

The Evaluation of Charter School Impacts

Executive Summary

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June 2010

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ACKNOWLEDGMENTS

This study was made possible by the efforts of many individuals and organizations over a six-year period. We greatly appreciate the willingness of study charter school principals and other administrative staff to participate in the evaluation, as well as their contributions in providing us access to their lotteries and admissions processes and endless patience in answering questions about how these processes worked. Without their active involvement, this study would not have been possible.

The study and this report benefitted greatly from input at various stages from Paul Hill at the University of Washington's Center on Reinventing Public Education. We also thank the study's technical working group for their contributions. The group included Tom Cook, Jay Greene, Laura Hamilton, Rick Hanushek, Helen Ladd, Rebecca Maynard, Robert Meyer, and Larry Orr. At Mathematica Policy Research, Brian Gill and Peter Schochet provided critical technical review and comments. We also thank two anonymous reviewers for their thoughtful comments and suggestions.

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DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST

The research team for this evaluation consists of a prime contractor, Mathematica Policy Research; its subcontractor, Optimal Solutions Group; and a consultant, Paul Hill at the University of Washington's Center on Reinventing Public Education. None of these organizations or their key staff members have financial interests that could be affected by findings from the study. None of the members of the Technical Working Group, convened by the research team to provide advice and guidance, have financial interests that could be affected by findings from the study.

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EXECUTIVE SUMMARY

Charter schools, first launched in the 1990s, are an important and growing component of the public school system in the United States. As of November 2009, more than 5,000 charter schools served over 1.5 million students—approximately three percent of all public school students—in 40 states and the District of Columbia (Center for Education Reform 2009). Charter schools are intended to play a key role in school improvement under the existing Elementary and Secondary Education Act (No Child Left Behind) as well as the programs established under the American Recovery and Reinvestment Act of 2009. However, there remains considerable debate as to whether, how, and under what circumstances charter schools improve the outcomes of students who attend them. This report summarizes the results of a new study: the Evaluation of Charter School Impacts, a large-scale randomized trial of the effectiveness of charter schools funded by the Institute of Education Sciences and conducted by Mathematica Policy Research and its partners.¹

The evaluation, which we conducted in 36 charter middle schools across 15 states, compares outcomes of students who applied and were admitted to these schools through randomized admissions lotteries (lottery winners) with the outcomes of students who also applied to these schools and participated in the lotteries but were not admitted (lottery losers). This analytic approach produces the most reliable impact estimates. But because the study could only include charter middle schools that held lotteries, the results do not necessarily apply to the full set of charter middle schools in the U.S.

Key findings from the evaluation include:

- ***On average, charter middle schools that hold lotteries are neither more nor less successful than traditional public schools in improving student achievement, behavior, and school progress.*** Participating schools had no significant impacts on math or reading test scores either a year or two years after students applied, other measures of academic progress (such as attendance or grade promotion), or student conduct within or outside of school. Being admitted to a study charter school did significantly and consistently improve both students' and parents' satisfaction with school.
- ***The impact of charter middle schools on student achievement varies significantly across schools.*** Across 28 sites (covering 32 schools), the effects on reading scores after two years were estimated to be greater than zero in 11 sites and less than zero in 17 sites (with magnitudes ranging from -0.43 to +0.33 standard deviation units), with 4 of the individual site estimates statistically significant. The estimated effects on math scores were greater than zero in 10 sites and less than zero in 18 of the 28 sites (-0.78 to +0.65 standard deviation units), with 10 of the site estimates statistically significant.
- ***In our exploratory analysis, for example, we found that study charter schools serving more low income or low achieving students had statistically significant positive effects on math test scores, while charter schools serving more***

¹ The evaluation team also included Optimal Solutions Group and Paul Hill of the University of Washington's Center on Reinventing Public Education.

advantaged students—those with higher income and prior achievement—had significant negative effects on math test scores. Charter middle schools in large urban areas also had significant positive impacts on math achievement compared to negative impacts in other locales, although urbanicity was no longer an influential factor once such characteristics as students’ demographics and income levels were controlled for. There were also differential effects on reading achievement, with negative and significant impacts for study charter schools serving more advantaged students and no impacts for study charter schools serving fewer advantaged students.

- *Some operational features of charter middle schools are associated with more positive (or less negative) impacts on achievement.* These features include smaller enrollments and the use of ability grouping in math or English classes. Although impacts differed for study charter schools with longer- versus shorter- hours of operations or higher versus lower revenue per student, these features were no longer significant once other school and student characteristics were controlled for. We found no statistically significant relationships between achievement impacts and the charter schools’ policy environment, including the extent of its decision-making autonomy, the type of authorizer and how the authorizer held the school accountable, and whether it was operated by a private organization.

What Kinds of Charter Schools Participated in the Study?

To be eligible for the study, charter middle schools had to meet two important criteria.² First, they had to have been in operation for at least two years, on the grounds that these schools were likely to be relatively stable in their organization and procedures. Second, each participating charter middle school had to have more applicants to their entry grade (4-7) in the year of the study than they could accommodate and to hold an admissions lottery to determine which students would be admitted. Not all charter schools met these criteria or agreed to participate in the study, and those that did participate differed in some ways from other charter middle schools nationally. In addition to operating longer than other charter middle schools in the country (7.0 versus 5.9 years), based on study data, participating schools served more advantaged students. For example, a smaller proportion of students in study charter schools were eligible for free or reduced-price school meals (44 versus 62 percent), came from minority racial or ethnic groups (47 versus 62 percent), or scored below the proficient level on their state assessment at the time they applied to the charter school (for example, 34 versus 49 percent in math). On the other hand, study charter schools were statistically similar to other charter middle schools in their location (urban versus suburban or rural), size, per student revenues, and teacher qualifications.

Study charter schools—attended by 78 percent of the lottery winners—were different from the schools their students would have attended if they had not won entrance to the charter school through the admissions lottery; in other words, schools attended by lottery losers (Table 1). Compared to the schools that lottery losers attended, lottery winners attended schools that:

² Middle schools were chosen primarily because of the likely availability of test score data from school records for this group. By relying on school records for test scores, we were able to avoid administering a test to sample members, reducing evaluation costs and the burden on sample members.

- were smaller (484 versus 736 students)
- had longer school days (7.2 versus 6.7 hours)
- were less likely to have a library (64 versus 88 percent) or gym (53 versus 79 percent)
- operated more autonomously

There were no statistically significant differences in the racial/ethnic distribution of students, percentage of students eligible for free or reduced-price school meals, student-teacher ratios, or length of the school year at the two sets of institutions. However, there were differences of 10 percentage points or more for some student characteristics, and some of these differences nearly reached the level of statistical significance: the average percentage of white, non-Hispanic students at schools attended by lottery winners was 56 versus 46 percent at schools attended by lottery losers (p-value = 0.191); the average percentage of students eligible for free or reduced-price meals was 33 versus 45 percent (p-value = 0.055) respectively.

Table ES.1. Characteristics of Schools Attended by Lottery Winners and Lottery Losers

	Schools Lottery Winners Attended	Schools Lottery Losers Attended	Difference
Enrollment (Means)			
Total enrollment	484	736	-252††
Student-teacher ratio	15.1	15.9	-0.8
Time in School (Means)			
Length of school day, in hours	7.2	6.7	0.4†
Length of school year, in days	181.2	179.9	1.3
School Facilities (Percentages)			
Library	64%	88%	-25%††
Gym	53%	79%	-27%††
Counselor	81%	88%	-7%
Nurse's office	72%	85%	-13%
Method of Organizing Classes (Percentages)			
Some/all math classes grouped by ability level	39%	56%	-17%
Some/all English classes grouped by ability level	36%	46%	-9%
Characteristics of Students at School (Means)			
Percentage of Hispanic students	26%	32%	-5%
Percentage of white students	56%	46%	10%
Percentage of black students	12%	16%	-3%
Percentage of students receiving free or reduced-price lunches	33%	45%	-12%
Autonomy Index^a (Mean)	4.1	1.4	2.6††

^a The autonomy index measures the extent to which principals report that they have control over decisions relating to staffing, budgetary matters, curriculum/instruction, or other school policies. The index has possible values ranging from 1 to 5, with higher values reflecting greater control over these decisions.

†Difference is statistically significant at the 0.05 level, two-tailed test.

††Difference is statistically significant at the 0.01 level, two-tailed test.

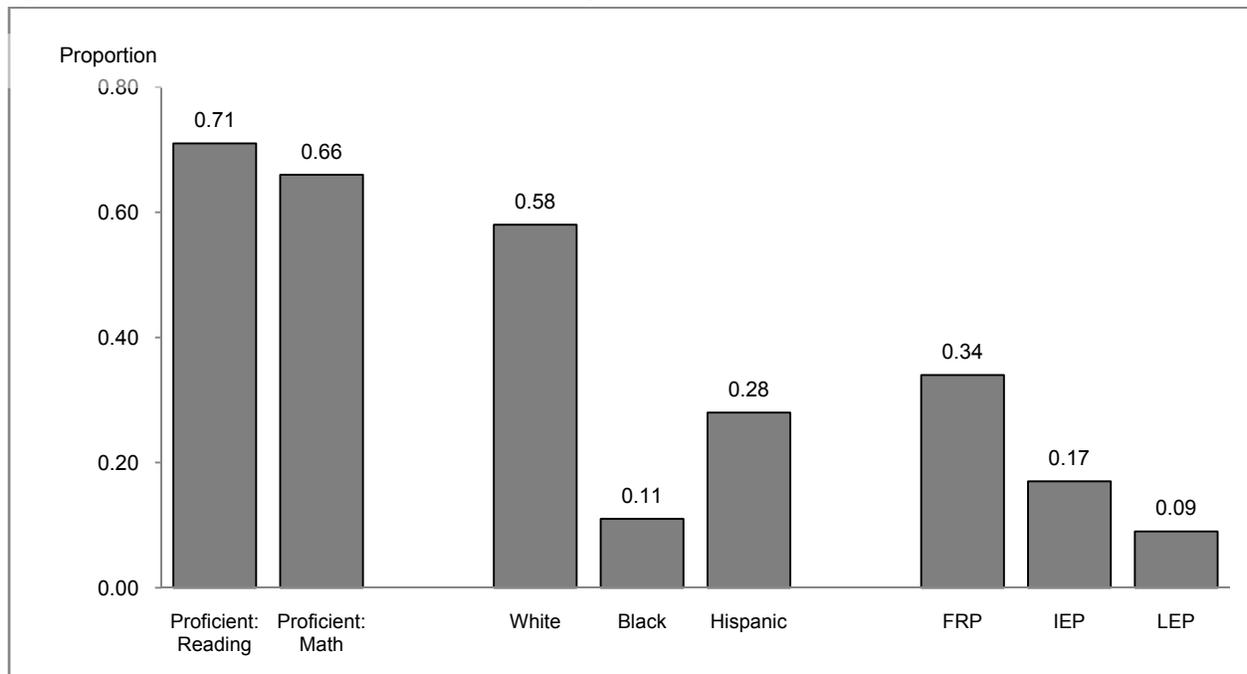
What Kinds of Students Applied to Study Schools and Participated in the Study?

On average, 7 out of 10 students met their state proficiency level in reading (71 percent) and math (66 percent) in the year they applied (Figure 1). Fifty-eight percent were white, 11 percent black, and more than one quarter (28 percent) were of Hispanic origins. In terms of eligibility for special programs and services, one third of participating applicants qualified for the

federal free or reduced-price lunch program, 17 percent had an individualized education plan (IEP), and 9 percent were limited English proficient or English language learners.

By comparing the characteristics of the students not offered admission to study charter schools (that is, the lottery losers) with the full populations of students at the schools they attended during the follow-up period, we were able to examine how applicants to the charter schools in the study differed from other students living in the area who did not apply to the charter schools. The charter school applicants were more likely to have achieved proficiency on their state reading tests (73 versus 57 percent) as well as their state math test (58 versus 45 percent).

Figure ES.1. Characteristics of Students in the Sample



FRP = Free or reduced-price school meals.
IEP = Individualized education plan.
LEP = Limited English proficient or English language learner.

How Were the Impacts Estimated?

To estimate charter schools impacts, we compared outcomes of lottery winners to those of lottery losers in each participating site, controlling for students' background characteristics. We then averaged impacts over all the sites to produce an overall estimate of the *impact of being admitted to a study charter school*.

Study Design

Participating Schools: Charter middle schools that held admissions lotteries in their entry grade were recruited to participate in the study during the 2004-2005 and 2005-2006 school years. The evaluation included 36 schools in 15 states.

Participating Students: Applicants to the schools' entry grade who participated in the schools' admissions lotteries and for whom we obtained parental consent formed the student sample. Students admitted to the school outside the lottery process were excluded. The primary analysis sample was also restricted to students who took the state assessment in the previous year (typically those who attended traditional public schools). This sample included 2,330 students.

Research Design: Lottery winners who were offered admission to a participating charter school—either at the time of the lottery or through the beginning of the school year—formed the study's treatment group. The control group comprised lottery losers who were not offered admission. Study team members observed participating schools' lotteries and monitored the entire admissions process at each school.

Analysis: In each participating charter school, impacts were estimated by comparing average outcomes among lottery winners with those of lottery losers over the two years following the lottery, controlling for students' background characteristics. An average impact was calculated over all participating schools. We conducted a variety of tests to determine the sensitivity of the results to the specific methods used to define the analysis sample and estimate impacts. For an exploratory analysis examining the relationship between achievement impacts and schools' characteristics and policy environments, we used the main impact model to estimate the correlation between a site's impact and the school characteristic or policy of interest.

Outcomes: The primary outcome of interest was student achievement, as measured by students' performance on their state tests in reading and math. Because the tests varied from state to state, we converted scores to a comparable scale (z-scores) for the analysis. In addition, we conducted an exploratory analysis of charter schools' impacts on several other outcomes, including student effort in school, behavior, and attitudes, as well as parental involvement and satisfaction. These additional outcomes came from school administrative records and student and parent surveys.

We also estimated the *impact of actually attending a charter school*, as opposed to simply being offered admission to the school. Most of the students offered admission to study charter schools as lottery winners ultimately attended those schools (78 percent), and another 3 percent attended a non-participating charter school nearby. The remaining lottery winners chose to attend a traditional public school (15 percent), a private school (3 percent), or were either home schooled or the school type was unknown (1 percent). Most students who did not win the charter school lotteries attended a traditional public school (78 percent). However 15 percent attended a charter school (6 percent attended one participating in the study and 9 percent attended a non-study charter school)³, 4 percent attended a private school, and the remaining 3 percent were either home schooled or their school type was unknown. To take into account the fact that not all lottery winners attended a charter school and that some lottery losers did attend a charter school, we used a standard statistical modeling approach in which the lotteries act as an “instrumental variable” for charter school

³ Lottery losers who attended a participating charter middle school were students who were either mistakenly admitted to the school despite a losing lottery draw or who were admitted to the school after the first half of the school year following the school lottery. Because these students were admitted after we had made a final determination of their treatment status and they did not receive the full charter school treatment, they remained in the control group.

attendance. The results of our analysis were similar regardless of whether we estimated the impact of being admitted to a study charter school or the impact of actually attending a charter school.

The primary outcome of interest for this study was student achievement, as reflected by students' performance on state tests in reading and math. Because the tests varied from state to state, we converted scores to a comparable scale for the analysis. The converted scores, or z-scores, reflect students' performance on their state test relative to the typical student in that state and grade. This is a standard approach in examining assessment data across multiple states.

What Was the Average Impact of Study Charter Schools?

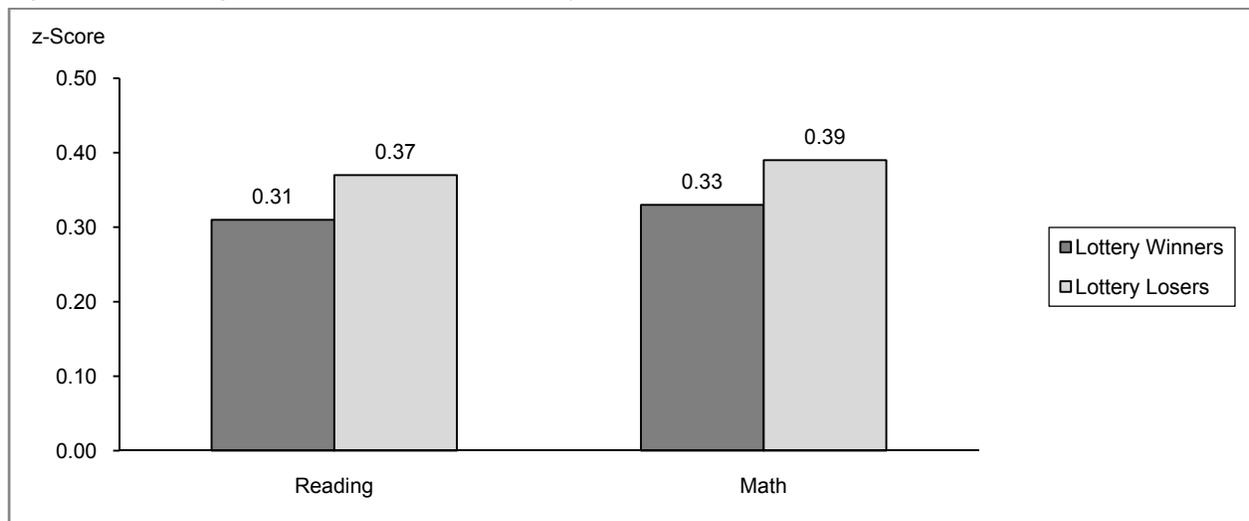
The main goal of the study was to estimate charter school impacts on student achievement. In addition, to further our understanding of charter schools' influence, we conducted an exploratory analysis of charter schools' impacts on several other outcomes, including student effort in school, behavior, and attitudes, as well as parental involvement and satisfaction.⁴ Estimating impacts on all these outcomes, the study found the following:

- **On average, study charter schools did not have a statistically significant impact on student achievement.** Although students admitted to charter middle schools through lotteries scored lower on state reading and math assessments (by 0.06 to 0.07 standard deviations in Year 2—the second year after the lottery) than students who applied but were not admitted (lottery losers), these differences were not statistically significant after adjusting for multiple treatment-control comparisons; thus these findings may be false discoveries (Figure 2).⁵
- **Study charter schools positively affected parent and student satisfaction with and perceptions of school.** Lottery winners and their parents were significantly more satisfied with their schools than lottery losers according to all 11 measures of student and parent satisfaction and perceptions examined by the study, after adjustment for multiple hypothesis testing. For instance, lottery winners were 13 percentage points more likely to report they “like school a lot” than lottery losers (Figure 3). Similarly, the parents of lottery winners were 33 percentage points more likely to rate their child’s school as “excellent” than parents of lottery losers.

⁴ Multiple treatment-control group comparisons (e.g. to estimate impacts on varied educational outcomes or time periods) may yield misleading estimates or “false discoveries.” In order to separate possible false discoveries from more reliable findings, we followed the framework recommended by the National Center for Education Evaluation (NCEE) (Schochet 2008). For our key outcomes, we applied formal adjustments for our multiple comparisons, or what is known as multiple hypothesis testing.

⁵ The magnitude of these effects—which are cumulative over the two year follow-up period—are equal to approximately one-quarter-year less instruction for students in charter schools than what they would have received had they not been admitted. This is based on estimates from Hill et al. (2007), who found that the average annual test score gains across a sample of seven nationally normed tests in grades 5 through 8 were, on average, 0.26 standard deviations in reading and 0.31 standard deviations in math.

Figure ES.2. Average Year 2 Test Scores of Lottery Winners and Losers



Note: Test scores shown here are based on students' performance on state assessments across multiple states. To make scores comparable across states, they were standardized into *effect size* or z-score units, in which a one unit change represents one standard deviation among all of the students in a state

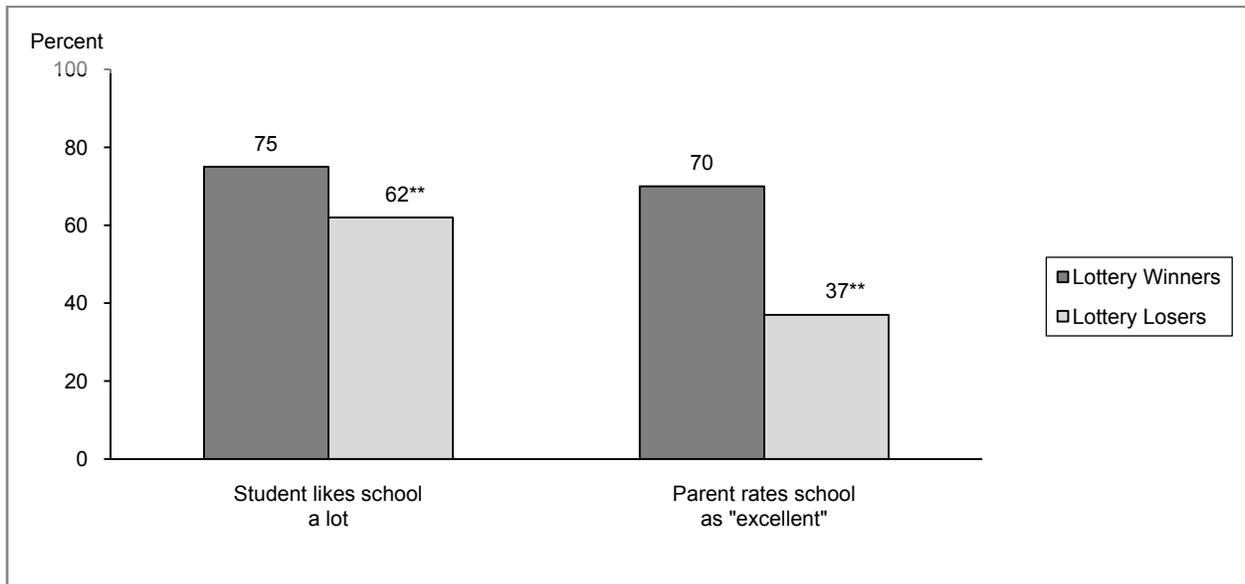
+Difference in means is statistically significant at the 0.05 level after adjusting for multiple hypothesis testing.
++Difference in means is statistically significant at the 0.01 level after adjusting for multiple hypothesis testing.

- **Study charter schools did not significantly affect most other outcomes examined.**

The study estimated charter schools' impacts on 35 other outcomes, including absences, suspensions, and other measures of student performance, as well as survey-based measures of student effort in school, student well-being, student behavior and attitudes, and parental involvement. There was no evidence that study charter schools had any impact on the majority of these outcomes.⁶ For instance, there were no significant differences between lottery winners and losers in the proportion reporting that they worked hard in school or expected to attend college (Figure 4). Similarly, there were no significant differences between the groups in the index reflecting student-reported bad behavior outside of school.

⁶ There were three exceptions. Parents of lottery winners reported their children to be better adjusted than parents of lottery losers, according to an index measuring this outcome. Parents of lottery winners were more likely than parents of lottery losers to attend events or volunteer at their child's school, according to an index measuring parents' presence at the child's school, but were less likely to belong to the school's parent-teacher association (PTA) or similar organization.

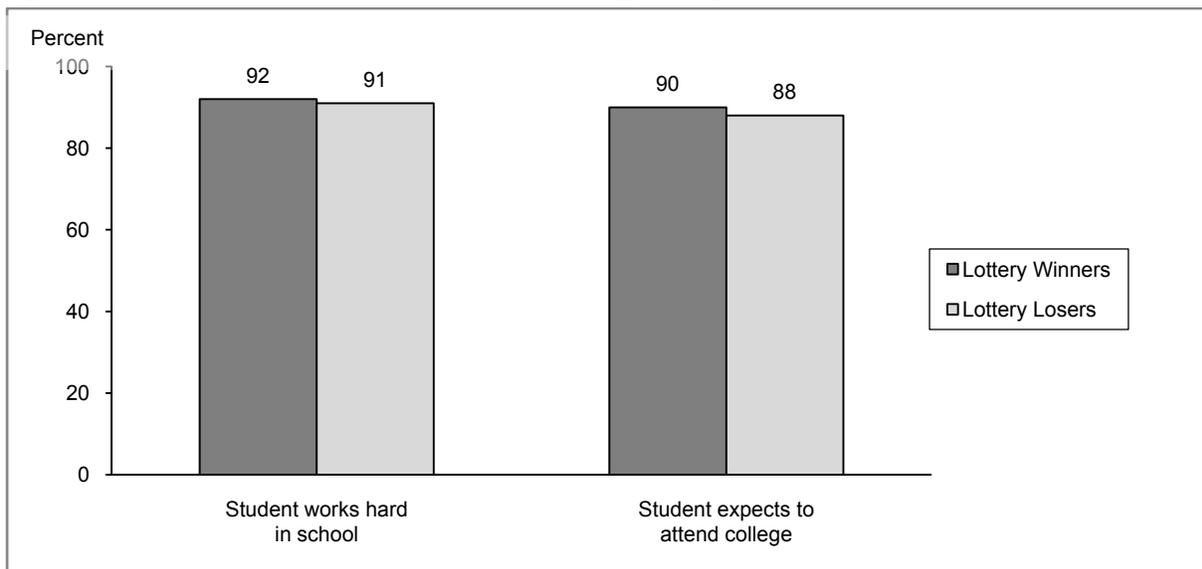
Figure ES.3. Student and Parent Satisfaction with School Among Lottery Winners and Losers



*Difference in means is statistically significant at the 0.05 level after adjusting for multiple hypothesis testing.

**Difference in means is statistically significant at the 0.01 level after adjusting for multiple hypothesis testing.

Figure ES.4. Measures of Student Effort and Well-Being, Lottery Winners and Losers

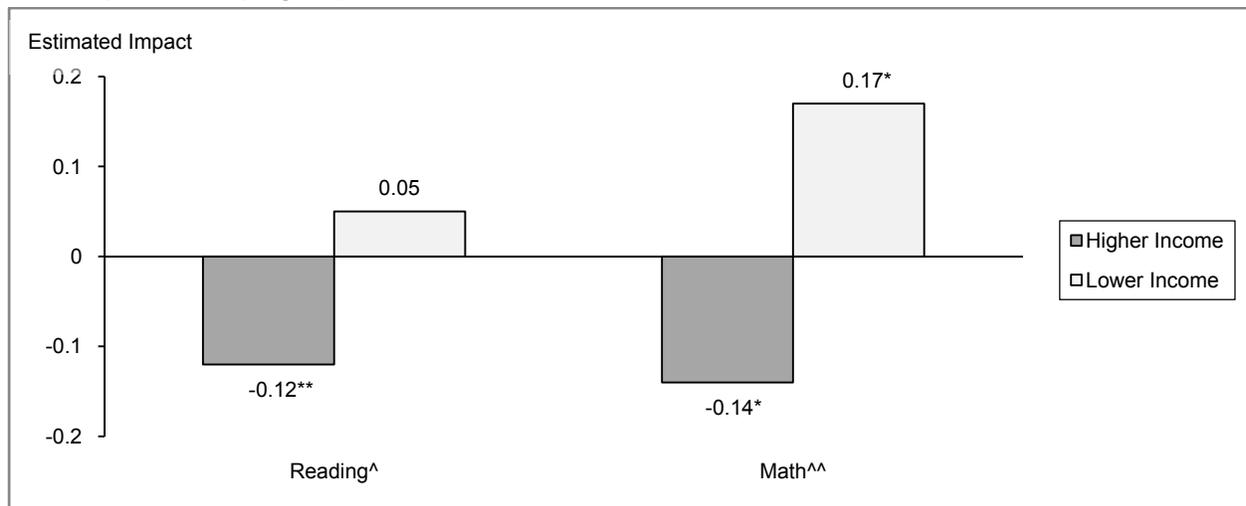


*Difference in means is statistically significant at the 0.05 level after adjusting for multiple hypothesis testing.

**Difference in means is statistically significant at the 0.01 level after adjusting for multiple hypothesis testing.

- **Study charter schools’ impacts on student achievement were inversely related to students’ income levels.** Study charter schools had a negative and statistically significant impact on test scores of higher income students (those not certified for free or reduced-price school lunches), but a positive and significant impact on Year 2 math scores among lower income students (Figure 5). The impact on Year 2 reading scores among lower income students was not statistically significant. However, the difference in impacts between the two groups was statistically significant for both reading and math.
- **There was some evidence of an inverse relationship between students’ baseline achievement levels and charter school impacts on achievement.** We found a strong and statistically significant negative association between students’ baseline test scores and charter schools impacts on their subsequent reading and math scores. The higher the achievement scores of their incoming students, the more negative were the estimated impacts of study charter schools. On the other hand, when we split students evenly into two groups—those with higher versus lower baseline achievement levels—differences in impacts between the two groups were not statistically significant after adjusting for multiple treatment-control comparisons.
- **There were no significant differences in charter school impacts for other student subgroups.** Charter school impacts were statistically similar for student subgroups defined by race and ethnicity and gender.

Figure ES.5. Impacts on Year 2 Test Scores, by Income Status (as determined by eligibility for the free and reduced-price lunch program)



*Impact estimate is statistically significant at the 0.05 level after adjusting for multiple hypothesis testing.

**Impact estimate is statistically significant at the 0.01 level after adjusting for multiple hypothesis testing.

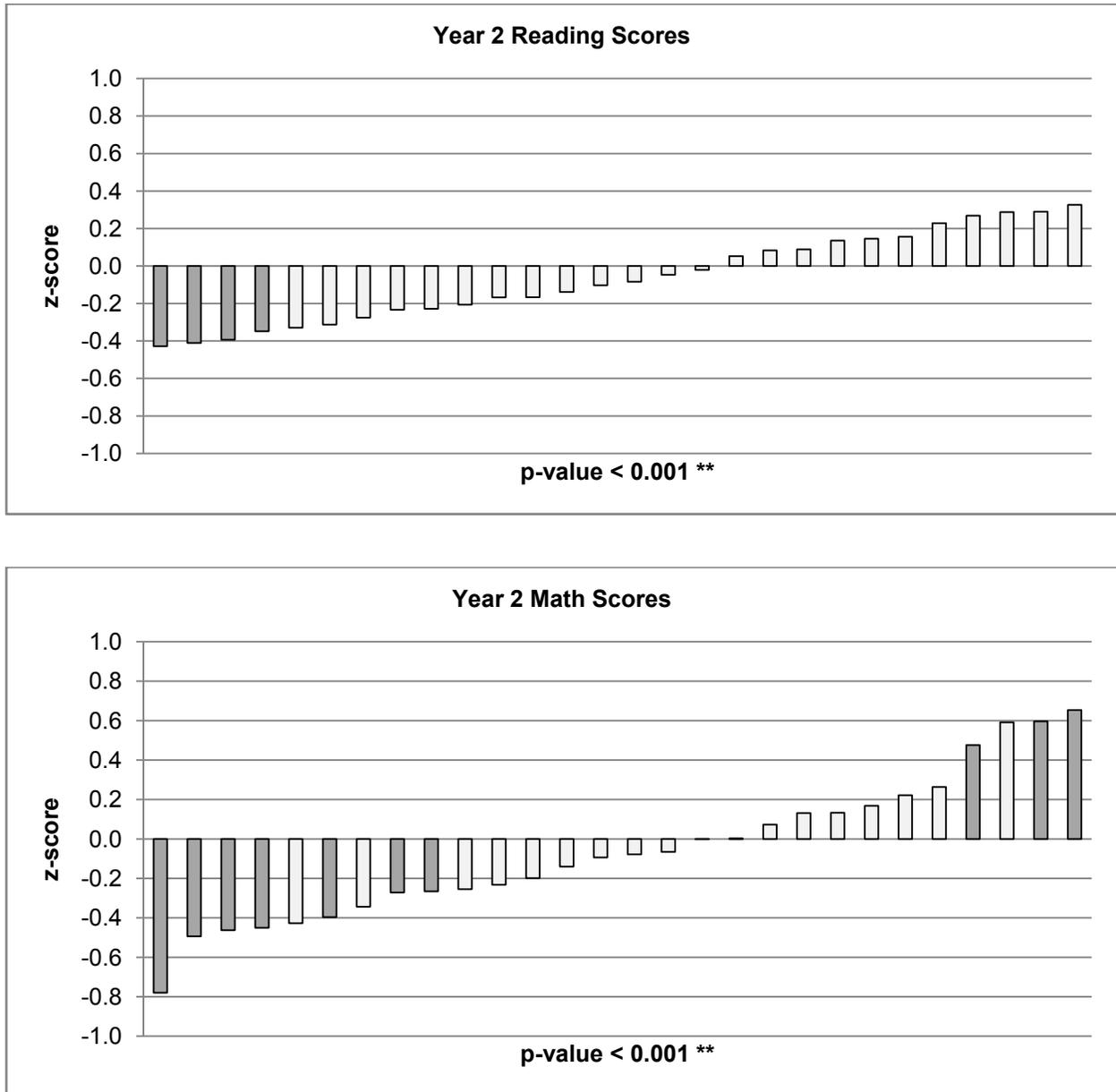
[^]Difference between estimates for subgroups is statistically significant at the 0.05 level after adjusting for multiple hypothesis testing.

^{^^}Difference between estimates for subgroups is statistically significant at the 0.01 level after adjusting for multiple hypothesis testing.

Did Some Charter Schools Improve Student Achievement?

Although study charter schools neither positively nor negatively affected most student outcomes on average, these averages mask variation across the schools in their impacts on students. The schools' impacts on students' math and reading scores after two years varied widely (Figure 6). In math, for example, the lowest performing charter school led to a decline of more than half a standard deviation in students' test scores while the highest performing school led to an increase of more than half a standard deviation; 10 of the 28 site-level estimates were statistically significant.

Figure ES.6. Distribution of Site-Level Impact Estimates



Note: p-values are from tests of homogeneity of impacts.

*Variation in impacts is statistically significant at the 0.05 level, two-tailed test.

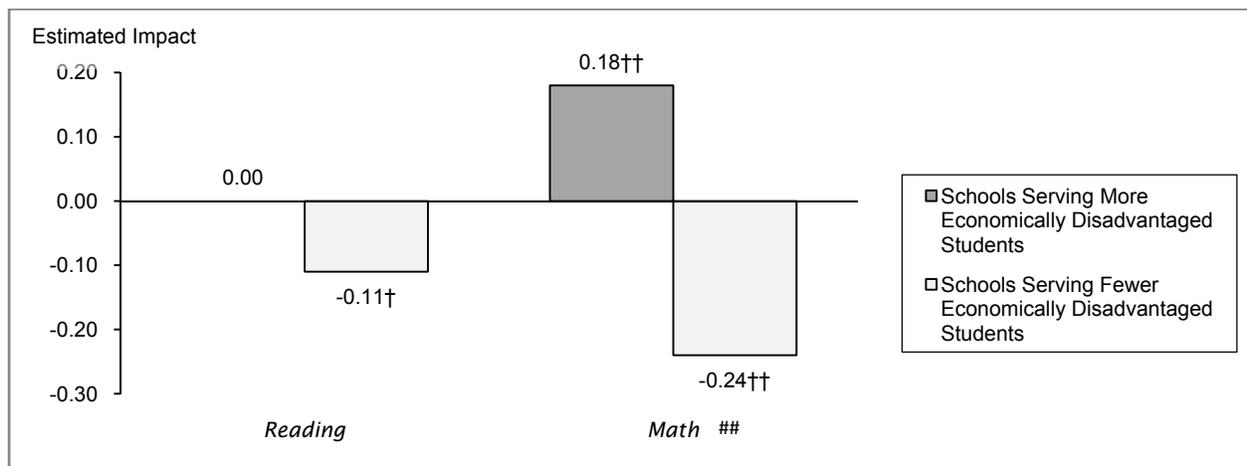
**Variation in impacts is statistically significant at the 0.01 level, two-tailed test.
Shaded bars are statistically significant impacts at the 0.05 level, two-tailed test.

We examined whether there were identifiable characteristics of the study charter schools, their students, or the conditions under which they operated that were associated with impacts on student achievement. Because this analysis was correlational, we could not determine whether the school characteristics themselves directly influenced charter school effectiveness, or whether relationships between the characteristics and impacts were driven by some other factor we did not measure that was associated both with the characteristics we examined and with charter school effectiveness. Nonetheless, these results may suggest avenues for more rigorous research in the future.

We found that the characteristics of the students served by study charter schools were strongly related to the schools' impacts on student achievement, particularly in math. Schools serving the largest proportions of disadvantaged and lower achieving students had more positive and statistically significant impacts; schools serving the smallest proportions of these students had negative and statistically significant impacts. The differences between the two groups of schools were also statistically significant.

- On average, the study schools with the highest proportions of disadvantaged students (based on their eligibility for free or reduced-price school meals) had a positive impact on Year 2 math scores of 0.18 (Figure 7). Schools with the lowest proportions of disadvantaged students had, on average, a negative impact on math scores of -0.24.
- Study schools with average student baseline achievement above the median had a negative impact on Year 2 math scores of -0.21 standard deviations, while schools with average student achievement below the median had a positive impact of 0.12 standard deviations (Figure 8).

Figure ES.7. Impacts on Year 2 Test Scores, by Characteristics of Charter Schools' Student Populations: Economic Status



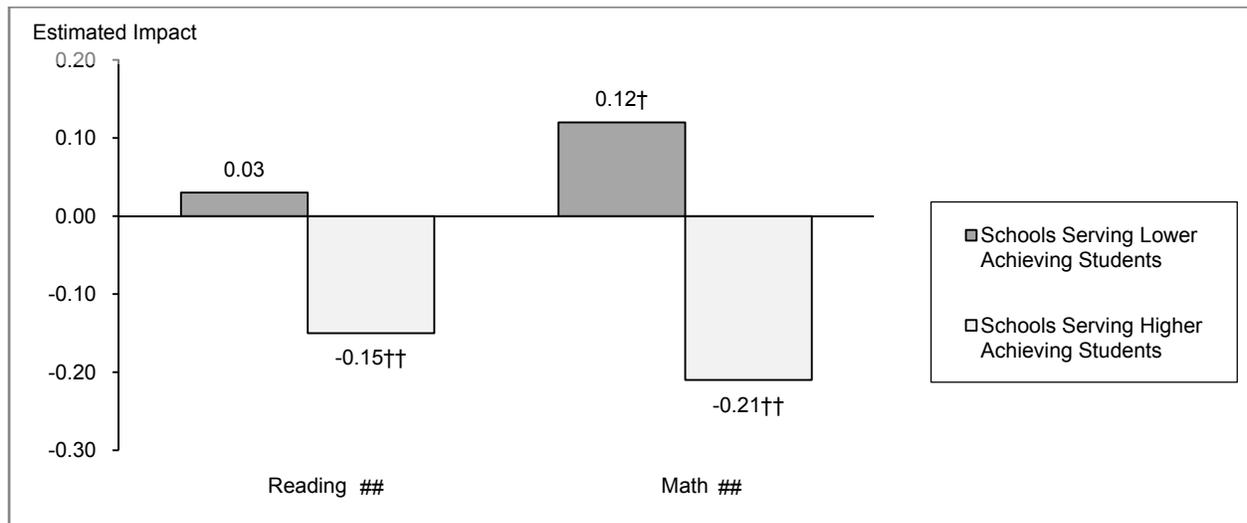
† Impact estimate is statistically significant at the 0.05 level.

†† Impact estimate is statistically significant at the 0.01 level.

Difference between estimates in two sets of sites is statistically significant at the 0.05 level.

Difference between estimates in two sets of sites is statistically significant at the 0.01 level.

Figure ES.8. Impacts on Year 2 Test Scores, by Characteristics of Charter Schools' Student Populations: Mean Baseline Test Scores



†Impact estimate is statistically significant at the 0.05 level.
 ††Impact estimate is statistically significant at the 0.01 level.
 #Difference between estimates in two sets of sites is statistically significant at the 0.05 level.
 ##Difference between estimates in two sets of sites is statistically significant at the 0.01 level.

Study schools located in large urban areas had a significant positive impact on Year 2 math scores of 0.16 standard deviations, compared with a significant negative impact of -0.14 standard deviations for schools outside of large urban areas. The difference between impacts for urban versus non-urban schools was also significant. However, once we accounted for both student and school characteristics, there were no significant differences between the impacts of study charter schools located in versus outside of large urban areas.

We also examined whether achievement impacts were associated with selected school policies and practices. Because impacts were estimated by comparing outcomes for lottery winners versus lottery losers, we also measured the school characteristics as the difference between schools attended by lottery winners (the study charter school in most cases) and the schools attended by lottery losers (typically traditional public schools). For example, the school enrollment measure reflected how much larger or smaller the study charter school was than nearby traditional public schools that the lottery losers attended.

Key characteristics associated with charter school impacts on student achievement included:

- **Enrollment:** Smaller charter schools had significantly less negative impacts than larger charter schools. For each 100 student increase in enrollment, the estimated impact on Year 2 mathematics was -0.06 standard deviation units more negative (p-value of the correlation ≤ 0.001).
- **Ability Grouping:** Charter schools more likely to use ability grouping for math (relative to schools attended by lottery losers) had significantly less negative impacts than charter schools less likely to use ability grouping. The same was not the case for reading.

We examined several other aspects of school operations, including the length of the school day and year (hours of operation), the student-teacher ratio, and the experience level of teachers. When the “hours of operation” measure was examined in isolation, we found that charter school impacts

on math achievement were significantly different for schools with longer versus shorter hours of operation. Impacts were also significantly related to the student-teacher ratio, when that characteristic was examined in isolation. However, we did not find evidence of a significant relationship between these characteristics and charter school impacts once we controlled for other aspects of charter school operations and student characteristics.

Finally, we examined a variety of policy-related characteristics of charter schools, including measures of their number of years operating, autonomy, accountability, revenues, type of authorizer, and management structure. With one exception (revenues per student), we found no evidence that these measures of the policy environment in which charter schools operated were related to their impacts on student achievement. In the case of per student revenues, we found a significant relationship between revenues and impacts on math achievement in models that did not account for other charter school characteristics, but this relationship was no longer statistically significant once we controlled for these other charter school characteristics.

Looking Ahead

The estimated relationships between charter school characteristics and impacts described above reinforce the notion that not all charter schools are the same—some are more effective than nearby traditional public schools, and others are less effective. Among charter schools popular enough to hold lotteries, overall, our results suggest that they are no more successful than nearby traditional public schools in boosting student achievement. However, those located in large urban areas and serving disadvantaged students are the most successful in doing so, a finding consistent with other recent lottery-based studies on charter schools in large urban areas (Abdulkadiroglu et al. 2009; Hoxby et al. 2009). Our study was not able to determine why these charter schools appear to be more effective than others, but further investigation focused on better understanding the reasons for this relationship would provide useful information for policymakers and educators seeking to improve student achievement through the expansion and adaptation of charter schools.

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