

# WORKING PAPER

**Student Selection, Attrition, and  
Replacement in KIPP Middle Schools**

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## ABSTRACT

Recent quasi-experimental and experimental studies have found that KIPP middle schools—part of a nationwide network of charter schools—have large, positive impacts on academic achievement. In light of these findings, skeptics have asked whether KIPP schools benefit from unusually selective student attrition and replacement patterns. We investigate this question using longitudinal, student-level data covering 19 KIPP middle schools. On average, we find that KIPP schools generally admit students who are disadvantaged in ways similar to their peers in local public schools. Rates of exit from KIPP schools are typically no different than rates at nearby district schools, and students exiting KIPP schools have characteristics similar to those of students exiting local district schools. To replace students who exit through attrition, KIPP schools admit a substantial number of new students in grade 6 but admit fewer students in grades 7 and 8 than do nearby public schools. Unlike local district schools, KIPP's late entrants also tend to have higher prior achievement levels and fewer males than the rest of the KIPP student body. Although it is difficult to gauge the size of any resulting peer effects at KIPP, the existing peer effects literature indicates that the range of possibilities is limited. Overall, we find that KIPP's impacts do not appear to be explained by advantages in the prior achievement of KIPP students, even when attrition and replacement throughout the middle school years are taken into account.



## I. STUDENT SELECTION, ATTRITION, AND REPLACEMENT AT KIPP

The Knowledge Is Power Program (KIPP) is a network of charter schools designed to improve the educational opportunities available to low-income families. KIPP schools seek to boost their students' academic achievement and, ultimately, prepare them to enroll and succeed in college. To achieve these objectives, KIPP schools operate under a group of standards known as the Five Pillars. These principles encompass (1) high expectations, (2) choice and commitment, (3) more time, (4) power to lead, and (5) a focus on results.<sup>1</sup> For example, high expectations are communicated through student behavior policies with rewards and sanctions; choice and commitment are embodied in contracts between students, parents, and teachers; school schedules include longer school days and school on Saturdays; principals and KIPP regional leaders are empowered to decide important issues, including policies for developing and rewarding teachers; and the network's focus on results includes efforts to closely monitor academic progress and help students prepare for and apply to college. KIPP has grown from two middle schools established in the mid-1990s to a nationwide network of 125 elementary, middle, and high schools in 20 states and the District of Columbia as of the 2012–2013 school year.

Several recent quasi-experimental and experimental studies have found that many KIPP middle schools (which constitute the majority of KIPP schools) have large, positive impacts on academic achievement. Using propensity-score matching, Woodworth et al. (2008) found that San Francisco KIPP schools had effect sizes ranging from 0.19 to 0.88 standard deviations in math and 0.16 to 0.68 standard deviations in reading. In 2010, Angrist et al. used an experimental study design based on admissions lotteries at one KIPP school and found statistically significant effect sizes of 0.35 standard deviations in math and 0.12 standard deviations in reading for each year spent at the school. Tuttle et al. (2010) used a matched comparison group design to estimate impacts at 22 KIPP middle schools. One year after students enrolled, the study found that on average these KIPP schools had statistically significant impacts of 0.26 standard deviations in math and 0.09 standard deviations in reading. The study also found large cumulative impacts three years after enrollment (0.42 standard deviations in math and 0.24 standard deviations in reading), even when students who exited KIPP schools through attrition were kept in the treatment group.

In light of these positive findings, skeptics have raised questions about the role of attrition from KIPP schools—that is, whether the lowest-achieving students leave KIPP and are not replaced. Kahlenberg (2011) argued that “the big difference between KIPP and regular public schools ... is that whereas struggling students come and go at regular schools, at KIPP, students leave but very few new students enter. Having few new entering students is an enormous advantage not only because low-scoring transfer students are kept out but also because in later grades, KIPP students are surrounded only by successful peers....” Miron et al. (2011) offered a similar critique of KIPP related to attrition.

Even if these skeptics are correct, the impacts estimated in the preceding studies would remain valid. Woodworth et al. (2008) examined only the first year of enrollment in a KIPP school, so subsequent attrition and replacement could not affect the results. Angrist et al. (2010) compared

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<sup>1</sup> For more details on each of the pillars, see <http://www.kipp.org> (accessed September 17, 2012).

results of lottery winners and losers regardless of whether they actually attended the KIPP school or remained enrolled in the KIPP school. Similarly, Tuttle et al. (2010) kept KIPP students in the treatment group even if they left the KIPP school after their first year. In consequence, the achievement impact estimates of these studies are not artificially inflated by changes in student enrollment.

Nonetheless, if the skeptics are correct, patterns of attrition and replacement of students could be relevant to the scalability of the KIPP model—that is, the extent to which schools in other contexts can replicate the KIPP model and achieve comparable impacts. The question is whether KIPP’s positive achievement effects might be attributable (partly or wholly) to a peer environment that is more conducive to academic achievement than the peer environment found in conventional public schools. The answer to this question matters not for assessing the validity of KIPP’s estimated achievement impacts, but for understanding the source of the positive achievement impacts. Student attrition and replacement can affect the peer environment in KIPP schools. If struggling students leave KIPP schools and are not replaced, then the average achievement levels of the remaining students will be higher. To the extent that students benefit from exposure to peers with higher achievement, this would create the potential for positive peer effects. If KIPP’s impacts are produced primarily by an improvement in the peer environment that derives from selective replacement of departing students, then it might be difficult to replicate KIPP’s success in schools that have a different mix of students. In contrast, if selective replacement of students cannot explain most of KIPP’s achievement impacts, then KIPP’s educational approach might be more broadly relevant for the improvement of conventional public schools.

Previous studies suggest that the peer environment can influence student achievement during middle school, although the size of the estimated effects varies widely. For example, Vigdor and Nechyba (2007) used data from grade 5 in North Carolina and found that, controlling for school fixed effects, a 1.0 standard deviation increase in the previous test scores of peers (measured against the distribution of student-level achievement) was associated with a 0.10 standard deviation increase in individual student achievement. In a Texas study that pooled data from grades 3 to 6 and controlled for student fixed effects, Hanushek et al. (2003) found that an increase of 1.0 standard deviation in prior peer test scores improved individual students’ scores by 0.43 to 0.49 standard deviations. In contrast, using Chicago data, Lefgren (2004) applied an instrumental-variable approach for grade 6 students and found that a 1.0 standard deviation increase in peers’ prior scores produced small impacts of 0.02 to 0.07 standard deviations. Other studies have found significant peer effects within the large range of estimates reported by Hanushek et al. (at the high end) and Lefgren (at the low end); for example, see Betts and Zau (2004) and Burke and Sass (2008).

In this paper, we present analyses clarifying the issues of selective entry, attrition, and replacement as they relate to KIPP schools. We use detailed, student-level data covering 19 KIPP middle schools to address the following research questions:

- 1. What does attrition from KIPP look like, and how does it compare with attrition in district schools? Do the characteristics of students who transfer early differ from those who remain enrolled until the end of middle school?**
- 2. To what extent do KIPP schools admit students in later grades to fill empty slots? Do the characteristics of late entrants at KIPP differ from the characteristics of students who enroll late at nearby district schools?**
- 3. Do the attrition and replacement patterns at KIPP schools meaningfully change the characteristics of the student body? How do the characteristics of students**

## **who complete the KIPP middle school program compare with those of local district students?**

On average, we find that attrition rates for KIPP students are not systematically different from those of students in local district schools, overall or for at-risk subgroups. Across all offered grades, the amount of late enrollment into KIPP is also similar to that of district schools. However, the details of KIPP's late-arrival pattern differ in several ways. KIPP middle schools typically begin at grade 5 and continue to admit a substantial number of new students at grade 6. In grades 7 and 8, however, local district schools generally admit more new students than do KIPP schools. KIPP's late entrants tend to have higher prior test scores and include fewer males than both the KIPP 5th graders and the late arrivals at district schools. Thus, by 8th grade, these differences produce a pool of KIPP students that has higher baseline (4th grade) test scores and fewer males than KIPP's 5th-grade students. In contrast, at district schools these student characteristics tend to be stable across all grade levels. Thus, in the later grades of middle school, it is possible that enrolled KIPP students might benefit from exposure to a group of peers with somewhat higher baseline achievement.

Although it is difficult to gauge the size of any resulting peer effects at KIPP, previous research about the magnitude of peer effects indicates a limited range of possibilities. First, it should be noted that late-entry patterns at KIPP cannot explain any of the first-year (5th grade) impacts estimated by quasi-experimental or experimental studies, because there is no late entry in that year. Replacement patterns might make a greater contribution to KIPP students' achievement in grades 7 and 8, but estimates extrapolated from the peer effects literature suggest that, at most, these effects can only explain about a quarter of KIPP's cumulative impact throughout middle school.

### **A. Defining Mobility: Attrition and “Late Arrivals”**

The debate over attrition from KIPP schools has sometimes been muddied by unclear or conflicting definitions of attrition. In this paper, we use the following definitions:

**Student mobility** captures the movement of students into and out of schools—regardless of the reason or motivation—at grades other than standard entry and exit points (such as between the last year of elementary school and the first year of middle school). Mobility encompasses both attrition from a given school or set of schools (early leavers) and late arrivals into the school.

**Attrition** occurs when a given student leaves a school during or immediately after a given year, provided the student is not enrolled in that school's culminating grade. This type of mobility can have many causes. A family may move out of the area for reasons that have little to do with school quality and transfer a student to a different school district. However, a student may also transfer in ways that are likely related to satisfaction with his or her current school, such as moving to another local public school, leaving for a private school, or dropping out of school altogether. Hypothetically, school staff might also advise students to transfer in cases of poor fit. Our measurement of the attrition rate combines all of these potential sources of attrition. The attrition rate is equal to the number of students we observe in a school in a given year but do not observe in the same school in the subsequent year, divided by the number observed in the former year. The cumulative attrition rate is equal to the percentage of students in a school's initial grade (for example, 5th grade at KIPP middle schools) who leave that school before completing the school's

final grade (for example, 8th grade at KIPP middle schools).<sup>2</sup> These attrition rates can further be separated into two substantively different types of attrition:

1. **Within-district movers** are students who leave a given school to attend a different school within their local school district (possibly a local charter school).<sup>3</sup> Within-district moves have a number of potential causes, such as school fit or satisfaction.
2. **Out-of-district leavers** are students observed in a given school in one year who are no longer observed in the data in the subsequent year. They include students who (1) begin attending a private school, (2) leave the district entirely, or (3) drop out.

**Late arrivals**, the other component of student mobility, are students first observed in a given school in a grade other than the school's entry grade—that is, they were *not* enrolled in that school in the previous year.

In this paper, we analyze both components of student mobility—attrition and late arrival. We use measures of these components to estimate **rates of replacement** in KIPP and district schools, or the extent to which late arrivals from other schools replace students who move within the district or leave the district entirely.

## B. Sample and Data

Our sample covers 19 KIPP middle schools located in nine states and the District of Columbia. These schools were selected based on two criteria. First, all schools had to be one of the 35 KIPP schools established in the 2005–2006 school year or earlier to ensure that a minimum of two cohorts<sup>4</sup> of students per school would be observed. Second, the KIPP schools had to be located in jurisdictions (states or school districts) that provided at least three consecutive years of complete, longitudinally linked student-level data for traditional public and charter schools. Student-level longitudinal data are essential to be able to accurately account for, and disentangle, student mobility. The key variables obtained from the jurisdictions' administrative data systems for these analyses included test scores in reading and mathematics, demographic characteristics, and schools attended.<sup>5</sup> Overall, we have data on a total of 82 school/year cohorts of students who entered the 19 KIPP schools between school years 2001–2002 and 2008–2009. The resulting sample includes 7,143

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<sup>2</sup> The cumulative attrition rate calculation uses data on cohorts of students that have not reached 8th grade. In this sense, cumulative attrition represents the inferred probability that a student in grade 5 will transfer before the end of grade 8 (as derived by a “life table” calculation), and not the directly observed percentage of early transfers.

<sup>3</sup> In the case of KIPP, we defined the *local school district* to be the traditional public school district in which a KIPP school is geographically located. In some cases, charter schools such as KIPP are actually part of this school district. In other cases, they form their own school district. In the latter situation, we defined the *local school district* to be the district or districts in which most students attended elementary school before applying to enroll in KIPP, including all geographically contiguous charter school districts.

<sup>4</sup> Throughout this report, a *cohort* is defined as the group of students who first enrolled in the entry grade of a KIPP middle school at the beginning of a given school year.

<sup>5</sup> Based on differences among participating schools in the year the KIPP school opened and the initial year the state or district was able to provide data, we have data on varying numbers—from three to eight—of cohorts at different schools. For more details on these data files, see Tuttle et al. (2010), which is based on the same sample. In addition to the 19 schools covered here, Tuttle et al. also analyzed 3 KIPP schools not included in this paper due to a lack of consistent data on school enrollment patterns.



students who enrolled in these KIPP schools and 1,202,060 non-KIPP students enrolled in districts where a KIPP school is located.

In this sample, large majorities of KIPP students are eligible for free or reduced-price school breakfasts and lunches (FRPL) and are either black or Hispanic. Compared with students in local districts, KIPP students are more likely to be members of racial minorities and FRPL-eligible, but less likely to be English-language learners or in special education. KIPP students' grade 4 reading and math achievement (before entering KIPP) tends to be lower than the district average; however, KIPP students' baseline test scores are similar to the grade 4 achievement of non-KIPP students who attended the same public elementary schools that effectively serve as KIPP feeder schools.<sup>6</sup> We explore these comparisons in greater detail below after we describe KIPP's attrition patterns (Section II) and student replacement patterns (Section III).

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<sup>6</sup> We define *feeder elementary schools* to be those attended by any KIPP student at baseline (before KIPP entry). See Tuttle et al. (2010) for a more detailed comparison of students who enter KIPP schools compared with traditional public school students from the surrounding district as well as from the same feeder elementary schools.



## II. ATTRITION FROM KIPP SCHOOLS

To compare attrition rates at KIPP middle schools with rates at other public schools, we defined *attrition* as school transfers (either within-district movers or out-of-district leavers) occurring during or immediately after each grade served by the KIPP or other public school. To measure the cumulative attrition rate for the grades covered by KIPP schools (that is, 5 through 8), we calculated a rate of student attrition at each grade level and used these grade-specific attrition rates to derive the cumulative percentage of students entering 5th grade who changed schools before completing 8th grade.<sup>7</sup> We considered school-specific grade ranges and disregarded transfers between schools in the same district when the transfers were caused by a normal grade progression (such as a move from an elementary school at the end of 5th grade to a middle school in 6th grade). All transfers out of the district or to private schools were counted as attrition.

In this attrition analysis, we compared KIPP students with two groups of district students, a full district sample and a comparison group of district middle schools we believed to be the most relevant district middle schools to compare with KIPP middle schools. In the KIPP sample, students were required to be enrolled in a KIPP school in either grade 5 or 6. In the full district sample, students were required to appear in a non-KIPP district school in grade 5 or 6. For the district middle school comparison group, we limited the district data to middle schools accepting a high (above-median) number of students from traditional public elementary schools attended by KIPP students.<sup>8</sup> In other words, if students from feeder elementary schools eventually attend five different non-KIPP middle schools, the two most frequently attended of these middle schools would be included in the district comparison group.

Given KIPP's unconventional grade span, comparing cumulative attrition rates in this manner might overstate the levels of attrition at KIPP relative to the rest of the district schools. Although some non-KIPP students also attend district schools serving grades 5 through 8 (such as K–8, K–12, or other 5–8 schools), most attend an elementary school through grade 5 and begin middle or secondary school the following year. Averaging across all sites in the study, 70 percent of students in the district comparison group were expected to graduate from elementary school following grade 5 (in contrast, for the KIPP sample no students are expected to graduate until the end of middle school, following grade 8). Because of the way we have defined attrition, the district students at K–5 schools do not contribute to the comparison group's attrition rate when they switch schools at the end of grade 5. In other words, disregarding the automatic school transfers occurring at the elementary-to-middle-school transition point could mean overlooking attrition that would have occurred if the comparison group attended schools with the same grade configuration as KIPP students.

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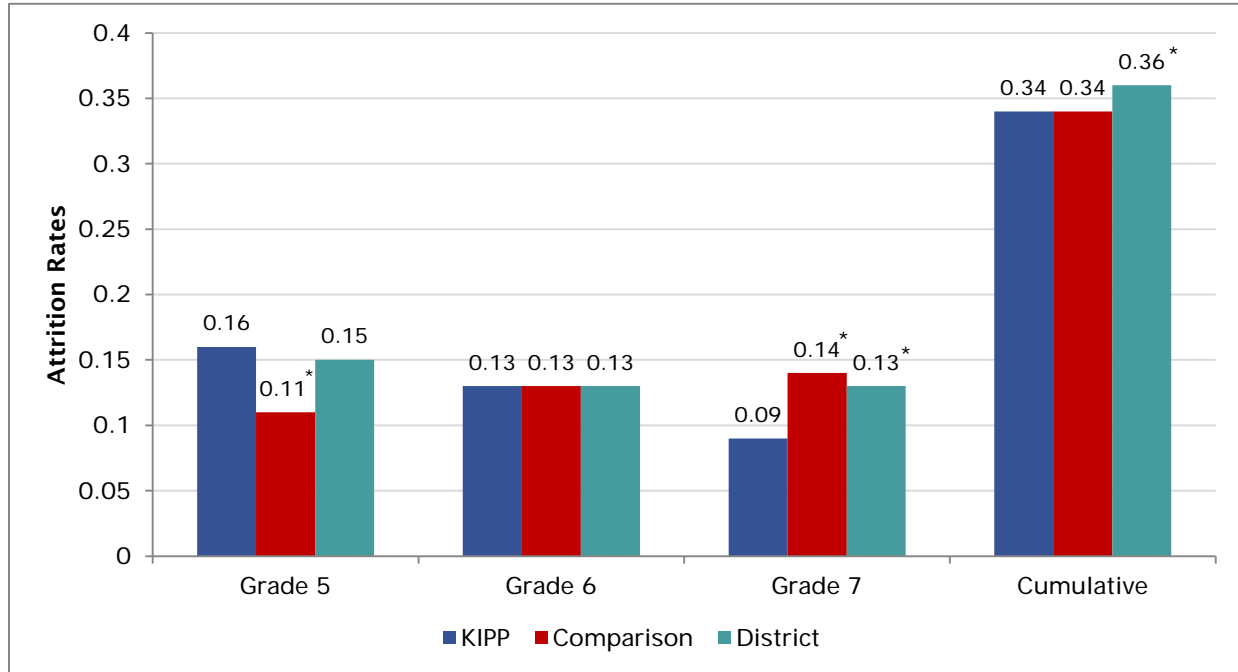
<sup>7</sup> Because many districts did not provide data on midyear school transfers, these attrition calculations do not include student transfers that took place during the 8th-grade school year.

<sup>8</sup> Although we restricted the middle schools in the district comparison group to those accepting a high number of students from these feeder elementary schools, the district comparison group sample includes all students attending these middle schools, not just those who also attended KIPP feeder elementary schools. The above-median schools in the comparison group were selected from the pool of middle schools accepting at least one student from a feeder elementary school.

## A. Overall Attrition Patterns

We did not find a consistent pattern of differences in attrition rates between KIPP and district schools (Figure II.1). At KIPP schools, the rate of attrition tended to decline moderately over the course of middle school. KIPP’s grade 5 attrition rate of 0.16 declined to 0.13 in grade 6 and 0.09 in grade 7.<sup>9</sup>

**Figure II.1. Middle School Attrition Rates, Cumulative and by Grade**



Note: This figure represents the average cumulative rate of attrition at all sites with valid data. The grade 5 and 6 rates include 19 sites, and the grade 7 and cumulative rates include the 16 sites with data available through the end of middle school. Tests of statistical significance compared the KIPP attrition rate with the rate at comparison schools and the district as a whole, using two-tailed t-tests that pooled variance across all sites included in each sample.

\*Difference from the KIPP rate is statistically significant at the 5 percent level.

Unlike the pattern for KIPP, in which average attrition tended to decline somewhat over the course of middle school, the grade-specific attrition rates in the district comparison group did not change substantially in grades 5, 6, and 7, with average rates of 0.11, 0.13, and 0.14, respectively. Attrition rates in the full district fell somewhere between those of the KIPP schools and district comparison schools in each grade.

Over the entire course of middle school, cumulative attrition rates at KIPP schools in our sample were similar to those of schools in their surrounding district. In the average site, the attrition rate at KIPP was 34 percent, compared with 34 percent in the district comparison group and a slightly higher attrition rate of 36 percent in the district as a whole. We also examined the range of

<sup>9</sup> KIPP’s grade-specific attrition rates were derived by averaging the rates associated with each of the 19 KIPP schools with data on the relevant grade level. Data on grade 5 and 6 attrition were available at all 19 schools, and data on grade 7 attrition were available at 16 of the 19 schools.

attrition rates for the schools in the sample—that is, the proportions of entering 5th and 6th graders who finished grade 8 at a different school. Across KIPP schools, cumulative attrition rates varied from a low of 11 percent to a high of 50 percent. Across comparison schools, cumulative attrition rates varied from a low of 12 percent to a high of 56 percent.

## B. Attrition Within Demographic Subgroups

Although we did not find systematic differences in total attrition levels when comparing KIPP and district schools, attrition rates could differ within important subgroups. To investigate this, we calculated cumulative attrition rate averages across sites containing nontrivial samples for the following groups: black students (both overall and for males only), Hispanic students (overall and for males only), and FRPL-eligible students (Table II.1). To obtain the cross-site averages, the results were weighted by the proportion of the relevant subgroup present in each sample.<sup>10</sup>

**Table II.1. Weighted Average Cumulative Attrition Rates, by Subgroup**

Subgroup	KIPP (1)	District Comparison Group (2)	District (3)
Black	0.37	0.44**	0.45**
Male	0.38	0.42	0.45**
Hispanic	0.24	0.29**	0.30**
Male	0.27	0.30	0.30
FRPL-Eligible	0.34	0.34	0.37**
Overall	0.34	0.34	0.36**

Note: All reported values are average attrition rates for all sites with available data. Sites were weighted by the proportion of the relevant subgroup in each sample. Sites were excluded from the reported average when fewer than 10 KIPP students or district comparison group students appeared in a given subgroup. In addition, six sites did not provide reliable or consistent data on FRPL status. Tests of statistical significance were conducted using two-tailed t-tests, pooling variance for all sites included in a given sample.

\*Difference from the KIPP rate was statistically significant at the 5 percent level.

\*\*Difference from the KIPP rate was statistically significant at the 1 percent level.

FRPL = free or reduced-price lunch.

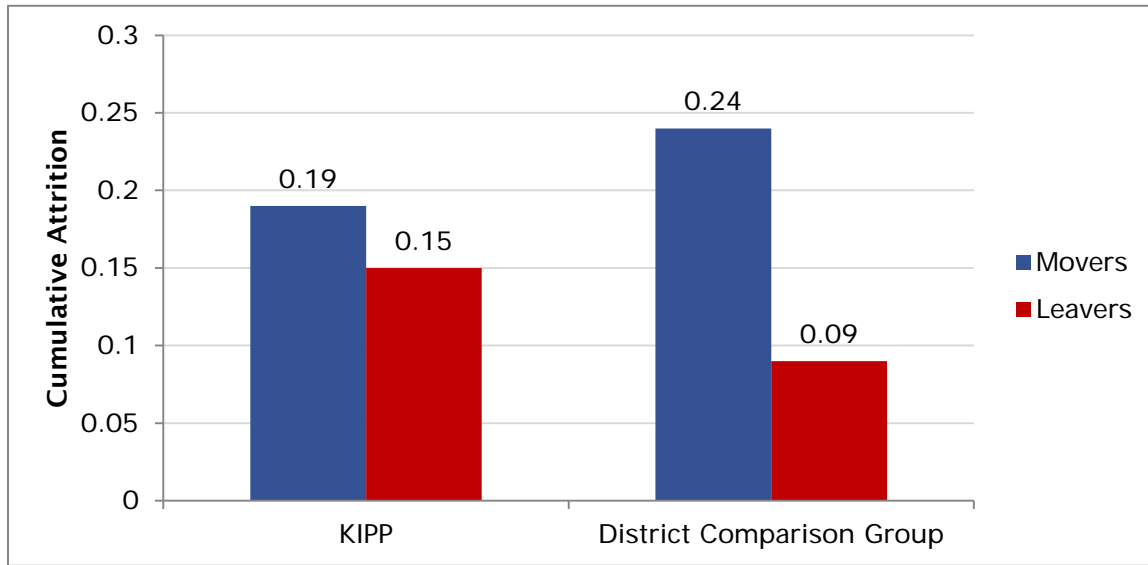
Attrition rates for black and Hispanic students were lower in KIPP schools than in comparison schools by statistically significant margins. For example, the attrition rate for black students was 0.37 at KIPP versus 0.44 in the comparison group and 0.45 for the district overall. On the other hand, attrition rates for black males and Hispanic males at KIPP were not significantly different from the rates in the district comparison group. There do not appear to be any notable differences between KIPP and district comparison schools in attrition rates for FRPL-eligible students. When all district schools were included in the comparison sample, however, the district attrition rate for black males and FRPL-eligible students was significantly higher than the rates found at KIPP schools.

<sup>10</sup> As a robustness check, we also estimated subgroup attrition rates using unweighted averages. Under this alternative approach, every KIPP school received an equal weight (although schools with fewer than 10 students in a given subgroup sample were disregarded). This approach did not appreciably change any of the point estimates for attrition rate averages.

### C. Differences in Attrition Types

As noted earlier, we distinguished between two attrition types, involving students who were (1) within-district movers and (2) out-of-district leavers. To investigate these issues, we compared the two attrition types separately for KIPP and for district comparison middle schools.<sup>11</sup>

**Figure II.2. Average Cumulative Attrition for Within- District Movers and Out- of- District Leavers**



Note: Bars represent the average cumulative attrition rate for all sites with complete data for grades 5 through 8 (n = 16). This aggregate figure does not reflect tests of statistical significance.

Relative to district comparison schools, KIPP schools experienced less attrition by within-district movers but more attrition by out-of-district leavers. Among those entering KIPP in 5th grade, for example, we found that 19 percent moved from KIPP to another district school by 8th grade, whereas 15 percent left the district entirely (Figure II.2). By contrast, at district comparison schools, more students (24 percent) moved to another district school but only 9 percent left the district. Note, however, that it is possible that some of the students we classified as leaving the district might in fact have attended a private school located within the district.

### D. Characteristics of Students Who Transfer Early

As shown previously, we found that KIPP and district schools have similar overall attrition rates. However, it is also important to examine the attributes of students who transfer early to determine the extent to which attrition potentially changes the composition of students at KIPP and the comparison group of nearby district middle schools. For example, if the early transferees from KIPP have lower (or higher) baseline test scores than early transferees from district comparison schools, that would suggest that KIPP students might experience a different set of attrition-related selection or peer effects, despite having similar total attrition levels.

<sup>11</sup> For the comparison of movers to leavers, as well as the comparison of student characteristics in the following section, we restricted the analysis to the district middle school comparison group (rather than the full district data). This confined the mobility analyses to a more restricted geographic area that approximates the neighborhoods served by KIPP schools.

We found a similar pattern of characteristics among students who transferred early from KIPP and district comparison schools. Most notably, early transferees tended to have had lower grade 4 test scores than did students who stayed, and this is true for both KIPP and district comparison middle schools (Table II.2). At KIPP, on average, transferees scored 0.25 and 0.22 standard deviations below the district-wide mean in math and reading at baseline (or the 40th and the 41st percentiles, respectively); students who stayed scored 0.02 below the mean (the 49th percentile) in both subjects. In district comparison middle schools, we saw a very similar pattern: transferees scored 0.23 and 0.21 standard deviations below the mean in math and reading (or the 41st and the 42nd percentiles, respectively) at baseline; students who stayed scored 0.01 above the mean (the 50th percentile) in math and at the mean in reading.

**Table II.2. Characteristics of Students Who Transfer Early, Compared with Those Who Remain Enrolled**

Characteristic	KIPP			District Comparison Group		
	Stayers (1)	Early Transfers (2)	Diff. (3)	Stayers (4)	Early Transfers (5)	Diff. (6)
Male	.46	.54	.08**	.50	.52	.02*
Racial Minority						
Black	.57	.65	.08**	.42	.51	.09**
<i>Male</i>	.26	.34	.08**	.21	.26	.05**
Hispanic	.39	.30	-.09**	.32	.32	.00
<i>Male</i>	.18	.17	-.01	.16	.17	.01*
Eligible for FRPL	.81	.80	-.01	.67	.75	.08**
Special Education	.08	.10	.02	.11	.15	.04**
Limited English Proficiency	.08	.05	-.03**	.12	.10	-.02**
Baseline Achievement						
Math (z-score)	-.02	-.25	-.23**	.01	-.23	-.22**
Reading (z-score)	-.02	-.22	-.20**	.00	-.21	-.21**

Note: Each column includes mean values for the subset of study sites with valid data on the relevant characteristic. All sites were weighted equally. The KIPP and district comparison samples compare all students who “transfer early” with “stayers” who remain enrolled through the end of middle school. Statistical significance was derived from two-tailed t-tests applying the pooled variance from all sample sites.

\*Difference between stayers and early transfers is statistically significant at the 5 percent level.

\*\*Difference between stayers and early transfers is statistically significant at the 1 percent level.

FRPL = free or reduced-price lunch.

The demographic composition of students transferring out of KIPP schools and district comparison schools was also broadly similar—but not identical. At both KIPP schools and district comparison schools, students who transferred early were significantly more likely to be black males and significantly less likely to have limited English proficiency. However, early transferees from KIPP were also less likely to be Hispanic, whereas at district comparison schools the proportion of Hispanic transferees was nearly identical to the Hispanic proportion of students who remained enrolled. In addition, students who exited KIPP were no more likely than stayers to be FRPL-eligible (both groups had high eligibility rates) or in special education, whereas transferees from district comparison schools were more likely than stayers to be FRPL-eligible and to participate in special education programs. Thus, if anything, it appears that the attrition from comparison schools

was more likely than that from KIPP to draw away students who were disadvantaged relative to the students left behind.



### III. REPLACEMENT OF STUDENTS WHO LEAVE KIPP SCHOOLS

In addition to student attrition, late-arriving students represent another potentially important pathway for changes in a school's overall enrollment. This analysis defines a *late arrival* as a student entering a given school for the first time at any point other than that school's normal entry grade. For example, in the case of a KIPP middle school beginning in grade 5, the population of late arrivals comprises students who enroll for the first time in grades 6, 7, or 8.<sup>12</sup> Given KIPP's unusual grade span, late entry at KIPP schools is not perfectly comparable to the late entry patterns we can observe at district middle schools (which generally begin at grade 6 and accept late entrants only in grades 7 or 8). For our comparison middle schools, we therefore restricted our analysis of late arrival patterns to grades 7 and 8. As a result, our descriptive analyses cannot detect any district late-arrival patterns in grade 6 that would have occurred if the comparison middle schools offered the same grades as KIPP.

The prevalence of late arrivals might affect students in several ways. As with so-called normal entry in a school's initial grade, each late arrival creates the potential for student selection; enrolling higher- (or lower-) performing students as late arrivals could change the distribution of overall achievement levels within the student body. Two key issues are related to late arrivals. The first involves their number relative to the number of students who leave the school early—in other words, the extent to which late arrivals are admitted at all. Assuming there are at least some late arrivals, the second issue is whether the average achievement level of these new students coming into the school is higher or lower than that of those who leave early. Consider a school in which students who leave early and students who arrive late both tend to be lower-achieving students, on average. In this scenario, a school could increase the average achievement of enrolled students by not admitting new students to replace those who left early. Alternatively, average achievement could also be boosted by replacing low-achieving students who leave early with higher-achieving late arrivals.<sup>13</sup>

#### A. Overall Late- Arrival Patterns

To describe late-arrival patterns at KIPP middle schools, we calculated the average number of new students entering each KIPP school in grades 6, 7, and 8. Table II.3 presents the results, along with the total average enrollment in each grade for the 19 KIPP middle schools and the district comparison schools. To define a relevant comparison sample, as noted previously, we limited the data to district middle schools that accept a high (above-median) number of students from KIPP's

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<sup>12</sup> For school districts that provided data on within-year transfers, students who transferred into a KIPP school after the beginning of the academic year in grade 5 were also classified as late arrivals. In a school's first year of operation, no student enrollment was counted as a late arrival. A school's normal entry grade was usually defined as the minimum observed grade, unless total enrollment in the school at a given grade level was more than twice that of the previous grade level within the school. In these cases, the expanded grade was also treated as a normal entry grade.

<sup>13</sup> Late arrivals could affect schools and their students in various other ways. For example, there could be instructional or administrative burdens associated with accommodating students who did not follow a complete grade progression in a given school, as late arrivals might have difficulty adjusting due to differences in curricula or school culture. Thus, even if the late arrivals to a school achieve higher middle school test scores than the students who left early, those late arrivals might still be a source of disruption to teachers, students, and administrators. Also, the prevalence of late arrivals could produce higher (or lower) total enrollments, potentially affecting average class sizes.

feeder elementary schools.<sup>14</sup> The enrollment and attrition averages in this table contextualize each grade’s late arrival count.<sup>15</sup>

Both KIPP and comparison schools admitted late arrivals, but at KIPP late arrivals tended to be concentrated in earlier grades. All KIPP schools admitted students after the normal entry grade, and most KIPP schools continued to admit at least some new students in every grade throughout middle school. However, the number of new enrollees substantially declined after grade 6. Averaging across all sites, KIPP schools in the sample enrolled 13 new students per year in grade 6 (accounting for 18 percent of average total enrollment in that grade), 7 new students per year in grade 7 (12 percent of total enrollment), and 3 new students per year in grade 8 (6 percent of total enrollment). KIPP admitted more new students in grade 6 than the number of students who left through attrition in grade 5—that is, its replacement ratio was greater than one.<sup>16</sup> Part of the explanation for this trend is the comparatively high rate of students retained in grade 5 at KIPP schools. This trend reverses in later grades, and KIPP admits slightly fewer new students than the number of students who left in the prior grade—its replacement ratio in grades 7 and 8 was less than one.

**Table III.1. Average Attrition and New Arrivals at KIPP and District Comparison Schools**

	Grade 5–6 Transition		Grade 6–7 Transition		Grade 7–8 Transition	
	KIPP	District Comparison Schools	KIPP	District Comparison Schools	KIPP	District Comparison Schools
Attrition in Initial Grade (number of early leavers)	11	n.a.	9	22	5	26
Number of Late Arrivals in Subsequent Grade	13	n.a.	7	29	3	35
Total Enrollment in Subsequent Grade	69	n.a.	60	228	53	246
Ratio of New Arrivals to Prior Attrition (replacement ratio)	1.18	n.a.	0.78	1.32	0.60	1.35

n.a. = not applicable.

<sup>14</sup> The district comparison group here is defined at the school level; all observations outside the comparison schools were dropped from the sample, making it possible to obtain average per-school enrollment counts. This definition is slightly different from the sample definition used in the attrition analysis. In the attrition rate calculations, the district comparison group was defined at the student level; the sample in all years included all students who ever attended a comparison middle school, regardless of their school in a given grade or year.

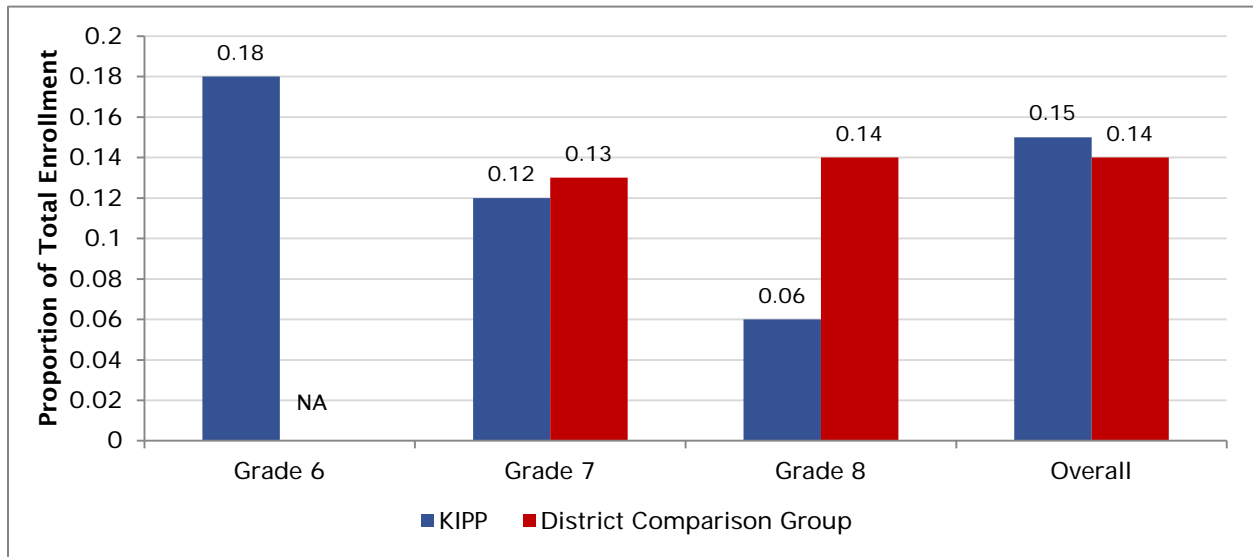
<sup>15</sup> For two reasons, it might be misleading to compare KIPP’s average total enrollment in grade 6 with the average total enrollment in grades 7 or 8 and ascribe any observed differences entirely to the pattern of attrition and late arrivals. First, our data are truncated, in that some student cohorts are followed only through 5th, 6th, or 7th grade and others are followed through 8th grade, so the student sample varies from grade to grade. Second, KIPP’s relatively high levels of grade repetition in grades 5 and 6 will also tend to increase the average total enrollment levels observed in these earlier grade levels, all other things being equal (Tuttle et al. 2010).

<sup>16</sup> Counts of attrition and late arrivals in each grade vary substantially among different KIPP schools. For example, the average number of new arrivals in grade 6 ranges from 3 students per year at one KIPP school (4 percent of grade 6 enrollment) to 28 new arrivals per year at a different school (35 percent of grade 6 enrollment).

District comparison schools also consistently admit students after the normal entry grade. Unlike KIPP, however, the district schools in our sample did not show any decline in new enrollment levels in grade 8 compared with grade 7. Rather, district schools in our sample consistently admitted more new students, on average, than the number of students who exited through attrition in the prior grade. In an average school, 29 new arrivals in grade 7 replaced 22 grade 6 students who left by attrition, and 35 grade 8 arrivals replaced 26 grade 7 students who left by attrition. This finding suggests that, in grades 7 and 8, district middle schools are more likely than are KIPP schools to replace the students who leave through attrition.<sup>17</sup>

KIPP schools are considerably smaller than the traditional public schools in local districts. To account for this, an additional approach to analyzing grade-specific late-arrival patterns is to calculate the proportion of attending students in each grade who are new arrivals. This statistic compares the number of new arrivals in a given grade with the total number of students observed in that grade. As discussed earlier, the grade-specific proportion of new arrivals at KIPP declined substantially after grade 6. In contrast, schools in the district comparison group showed no appreciable change in the portion of new arrivals in grade 7 (13 percent) relative to grade 8 (14 percent).

**Figure III.1. Late Arrivals as a Proportion of Total Enrollment**



Note: This figure represents the average proportion of late arrivals relative to grade-specific and total enrollment at all sites with valid data. The proportion of grade 6 late arrivals could not be calculated for the district comparison group because of the grade spans at these schools. A two-tailed t-test with pooled variance for all sites in the sample was performed to compare the overall proportion of late arrivals at KIPP to the proportion at district comparison schools. The difference was not statistically significant at the 5 percent level.

Figure III.1 shows the overall proportion of late arrivals across all offered grades in our sample of KIPP schools and comparison districts. To calculate this proportion, we adjusted for the unusual middle school grade span at KIPP. For KIPP, the overall proportion was calculated by dividing the

<sup>17</sup> These ratios suggest that, for district middle schools that offer grade 6, the number of new enrollees in grades 7 and 8 was higher than the number of early leavers. This pattern may be the result of increases in total district enrollment over time, but it might also be affected by school reorganizations or closures that led some schools to accept large numbers of new students in grades 7 and 8.

number of new arrivals in grades 6, 7, and 8 by the total number of students attending the school during those grades. To match the most common middle school grade span at district schools, we calculated the district proportion by dividing the number of new arrivals in grades 7 and 8 by the total number of students attending grades 7 and 8.

Pooling results across all offered middle school grades, we found no significant difference in the average prevalence of late arrivals at KIPP schools and comparison district schools. The overall proportion of late arrivals at KIPP (15 percent) was statistically indistinguishable from the overall proportion in the district middle school comparison group (14 percent).<sup>18</sup>

## **B. Characteristics of Late Arrivals**

KIPP schools differ from district comparison group middle schools in how late arrivals compare with on-time enrollees. Students who enroll late at KIPP tend to be higher achieving than those who enroll on time, as measured by their grade 4 test scores, whereas the reverse is true at district comparison group schools (see Table III.2). At KIPP schools, on average, late arrivals scored 0.16 and 0.15 standard deviations above the mean for the local district in math and reading, respectively, at baseline (or the 56th percentile); students who enrolled in the normal intake grade scored 0.03 or 0.04 below the local district mean in baseline math and reading, respectively (or the 49th and the 48th percentiles, respectively).<sup>19</sup> Conversely, late arrivals at district schools had significantly lower average baseline test scores than on-time enrollees. In district comparison schools, late arrivals scored 0.29 standard deviations below the mean in both subjects (or the 39th percentile); on-time entrants scored 0.03 and 0.01 above the mean in math and reading, respectively (the 51st and the 50th percentile). All of these differences are statistically significant.

In addition to the substantial difference in baseline test score patterns, modest differences also exist between KIPP and district comparison schools in the demographic characteristics of late entrants. Again, these differences mean that, in the upper grades, late entrants tend to make the KIPP student body somewhat less disadvantaged over time, but the district comparison group more disadvantaged over time. Compared with on-time enrollees, KIPP's late entrants were equally likely to qualify for FRPL and slightly less likely (by 4 percentage points) to be in special education; in the district comparison group, in contrast, late entrants were significantly more likely to be FRPL-eligible and slightly more likely (by 3 percentage points) to be in special education. Late entrants at KIPP were significantly less likely than on-time enrollees to be male and equally likely to be black (and therefore significantly less likely to be black males); at district comparison schools, late arrivals were equally likely to be male but significantly more likely to be black (and therefore include significantly more black males). At KIPP and at district comparison schools, late and on-time

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<sup>18</sup> The overall proportion of late arrivals, relative to total enrollment, varied substantially at specific KIPP and district schools. The overall proportion at specific KIPP schools ranged from 0.03 to 0.30, and there was a similar degree of variation in the overall proportion of late arrivals in the district comparison group, in which the site-specific proportion of late arrivals ranged from 0.04 to 0.28.

<sup>19</sup> These comparisons of 4th-grade achievement do not necessarily imply that KIPP's late arrivals achieved higher test scores than on-time entrants in the years both groups of students attended KIPP schools. On-time entrants received more exposure to KIPP than late arrivals. Thus, at a KIPP school with positive impacts, the additional time spent at KIPP may have helped on-time entrants to achieve higher test scores than those who entered late.

entrants included similar proportions of Hispanic students and students with limited English proficiency.<sup>20</sup>

**Table III.2. Characteristics of Students Who Enroll Late, Compared with On- Time Entrants**

Characteristic	KIPP			District Comparison Group		
	On-Time Entrants (1)	Late Arrivals (2)	Diff. (3)	On-Time Entrants (4)	Late Arrivals (5)	Diff. (6)
Male	.47	.42	-.05*	.50	.51	.01
Racial Minority						
Black	.57	.57	.00	.43	.54	.11**
<i>Male</i>	.27	.21	-.06**	.21	.27	.06*
Hispanic	.39	.39	.00	.32	.33	.01**
<i>Male</i>	.18	.18	.00	.16	.17	.01**
Eligible for FRPL	.81	.81	.00	.66	.79	.13**
Special Education	.09	.05	-.04**	.11	.14	.03**
Limited English Proficiency	.06	.06	.00	.11	.10	-.01**
Baseline Achievement						
Math (z-score)	-.03	.16	.19**	.03	-.29	-.32**
Reading (z-score)	-.04	.15	.19**	.01	-.29	-.30**

Note: Each column includes mean values for the subset of study sites with valid data on the relevant characteristic. All sites were weighted equally. The KIPP sample (columns 1, 2, and 3) compares all “On-Time Entrants” (those who enrolled at the beginning of grade 5) with “Late Arrivals” who entered KIPP after the beginning of grade 5 or in grades 6, 7, or 8. The district comparison group sample (columns 4, 5, and 6) compares students who enrolled “On Time” in grade 6 with those who enrolled after the beginning of grade 6 or in grades 7 or 8. Statistical significance was derived from two-tailed t-tests applying the pooled variance from all sites.

\*Difference between on-time entrants and late arrivals is statistically significant at the 5 percent level.

\*\*Difference between on-time entrants and late arrivals is statistically significant at the 1 percent level.

FRPL = free or reduced-price lunch.

<sup>20</sup> We also calculated grade-specific and overall late-arrival rates within demographic subgroups and did not find substantial differences between KIPP and the district comparison group. The overall late-arrival rate for KIPP’s FRPL students (15 percent) is higher than the district comparison group rate (11 percent) by a statistically significant margin. The overall proportions of late arrivals among black students (as well as black males) and Hispanic students (as well as Hispanic males) are not significantly different from the rates at comparison schools.

## IV. EFFECTS OF ATTRITION AND REPLACEMENT ON THE COMPOSITION OF STUDENTS AT KIPP SCHOOLS

Our final set of analyses examines the extent to which attrition and replacement patterns affect the composition of KIPP students during middle school. As noted previously, the pattern of student attrition from KIPP schools (including the tendency of early transferees to be lower-achieving) closely resembles the pattern found in district schools and there are similar total proportions of late arrivals at KIPP and district schools. However, we also observed some key ways in which KIPP's late-entry pattern differs from that of nearby district schools. KIPP is more likely to accept students in grade 6 and less likely to enroll new students in later grades. Also, on average the students who enter KIPP after the normal intake grade differ from the late arrivals at nearby schools: KIPP's late entrants tend to be higher achieving, less likely to be in special education, and less likely to be male than are on-time entrants; at district schools, late entrants tend to have lower baseline test scores, a higher proportion of them are special education students, and a similar proportion of them are male.

Are these differences large enough to appreciably change the composition of students attending KIPP in each grade? To answer this question, we compared the characteristics of KIPP attendees with the characteristics of district attendees separately in grades 5, 6, 7, and 8. In grade 5, the characteristics of attending KIPP students primarily reflect the characteristics of on-time entrants.<sup>21</sup> By contrast, the characteristics of attendees in later grades will be influenced by the combined effects of attrition, late arrivals, and retention in grade. Similar to our earlier analyses, we compared KIPP students with two different groups of local public school students in each grade: (1) students who attended one of KIPP's feeder elementary schools and (2) students in the local district as a whole.<sup>22</sup> In addition, the comparisons were restricted to districts associated with the 16 KIPP schools in the study that had valid data through grade 8.<sup>23</sup>

Because of the attrition and late enrollment patterns described earlier, we found several differences between KIPP and district schools in how the average characteristics of students changed through the middle school years. Within KIPP schools, students in early grades had lower baseline achievement levels, on average, than those in later grades. Table IV.1 shows the average grade 4 (baseline) reading and math scores of KIPP students and district students, separately for each grade during middle school. At KIPP, grade 5 students had scored 0.10 standard deviations

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<sup>21</sup> However, some on-time entrants may have transferred out of KIPP too quickly to appear as KIPP students in the administrative data files provided to the study. Also, the characteristics of grade 5 students in the sample do not perfectly reflect the average characteristics of all on-time entrants. Students who repeat grade 5 will disproportionately influence student characteristics in that grade, relative to later grades, because they remain in the grade 5 sample for multiple years. The tables in this section also include comparisons that pool observations from all grades; these pooled comparisons weight each student equally, regardless of the student's grade progression.

<sup>22</sup> As a sensitivity test, we also compared KIPP schools' grade-specific student characteristics with those found in the comparison group of district middle schools analyzed in the attrition and late-arrival sections of this paper. The general pattern we found for feeder elementary school students and local districts also holds for the district comparison group of middle schools (which offer only grades 6, 7, and 8); in all three cases, the average characteristics of district enrollees were similar in each offered grade throughout middle school.

<sup>23</sup> Newly created KIPP middle schools generally begin by enrolling only grade 5 students in their first year of operation, adding one new grade level in each subsequent year. Of the 19 KIPP schools included in the attrition and late-arrival analyses, 3 had not been operating long enough to observe 8th grade students at the time data were collected.

below the mean for the local district in both reading and math at baseline; KIPP’s grade 8 attendees, in contrast, had average baseline scores that were 0.07 and 0.13 above the mean in reading and math, respectively. In other words, the average prior achievement of KIPP students in grade 5 was at the 46th percentile in reading and math, but for students attending KIPP in grade 8 the average prior achievement was at the 53rd percentile in reading and the 55th percentile in math.

Compared with KIPP, the prior achievement of district students tended to be considerably more stable across middle school grades. This is because the early leavers and late entrants at district schools resembled each other—both groups of students tended to be relatively lower-achieving. For example, baseline reading scores among enrolled students in the feeder school sample were 0.09 standard deviations below the mean in grade 5 and 0.07 standard deviations below the mean in grade 8; in the district as a whole, baseline reading scores were from 0.03 to 0.05 standard deviations above the mean over the same grade range. At KIPP, the difference in baseline achievement between grade 5 and grade 8 was much larger—0.17 standard deviations in reading and 0.23 standard deviations in math. Thus, relative to the change in peer achievement among other students from KIPP’s feeder schools, the baseline achievement levels of peers of KIPP students increased from 5th to 8th grade by 0.15 standard deviations in reading and 0.19 standard deviations in math.

**Table IV.1. Baseline Reading and Math Scores, by Grade**

Grade Level	Baseline Reading (z-score)			Baseline Math (z-score)		
	KIPP (1)	Feeder Schools (2)	Whole District (3)	KIPP (4)	Feeder Schools (5)	Whole District (6)
5	-.10	-.09	.03**	-.10	-.09	.04**
6	-.03	-.08**	.05**	-.01	-.07**	.05**
7	.06	-.07**	.05	.07	-.07**	.05
8	.07	-.07**	.05	.13	-.05**	.06*
All Enrolled Students	-.09	-.09	.03**	-.08	-.09	.03**

Note: Each column includes mean values for the subset of the study sites with valid data on the relevant characteristic. All sites were weighted equally. The KIPP sample (columns 1 and 4) includes all students who ever attended KIPP in the relevant grade. The feeder school sample (columns 2 and 5) includes all students who attended the same elementary schools as KIPP students did. The district sample (columns 3 and 6) includes all students in the sample districts. Statistical significance was derived from two-tailed t-tests applying the pooled variance from all sample sites and represents the significance of the difference between the group in question and the KIPP group.

\*Difference from the mean level at KIPP is statistically significant at the 5 percent level.

\*\*Difference from the mean level at KIPP is statistically significant at the 1 percent level.

As a result, in each grade there was a different relationship in baseline achievement between KIPP students and those in local districts. In grade 5, currently enrolled KIPP students had baseline reading and math scores similar to those of students from feeder elementary schools and had significantly lower baseline scores than the average in local districts. In grade 6, KIPP students had significantly higher baseline reading and math scores than students from feeder schools, but KIPP students’ baseline scores were still below those of local district students in both subjects. In grade 7, the baseline scores of KIPP students remained higher than feeder school students’ and rose to become statistically indistinguishable from those of the district students in both reading and math. By grade 8, KIPP attendees had higher baseline achievement than students from feeder schools;

relative to local district students, KIPP students had significantly higher baseline achievement in math and similar baseline achievement in reading.

These changes reflect the findings related to the characteristics of early leavers and late arrivals presented previously. Although plenty of low-achieving students transfer early from district schools, these early leavers are replaced by other low-achieving students who are late arrivals. At KIPP schools, the early leavers also tend to be low-achieving, but they are replaced by a group of higher-achieving late arrivals.

Another factor that probably contributes to the finding that students in higher grades at KIPP tend to be higher achieving (at baseline) than those in lower grades is the relatively high rates of retention in grade at KIPP schools. Because the lowest-achieving students tend to be the ones who are retained in grade, they spend more years in the lower grades and thus contribute more to the average achievement levels at those grades (and less to the average achievement levels at higher grades). This issue is especially important at KIPP schools, where retention in grades 5 and 6 is more common than in most district schools. As reported in Tuttle et al. (2010), the average rates of repetition at KIPP were 11 percent in grade 5 and 5 percent in grade 6, compared with a rate of 2 percent in each grade at other district schools.

Unlike baseline test scores, most demographic characteristics at KIPP schools remain stable throughout middle school. As shown in Table IV.2, at KIPP the proportion of black and Hispanic students in grade 5 was similar to the proportion in grade 8 (specifically, the proportions in grades 5 and 8 were less than 4 percentage points apart for both racial groups). The proportion of racial minorities in district schools was also consistent across grades. Thus, throughout every grade of middle school, KIPP schools had a substantially higher proportion of blacks and Hispanics compared with feeder schools or local districts.

**Table IV.2. Grade- Specific Proportions of Black, Hispanic, and Male Students**

Grade	Black			Hispanic			Male		
	KIPP (1)	Feeder (2)	District (3)	KIPP (4)	Feeder (5)	District (6)	KIPP (7)	Feeder (8)	District (9)
5	.57	.44**	.37**	.38	.35**	.31**	.48	.50**	.51**
6	.55	.44**	.37**	.41	.35**	.31**	.46	.50**	.50**
7	.55	.44**	.38**	.41	.34**	.31**	.44	.50**	.50**
8	.54	.45**	.38**	.41	.34**	.30**	.40	.50**	.50**
All Enrollees	.57	.33**	.37**	.39	.25**	.31**	.48	.50**	.51**

Note: Each column includes mean values for the subset of the study sites with valid data on the relevant characteristic. All sites were weighted equally. The KIPP sample (columns 1, 4, and 7) includes all students who ever attended KIPP in the relevant grade. The feeder school sample (columns 2, 5, and 8) includes all students who attended the same elementary schools attended by KIPP students. The district sample (columns 3, 6, and 9) includes all students in the sample districts. Statistical significance was derived from two-tailed t-tests applying the pooled variance from all sample sites and represents the significance of the difference between the group in question and the KIPP group.

\*Difference from the mean level at KIPP is statistically significant at the 5 percent level.

\*\*Difference from the mean level at KIPP is statistically significant at the 1 percent level.



However, the proportion of male students at KIPP did decline somewhat in later grades. Between grades 5 and 8, the proportion of males attending KIPP schools declined from 48 to 40 percent (Table IV.3). The gender ratio at district schools remained evenly balanced throughout middle school. Thus, KIPP schools had significantly fewer males than district schools had in all grades, with the largest gap occurring in grade 8. The trend of lower male enrollments at KIPP was also more common among black students than Hispanic students. The proportion of Hispanic males in KIPP schools remained stable throughout middle school, but the proportion of black males declined from 27 percent in grade 5 to 19 percent in grade 8 (not shown). As a result, in grade 5 KIPP enrolled more black males than district schools, but by grade 8 KIPP's proportion of black males (19 percent) was statistically indistinguishable from local districts' (also 19 percent) and significantly lower than the proportion of black males from feeder schools (22 percent).

KIPP's attrition and late-enrollment patterns did not appreciably change the proportion of students who were in special education, had limited English proficiency, or were FRPL-eligible (Table 7). In district schools, the proportion of students with these attributes also remained very similar in each of the grades we examined. Thus, compared to local districts, in each grade of middle school KIPP schools had significantly more FRPL-eligible students, significantly fewer special education students, and significantly fewer students with limited English proficiency. For each of these attributes, the proportion of KIPP students in grade 5 was within two percentage points of the proportion at KIPP in grade 8.

**Table IV.3. Proportion of FRPL, Special Education, and Limited English Proficiency Students, by Grade**

Grade Level	FRPL			Special Education			Limited English Proficiency		
	KIPP (1)	Feeder (2)	District (3)	KIPP (4)	Feeder (5)	District (6)	KIPP (7)	Feeder (8)	District (9)
5	.80	.69**	.60**	.09	.11**	.11**	.07	.14**	.14**
6	.81	.69**	.60**	.08	.11**	.11**	.06	.13**	.13**
7	.79	.69**	.60**	.08	.11**	.11**	.05	.12**	.12**
8	.80	.67**	.58**	.07	.12**	.11**	.06	.12**	.12**
All Enrollees	.80	.68**	.59**	.09	.11**	.11**	.07	.13**	.12**

Note: Each column includes mean values for the subset of the study sites with valid data on the relevant characteristic. All sites were weighted equally. The KIPP sample (columns 1, 4, and 7) includes all students who ever attended KIPP in the relevant grade. The feeder school sample (columns 2, 5, and 8) includes all students who attended the same elementary schools attended by KIPP students. The district sample (columns 3, 6, and 9) includes all students in the sample districts. Statistical significance was derived from two-tailed t-tests applying the pooled variance from all sample sites and represents the significance of the difference between the group in question and the KIPP group.

\* Difference from the mean level at KIPP is statistically significant at the 5 percent level.

\*\* Difference from the mean level at KIPP is statistically significant at the 1 percent level.

FRPL = free or reduced-price lunch.

## V. CONCLUSION AND DISCUSSION OF POSSIBLE PEER EFFECTS

In light of research showing the positive impacts of KIPP schools on achievement, student transitions into and out of KIPP remain of interest. Policymakers supportive of KIPP wonder how much of the student population the KIPP network might grow to serve, and skeptics ask whether KIPP's results depend on excluding students who are the most disadvantaged or the most difficult to teach, either in admissions or subsequent attrition.

The findings presented in this paper provide a picture of KIPP's student population from several key angles. In terms of prior achievement, KIPP schools generally appear to admit students who are disadvantaged in ways similar to their peers in local public schools.<sup>24</sup> These disadvantaged populations have high rates of educational mobility, but rates of exit from KIPP schools are typically no higher than rates at nearby district schools. Students exiting KIPP schools have similar prior achievement to those exiting nearby schools, but unlike district schools KIPP is not more likely to lose the students who are Hispanic, low-income, or in special education. In part because of high grade 5 retention rates, KIPP schools admit a substantial number of late entrants in grade 6 but admit fewer new students in grades 7 and 8 than do nearby public schools. Compared to the rest of the KIPP student body, the late entrants at KIPP schools tend to have higher baseline achievement, fewer males, fewer special education students, and a similar number of low-income students. In contrast, at neighboring district schools the late entrants tend to be more disadvantaged than previously enrolled students.

These attrition and replacement patterns underscore the importance of using careful quasi-experimental and experimental methods to assess KIPP's impacts. Because KIPP schools tend to replace low-achieving students who transfer early with higher-performing late entrants, a simple comparison of the average test scores recorded by attending KIPP students in each grade could overstate growth in academic achievement between grades 5 and 8. Fortunately, key studies have dealt with this issue appropriately. Angrist et al. (2010) based their impact estimates on a comparison of all students who participated in admissions lotteries. The authors used a two-stage least squares model, in which the students' treatment status served as an instrument for the number of years of KIPP attendance. Treatment status was based entirely on the lottery outcome, so lottery winners remained in the treatment group whether they enrolled in KIPP and remained there, enrolled in KIPP but left early, or never enrolled in KIPP. Thus, the resulting impact estimates cannot be biased by attrition or late arrival patterns. Similarly, in a separate, quasi-experimental study, Tuttle et al. (2010) compared a treatment group of students who initially entered KIPP with a comparison group of traditional public school students, but retained students in the treatment group even if they ultimately exited from KIPP. Both of these studies suggest that KIPP has substantial and positive impacts on middle school test scores even after accounting for attrition.

The questions raised by Kahlenberg (2011) and Miron et al. (2011), however, are more subtle than this. They do not dispute that KIPP's positive achievement impacts are real; instead, they ask whether these impacts are attributable to a gradual change in the KIPP student population that

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<sup>24</sup> Outside of prior academic achievement, the pattern differs somewhat, as shown previously. Compared to local schools, KIPP enrolls a higher percentage of racial minority and FRPL-eligible students, but a lower percentage of special education and limited English proficiency students.

occurs between 5th and 8th grades as a result of attrition and replacement patterns. If so, KIPP's educational approach would be less relevant to conventional public schools.

How much of KIPP's impacts on student achievement might be explained by the fact that KIPP tends to attract higher-achieving replacement students in the upper grades? Our findings confirm suggestions by Kahlenberg and Miron that selective replacement of departing KIPP students produces a gradual improvement over the course of middle school in the pre-KIPP achievement levels of the KIPP student population. But it is difficult to ascertain the magnitude of any resulting peer effects at KIPP schools. One way to extrapolate the possible size of peer effects at KIPP is to combine our findings with other research on how peers' prior scores affect student achievement. Although we employ this method in the following paragraphs, this should be viewed as only a rough approximation of peer effects at KIPP schools.<sup>25</sup>

As we noted in the introduction, prior research shows a wide range of estimates regarding the effect of peers' academic ability on student achievement. These studies have found that peer effects can range from close to zero to nearly half a standard deviation impact on student achievement for each standard deviation of difference in peers' achievement (Lefgren 2004; Hanushek et al. 2003). Relative to other students from KIPP's feeder schools, the baseline achievement levels of peers of KIPP students increase from 5th to 8th grades by 0.15 standard deviations in reading and 0.19 standard deviations in math (see Table IV.1). If the smaller estimates of peer effects are accurate, a change of this magnitude would not meaningfully affect student achievement at KIPP. Even if the largest estimates of peer effects are correct, the improvement in peers' prior test scores would appear to benefit KIPP students' achievement only by about 0.07 standard deviations in reading and 0.09 standard deviations in math after four years at KIPP. Average estimates of KIPP's cumulative impacts are much larger, 0.24 standard deviations in reading and 0.42 standard deviations in math (Tuttle et al. 2010). Thus, peer effects could potentially explain between 0 and 29 percent of the cumulative KIPP impact on reading and between 0 and 21 percent of the cumulative KIPP impact on math.

Moreover, the best available evidence suggests that KIPP produces its largest impacts on students in their first year at KIPP—before selective replacement could possibly have any effect. In consequence, the true peer effect resulting from selective replacement is likely substantially below the upper estimates in the previous paragraph. However, an important limitation of this study is that there could still be unmeasured differences between the students attracted to KIPP and those enrolling in other schools; such unobserved factors could produce either positive or negative peer effects. For example, KIPP students might benefit from attending school with peers who are especially motivated to accept KIPP's academic and behavioral demands. In this study we have analyzed the peer environment at KIPP as measured by demographic characteristics and prior

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<sup>25</sup> These estimates of peer effects might not be accurate for three reasons. First, the literature on peer effects is still evolving, and there is disagreement regarding which peer effect estimation methods are most credible. Second, these effects could differ in various educational contexts and schools, so some of the estimates from the literature might not be relevant to the KIPP network. Third, although we can estimate peer effects related to baseline test scores, there are other effects we cannot easily estimate. These other factors include some differences between KIPP and other public schools (such as the fact that KIPP tends to enroll more low-income students but fewer students in special education), or the presence of unmeasured differences in peer characteristics both in the entry grades and in subsequent grades. For example, our data do not include a measure of baseline student behavior.

achievement, but we do not have measures of parent characteristics, prior motivation, or student behavior (except to the extent that these factors correlate with prior achievement).

Using the data available for this analysis, we find that KIPP's impacts do not appear to be explained by advantages in the prior achievement of KIPP students. Even when attrition and replacement throughout the middle school years are taken into account, the limited range of potential peer effects at KIPP schools does not account for the large cumulative impacts on student achievement identified by prior studies.

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