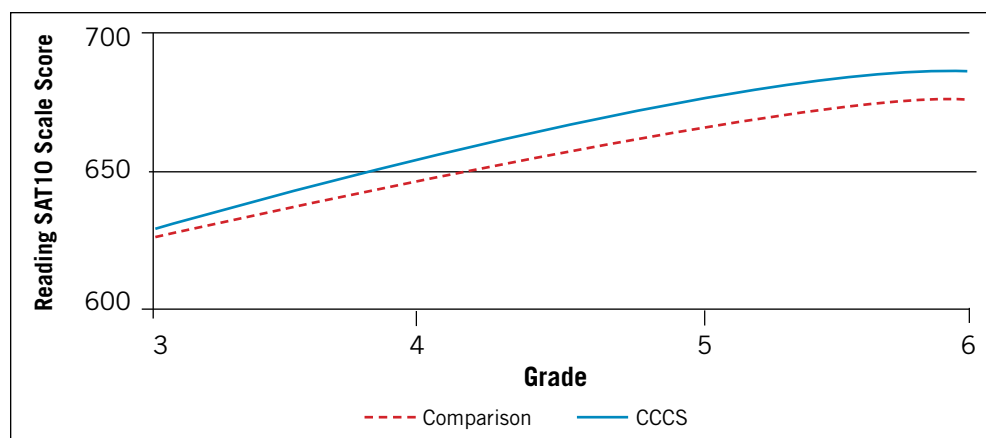
six, based on model estimates.

Figure 2. Growth in Stanford 10 mathematics scores (2009–2010 to 2012–2013): Model-adjusted mean scores (CCCS $N = 3,216$; Comparison $N = 2,403$). For CCCS students, assumes the student is enrolled in a CCCS school from 3rd to 6th grade. Figure shows estimated mean scores.

Students who were male, higher-income, White, or Asian had significantly higher mathematics scores by sixth grade, on average, whereas students who were female, Black, Hispanic, lower-income, or had an IEP had lower scores. A positive interaction between being lower-income and being Black mitigated the net effect of these two negative factors occurring together. No other interactions were found between student-level characteristics, and there were no significant interactions between treatment status and student characteristics, suggesting that the relationship between treatment and mathematics achievement did not differ across different types of students. The only demographic characteristic associated with the rate of growth was income level: lower-income students had a slower rate of growth on average compared to higher-income students.

Reading achievement. For Stanford 10 reading assessment scores, CCCS students again exhibited higher scores on average in sixth grade than their peers in comparison schools. However, the size of this gap was smaller than for math, and the difference was not statistically significant at an alpha level of .05. The average reading scale scores for CCCS sixth-graders were 11 points (39% of a standard deviation) higher than those for their peers after controlling for demographic factors (gender, race/ethnicity, having an Individualized Development Plan, and eligibility for free/reduced-price lunch).

The number of years the student spent in CCCS schools was likewise not a significant factor for reading growth. However, the average rate of growth estimated in the longitudinal analysis was significantly higher for CCCS students than for their comparison school peers by 6th grade. Figure 3 presents



the estimated reading growth curves.

Figure 3. Growth in Stanford 10 reading scores (2009–2010 to 2012–2013): Model-adjusted mean scores CCCS $N = 3,182$; Comparison $N = 2,403$. For CCCS students, assumes the student is enrolled in a CCCS school from 3rd to 6th grade.

Being Black, Hispanic, low-income, or having an IEP were factors significantly associated with lower reading achievement in sixth grade. A positive interaction between being Black and lower-income was present for reading achievement, similar to the pattern seen for mathematics. In addition, boys and Black students exhibited a higher estimated rate of growth in reading than their female and White peers.

Language achievement. Based on the cross-sectional analysis of language assessment scores, sixth-graders participating in CCCS had higher scores on average than their peers in comparison schools after controlling for demographic characteristics (15 scale score points, or half a standard deviation), but the difference was not statistically significant at the .05 alpha level. This relationship between CCCS participation and achievement was weaker among lower-income students compared to higher-income students, as indicated by a statistically significant interaction term. As the two graphs in Figure 4 illustrate, lower-income CCCS students started out with slightly lower

average scores in third grade than their lower-income peers in comparison schools, but surpassed the comparison students by sixth grade. The overall difference in scores for this subgroup in sixth grade was about a quarter of a standard deviation (8 scale score points). Among higher-income students, CCCS participants started out at about the same level as comparison students, but pulled ahead of them by approximately half a standard deviation (15 scale score points) by sixth grade. Although higher and lower income students exhibited different patterns, the relationship between CCCS participation and sixth grade results did not reach the level of statistical significance in either group.

The longitudinal analysis found that the rate of growth in language achievement was significantly higher for students participating in CCCS by 6th grade. However, the maximum time spent in CCCS schools did not have a relationship to the rate of language achievement growth.

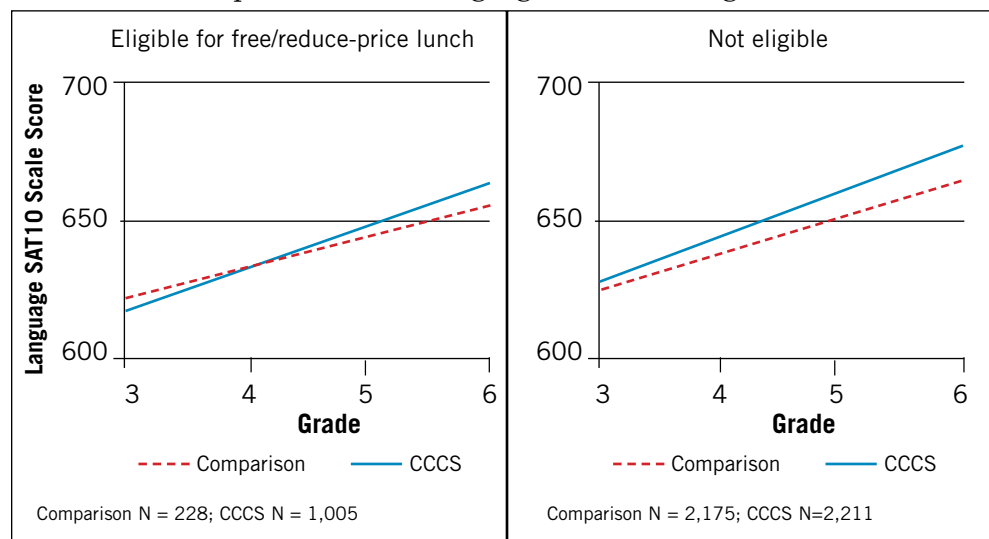


Figure 4. Growth in model-adjusted mean Stanford 10 language scores (2009–2010 to 2012–2013) by free/reduced-price lunch eligibility. Cross-sectional differences in language scores in 6th grade between CCCS and Comparison students were not statistically significant.

Students who were male, Black, Hispanic, other races, or had an IEP had lower language scores on average by the sixth grade. The positive interaction between being Black and lower-income was again present. No demographic characteristic was statistically associated with the rate of growth in language achievement.

A Note on Limited English Proficiency

English proficiency is an additional student factor relevant to achievement. In Boston, which has a large immigrant population, public school students who are classified as English language learners have lower state achievement test scores on average (Boston Public Schools, 2013). In this study, although some student records indicated whether or not the child was LEP and/or bilingual, 36% of students were missing this information. Two alternative sets of models were estimated: one in which LEP status was included in the model and listwise deletion performed, thereby reducing the analytic sample by nearly one-fourth; and one in which all cases were retained, and missing data for LEP (as well as other demographic characteristics) represented with a dummy variable.

In the listwise deletion models, LEP status was not a statistically significant factor for achievement in any of the three subjects. In the analysis with missing data dummies, LEP did not have a statistically significant relationship to achievement in mathematics or language, but did have a significant negative association with reading scores. In all three subjects, the coefficient for missing LEP data was significant, indicating that students with missing LEP status differed from those whose LEP status was available. In both models, the direction and magnitude of the overall relationship of treatment to outcome were similar to the original models without the LEP variable. However, in both alternative LEP models, the treatment coefficient was statistically significant for language and reading achievement, in contrast to the nonsignificant finding for these subjects in the original model. While the more conservative, nonsignificant results from the original models are reported in this article, it appears that English language learners may have a different experience with CCCS than other students, a finding worthy of additional study. A study of within-school implementation changes in Boston Public Schools found that City Connects had significant, positive effects on immigrant students' math and reading achievement at the end of elementary school, and narrowed the achievement gap between English Language Learners and English proficient students (Dearing et al., in press).

Discussion

These findings suggest that participation in a systematic, comprehensive intervention addressing out-of-school barriers to learning is associated with increased academic achievement in the Catholic school context.

In mathematics, the cross-sectional analysis found that students at City Connects schools had pulled ahead of comparison schools by sixth grade and demonstrated significantly higher average achievement scores. Although achievement advantages were found for CCCS students in reading and language as well, those differences were smaller and did not reach the level of statistical significance. Mathematics learning may be more sensitive to improvements in noncognitive attitudes and skills—such as attention, self-efficacy, and study habits—and therefore more responsive to support. A meta-analysis of impact evaluations of a widely used counseling intervention to help students develop cognitive, social, and self-management skills supports this hypothesis; the authors found a larger overall treatment effect size for mathematics than for reading (Villares et al., 2012). English proficiency, a factor not included in the present study, might also have some bearing on the smaller, nonsignificant differences found for language and reading.

CCCS students exhibited significantly higher rates of growth in achievement in each of the three subject areas compared to nonparticipating peers with similar demographic characteristics. This finding is consistent with the City Connects theory of change, which posits that students will come to school more ready to learn when their strengths and needs are addressed, and teachers will be better able to tailor their instruction when they know more about those strengths and needs. The schools' enhanced ability to engage with families may also contribute to achievement: a dedicated school site coordinator facilitates relationships and communication between families, schools, and services. Other research has documented the effective use of asset-based, social justice-oriented practices in urban Catholic schools to successfully connect with parents and other caregivers (Scanlan, 2008).

Mathematics was the only subject in which additional advantage accrued with more years of City Connects exposure. For a student who remains in a comprehensive support intervention over time, the benefits appear to accumulate and reinforce the student's achievement gains in this subject area.

The mathematics effect sizes found in this study are comparable to results from other comprehensive student support interventions. For example, the Harlem Children's Zone Promise Academy reported an effect size of 0.23 standard deviations on the New York Math Exam associated with one year of the intervention in middle school (Dobbie & Fryer, 2011), and the SEED urban boarding middle school found a 0.30 effect size on math achievement measures for students after one year of participation (Curto & Fryer, 2011). The findings are also consistent with those reported for City Connects in

the Boston Public Schools, where students averaged 0.21 standard deviations higher than nonparticipants on the state mathematics achievement test as a cumulative effect over five years ending in seventh grade (Walsh et al., 2014). A City Connects study of the cost per unit increase in effect size in public schools found that City Connects achieved larger achievement gains for a lower cost than these more resource-intensive support programs (Sibley, Raczek, Dearing, & Walsh, 2014). A similar efficient cost structure characterizes the Catholic school implementation of the program.

Addressing the Achievement Gap

For mathematics achievement, City Connects participation was associated with reductions over time in the gap between higher and lower income students' scores. Low-income students who remained in City Connects schools for four years were estimated to achieve near parity with middle- and higher-income students in comparison schools by the time they reached sixth grade: CCCS students who were eligible for free/reduced-price lunch had slightly higher estimated sixth-grade scores on average than comparison students who were not eligible for the free lunch program. In relation to language scores, however, participation in City Connects interacted in unexpected ways with poverty status. CCCS participation appeared to have a stronger beneficial association with sixth-grade language achievement among students who did not qualify for free or reduced-price lunch than among lower-income students (although it was not a statistically significant relationship for either group)—an example of the “Matthew effect,” by which advantages accrue to those who already have advantages. Furthermore, the higher concentration of poverty in Boston schools versus comparison schools may have aggregate effects on low-income students and their school environment that slow their academic growth and make it more difficult for them to reap the benefits of support programs like City Connects. Growing up in a neighborhood with a high concentration of poverty may have negative effects on children's cognitive development, through mechanisms such as normative parenting practices (Greenman, Bodovski, & Reed, 2011), availability and use of enrichment activities outside school (Dearing et al., 2009), environmental stressors, trauma, lack of access to healthy food, and exposure to environmental toxins (Nelson & Sheridan, 2011).

However, pre-existing differences between CCCS and comparison schools should be kept in mind as context for interpreting results. Because

a lower percentage of comparison students than intervention students were low-income (see Table 1), the two groups were not equivalent, meaning that the effects found in the analysis could be biased by differences between the two groups. The analyses attempted to adjust for the lack of equivalence by including student poverty status as a control variable in the models.

This study analyzes associations among achievement, treatment, and other factors; it does not seek to establish causal relationships. Because the study does not employ an experimental design with randomly assigned treatment and control groups, there may be unmeasured factors associated with higher academic achievement that systematically lead students to attend a City Connects school rather than a comparison school. For example, parents with higher levels of education, who are better equipped to support their children's learning, might represent greater numbers in the comparison cities than in Boston. Such factors could introduce bias into the results. Analysis of student support interventions and their effects using an experimental design with random assignment, or a quasi-experimental propensity score matching design, would contribute evidence about causal linkages between treatment and outcomes. Finally, additional detail and qualitative information about the school contexts in which the intervention takes place would help administrators identify any characteristics of the school environment that facilitate or impede program success. In particular, differences in language achievement results based on student family income warrant additional study.

Conclusion

This article has presented findings from a study of a coordinated, systemic approach to addressing out-of-school needs that is easily implemented, cost-effective, and shows promising results in relation to increased academic achievement. The results add to the body of research on meeting nonacademic needs as a potential strategy for closing achievement gaps between lower-income and middle/upper income students. It extends what is already known about such interventions in the public school setting to the Catholic education context. The intervention is particularly well suited to Catholic schools, with their explicit commitment to educating the whole child. Given the lagging academic performance of urban, lower-income students in Catholic (as well as public) schools nationwide, it is incumbent on schools to consider how to mitigate the effects of poverty on their students' academic progress. Free of some of the regulations that constrain operations in the public sector,

Catholic schools have the flexibility to try out innovative approaches in ways that public school systems cannot. To that end, many Catholic schools use their mandate to educate the “whole child” as an opportunity to promote a safe, positive school culture and collaborative community support structures that help students thrive (Goldschmidt & Walsh, 2012). If urban Catholic schools are to achieve their vision of holistic education of the whole child, it will be critical to offer families living in poverty coordinated, systematic help to address the multiple barriers they face.

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Katherine A. Shields, Ph.D. is a Senior Research Associate with EDC. Correspondence regarding this article can be directed to Dr. Shields at katherine.shields@bc.edu

Mary E. Walsh, Ph.D. is the Daniel E. Kearns Professor in Urban Education and Innovative Leadership in the Department of Counseling, Developmental and Educational Psychology in the Lynch School of Education at Boston College.

Terrence J. Lee-St.John, Ph.D. is a Quantitative Research Analyst in the Center for Learning and Development at SRI International.

Appendix A

Table A1

*Longitudinal Growth Models of Stanford 10 Achievement Scores (2009-2010 to 2012-2013):**Fixed Effects*

	Mathematics		Reading		Language	
	<u>Coeff.</u>	<u>(SE)</u>	<u>Coeff.</u>	<u>(SE)</u>	<u>Coeff.</u>	<u>(SE)</u>
Intercept	667.35 ***	4.98	673.15 ***	4.79	663.89 ***	5.92
Any CCCS Treatment	16.26 **	5.80	10.77	7.00	14.68 †	8.37
Male	4.56 ** ^a	1.26	-1.58	1.15	-8.54 *** ^a	1.25
Black	-11.10 ***	2.06	-11.65***	1.75	-11.51 ***	2.13
Hispanic	-6.29 *	2.79	-6.85 *	2.77	-7.46 **	2.44
Asian	14.99 *** ^a	3.68	-0.57	3.21	2.27	2.58
Other/more than one race	0.64	2.00	-3.19	2.09	-3.39 *	1.66
IEP	-24.89 ***	3.07	-21.90 ***	3.75	-23.99 ***	3.21
Free/reduced-price lunch	-12.15 *** ^a	1.88	-9.66 ***	2.02	-4.22 †	2.50
Any CCCS x Lunch					-6.86 **	2.55
Lunch x Black	10.15 ***	2.55	10.77 **	3.14	10.23 **	2.99
TIME slope:						
Intercept	15.01 *** ^a	0.75	11.78 *** ^a	0.35	11.61 ***	0.59
Male	0.06	0.33	0.85 *	0.37	0.54	0.34
Black	0.92	0.73	1.75 **	0.55	1.00	0.67
Hispanic	-0.15	0.80	0.95	0.60	0.65	0.70
Asian	0.17	1.10	-0.47	0.74	-0.32	1.23
Other/more than one race	0.35	0.54	0.31	0.44	0.48	0.55
IEP	0.23	0.95	1.81 †	1.06	1.60	1.14
Free/reduced-price lunch	-1.05 *	0.52	-0.06	0.55	0.09	0.54
TIME-squared slope:						
Intercept	-3.04 ***	0.16	-1.03 ***	0.09	-0.45 **	0.15
Dosage slope:						
Intercept	4.64 ***	1.00	2.48 **	0.95	3.74 ***	0.74
Maximum CCCS dosage	0.77 *	0.31	-0.19	0.26	0.23	0.27

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$;^a Slope allowed to vary randomly across schools

Table A2

Longitudinal Growth Models of Stanford 10 Achievement Scores (2009-2010 to 2012-2013): Random Effects

	Mathematics	Reading	Language
<i>Variance Components</i>			
<u>Levels 1 and 2:</u>			
Within-student variance	277.10	217.55	409.34
Between-student variance	823.20 ***	758.52 ***	827.79 ***
TIME slope variance	22.44 ***	1.22 **	
Male slope variance	15.90 **		14.35 **
Asian slope variance	152.11 ***		
Free lunch slope variance	35.03 *		
<u>Level 3:</u>			
Between-school variance	177.81 ***	98.76 ***	177.33 ***
<i>Reliability Statistics</i>			
Level-1 intercept	0.48	0.65	0.76
TIME slope	0.10	0.08	
Level-2 intercept	0.94	0.95	0.97
Male slope	0.43		0.39
Asian slope	0.56		
Free lunch slope	0.40		
<i>Variance Explained</i>			
Between students	34%	54%	31%
Between schools	27%	70%	44%
Total	35%	61%	35%

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