MATHEMATICA Policy Research

Executive SUMMARY

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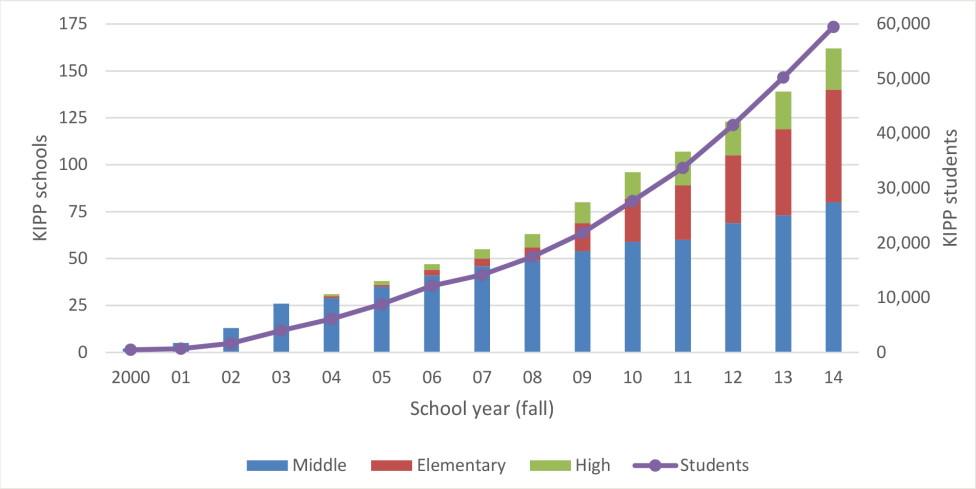
Final Report of KIPP's Investing in Innovation Grant Evaluation

Understanding the Effect of KIPP as it Scales: Volume I, Impacts on Achievement and Other Outcomes

KIPP is a national network of public charter schools whose stated mission is to help underserved students enroll in and graduate from college. KIPP began exclusively as a middle school program in 1994, but began expanding into the elementary and high school levels in 2004. By 2009, KIPP was educating students in grades prekindergarten through 12, and as of 2014-2015 the network included 162 elementary, middle, and high schools serving 59,495 students (Figure ES.1). Prior studies (see Tuttle et al. 2013) have consistently found that attending a KIPP middle school positively affects student achievement, but few have addressed longer-term outcomes and no rigorous research exists on impacts of KIPP schools at levels other than middle school.

Figure ES.1. Number of KIPP schools and students, by year

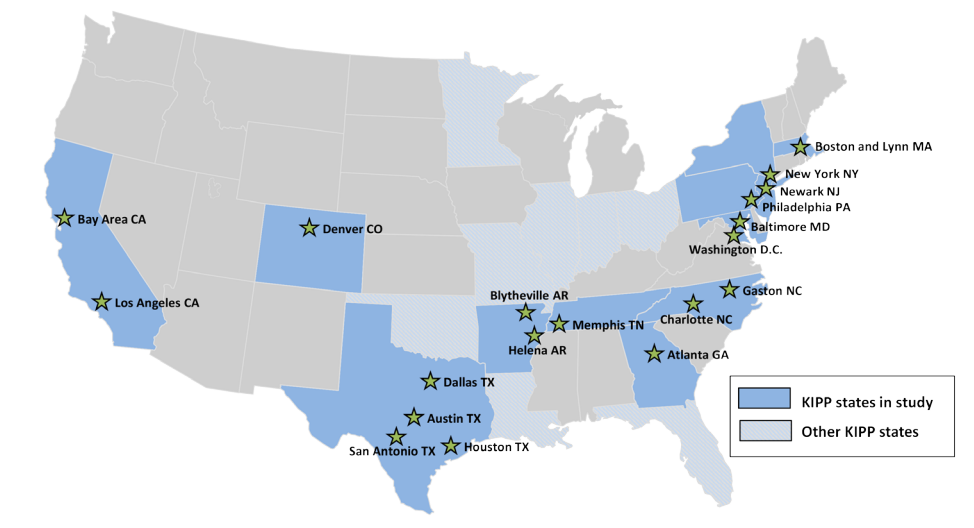


Source: KIPP Foundation.

As the KIPP network continues to grow, it faces the challenge of building a pipeline of leaders to effectively serve more students and schools. In 2010, the KIPP Foundation was awarded a five-year, $50 million Investing in Innovation (i3) scale-up grant by the U.S. Department of Education. The foundation used the i3 grant to scale up its network with the aim of sustaining KIPP's positive impacts—specifically by bolstering its leadership pipeline—while doubling the number of students served from 27,000 to over 55,000 by 2015. The KIPP Foundation contracted with Mathematica Policy Research to conduct an independent evaluation of its success in improving student outcomes on a larger scale under the i3 scale-up grant. This study builds on two prior reports published by Mathematica (Tuttle et al. 2010, Tuttle et al. 2013), and is the first rigorous research to examine the impacts of KIPP schools at all three grade levels.

The key evaluation objective is to measure the impact of KIPP on student outcomes as the network scales up the number of schools, students, and grades served. To do this, we use a combination of lottery-based and quasi-experimental designs in a set of 8 elementary, 43 middle, and 18 high schools in 20 cities (Figure ES.2), employing the most rigorous study designs possible at each school level. Under different designs and samples, we measure KIPP's impacts on outcomes up to four years after students enter a KIPP school. The analysis uses data from study-administered student achievement tests; state assessments in math, English/language arts (ELA), science, and social studies; and student and parent surveys.

Figure ES.2. Location of KIPP schools in the study



Network-wide, KIPP schools have positive, statistically significant, and educationally meaningful impacts on student achievement, particularly at the elementary and middle school grades. We find that KIPP elementary schools have positive impacts on students' reading and math achievement. KIPP middle schools, meanwhile, have maintained a pattern of positive and significant impacts on reading and math over the last decade, even as the network has grown rapidly. While average impacts across the middle schools in the network declined somewhat since 2007, they stabilized during the i3 scale-up period. Moreover, the KIPP middle schools that have opened most recently—during the i3 scale-up period beginning in fall 2011—are producing positive impacts that are generally similar to those produced by older KIPP middle schools when they were in their first years of operation.

KIPP high schools have positive, statistically significant, and educationally meaningful impacts on achievement for new entrants to the network. For students continuing from KIPP middle schools, the marginal impacts of having the option to attend a KIPP high school were not statistically significant, on average (in comparison to students who did not have the option to attend a KIPP high school and instead attended a mix of other non-KIPP charter, private, and

traditional public high schools). Among these continuing students, KIPP high schools have positive impacts on several aspects of college preparation, including more discussions about college, increased likelihood of applying to college, and more advanced coursetaking.

Across grade levels, we generally find no impacts of KIPP schools on measures of students' motivation, engagement, educational aspirations, or behavior, but positive impacts on the satisfaction of parents with their child's school.

We describe these findings in more detail below.

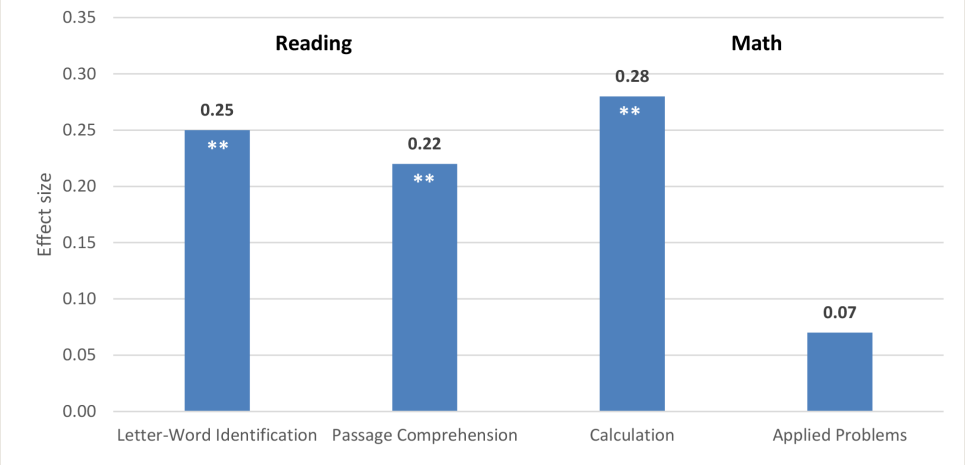
WHAT ARE THE IMPACTS OF KIPP ELEMENTARY SCHOOLS ON STUDENT ACHIEVEMENT?

To measure impacts of KIPP elementary schools, we use a research design that uses school admissions lotteries as randomized experiments. This type of randomized design is the "gold standard" for research measuring the impacts of schools on student achievement. Students offered admission via the lottery are included in the treatment group; those not offered admission through the lottery (and enroll at other charter, private, or traditional public preschools or elementary schools) are included in the control group. This design ensures that treatment and control group students are similar at baseline (pre-KIPP) in terms of demographics and academic preparation as well as key factors such as motivation and parental support.

We used admissions lotteries for the 2011–2012 school year to measure the impacts of eight KIPP elementary schools. These schools make up 28 percent of KIPP elementary schools in operation in 2011–2012. To measure elementary school students' academic achievement in reading and math, we administered the Woodcock-Johnson III (WJ-III) assessment in the spring of the third follow-up year after the lottery, when most students who applied to pre-kindergarten at age 3 (PK3) were in kindergarten, and most who applied to kindergarten were in grade 2.

KIPP elementary schools have positive, statistically significant, and educationally meaningful impacts on three of four measures of students' reading and mathematics skills. On tests administered three years after entry, being offered admission to a KIPP elementary school leads to an increase of 0.25 standard deviation units on the Letter-Word Identification test and 0.22 on the Passage Comprehension test in reading (Figure ES.3). These impacts are equivalent to boosting a student's Letter-Word Identification score from the 78th percentile (the percentile corresponding to the control group students' mean score) to the 84th percentile, and boosting the Passage Comprehension score from the 48th to the 57th percentile. In math, being offered admission to a KIPP elementary school has a positive and statistically significant impact on students' Calculation score of 0.28, equivalent to an increase from the 58th to the 68th percentile. The impact on the Applied Problems score is smaller and not statistically significant.

Figure ES.3. KIPP elementary school achievement impacts



Notes: Model: Lottery-based design. Outcome: Woodcock-Johnson III Test. Sample size: eight schools; 654 students. Statistically significant at the 0.05 level (*) or 0.01 level (**), two-tailed test.

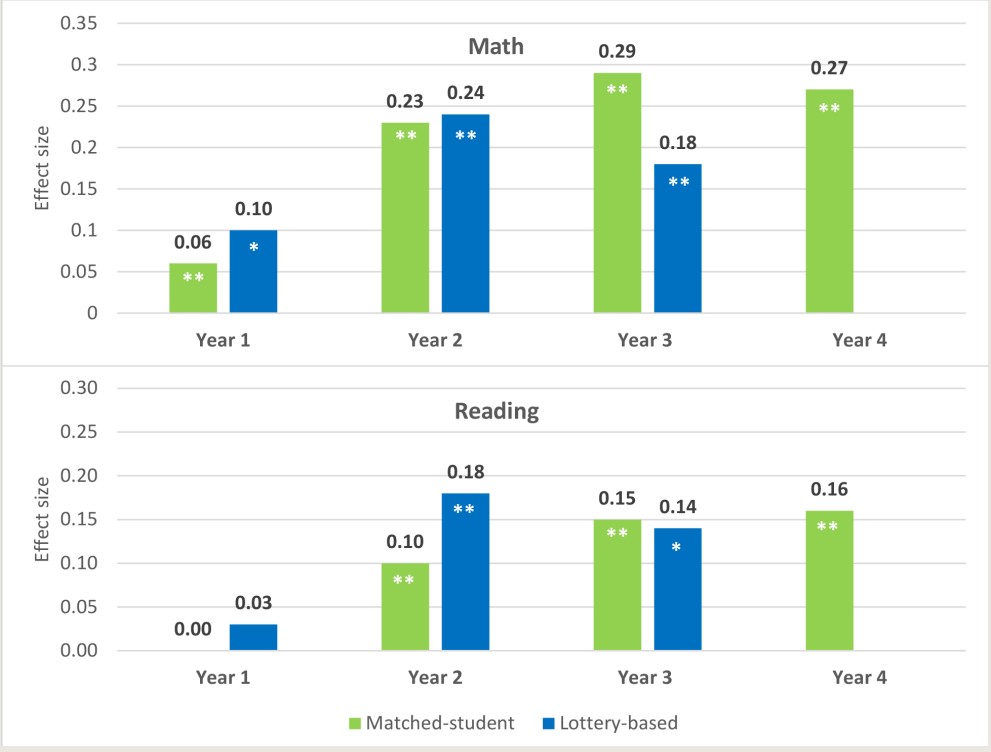
WHAT ARE THE IMPACTS OF KIPP MIDDLE SCHOOLS ON STUDENT ACHIEVEMENT?

We use two different approaches for measuring the impacts of KIPP middle school on student outcomes: the lottery-based design described above in sufficiently oversubscribed KIPP middle schools and a matched-student design in a broader set of KIPP middle schools. In the matched-student design, we identify a treatment group of students who enter KIPP middle schools in grade 5 or 6 and use propensity-score matching to define a comparison group of students—not attending KIPP—who most closely "match" the treatment group in terms of demographic characteristics and baseline test scores. This approach has been previously validated using lottery-based results (Tuttle et al. 2013; Fortson et al. 2015) and allows us to include as many KIPP middle schools as possible in our sample. In both designs, the comparison group comprises students attending other charter or traditional public schools.

Across the lottery-based and matched-student designs, our middle school sample includes 43 schools (53 percent of all KIPP middle schools in operation in 2014–2015), including 7 of 21 new KIPP middle schools that opened during the scale-up period. For both designs, we measured academic achievement scores on statewide assessments drawn from state- or district-provided administrative records. Students' scores were standardized (converted into z-scores) using statewide means and standard deviations, so scores represent students' achievement level relative to the typical student in the state at their grade level. We collected test score outcomes corresponding to the first three years after the lottery for the lottery-based sample, and the first four years after the treatment group entered KIPP for the matched-student sample.

Consistent with prior research, KIPP middle schools have positive, statistically significant, and educationally meaningful impacts in math, reading, science, and social studies. Based on both study designs, KIPP middle schools have positive and statistically significant impacts on students' state test scores in both math and reading, by the second year after students are admitted (Figure ES.4). For example, the lottery-based design suggests that being admitted to a KIPP middle

Figure ES.4. KIPP middle school achievement impacts



Notes: Model: Lottery-based and matched-student designs. Outcome: State test scores. Sample size: 15 schools, 608 students (lottery-based); 37 schools, 36,798 students (matched-student). Statistically significant at the 0.05 level (*) or 0.01 level (**), two-tailed test.

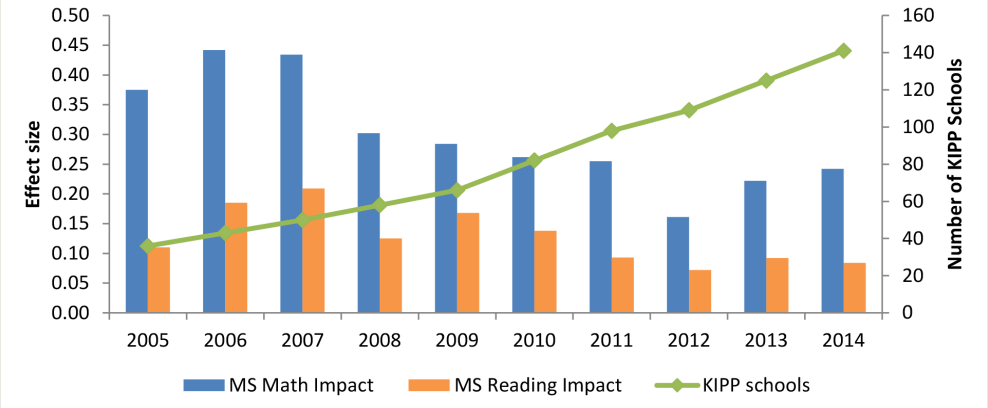
school leads to an increase in students' average math score of 0.24 student standard deviation units after two years, equivalent to a student moving from the 40th to the 50th percentile in the state. The two-year reading impact of 0.18 is equivalent to a student moving from the 37th to the 44th percentile. The impact estimates from the matched-student design are similar for a larger sample of 37 schools, suggesting that KIPP middle schools lead to an increase in average math scores of 0.23 standard deviations and reading scores of 0.10 standard deviations. The matched-student design also suggests that, on average, KIPP middle schools have a positive and statistically significant impact of 0.25 standard deviations in both science and social studies (not shown in the figure), equivalent to moving the average student from the 48th percentile to the 58th percentile in science and from the 51st to the 61st percentile in social studies.

ARE THE PREVIOUS POSITIVE IMPACTS IN KIPP MIDDLE SCHOOLS MAINTAINED WITHIN THE LARGER NETWORK AS IT SCALES?

Across the KIPP network, the average impacts of middle schools were positive and statistically significant throughout the 10-year period for which we have data, though higher in earlier years than recent years. To examine changes in the effectiveness of the network over time, we focus on trends in the impacts of KIPP middle schools, since the network has always included middle schools, and added elementary and high schools only in recent years. We calculate the average impact for each KIPP middle school in each school year, using the results for students two years after KIPP entry. KIPP middle schools have positive and statistically significant impacts in both math and reading for all years from 2005 to 2014. Impacts were largest in 2007 and earlier, especially in math, ranging from 0.38 to 0.50 standard deviations, compared with 0.16 to 0.30 between 2008 and 2014. In 2013 and 2014, when these two-year impacts fully reflect the performance of KIPP schools during the scale-up period, math impacts are 0.22 and 0.24, respectively.

Several factors may explain the trends in KIPP middle school impacts, including changes in the number and composition of schools in the sample, the relative performance of newer versus older schools, and changes over time in the effectiveness of existing KIPP schools as the network has expanded. Overall, KIPP's student achievement impacts decreased during a time of high growth in the network, although they rebounded somewhat during the i3 scale-up period (Figure ES.5).

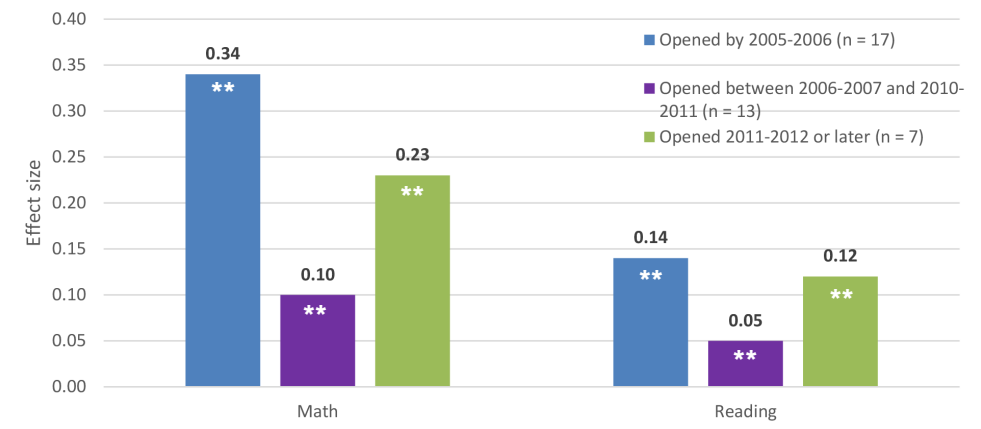
Figure ES.5. Change in the size of the KIPP network and middle school impacts over time



Notes: Impact estimates are the cumulative two-year impact of KIPP on students who enrolled in any of the KIPP middle schools in the school records data provided to the study. Impacts are calculated by comparing the outcomes of these treatment students to a set of matched comparison students with similar baseline (grade 4) achievement profiles and demographic characteristics. Impact estimates are calculated separately for each KIPP school; the average impact estimates reported here assign an equal weight to each of the school-level impact estimates. They are estimated separately by school year and plotted using the left-side y-axis. All impacts are statistically significant at the 0.01 level. The year refers to the spring semester of the school year when the achievement exams were taken. The size of the KIPP network is plotted against the right-side y-axis. MS = middle schools.

In fact, the newer KIPP middle schools in our matched student analysis—those opened during the i3 grant period (fall 2011 or later)—have positive impacts on math and reading achievement that are of a similar magnitude of those of the overall impacts for middle schools across the entire study period. When we compare the performance of schools opened during different periods in KIPP's history, we find that the schools opened during the scale up period have impacts that are not quite as large as the oldest KIPP schools (those opened by 2005), but larger than those opened during the period from 2006 to 2010 (Figure ES.6).

Figure ES.6. Impacts of KIPP middle schools on students two years after enrolling, by year opened



Notes: Impact estimates are the cumulative two-year impact of KIPP on students who enrolled in any of the KIPP middle schools in the school records data provided to the study, based on the year the school opened. Statistically significant at the 0.05 level (*) or 0.01 level (**), two-tailed test.

WHAT ARE THE IMPACTS OF KIPP HIGH SCHOOLS ON STUDENT ACHIEVEMENT?

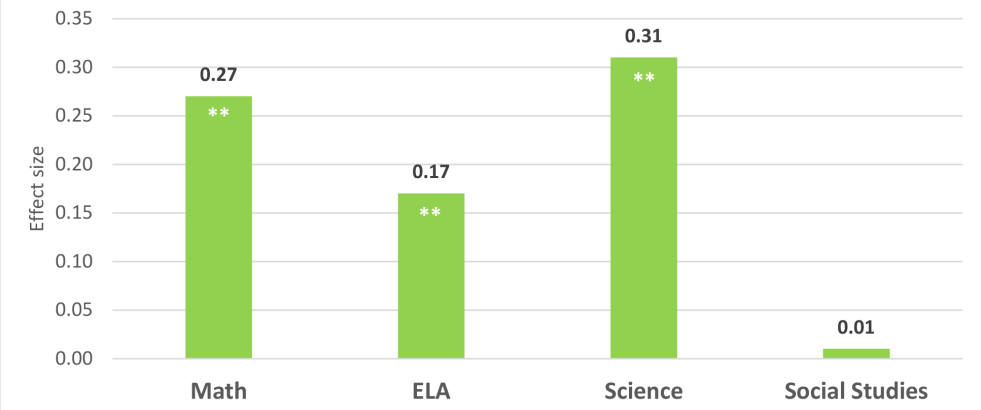
Since students enter KIPP high schools via two routes—from KIPP middle schools and non-KIPP middle schools—we use different quasi-experimental designs to measure impacts on the two groups of students. For the one-third of KIPP high-school students who entered the KIPP network for the first time in grade 9, we use a matched-student design similar to that described above for middle schools. We identify a comparison group for these new entrants, based on demographic characteristics and baseline test scores from grades 7 and 8, of students who attend other charter or traditional public high schools. For the two-thirds of KIPP high school students who also attended a KIPP middle school, we use a matched-school design, comparing outcomes for KIPP middle school students who had the option to attend a KIPP high school with outcomes for a similar set of KIPP middle school students who did not have this option. Whether or not students have the option to enter a KIPP high school depends on the location and timing of their enrollment in KIPP middle schools—in some places and years, the KIPP high school option is present and in others it is absent. Students who do not attend a KIPP high school enroll in a variety of other high schools, including other charter, private, magnet, or boarding schools, in addition to their traditional public school options. This design assumes that aside from the presence/absence of the KIPP high school option, the treatment and comparison groups are similar, on average.

We include 14 KIPP high schools in our matched-student analysis of new entrants and 8 high schools in our matched-school analysis of continuing KIPP students; 4 high schools are included in both designs. Across designs, the high school sample includes 82 percent of all KIPP high schools in operation in 2014–2015. We measure student achievement outcomes using state assessments for the analysis of impacts on new entrants. For the analysis of impacts on continuing KIPP students, state test scores are less consistently available, because

many in the comparison group were attending private high schools or public schools outside the jurisdictions providing data. We therefore measure achievement in the analysis of continuing KIPP students by administering a TerraNova assessment in the third follow-up year after high school entry (typically grade 11).

For new entrants to the network, KIPP high schools have positive, statistically significant, and educationally meaningful impacts on achievement in math, ELA, and science. Having the opportunity to attend a KIPP high school boosts new entrants' high school math scores by 0.27 standard deviation units, a statistically significant impact representing an increase from the 48th to the 59th percentile for the typical student (Figure ES.7). Impacts in ELA and science are 0.18 and 0.31 standard deviations, respectively, and are also significant. Relative to outcomes for the matched comparison group, these impacts are equivalent to an increase from the 47th to the 54th percentile in ELA and from the 42nd to the 54th percentile in science. The average impact in social studies (0.01) is close to zero and not statistically significant. The magnitude of the impact on graduation after four years is positive (four percentage points, not shown), but also not statistically significant.

Figure ES.7. KIPP high school impacts for new entrants

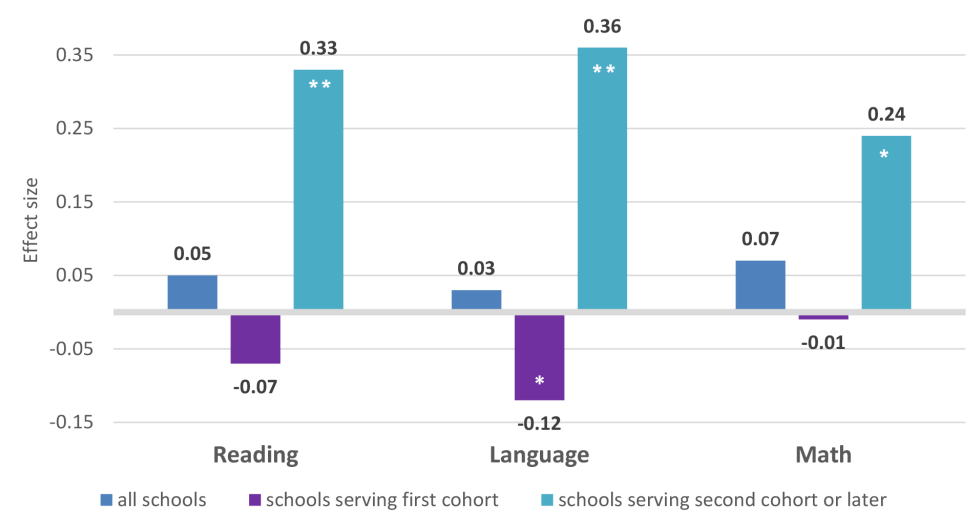


Notes: Model: Matched-student design. Outcome: State test scores. Maximum sample size: 14 schools; 1,861 students. Statistically significant at the 0.05 level (*) or 0.01 level (**), two-tailed test.

For students continuing from KIPP middle schools, the achievement impacts of KIPP high schools are not statistically significant on average, but these impacts vary by school. For continuing students (compared with KIPP middle school graduates without access to a KIPP high school), the average impacts of KIPP high schools on TerraNova tests in reading, language, and math are positive, but small and not statistically significant (Figure ES.8). These results underestimate the full impact of actually attending a KIPP high school, because all students with the opportunity to attend are included in the treatment group, but not all of them in fact attended. Five of the eight KIPP high schools in this analysis were brand new and serving their first cohort of students when we measured their impacts. There are significant differences between the impacts of these new KIPP high schools and those of more experienced KIPP high schools. For the five new schools, impacts are negative in all three subjects and statistically significant in language. For the three more experienced high schools, impacts are positive and statistically significant in all three subjects, with magnitudes ranging from 0.24 to 0.36. These more positive impacts for more experienced high schools could imply that KIPP high schools become more effective as they gain experience. Because we do not have data to measure impacts of high schools in multiple years under this design, we cannot determine if KIPP high schools increase their impacts on continuing students as the schools gain experience.

Continuing students with the option to attend a KIPP high school are less likely to drop out of high school. The overall dropout rate is very low, but is significantly lower for the treatment group—1 percent for those who had the chance to attend a KIPP high school and 3 percent for those who did not.

Figure ES.8. KIPP high school impacts for continuing students



Notes: Model: Matched-school design. Outcome: TerraNova test. Sample size: eight schools; 933 students. Statistically significant at the 0.05 level (*) or 0.01 level (**), two-tailed test.

WHAT ARE THE IMPACTS OF KIPP SCHOOLS ON STUDENT OUTCOMES OTHER THAN ACHIEVEMENT?

We administered surveys to students and parents to measure impacts on key outcomes other than achievement at all three grade levels.

KIPP elementary and middle schools have positive impacts on school satisfaction, particularly among parents. At both the elementary and middle school levels, being offered admission to KIPP leads to increases in parents' satisfaction with their child's school. More than three-quarters of elementary parents in the treatment group rate their child's school as excellent, compared to about half of parents in the control group. At the middle school level, 56 percent of treatment group parents and 28 percent of control group parents rate the school as excellent. These findings are consistent with previous research on KIPP in particular and oversubscribed charter middle schools in general (Tuttle et al. 2013; Gleason et al. 2010). Similarly, KIPP has significant positive impacts on a parent-based index capturing satisfaction with school facilities, academics, safety, and discipline. KIPP also has significant positive impacts on several other satisfaction measures, including indices of school efforts to engage parents at both the elementary and middle school level and middle school students' perceptions of their schoolmates. Evidence of KIPP impacts on satisfaction do not extend to the high school level, however, as none of eight measures of impacts on student-reported satisfaction at that level were statistically significant.

KIPP high schools have positive effects on several aspects of college preparation, including discussions about college, applying to college, and coursetaking. KIPP high schools have positive and significant impacts on measures related to school assistance in planning for college, including the frequency of discussions about college at school, students being more likely to have in-depth discussions at school about how to pay for college, and teacher or counselor assistance with planning for college. In addition to assistance provided by the school, KIPP high schools have a positive and significant effect on college preparation activities undertaken by students, as well as on whether the student applied to at least one college or university by spring of senior year—93 percent of treatment students did so, compared with 88 percent of comparison students. Students with the opportunity to attend a KIPP high school enroll in schools more likely to offer advanced placement (AP) or international baccalaureate courses (97 percent versus 89 percent), and the number

of AP courses and exams students have taken or intend to take is correspondingly higher.

On average, across grade levels, KIPP schools have no statistically significant impact on most survey measures of student motivation and engagement, behavior, or educational aspirations. At all three grade levels, KIPP did not significantly affect measures of motivation and engagement related to student self-control, academic motivation, academic confidence, grit, school engagement, or effort in school, including student reports of the time spent on homework. Student behavior was measured only at the elementary and middle school levels; we find no evidence that KIPP schools affect behavior, including indices of positive behaviors, undesirable behaviors, peer pressure, illegal activities, parental concerns about their child, frequency of school disciplinary actions (according to the parent), and the extent to which the child is well-adjusted. We measure educational goals and aspirations using responses from both parents and the students themselves. In general, the educational goals and aspirations among these elementary, middle, and high school students are high in both the treatment (KIPP) and comparison (non-KIPP) groups. At the high school level, for example, 84 percent of students reported that they think they will graduate from college. For 12 of 13 outcomes, the estimated impact of KIPP is not statistically significant. The single exception is among parents of students at KIPP elementary schools, who are 10 percentage points more likely than the comparison group to believe their child is very likely to complete college (81 versus 71 percent).