Ewing Marion Kauffman School Year 7 Impacts

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Mathematica
Progress Together

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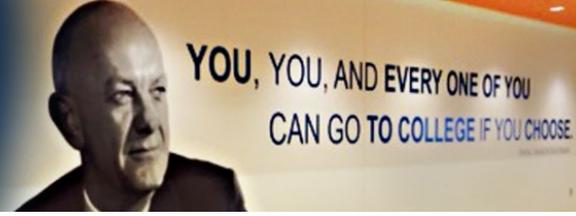
Key Findings

Substantial positive impacts on student achievement. The Kauffman School has positive and educationally meaningful impacts on student achievement growth in mathematics, English language arts (ELA), and science, beyond the growth achieved by students in other Kansas City public schools.

In Figure ES.1, we show the impacts for Kauffman students relative to comparison students in Kansas City district and charter schools, measured in years of learning growth. Comparison students are assumed to achieve one year of learning growth per school year (as indicated by the black horizontal lines). One of the goals stated in the Kauffman School's charter is that its students, on average, will achieve at least 1.25 years of learning growth for each year they are enrolled in the school. Kauffman students have achieved this goal in each subject for all enrollment durations. The sizes of the five-year impacts are more than enough to close the Algebra I, English II, and Biology achievement gaps for black students in Kansas City.

Figure ES.1. The Kauffman School has substantial positive impacts on student achievement
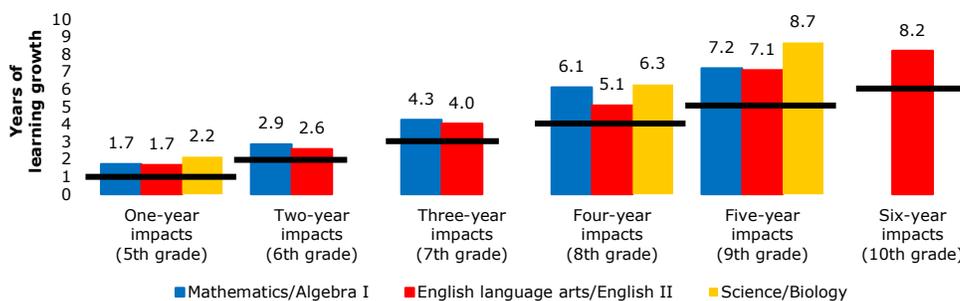
Larger impacts than in other charter school studies. The Kauffman School's impacts on achievement in mathematics and ELA three years after enrollment are larger than the average effects observed for other successful charter schools such as those in Boston, New York City, or the KIPP network (Figure ES.2; citations included in full report. Note that some *individual* schools in those studies achieved higher impacts than the Kauffman School).

Figure ES.2. The Kauffman School's three-year impacts are higher than those found in studies of other charter schools
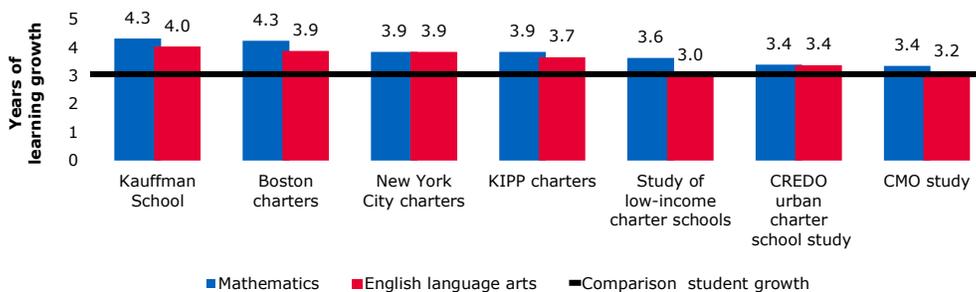
Moreover, the Kauffman School is strongly outperforming broader samples of charter schools nationwide, as shown in the last three comparisons in Figure ES.2, which include oversubscribed charter schools serving a large proportion of low-income students, urban charter schools, and schools operated by charter-school management organizations (CMOs).

EVALUATION NOTES

The Kauffman School is a public, tuition-free charter school serving Kansas City students. In the 2017–18 school year, the school enrolled 994 students in grades 5 through 11. Most (87 percent) of the students were low-income, and 89 percent were black or Hispanic. This report evaluates the impact of the Kauffman School on student achievement, attendance, and suspensions.

DATA

Data are from the Missouri Department of Elementary and Secondary Education and the Kauffman School. Data include scores on the Missouri Assessment Program, end-of-course exams, the ACT, information on attendance and suspensions, and demographic characteristics of the students.

METHODS

To measure the impact of the Kauffman School on its students, we identified a group of students in other Kansas City district and charter schools who had similar demographic characteristics and achievement at the end of 4th grade. We compared outcomes for those students to the outcomes of Kauffman students in 5th through 11th grades.

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Rising proficiency rates on state tests. One of the goals of the Kauffman School is for at least 75 percent of students who are enrolled for three consecutive years to score at the proficient or advanced level on each state test. This is an ambitious goal, because less than 40 percent of incoming students were proficient in mathematics or ELA before enrolling in the Kauffman School. After three consecutive years of enrollment, 57 percent achieved the proficient or advanced level in mathematics, and 61 percent did so in ELA, which is equivalent to an annual increase of approximately 7 percentage points in both subjects (Figure ES.3). Caution is warranted when interpreting the proficiency rate results due to changes in the state assessments over this time period; section II.C provides additional details. Although Kauffman students did not achieve the 75 percent proficiency goal after three years of enrollment, they nearly achieved this goal in all subjects by the end of their fourth year.

Figure ES.3. Students who stay enrolled for three years have rising proficiency rates

Proficiency rate in mathematics

36% At enrollment

57% After three years of enrollment

Proficiency rate in English language arts

39% At enrollment

61% After three years of enrollment
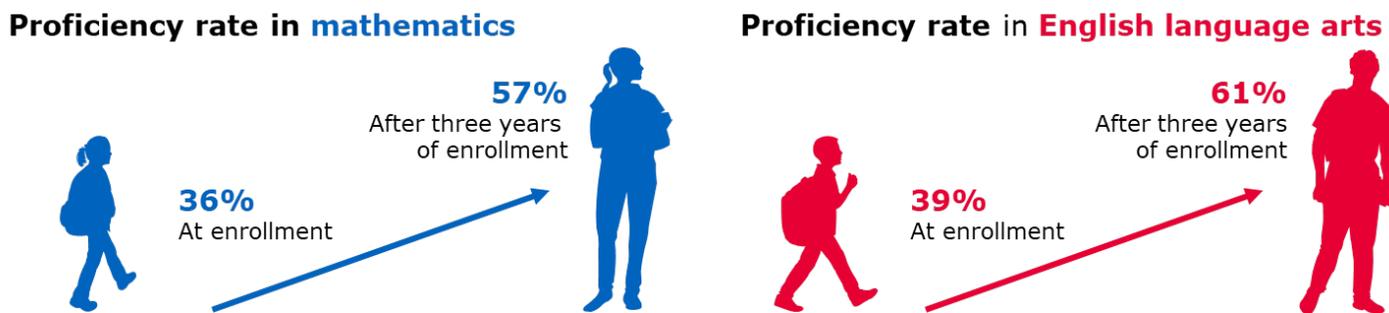
Higher ACT scores than other Kansas City high schools. Kauffman students are performing well on the ACT compared to students attending other Kansas City schools. In Figure ES.4, we show that the national percentile rank of the average score of 11th-grade Kauffman students on the spring 2018 ACT is substantially higher than 11th graders attending other high schools in Kansas City scored on the spring 2017 ACT. Missouri stopped requiring all 11th graders to take the ACT in 2018, which is why the scores for other Kansas City students are based on the 2017 administration of the exam. It is also important to note that student-level ACT data were not available for this analysis, so the numbers displayed in Figure ES.4 represent school-level averages rather than impacts based on a matched comparison group of students.

Figure ES.4. The Kauffman School's ACT scores are higher than those of other high schools in Kansas City

National percentile rank

	Composite	English	Math	Reading	Science
Kauffman School spring 2018 ACT	51	52	55	48	41
Kansas City spring 2017 ACT	31	34	38	31	28
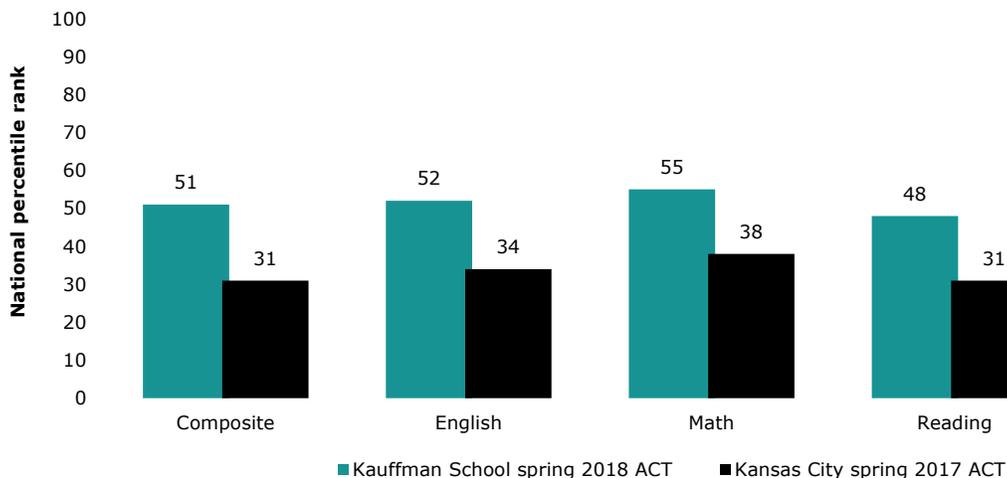
Another ambitious goal of the Kauffman School is for its students to score at the 75th percentile nationally on the ACT. Students did not achieve this goal during the most recent school year. Based on the highest composite score students achieved across all administrations of the ACT – the score commonly used in college admissions and also by Missouri for school accountability purposes – the average ACT composite score of Kauffman students was at the 58th percentile nationwide.

No impact on attendance or overall suspensions. During the 2017–18 school year, the attendance and suspension rates of Kauffman students were not significantly different from those of comparison students. However, Kauffman students were significantly less likely to receive in-school suspensions and more likely to receive out-of-school suspensions.

CONTENTS

I.   BACKGROUND ABOUT THE KAUFFMAN SCHOOL

The Kauffman School enrolled its first class of 5th graders in fall 2011. Each year the Kauffman School adds a new class of 5th graders, ultimately resulting in a fully enrolled middle school and high school (grades 5 through 12). In the 2017–18 school year, the Kauffman School enrolled 994 students in grades 5 through 11; 87 percent of the students were low-income, and 89 percent were black or Hispanic. See Appendix A for additional background about the Kauffman School.

## THE HALLMARKS OF THE KAUFFMAN SCHOOL INCLUDE:

1. **Ambitious academic goals.** The Kauffman School expects its students to excel academically and achieve at least 1.25 years of growth in mathematics, science, and reading each year.

2. **High attendance and character expectations.** The Kauffman School has high goals for student attendance (95 percent average daily attendance) and character (good citizenship; full observance of school policies and procedures).

3. **Extended school day and year.** Kauffman students receive approximately five additional weeks of schooling each year compared to what students receive in traditional public schools in Kansas City.

4. **Increased mathematics and reading instructional time.** Each day, Kauffman students take a double period of mathematics and two to three periods of English language arts (ELA).

5. **Intensive data-driven decision making.** With its strong emphasis on results, the Kauffman School uses a large assessment portfolio to help teachers and administrators make data-driven decisions about how best to adapt instruction to meet students' needs.

6. **Extensive teacher professional development.** Teachers at the Kauffman School participate in (1) a multiweek professional development program focused on curriculum, instruction, and school culture each summer preceding the start of the school year; (2) observations and feedback from administrators several times per week; (3) weekly individual coaching sessions; and (4) group-based professional development sessions every Friday afternoon, focused on various topics related to curriculum, instruction, and assessment (Gentile et al. 2014).

7. **Well-established cultural norms.** School administrators noted that "the Kauffman School takes an intentional approach to establishing a culture of shared values that affirm student identity, develop conscious citizens, and maintain high expectations, all in pursuit of its mission: Creating College Graduates" (personal communication, April 12, 2017). The Kauffman School makes continuous efforts to communicate explicitly—to all school staff, students, and families— the school's values, expectations, and norms.

II. THE KAUFFMAN SCHOOL HAS A POSITIVE IMPACT ON STUDENT ACHIEVEMENT

A. Impacts on state test scores

The Kauffman School has positive, statistically significant, and educationally meaningful impacts on student achievement growth, beyond the growth achieved by students in other Kansas City public schools. We measure the Kauffman School's impacts on student performance in mathematics, ELA, and science on the Missouri Assessment Program (MAP) exams one to four years after enrollment, and on the Algebra I, English II, and Biology end-of-course (EOC) exams five or six years after enrollment. In Figure II.1, we display the impact estimates converted to years of learning growth for Kauffman students through a commonly used conversion method for effect sizes (Bloom et al. 2008). When performing this conversion, we assume that comparison students in Kansas City public schools achieve, on average, one year of learning growth per school year, as indicated by the black horizontal lines. See Appendix D for the impact estimates presented in effect size units (standard deviations of student achievement) and for additional details about the conversion to years of learning growth.

Figure II.1 The Kauffman School has substantial positive impacts on student achievement
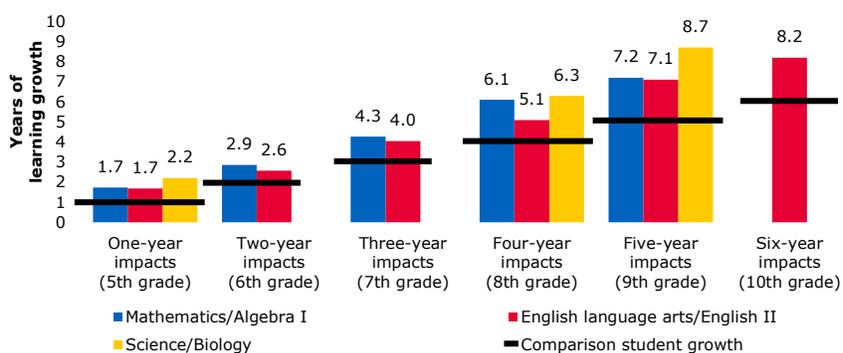
Notes: All differences between Kauffman student and comparison student years of learning growth are statistically significant at the 1 percent level. The five- and six-year impact estimates are based on EOC exams. There are no two- or three-year estimates for science because the state does not have a science test for 6th or 7th graders. Similarly, there is no six-year impact for Algebra I or Biology because the EOC exams in those subjects are typically administered to 9th graders. The four-year mathematics impact is based in part on imputed outcome data (see Appendix C for details).

The differences between Kauffman student and comparison student years of learning growth are indicated by the height of the bars above the black horizontal lines. All differences are statistically significant (at the 1 percent level). One of the goals stated in the Kauffman School's charter is that, on average, its students will achieve at least 1.25 years of learning growth for each year that they are enrolled in the school. The Kauffman School has achieved this goal in all tested subjects and grades.

The impact estimates displayed in Figure II.1 include data on all available cohorts of Kauffman students. For example, the one-year bars represent an average of the Kauffman School's impact on the first seven cohorts of students who entered the school. Impacts are presented separately by year and cohort in section III.

B. Interpretation of Kauffman School impact estimates

To further illustrate the magnitude of the Kauffman School's impacts on student achievement, we present three alternative ways to view the impacts: (1) changes in test score percentile ranks, (2) the size of the impact as a percentage of the local achievement gap for black students, and (3) a comparison of the Kauffman School's impacts to the impacts of other charter schools, both in Kansas City and nationwide.

The test score percentile ranks of students increase substantially as a result of attending the Kauffman School. In 4th grade before entering the Kauffman School, the average Kauffman student in the first, second, and third cohorts (the only cohorts that have been enrolled for five years) was at the 36th percentile in the state mathematics test score distribution and at the 40th percentile in the state ELA test score distribution. The impact five years after enrollment at the Kauffman School is equivalent to the average student moving to the 67th percentile among Algebra I EOC scores and to the 63rd percentile among English II EOC scores.[1] On average, Kauffman students move from substantially below the state average to substantially above the state average five years after enrollment.

The five-year impacts of the Kauffman School are more than enough to close the Algebra I, English II, and Biology achievement gaps for black students in Kansas City. The Kauffman School effect-size estimates can also be reported as a percentage of the local achievement gap for black students (Figure II.2).[2] These percentages provide a sense of how much of the achievement gap is being closed five years after enrollment in the Kauffman School. The five-year impact estimates are larger than the achievement gaps in all three

> The five-year impacts of the Kauffman School are more than enough to close the Algebra I, English II, and Biology achievement gaps for black students in Kansas City.

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[1] We calculated the percentile ranks five years after enrollment in the Kauffman School by taking the average 4th-grade *z*-scores of Kauffman students and adding the five-year effect-size estimates.

[2] We calculated the achievement gap for non-Kauffman students as the difference between the average EOC score for black students and other (non-black and non-Hispanic) students. The data we receive from the Missouri Department of Elementary and Secondary Education contain only three race/ethnicity categories: black, Hispanic, and other. Few race/ethnicity categories are provided in order to limit the amount of data that needs to be redacted (see Appendix B.2).

subjects, equivalent to 112 percent in Algebra I, 131 percent in English II, and 152 percent in Biology.[3] The results indicate that the Kauffman School is making significant progress toward eliminating achievement gaps for black students.

Figure II.2. Kauffman School five-year impact estimates as a percentage of the local achievement gap for black students
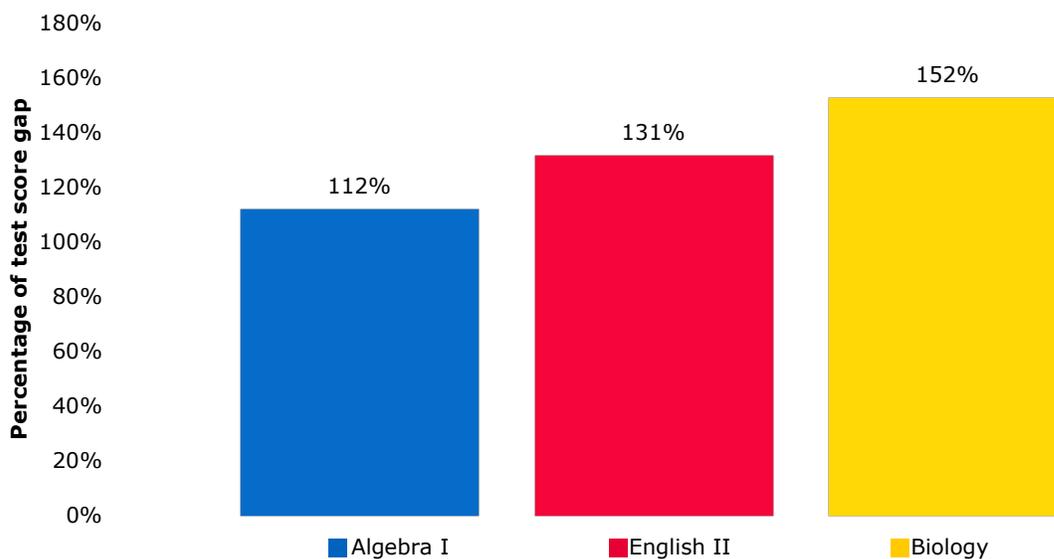
The Kauffman School is outperforming other charter schools in Kansas City. In our main results, the comparison group for Kauffman students consists of similar students in district and charter schools in Kansas City. In Figure II.3, we display the three-year impact estimates when the Kauffman School is compared separately to two subgroups: other charter schools in Kansas City and district-operated (non-charter) schools in Kansas City. In this figure, the three-year impact estimates are converted to years of learning growth under the assumption that the average comparison student in Kansas City is achieving 3 years of learning growth. The Kauffman School has somewhat smaller impacts when compared to other charter schools in Kansas City than when compared to district-operated schools in Kansas City, though the Kauffman School's years of learning growth are statistically significantly higher than both comparison groups. See Appendix Table A.6 for impact estimates for other enrollment durations and subjects relative to these two comparison groups.

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[3] In 2017–18, the average Algebra I z-score for non-Kauffman black students in Kansas City was –0.8732, and the average z-score for other (non-Hispanic) students was -0.1610. The corresponding z-scores in English II were –0.9406 for black students and –0.4792 for other students. In 2016–17, the corresponding z-scores in Biology were –1.018 for black students and –0.329 for other students.

Figure II.3. The Kauffman School's three-year impacts are higher than those of Kansas City charter and district schools
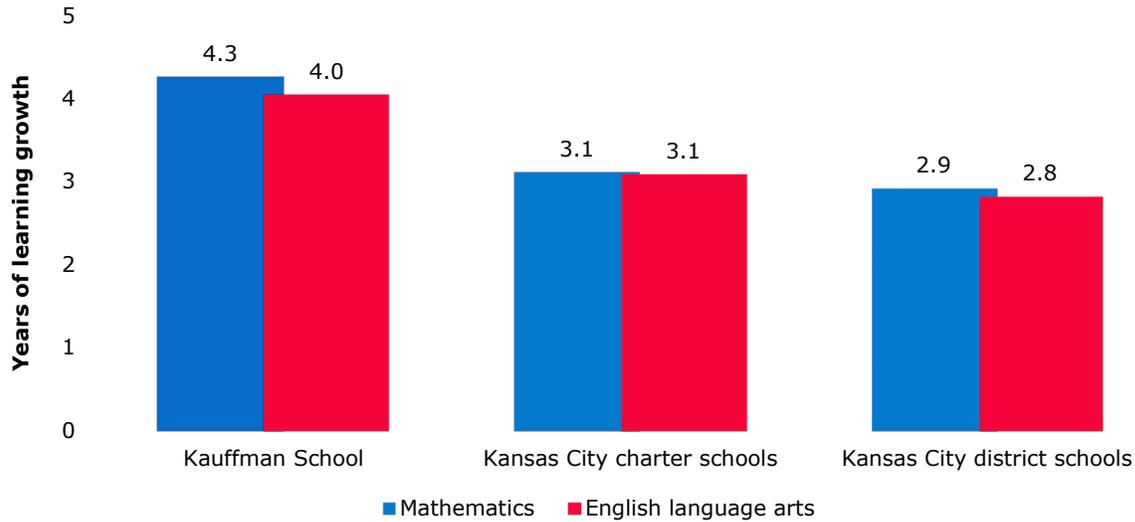
The Kauffman School's impacts are larger than those in other charter school studies (Figure II.4). The Kauffman School's achievement impacts in mathematics and ELA three years after enrollment are larger than those of the average Boston charter school analyzed by Abdulkadiroglu et al. (2009), the average Knowledge Is Power Program (KIPP) middle school studied by Tuttle et al. (2013), and the average New York City charter school analyzed by Hoxby et al. (2009), although some *individual* schools in those groups that were studied achieved higher impacts than the Kauffman School.[4]

Figure II.4. The Kauffman School's three-year impacts are higher than those in other charter school studies

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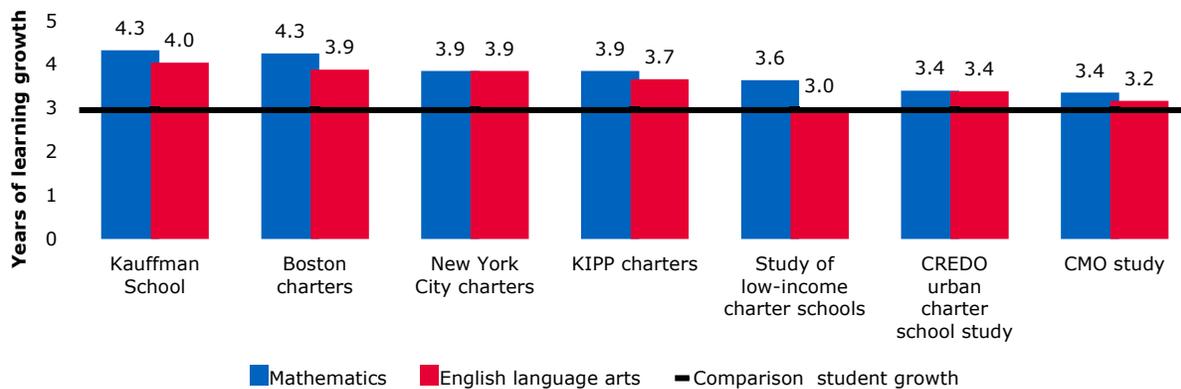
[4] We use the three-year impacts as a comparison because this is the longest duration for which we have impact estimates based on actual (nonimputed) outcome data for both mathematics and ELA for several cohorts of Kauffman students. In addition, three-year impact estimates based on grade-level exams are more directly comparable to the results of other charter school effectiveness studies than impacts based on EOC exams.

Moreover, the Kauffman School is strongly outperforming broader samples of charter schools nationwide. The effects of the Kauffman School are substantially greater than those of the average oversubscribed charter school serving a large proportion of low-income students analyzed by Gleason et al. (2010), the average urban charter school in the 41 regions analyzed by the Center for Research on Education Outcomes (CREDO 2015), and the average school in a nationwide group of charter school management organizations (CMOs) studied by Furgeson et al. (2012).

The impacts of charter schools on science achievement and on EOC exams are less widely reported in other studies because these tests are generally administered in fewer grades. The most comparable impacts on these exams come from studies of KIPP middle and high schools (Tuttle et al. 2013; Tuttle et al. 2015). The Kauffman School's impacts in science and on EOC exams are substantially larger than the average impacts of KIPP schools. Four years after enrollment, Kauffman students achieve approximately 6.3 years of learning growth in science compared to 5.1 years of learning growth for KIPP students. As measured by impacts on EOC exams five years after enrollment, Kauffman students achieve 7.2 years of learning growth in mathematics, 7.1 years of learning growth in ELA, and 8.7 years of learning growth in science. The comparable years of learning growth for KIPP students as measured by EOC exams are 5.9 in mathematics, 6.0 in ELA, and 6.4 in science. See Appendix Table A.7 for more details.

C. Goal that 75 percent of students score proficient or advanced on MAP exams

Proficiency rates improved substantially for Kauffman students enrolled for three consecutive years (Figure II.5). Before enrolling in the Kauffman School, 36 percent of students scored proficient or advanced on the mathematics MAP test. After three years of enrollment, 57 percent scored proficient or better in mathematics, which is equivalent to an annual increase of approximately 7 percentage points. The ELA proficiency rates similarly increased from 39 percent to 61 percent, which is also approximately equivalent to a 7 percentage point annual increase. [5] These increases in proficiency rates were not sufficient for the Kauffman School to meet its ambitious goal that at least 75 percent of students enrolled for three consecutive years score proficient or advanced on each state test administered to its students.

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[5] The proficiency rate results should be interpreted with caution because of changes to the state assessments that occurred in recent years. A new MAP exam aligned to the Common Core State Standards was administered in 2014–15, which was then replaced by an exam aligned to preliminary Missouri Learning Standards in 2015-16. A third new version of the exam aligned to revised Missouri Learning Standards was administered in 2017–18 and will be the version administered in future years (Missouri Department of Elementary and Secondary Education 2017). Proficiency rates on the 2017–18 MAP exam were generally lower statewide than in previous years, indicating that the new assessments may be more challenging (Hunn and O'Dea 2019). Appendix E provides additional details.

Figure II.5. Students who stay enrolled for three years have rising proficiency rates

Proficiency rate in mathematics

57%
After three years
of enrollment

36%
At enrollment

Proficiency rate in English language arts

61%
After three years
of enrollment

39%
At enrollment
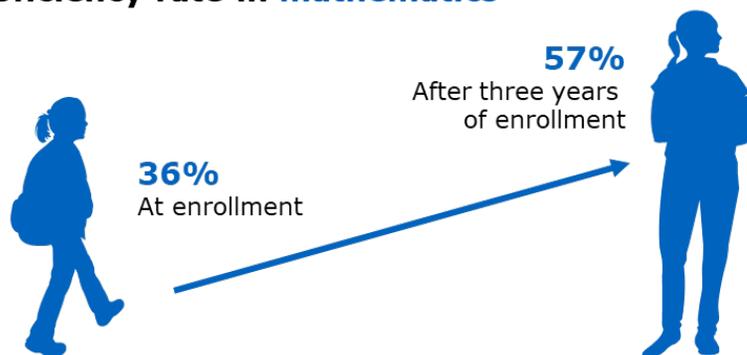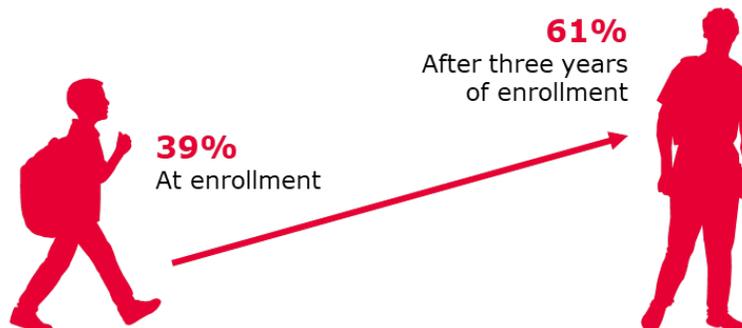
After four years of continuous enrollment, students at the Kauffman School did meet the 75 percent proficiency goal in mathematics and science, with 76 percent of students scoring proficient or higher in mathematics and 83 percent in science. Just shy of this goal, 73 percent of Kauffman students scored proficient or higher in ELA. These proficiency rates are based on all available cohorts of Kauffman students; see Appendix E for results reported separately by cohort.

After five years of enrollment, 73 percent of students scored proficient or higher on the Algebra I EOC exam, 50 percent on the English II EOC exam, and 89 percent on the Biology EOC exam. However, caution is warranted when interpreting the proficiency results on the EOC exams. Both the Algebra I and English II EOC exams were new this year, and the proficiency rates are not comparable to those of previous years.[6] No Biology EOC exam scores were available this year because Missouri was field testing new science exams in 2017–18, so the Biology proficiency rate is based only on Kauffman students taking the exam in 2016–17.

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[6] Similar to the new MAP exams, proficiency rates on the new EOC exams in 2017–18 were lower than in previous years. Among other students in Kansas City, the proficiency rates in Algebra I and English II were 28 percent and 35 percent during 2017–18, compared to 43 percent and 57 percent in 2015–16. Proficiency rates were not publicly released for the Algebra I and English II EOC exams in 2016–17 due to a statewide problem with the exams that year. Appendix E provides additional details.

D. Goal that average scores on the ACT are at the 75th percentile nationally

Scores on the ACT were higher for Kauffman students than for other students in Kansas City, though the Kauffman School did not achieve its goal that average ACT scores are at the 75th percentile nationally. In Figure II.6, we show that the national percentile of the average score of 11th-grade Kauffman students on the spring 2018 ACT is substantially higher than 11th graders attending other high schools in Kansas City scored on the spring 2017 ACT. Missouri stopped requiring all 11th graders to take the ACT in 2018, which is why the scores for other Kansas City students are based on the 2017 administration of the exam. It is also important to note that student-level ACT data were not available for this analysis, so the numbers displayed in Figure II.6 represent school-level averages rather than impacts based on a matched comparison group of students.

Figure II.6. The Kauffman School's ACT scores are higher than those of other high schools in Kansas City
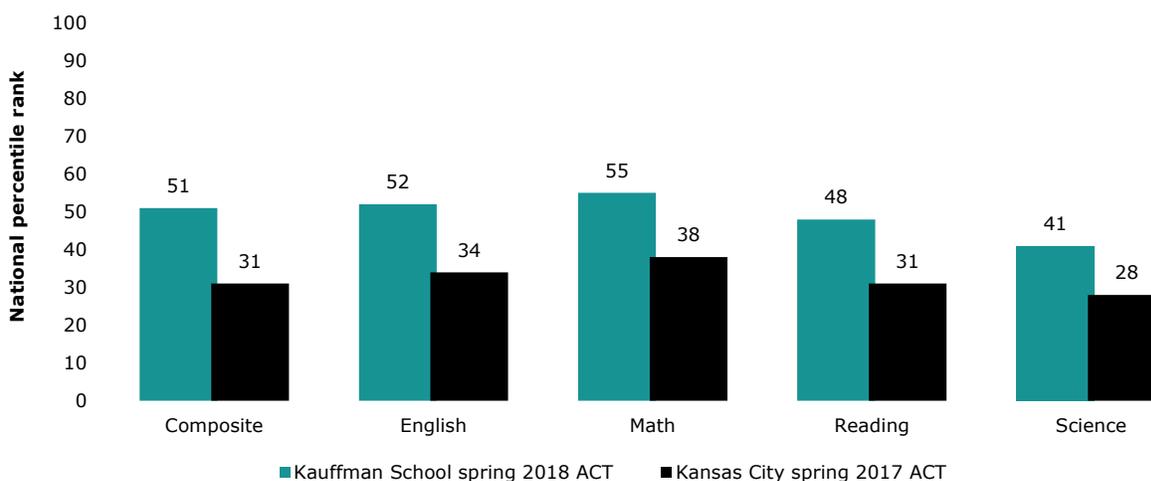
Notes: Kauffman School ACT scores include 11th graders who took the exam in April 2018. ACT scores for other Kansas City schools are based on the April 2017 administration of the exam, which is the last time the ACT was administered to all 11th-grade students in Missouri. The national percentile ranks are based on norms provided by ACT for tests taken during the 2017–18 school year. All differences between Kauffman School and Kansas City average ACT scores are statistically significant at the 1 percent level.

Another ambitious goal of the Kauffman School is for average ACT scores of Kauffman students to be at the 75th percentile nationally. Kauffman students who were in 11th grade during the 2017–18 school year did not achieve this ambitious goal. Based on the highest composite score students achieved across all administrations of the ACT—the score commonly used in college admissions and also by Missouri for school accountability purposes—the average ACT composite score of Kauffman students was at the 58th percentile nationwide (Table II.1).[7] According to college readiness benchmarks provided by the ACT (Allen and Radunzel 2017), the percentage of Kauffman students who are college ready varies between 29 and 66 percent across subjects.

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[7] Kauffman students took the ACT exam more often than other students in the state; most Kauffman students took the exam three times, whereas only about half of students in Missouri took the exam more than once (Missouri Department of Elementary and Secondary Education 2018).

Table II.1. ACT scores for 11th-grade Kauffman Students were below the 75th percentile national rank target

ACT subject	Average score	National percentile rank (%)	College ready (%)
Composite	20.9	58	37
English	20.5	59	66
Mathematics	20.1	56	42
Reading	21.4	54	46
Science	20.7	56	29

Notes: Results based on ACT with highest composite score across the spring, summer, and fall 2018 administrations of the exam. The conversion from average scores to national percentile ranks is based on norms provided by ACT for tests taken during the 2018–19 school year. College readiness for the composite score is defined as meeting the ACT college-readiness benchmark in at least three of the four possible subjects.

III. THE KAUFFMAN SCHOOL HAS SUSTAINED POSITIVE IMPACTS OVER SEVEN YEARS

The Kauffman School has had positive impacts on student achievement during each of its first seven years of operation, 2011–12 through 2017–18. Figure III.1 shows how the one- through five-year impacts changed over time.

During the first three years of the school's operation (2011–12 through 2013–14), there were no statistically significant year-to-year *changes* in impacts.[8] However, during Year 4 (2014–15) the Kauffman School's impacts exceeded those for the preceding years. Impacts were significantly higher in Year 4 relative to Year 3 in all grades and subjects except 5th-grade science and 6th-grade ELA.

In the most recent three years, the estimated achievement impacts have generally been stable. During Year 7 (2017–18), the only statistically significant change relative to the previous year was a decline in the impact on 5th-grade ELA performance.[9]

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[8] See Appendix F for these impacts reported in effect size units and for the results of statistical tests of whether each year's impacts differ significantly from those of the previous year. Because a large number of statistical tests are performed in this section of the Appendix, some year-to-year differences may be statistically significant due to random chance.

[9] There is a limited literature studying changes in the impacts of charter schools over time. Three published articles on this topic show that, among charter schools in Florida, North Carolina, and Utah, it is common for schools' impacts to increase during the first five years of operation (Sass 2006; Carruthers 2012; Ni and Rorrer 2012). However, the charter schools in all three studies on average had significant *negative* impacts during their first year, and generally increased in effectiveness until they were on par with or in some instances had larger impacts than district schools. Though not perfectly comparable to these studies, it is noteworthy that the Kauffman School started out having significant *positive* impacts during its first year of operation, and went on to maintain them at a high level and in some cases increase them in subsequent years.

Figure III.1. The Kauffman School has sustained positive impacts

Changes in one-year impacts (5th grade)

Changes in two-year impacts (6th grade)

Changes in three-year impacts (7th grade)

Changes in four-year impacts (8th grade)

Changes in five-year impacts (9th grade)
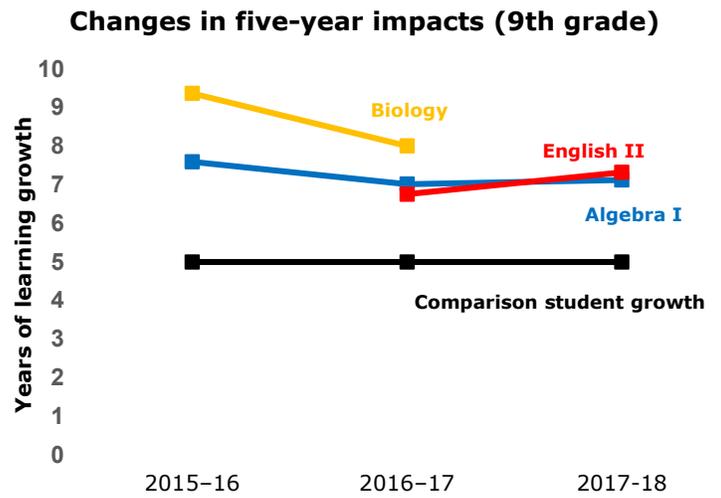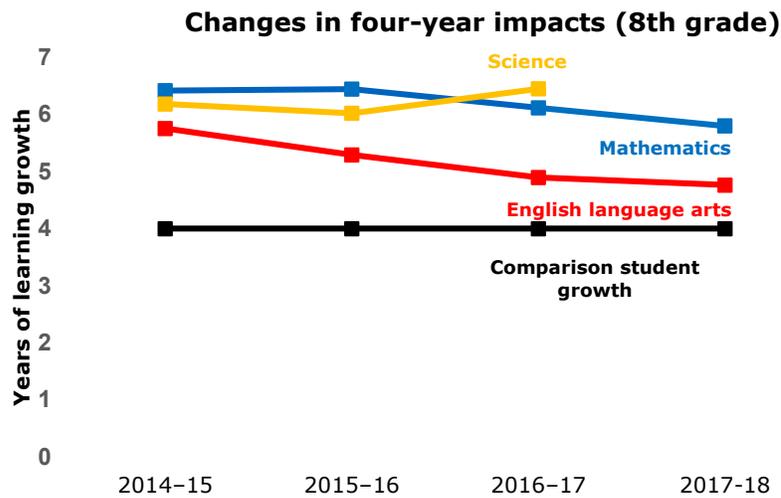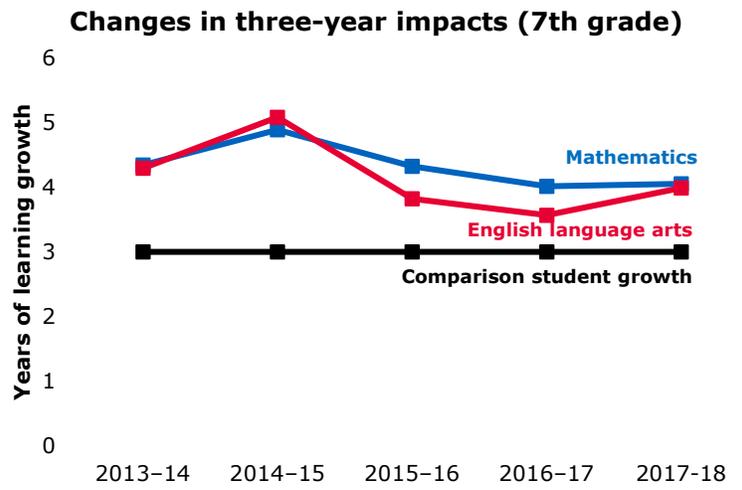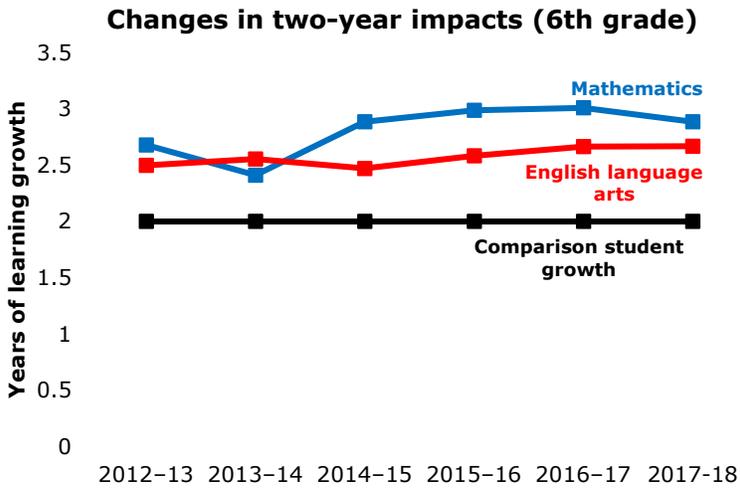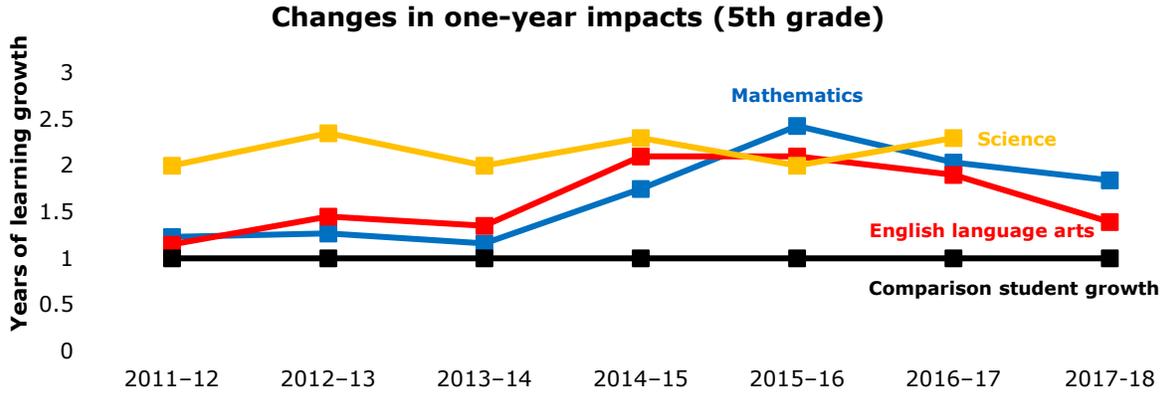
The higher impacts in recent years may be related to the change in standards tested on the MAP exams that started in Year 4. In Year 4, Missouri administered a new standardized test provided by the Smarter Balanced Assessment Consortium, which aligned with the Common Core State Standards. Missouri then discontinued its association with Smarter Balanced and administered a different version of the MAP exam in Years 5 and 6, based on a preliminary version of new Missouri Learning Standards. In Year 7, the state adopted revised Missouri Learning Standards and administered a new MAP assessment, which will be the version administered in future years (Missouri Department of Elementary and Secondary Education 2017). Before Year 4, the Kauffman School had already changed its curricula to align with the Common Core standards, which likely positioned students to perform well on the new state tests that year. In subsequent years, the Kauffman School may also have more quickly adapted its curriculum to align with the evolving state standards than did other Kansas City schools.

It is also possible that the particularly strong impacts during recent years are related to other factors. Since its founding, the Kauffman School has implemented many educational practices that, according to the research literature, foster students' academic achievement, including a strong culture, a rigorous curriculum, increased instructional time, a dedicated teacher professional development program, and strong school leaders (Johnson et al. 2017b). Johnson et al. (2017a) discuss the ways in which these features of the Kauffman School evolved over the school's first five years of operation and may have contributed to the positive achievement impacts.

IV. THE KAUFFMAN SCHOOL HAD NO IMPACT ON STUDENT ATTENDANCE OR SUSPENSIONS IN 2017–18

A. Impacts on attendance and suspensions

The Kauffman School had no impact on student attendance rates in the most recent year. As shown in the last set of columns in Figure IV.1, the average attendance rate of Kauffman students during 2017–18 was 93 percent, which was not significantly different from the attendance rate of comparison students. This year's impact differs from those in previous years; between 2012–13 and 2016–17, the Kauffman School had a positive and significant impact on student attendance of approximately 1 percentage point.

Figure IV.1. The Kauffman School had no impact on student attendance during 2017–18
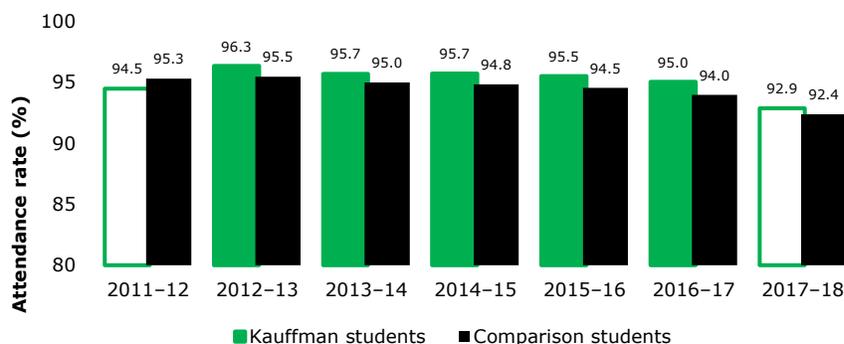
Note: Solid green bars indicate that the impact of the Kauffman School is statistically significant at the 0.05 level.

There was no significant difference in the overall suspension rate of Kauffman students relative to comparison students in the most recent year (Figure IV.2).[10] Similar to 2015–16 and 2016–17, in 2017–18 Kauffman students were suspended at approximately the same rate as comparison students. The measure displayed in Figure IV.2 combines both in-school an out-of-school suspensions together, and represents the percentage of students receiving at least one suspension of either type.

METHODS

We analyzed the attendance and suspension outcomes separately by year to highlight differences that may arise over time.

For the primary suspension analysis, we combined in-school and out-of-school suspension data into one variable, indicating whether a student received either type of suspension. Our aim in combining these data was to create a variable that would be as comparable as possible across schools, because different schools have different standards for the types of disciplinary infractions that warrant in-school and out-of-school suspensions. We also present separate results where indicators for receiving an in-school or out-of-school suspension are used as outcome variables.

See Appendix B for details about how the attendance and suspension variables were constructed. Appendix D contains the attendance and suspension impacts reported separately by grade level.

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[10] It is important to note that the analysis of suspensions cannot distinguish effects driven by differences in student behavior from effects driven by differences in the enforcement of school policies or reporting practices. For example, if Kauffman students were less likely than students in other schools to be suspended, that could reflect a lower frequency of infractions among Kauffman students, or it could indicate that the Kauffman School does not suspend students for behaviors that other Kansas City schools consider to be infractions.

Figure IV.2. Kauffman students and comparison students had similar overall suspension rates during 2017–18
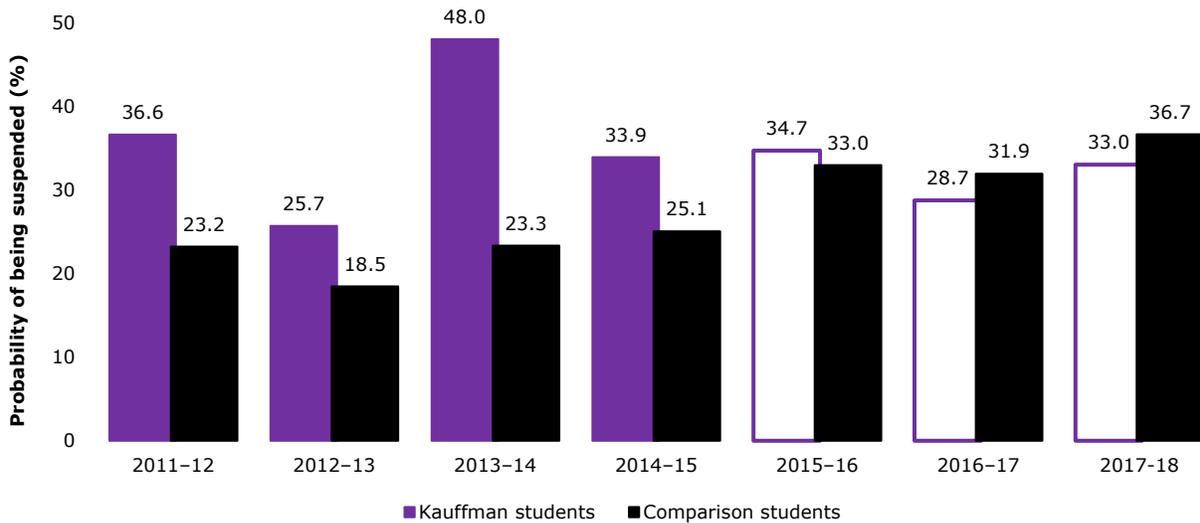
Note: Solid purple bars indicate that the impact of the Kauffman School is statistically significant at the 0.05 level.

We also measured the impact of the Kauffman School separately for in-school and out-of-school suspensions. Kauffman students were approximately 10 percentage points less likely to receive an in-school suspension relative to comparison students (Figure IV.3).

Figure IV.3. Kauffman students had significantly lower rates of in-school suspensions than comparison students during 2017–18
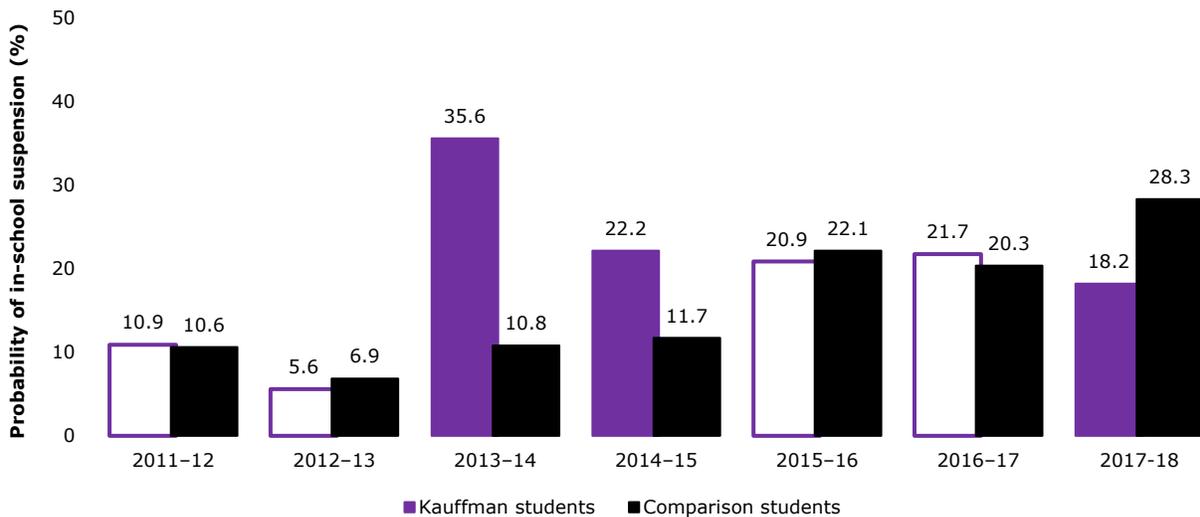
Note: Solid purple bars indicate that the impact of the Kauffman School is statistically significant at the 0.05 level.

In contrast to the Kauffman School's impact on in-school suspensions, Kauffman students were approximately 5 percentage points more likely to receive an out-of-school suspension relative to comparison students (Figure IV.4). This represents a departure from the trend in recent years; during 2015–16 and 2016–17, the Kauffman School had no significant impact on out-of-school suspensions. The increase in out-of-school suspensions may be important to monitor, given that research has shown out-of-school suspensions can negatively impact student academic performance (Lacoe and Steinberg 2019).

Figure IV.4. Kauffman students had significantly higher rates of out-of-school suspensions than comparison students during 2017−18
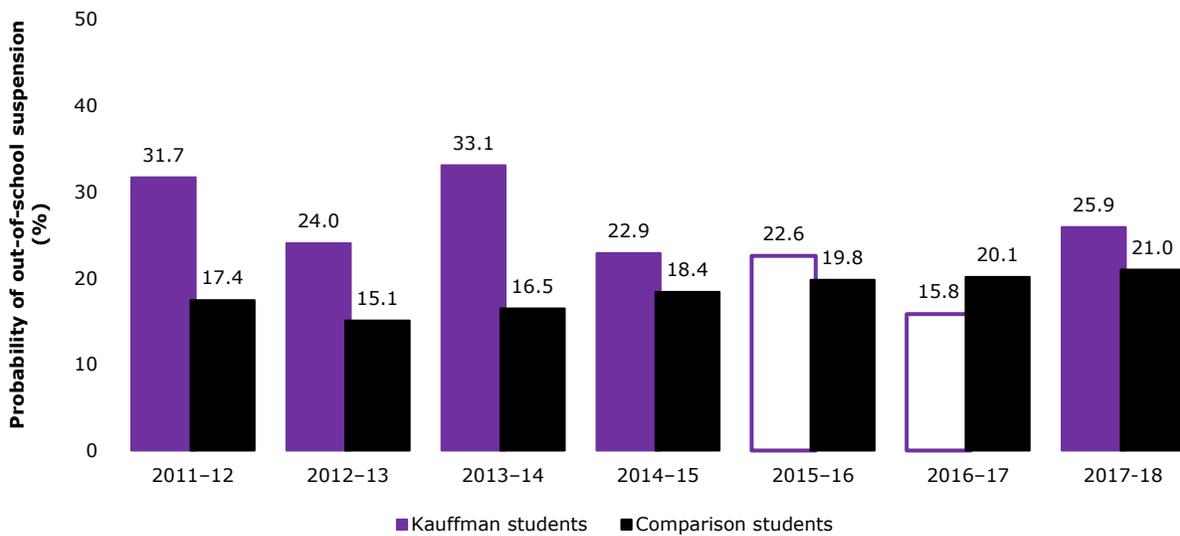
Note: Solid purple bars indicate that the impact of the Kauffman School is statistically significant at the 0.05 level.

VII. CONCLUSIONS

The Kauffman School has ambitious academic goals for its students in support of its mission to create college graduates. The results from our analysis of assessment data show that the Kauffman School is either achieving or making substantial progress toward these goals.

Achieving academic goals on MAP and EOC exams. An analysis of the state assessment data from the Kauffman School's first seven years shows that the school achieved its goal of average student growth of at least 1.25 years for every year of attendance. Upon entering the school, the average student was substantially below the state average in terms of mathematics and ELA scores but, within five years, performed well above the state average in both subjects. Although the Kauffman School did not achieve its ambitious goal of 75 percent proficiency on each state assessment after three years of student enrollment, the school nearly achieved that goal after four years of enrollment. The Kauffman School's impact on student achievement is more than enough to close the Algebra I, English II, and Biology achievement gaps for black students in Kansas City.

Higher average impacts than in other charter school studies. The Kauffman School's impact on student test scores is significantly greater than the impact of other charter schools in Kansas City. The Kauffman School's three-year impacts are also greater than the average effects of groups of other charter schools known for strong performance, such as those in Boston and New York City, as well as the KIPP network of charter schools.

ACT scores higher than other Kansas City schools but below the 75th percentile nationally. The Kauffman School ACT scores were significantly higher than those of other high schools in Kansas City in all subjects. However, average ACT composite scores for Kauffman students were at the 58th percentile nationally, which is below the school's ambitious 75th percentile target.

No significant impact on attendance or overall suspensions. During the 2017–18 school year, the attendance rates of Kauffman students were not significantly different from those of comparison students. Although the Kauffman School had no impact on overall suspension rates, Kauffman students had significantly lower rates of in-school suspensions and significantly higher rates of out-of-school suspensions than comparison students.

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APPENDIX

A. Background about the Kauffman School

For many years, the Kauffman Foundation has focused on improving education for children in Kansas City. Before opening the Kauffman School, the Kauffman Foundation operated several programs that addressed some of the challenges faced in urban education. Such programs included Project Early (an early childhood program), Project Choice (a high school dropout prevention program), and the Kauffman Scholars program (a college access and scholarship program). These programs led Foundation leaders to consider the Foundation's possible impact on Kansas City's students through the establishment of a charter school. In March 2009, the Foundation assembled a school design team composed of Foundation education experts and the founding executive director of the Missouri Charter Public School Association.[11] The team undertook a three-step process of exploration and decision making before establishing the Kauffman School.

Step 1. Analyzing Kansas City's educational landscape. The school design team learned from a review of Kansas City assessment data that, during the 2008–09 school year, charter school enrollment accounted for one-third of all public school enrollment in Kansas City (North 2009). The team also found that, among Kansas City's charter and non-charter schools, only 16 percent of middle schools and 7 percent of high schools could claim that at least 50 percent of their students achieved proficient or better on statewide mathematics assessments in 2009 (Richardson 2009).

From the Foundation's perspective, the data suggested that Kansas City's charter and non-charter public schools were struggling to help students achieve, and families might desire alternatives to the city's traditional public schools. In light of students' low academic performance, the Foundation determined that 5th grade was the optimal grade for students to enter its charter school, providing ample time to prepare struggling students for a college preparatory program that would begin in 9th grade.

Step 2. Selecting a location. The Foundation intended that the Kauffman School serve Kansas City's low-income families. From a review of demographic data on Kansas City, the school design team learned that most of the city's low-income population lives in the eastern part of the city, yet most of the city's 23 charter schools were located in the western section of the city. Thus, the Foundation selected a site in the eastern side of the city. Using data on household income by zip code, the design team identified five sections of the city with high concentrations of low-income families. Students living within these five (since expanded to six) zip codes are given first preference for enrollment.[12]

In August 2013, the Kauffman School moved to its permanent location. The campus encompasses three buildings: a middle school, a high school, and a gymnasium and cafeteria/commons area. Design elements of the new buildings reflect the Kauffman School's key values and accommodate its core activities. For example, the new buildings have interior windows to facilitate classroom

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[11] The design team was composed of Kauffman Foundation associates, Kauffman Scholars program staff, and consultants from various schools and organizations (Ewing Marion Kauffman Foundation 2010).

[12] The Kauffman School also offers bus transportation for students who live more than one mile away from the school, thereby providing access to students in need across the city. During the Kauffman School's second year of operation, the Foundation identified an additional zip code with a high concentration of low-income students and offered first preference for enrollment to students there as well.

observations, a central feature of the Kauffman School's professional development model. According to the Kauffman School's website, the interior windows create "an environment that is transparent" and encourage "staff, faculty, parents, and visitors to observe classroom instruction as they walk through the building" (Ewing Marion Kauffman School 2017). The Kauffman School also features teacher workrooms and community spaces for small- and large-group meetings, such as the weekly professional development meetings and community events.

Step 3. Identifying best practices. Before the school opened, the design team made extensive efforts to learn about the best practices of successful charter schools, a process the team described as the "year of learning." The team reviewed research on charter schools and visited successful charter schools in New York, Massachusetts, Illinois, and Wisconsin to learn more about the variables that contributed to the success of those schools.

The Kauffman School enrolled its first class of 5th graders (about 100 students) in fall 2011 and added a second class of 5th graders (about 100 students) in fall 2012. In fall 2013, a third class of 5th graders joined the Kauffman School (about 200 students). With the opening of its new campus, the Kauffman School had sufficient capacity to double the size of the cohort entering in 2013. Each year since then, the Kauffman School continues to add a new 5th-grade class of more than 200 students, and will ultimately fully enroll a middle school and high school (grades 5 through 12).

B. Data preparation details

In this section, we provide details about the data used in our main analysis of the impact of the Kauffman School on student outcomes. We also present a set of descriptive statistics to show how Kauffman students compare to students in other public schools in Kansas City with respect to prior achievement and demographic characteristics.

1. Data

The Missouri Department of Elementary and Secondary Education (DESE) provided data on the results from its state assessment and on student characteristics for all students enrolled in Missouri public schools from 2007–08 through 2017–18. The state assessment data includes the Missouri Assessment Program (MAP) and end-of-course (EOC) scaled scores, proficiency levels, and information on test accommodations for each student by year, grade level, and content area. The data on student characteristics includes information on demographic characteristics, free or reduced-price lunch status, limited English proficiency, disability, attendance, and disciplinary information for each student by year and school in which they were enrolled. Also included are school-level characteristics such as charter school classification and location. Except for data redacted by DESE, the data included student-level data for all students in Missouri. In the next section, we provide details about DESE's data redacting process.

To link the state assessment and student characteristics data, we reduced both to the student level. From the assessment data, we removed records in which students had more than one unique subject-specific MAP or EOC scaled score reported in a given year. Each year there are three administration windows—in the fall, spring, and summer—for EOC exams. A large majority of students take EOC

exams in the spring, so we used the spring score, if available. If a student had no spring score, we used that student's fall score. If neither spring nor fall scores were available, we used the score from the summer administration.[13]

From the characteristics data, we first removed all records with zero or missing reported attendance and then summed attendance and disciplinary variables across each student's school-specific records to calculate student-year totals. We then reduced the data to the student level, such that all year-specific attendance and/or disciplinary information was preserved in separate variables. Demographic information, free or reduced-price lunch status, limited English proficiency, and disability information were taken from the student's 4th-grade record, if available; from the next closest earlier grade if the 4th-grade record was not available; and from the 5th-grade record if no information from kindergarten through 4th grade was available.[14] Students not found in both the assessment and the characteristics data were dropped from the analysis.

To facilitate the analyses, we created several new variables using these data. We transformed student MAP and EOC scaled scores into z-scores based on statewide year-, grade-, and subject-specific means and standard deviations.[15] We also used information on enrollment and absences to create a measure of the attendance rate that we bottom-coded at the year-specific first percentile to remove extreme outliers. We used disciplinary information to create yearly indicators of whether students were suspended that year.[16] We then collapsed subject-specific 3rd- and 4th-grade MAP z-scores into grade-specific variables by taking each student's most recent score (by year) within the grade level for students who repeated 3rd or 4th grade. We created a single binary test accommodation indicator to represent having test accommodations on any 3rd- or 4th-grade MAP test.

For many students, data on one or more of the variables used as baseline controls are missing. About 15 percent of the students we could potentially include in our analysis sample for the most recent year of data are missing data on one or more of the baseline control variables. Instead of dropping them from the analysis, we employed a multiple imputation procedure to estimate their missing baseline values (see the next section, "Methods," for details). As a robustness check, we analyzed the data without using imputation and found similar results (results are available upon request).

When a student repeats a grade (in grade 5 or later), another missing-data problem for the analysis arises because that student no longer takes the same outcome assessment as the rest of the students in his or her original cohort. We follow the method used in Tuttle et al. (2013) for dealing with missing outcome scores for repeaters, which involves assuming that the relative rank in the district test score

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[13] Almost all students enrolled in the Kauffman School during 2017–18 took the EOC exams in the fall. In contrast, the large majority of comparison students took the exams in the spring. Only 6 percent of students in other Kansas City schools took the Algebra I exam in the fall and 7 percent took it in the summer. Similarly, 3 percent of students in other Kansas City schools took the English II exam in the fall and 4 percent took it in the summer.

[14] Starting with Cohort V Kauffman and comparison students, all free lunch status information comes from earlier than 4th grade. This is because KCPS participated in the Community Eligibility Provision meal service option starting in 2014–15, and free or reduced-price lunch status was not tracked in subsequent years.

[15] DESE sent us separate nonredacted but completely de-identified data that we used to calculate the statewide means and standard deviations.

[16] We used 4th-grade attendance and suspensions as control variables in all analyses. If 4th-grade information on these variables was missing, 3rd-grade values were used instead.

distribution does not change after the first time the repeater completed his or her previous grade. This is done for both Kauffman students and comparison students who repeated a grade. For example, students who repeat 5th grade are included along with other students from their same cohort in the two-, three-, and four-year impact estimates, with the *z*-scores of the repeater students fixed at their end-of-5th-grade values. Similarly, students who repeated grade 5, 6, or 7 were missing 8th-grade science scores at the time we analyzed their cohort's four-year science impacts. We therefore substituted 5th-grade science *z*-scores for these students in our main analysis.

Because the Kauffman School has positive impacts on student achievement, the assumption about the test scores of repeaters will likely understate the two-, three-, and four-year impact estimates. This is because our method for including repeaters assumes that the Kauffman School has no effect on these students during their subsequent years of enrollment. Johnson et al. (2016) show that the exclusion of grade repeaters leads to small increases in the Kauffman School impact estimates.

Note that student grade repetition does not pose a problem for the EOC analyses, because those exams are given to students in multiple grades. The analysis therefore does not depend on students taking the exam at the same time as other students in their cohort. For example, Cohort III Kauffman students who repeated a grade at some point are not included in the 2017–18 EOC analysis because they were 8th graders in that year and did not take the EOC exams that 9th-grade Kauffman students did. If these students progress into 9th grade in 2018–19 and take the EOC exams then, they will be included in the 2018–19 analysis.

2.   DESE's data redacting process

Starting with data requests filled in 2016, DESE began redacting observations in which some combination of student demographic or proficiency information could identify a group with fewer than 5 students in a particular grade and school district. The new redacting policy led to the removal of between 10 and 30 Kauffman students from each cohort. DESE removed a larger proportion of students from the first two cohorts because the starting sample in 5th grade was only about 100 students for Cohorts I and II, whereas later cohorts had 200 students.

3.   Issues with 2016–17 Algebra I and English II EOC exam scores and 2017–18 science scores

During 2016–17, there was a statewide problem with the Algebra I and English II EOC exams, such that the scores and proficiency levels were not comparable to those of previous years. However, the scores continued to provide a valid within-year comparison across students taking the exam in 2016–17. Ultimately, DESE decided not to use the achievement levels on these two exams for accountability purposes in 2016–17. We therefore excluded these data from our proficiency rate calculations in the sections in this Appendix titled "Methods" and "Additional proficiency rate calculations." We did include these scores to calculate impacts, however, because the comparison groups for those analyses consist only of students taking EOC exams in the same year.

During 2017–18, DESE field-tested new 4th- and 8th-grade science exams as well as a new Biology EOC exam. These exams were administered but were not used for accountability purposes during 2017–18, and no science scores were released to students or schools.

4.   Sample selection

The main results in this report are based on a matched comparison group selected from all students attending schools within the borders of the Kansas City Public School (KCPS) system, including other charter schools. The impact estimates can therefore be interpreted in terms of how much more or less a Kansas City student would be expected to achieve if that student were to enroll in the Kauffman School rather than in a typical Kansas City school. However, given the large number of charter schools serving students in the Kansas City area, a comparison of the Kauffman School's impacts on student achievement to those of other Kansas City charter schools might also be of interest. Thus, we report our results in three ways. We use comparison groups of students from (1) all public schools in Kansas City (the primary impact estimates), (2) district-operated (non-charter) KCPS schools only, and (3) other charter schools within Kansas City only.

The *Kauffman School group* is composed of students who were enrolled in the Kauffman School in 5th grade in any year from 2011–12 through 2017–18 for at least part of the school year.[17] The *Kansas City district schools* comparison group is composed of students who were enrolled in the Kansas City Public Schools district in 5th grade in our analysis years, during at least part of the school year, and who were not included in the Kauffman School group. The *Kansas City charter schools* comparison group includes only those students who were enrolled in 5th grade for all or part of the school year in a Kansas City charter school other than the Kauffman School. The *all Kansas City public schools* comparison group includes all students in either of the two comparison groups.

In addition to these restrictions, we excluded Kauffman students who were missing all outcome test scores or all 3rd- and 4th-grade MAP test scores.[18] We also dropped any comparison students who were missing all 3rd- and 4th-grade MAP test scores or any outcome scores from the final analysis sample. Finally, we excluded from the comparison group students who were enrolled for part of any school year at the Kauffman School (we included them in the Kauffman School group).

5.   Descriptive statistics: What types of students attend the Kauffman School?

The baseline average characteristics of all students in the Kauffman School and comparison groups for the most recent cohort (Cohort VII) are shown in Table A.1.[19] Kauffman students differ significantly from students enrolled in Kansas City public schools on several baseline measures.[20] Kauffman students were more likely to be black, less likely to be Hispanic, less likely to be English

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[17] In 2014–15, the Kauffman School began accepting new students in grades 6 and higher who were not previously enrolled in the school in 5th grade, such that approximately 4 percent of students in these grades were backfilled. Backfilled students were excluded from our analysis because the amount of time they spent at the Kauffman School is not comparable to that of other students in the same grade. Some 5th-grade students were also enrolled in the school midyear. These students were included in the analysis because they spent part of their 5th-grade year at the Kauffman School.

[18] Students who transfer to different school districts in Missouri will generally remain in our sample, but students who leave the state will be excluded because their test scores will be missing.

[19] See Johnson and Demers (2018) for baseline characteristics of students from the previous cohort.

[20] Characteristics for which there are a small percentage of Kauffman students in our sample (e.g., English language learner) may not be representative of the Kauffman School overall because of DESE's data redacting policy. See Johnson et al. (2016) for baseline characteristics of earlier cohorts of Kauffman students before the redacting policy was enacted.

language learners, and less likely to receive baseline test accommodations than students in other Kansas City schools.

Table A.1. Baseline 4th-grade average characteristics of Kauffman students and other Kansas City public school students: Cohort VII 5th graders

	Kauffman School	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
4th-grade mathematics scaled score	442	447	440	460**
4th-grade ELA scaled score	458	457	452	467*
Free or reduced-price lunch	0.92	0.90	0.94	0.84**
Black	0.96	0.56**	0.55**	0.60**
Hispanic	0.00	0.28**	0.31**	0.24**
English language learner	0.01	0.23**	0.26**	0.17**
Male	0.44	0.51	0.52*	0.47
Disabled	0.08	0.11	0.15**	0.04
Any baseline test accommodation	0.37	0.46*	0.54**	0.30
4th-grade attendance rate	0.95	0.95	0.95	0.95
4th-grade ever suspended	0.20	0.15	0.16	0.14
Sample size	**167**	**1,486**	**956**	**543**

*Significantly different from Kauffman students at the 5 percent level.

**Significantly different from Kauffman students at the 1 percent level.

C. Methods

In this section, we provide details about our analysis methodology, including information about our propensity score matching and imputation procedures.

1. *Comparing Kauffman students to students from other Kansas City schools*

Given that all Kauffman students have chosen to enroll in the Kauffman School, they might differ from other Kansas City students in important ways. Therefore, any effort to measure the effect of the Kauffman School on student achievement requires the identification of a comparison group of Kansas City students who, as of 4th grade (before the Kauffman School's 5th-grade entry year), are similar to the students about to enter the Kauffman School. Otherwise, any differences we find in later student outcomes might not be attributable to the effect of the Kauffman School.

To guarantee that the comparison group is similar, the gold standard research design would require a lottery wherein some of the students who apply to the Kauffman School are randomly selected to attend the school and others are randomly denied acceptance to the school. We would then fairly compare the achievement of the two randomly established groups (and assume that any naturally occurring differences among students would be randomly distributed between the two groups).

However, the Kauffman School has not been sufficiently oversubscribed to turn away large numbers of applicants; therefore, we cannot adopt this research design. Instead, we turned to the next-best approach. We used data from students across Kansas City to identify a matched comparison group of students who were similar to Kauffman students in the 4th grade, immediately prior to when Kauffman students enrolled in the school.

To construct a comparison group of students, we implemented a propensity-score matching procedure. We matched students attending other schools in Kansas City to Kauffman students based on characteristics including prior test scores, prior attendance, prior suspensions, and demographic characteristics. This approach is a commonly used alternative when random assignment is not possible. In fact, research has shown that the propensity-score matching procedure produces valid impact estimates that replicate the results of experimental research designs in the context of charter school evaluation (Tuttle et al. 2013; Gill et al. 2015).

2. Constituting the Kauffman student group

Throughout our analysis, we classify any student who was enrolled for at least part of his or her 5th-grade year in the Kauffman School as a Kauffman student. Classifying students in this manner defuses the potential criticism that the Kauffman School's effects are overestimated because low-achieving students have left the charter school. However, the inclusion of these students might lead to understating the impact of the Kauffman School on student achievement because students who left the Kauffman School early would not have experienced its full impact. This conservative analytic approach eliminates the risk of overestimating the impact, but it means that the full impact on students who continue in the Kauffman School for additional years is likely to be underestimated.

Data for our analysis were available for seven cohorts of Kauffman students. Cohort I students are those who entered the Kauffman School as 5th graders in 2011–12 (the year the Kauffman School opened). Each subsequent cohort entered the Kauffman School during the following year, such that the most recent cohort of students (Cohort VII) entered in 2017–18.

We present impact estimates by the number of years that have elapsed since students first enrolled in the Kauffman School. The five- and six-year impacts are based on EOC exam scores. For the Algebra I, Biology, and English II EOC exams, the Kauffman students in the analysis are mostly 9th graders, though students in any grade may be included in the EOC exam analysis as long as they are taking the exam for the first time.

The main impact estimates reflect the average effect of the Kauffman School across all cohorts with available data. For example, the one-year impacts are the average of the Kauffman School's estimated impact on all seven cohorts in their 5th-grade year.

3. Multiple imputation methodology

We calculated impact estimates by using a multiple imputation procedure with $M = 10$ imputed data sets. We imputed missing baseline outcome variable values separately by treatment or comparison status by using a chained linear equations model that included all outcome variables and all student characteristic variables in the final impact regressions. Results that exclude imputed data and limit the sample to students for whom all data were nonmissing are available upon request.

Students were excluded from the imputation model if they had missing data for all 3rd- or 4th-grade MAP test scores or missing data for all outcome MAP or EOC test scores. Missing values were imputed before both propensity-score matching and regression analyses in each multiple imputation data set.

After collecting coefficient and standard error estimates from each of the 10 imputed data sets, we computed multiple imputation coefficients and standard errors by using Rubin's combination method (Rubin 1987). The multiple imputation beta (β_M) coefficient is the average of the beta coefficient values in each imputed data set (β_m); the multiple imputation standard error is the square root of the within-imputation coefficient variance (Var_W) plus the between-imputation coefficient variance (Var_B) inflated by a finite imputation correction multiplier:

$$(1)\; SE_M = \sqrt{Var_W + \left(1 + \frac{1}{M}\right)Var_B} = \sqrt{\left(\frac{\sum_{m=1}^{M} Var_m}{M}\right) + \left(1 + \frac{1}{M}\right)\left(\frac{\sum_{m=1}^{M}(\beta_m - \beta_M)^2}{M-1}\right)}$$

4. Missing 8th-grade mathematics MAP scores

Approximately one quarter of 8th-grade students outside the Kauffman School took the Algebra I EOC exam instead of the 8th-grade mathematics MAP exam. We imputed the missing 8th-grade mathematics MAP test scores for these students by using their 8th-grade English language arts (ELA) and science MAP test scores, 7th-grade ELA and mathematics test MAP scores, 8th-grade attendance and suspension data, and the same set of student baseline characteristic variables included in the other imputations.

The four-year mathematics impact estimate should be interpreted with caution, because the imputation procedure may not provide an accurate estimate of these students' 8th-grade mathematics scores. This could occur if advanced students who were likely to do well in mathematics chose to take Algebra I instead of 8th-grade mathematics and this aptitude for mathematics was not fully captured in the student's 7th-grade mathematics or other test scores. If true, this unobserved characteristic would cause an upward bias in our estimate of the Kauffman School's impact on 8th-grade math scores.

5. Propensity-score matching methodology

We estimated a propensity score for each eligible treatment and comparison student in each multiple imputation data set using a stepwise logistic regression model. We used an entry criterion of ($p < .20$) to determine whether each variable would enter the final logistic regression model. (See Table A.2 for a list of the variables.)

As a result of the data redacting process, there were some cohorts in which all Kauffman students with a certain characteristic were removed from the data. For example, all Cohort I 10th-grade English language learner Kauffman students were redacted from the data. In such cases, we dropped all comparison students with this characteristic from the data prior to the matching.

Table A.2. Potential covariates used for propensity-score matching

4th-grade mathematics and ELA MAP *z*-scores
Second- and third-order polynomials of 4th-grade mathematics and ELA MAP *z*-scores
3rd-grade mathematics and ELA MAP *z*-scores
4th-grade attendance rate and ever-suspended variables
Gender, race, individualized education program, English language learner, free or reduced-price lunch, any baseline test accommodation
Indicators for imputed 3rd- and 4th-grade mathematics and ELA MAP *z*-score variables
Indicator for imputed 4th-grade attendance rate or ever-suspended variables

After generating propensity scores for each Kauffman student and each eligible comparison student, we selected a matched comparison group by finding comparison students with propensity scores within a given threshold, or radius, from each Kauffman student's propensity score. Comparison students were sampled with replacement, which means that each comparison student could be matched to multiple Kauffman students. To limit the number of possible comparison students, we specified a minimum matching radius and maximum number of potential matched neighbors.[21] Because district students differed more from Kauffman students on baseline characteristics relative to the other two groups, we made the matching radius larger for the district comparison group. This was necessary in order to prevent the samples of the Kauffman and matched comparison students from being too small. If there were no comparison students within the matching radius for a given treatment student, that student was excluded from the matched comparison impact analyses. We used a weighting scheme in which each treatment student had a weight of one, and each comparison student was weighted according to the number of matching treatment students. Table A.3 shows a summary of matching information from the 2017–18 school year for each comparison group.[22]

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[21] For each analysis, the matching radius was 0.0012 for the all Kansas City comparison group; it was 0.0022 for the district comparison group and 0.0018 for the charter comparison group. The maximum number of potential matched neighbors was 20.

[22] For the grade/cohort combinations from the previous year, see Johnson and Demers (2018).

Table A.3. Matching information summary for the 2017–18 analysis

	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
Algebra I EOC analysis (9th grade)			
Number of Kauffman students	106	106	106
Mean number of Kauffman students matched	95	84	85
Mean number of comparison students	370	253	152
Mean matches per Kauffman student	5.9	4.4	3.0
English II EOC analysis (9th grade)			
Number of Kauffman students	79	79	79
Mean number of Kauffman students matched	74	72	74
Mean number of comparison students	514	319	225
Mean matches per Kauffman student	11.3	7.1	5.2
Cohort I 11th graders (attendance and suspension analysis)			
Number of Kauffman students	64	64	64
Mean number of Kauffman students matched	62	59	58
Mean number of comparison students	534	366	200
Mean matches per Kauffman student	14.8	10.4	5.5
Cohort II 10th graders (attendance and suspension analysis)			
Number of Kauffman students	52	52	52
Mean number of Kauffman students matched	49	47	52
Mean number of comparison students	453	261	219
Mean matches per Kauffman student	15.0	8.7	7.2
Cohort III 9th graders (attendance and suspension analysis)			
Number of Kauffman students	127	127	127
Mean number of Kauffman students matched	117	105	107
Mean number of comparison students	541	330	233
Mean matches per Kauffman student	8.2	5.1	4.6
Cohort IV 8th graders			
Number of Kauffman students	146	146	146
Mean number of Kauffman students matched	141	131	126
Mean number of comparison students	549	300	248
Mean matches per Kauffman student	7.6	3.8	3.7
Cohort V 7th graders			
Number of Kauffman students	154	154	154
Mean number of Kauffman students matched	140	129	123
Mean number of comparison students	631	391	251
Mean matches per Kauffman student	7.6	5.2	3.5
Cohort VI 6th graders			
Number of Kauffman students	147	147	147
Mean number of Kauffman students matched	135	129	130
Mean number of comparison students	626	343	285
Mean matches per Kauffman student	12.0	5.8	5.4

	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
Cohort VII 5th graders			
Number of Kauffman students	167	167	167
Mean number of Kauffman students matched	152	147	128
Mean number of comparison students	747	462	227
Mean matches per Kauffman student	14.0	8.8	3.4

Notes: There are fewer Kauffman students in the EOC analysis than in corresponding 9th-grade analyses. This is partly because students who started as 5th graders in the Kauffman School but transferred out at some point may have taken the EOC exams in a different grade and year in their new school.

Table A.4 presents summary statistics to show how well Kauffman students were matched to comparison students on baseline characteristics.[23] On average, comparison students from each matched group were not significantly different from Kauffman students on any baseline characteristic used in the analysis.

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[23] The composition of Kauffman students included in each matched comparison group analysis differs slightly from one analysis to the next, depending on the comparison group. In Table A.4, we report averages for Kauffman students included in the main analysis, in which the comparison group includes all Kansas City public schools.

Table A.4. Baseline 4th-grade average characteristics of matched comparison samples for the 2017–18 analysis

	Kauffman School	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
Cohort I 11th graders				
4th-grade mathematics scaled score	636	635	634	636
4th-grade ELA scaled score	650	650	647	650
Free or reduced-price lunch	0.95	0.96	0.96	0.96
Black	0.95	0.95	0.96	0.93
Hispanic	0.05	0.05	0.04	0.07
English language learner	0.00	0.00	0.00	0.00
Male	0.45	0.43	0.42	0.45
Disabled	0.02	0.05	0.04	0.02
Any prior test accommodation	0.02	0.04	0.04	0.02
4th-grade attendance rate	0.94	0.94	0.94	0.95
4th-grade ever suspended	0.21	0.21	0.19	0.20
Sample size	**62**	**534**	**366**	**200**
Cohort II 10th graders				
4th-grade mathematics scaled score	638	639	639	638
4th-grade ELA scaled score	650	649	650	650
Free or reduced-price lunch	0.90	0.91	0.93	0.88
Black	0.96	0.97	0.97	0.96
Hispanic	0.02	0.01	0.02	0.03
English language learner	0.02	0.02	0.01	0.04
Male	0.45	0.39	0.41	0.40
Disabled	0.02	0.02	0.01	0.01
Any prior test accommodation	0.00	0.00	0.00	0.00
4th-grade attendance rate	0.96	0.96	0.96	0.96
4th-grade ever suspended	0.12	0.12	0.13	0.11
Sample size	**49**	**453**	**261**	**219**
Cohort III 9th graders				
4th-grade mathematics scaled score	634	634	633	638
4th-grade ELA scaled score	649	649	648	651
Free or reduced-price lunch	0.93	0.94	0.95	0.92
Black	0.92	0.93	0.91	0.91
Hispanic	0.04	0.04	0.04	0.06
English language learner	0.01	0.02	0.02	0.03
Male	0.44	0.47	0.47	0.44
Disabled	0.01	0.01	0.01	0.03
Any prior test accommodation	0.02	0.01	0.02	0.02
4th-grade attendance rate	0.95	0.95	0.95	0.95
4th-grade ever suspended	0.19	0.17	0.16	0.16
Sample size	**117**	**541**	**330**	**233**

Table A-4 (continued)

	Kauffman School	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
Cohort IV 8th graders				
4th-grade mathematics scaled score	634	634	635	633
4th-grade ELA scaled score	648	648	648	647
Free or reduced-price lunch	0.96	0.96	0.95	0.96
Black	0.91	0.90	0.90	0.90
Hispanic	0.06	0.06	0.04	0.07
English language learner	0.01	0.01	0.01	0.03
Male	0.43	0.46	0.48	0.44
Disabled	0.06	0.05	0.05	0.05
Any prior test accommodation	0.06	0.06	0.05	0.06
4th-grade attendance rate	0.95	0.95	0.95	0.95
4th-grade ever suspended	0.20	0.20	0.14	0.22
Sample size	**141**	**549**	**300**	**248**
Cohort V 7th graders				
4th-grade mathematics scaled score	2443	2446	2445	2443
4th-grade ELA scaled score	2448	2451	2446	2449
Free or reduced-price lunch	0.96	0.96	0.95	0.95
Black	0.90	0.89	0.88	0.88
Hispanic	0.06	0.07	0.07	0.09
English language learner	0.03	0.03	0.03	0.04
Male	0.49	0.49	0.51	0.46
Disabled	0.08	0.06	0.09	0.01
Any prior test accommodation	0.09	0.09	0.11	0.07
4th-grade attendance rate	0.95	0.95	0.95	0.95
4th-grade ever suspended	0.20	0.18	0.18	0.19
Sample size	**140**	**631**	**391**	**251**
Cohort VI 6th graders				
4th-grade mathematics scaled score	449	451	448	454
4th-grade ELA scaled score	461	459	458	463
Free or reduced-price lunch	0.94	0.92	0.94	0.94
Black	0.96	0.97	0.96	0.95
Hispanic	0.00	0.00	0.00	0.00
English language learner	0.00	0.00	0.00	0.00
Male	0.44	0.50	0.47	0.49
Disabled	0.04	0.04	0.05	0.04
Any prior test accommodation	0.01	0.02	0.01	0.00
4th-grade attendance rate	0.96	0.96	0.96	0.96
4th-grade ever suspended	0.22	0.21	0.20	0.24
Sample size	**135**	**626**	**343**	**285**

Table A-4 (continued)

	Kauffman School	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
Cohort VII 5th graders				
4th-grade mathematics scaled score	440	439	438	447
4th-grade ELA scaled score	455	454	454	459
Free or reduced-price lunch	0.92	0.95	0.94	0.94
Black	0.96	0.97	0.96	0.97
Hispanic	0.00	0.00	0.00	0.00
English language learner	0.01	0.01	0.01	0.00
Male	0.44	0.48	0.47	0.45
Disabled	0.08	0.11	0.08	0.01
Any prior test accommodation	0.38	0.36	0.43	0.27
4th-grade attendance rate	0.95	0.94	0.95	0.95
4th-grade ever suspended	0.20	0.21	0.22	0.18
Sample size	**152**	**747**	**462**	**227**

Notes: The Kauffman characteristics and sample size represent the total number of Kauffman students matched to the full comparison group of students from all Kansas City public schools. Standard deviations are displayed in parentheses next to the averages in this table. No differences between averages for Kauffman students and comparison group students are significantly different from zero. The 9th-, 10th-, and 11th-grade samples included in this table are the ones used for the attendance and suspension analyses. Separate baseline equivalence results for each EOC analysis are available upon request.

D. Additional impact estimates

In this section, we first report the Kauffman School impact estimates in effect size units, both for the main analysis sample and separately for the district and charter comparison group. We then compare the Kauffman School's science and EOC impacts to those from studies of KIPP middle and high schools. Next, we provide additional details about the conversion of effect size estimates to years of additional learning growth. Finally, we display the 2017–18 attendance and suspension impact separately for each grade level.

1. Impacts on state test scores

The impact estimates for the Kauffman School on student achievement in each subject and enrollment duration are displayed in Table A.5. The results are based on regression models that include the Kauffman students and matched comparison students, and control for small remaining differences in prior achievement and other baseline characteristics.[24] As noted previously, any student who is enrolled in the Kauffman School as a 5th grader for at least part of the school year is included in the Kauffman group for all impact estimates. The impact estimates should therefore be interpreted as the average effect of enrolling in the Kauffman School, accounting for the possibility that students may leave. The results are shown in effect-size units, which can be interpreted as the number of test score standard deviations higher or lower Kauffman students are performing relative to students in the comparison groups.[25]

The first row of Table A.5 shows the amount of additional growth realized by Kauffman students relative to matched comparison students in all other Kansas City public schools one year after enrollment. The numbers represent the average effect-size estimate for the first seven cohorts of 5th graders.[26] The one-year impact estimates for the Kauffman School are positive and statistically significant in mathematics, ELA, and science. Caution should be used when interpreting the science estimate, however, because no prior-year science test score was available to use in the propensity-score matching procedure or as a control variable in the regressions. Missouri does not administer a statewide science assessment until 5th grade, so the only baseline test score variables available for use in the analysis of 5th-grade science impacts are prior scores in mathematics and ELA.

The remaining rows of Table A.5 report the estimated effect of the Kauffman School on student achievement two through six years after enrollment. There are no two- or three-year estimates for science because the state does not have a science test for 6th or 7th graders. Similarly, there is no six-year impact for Algebra I or Biology because those EOC exams are not usually administered to 10th-grade students.

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[24] Appendix Table A.2 provides a list of variables included in the model.

[25] During the 2017–18 school year, the statewide standard deviations of 8th-grade MAP scores were 51 in mathematics and 42 in ELA; of 7th-grade MAP scores, 46 in mathematics and 40 in ELA; of 6th-grade MAP scores, 39 in mathematics and 36 in ELA; and of 5th-grade MAP scores, 40 in mathematics and 41 in ELA. The statewide standard deviations of the EOC exam scores were 28 in Algebra I and 21 in English II.

[26] We estimated the effect sizes separately for each cohort of students. To calculate the impact estimates in Table A.5, we averaged the effect sizes together, weighting by the number of Kauffman students in the analysis sample for each cohort.

Table A.5. Impact of Kauffman School on MAP and EOC test scores (citywide comparison group)

	Mathematics/ Algebra I	ELA/ English II	Science/ Biology	Sample size
One-year impact estimates (5th grade)	0.41** (0.02)	0.27** (0.02)	0.46** (0.03)	5,501
Two-year impact estimates (6th grade)	0.42** (0.03)	0.21** (0.03)	n/a	4,508
Three-year impact estimates (7th grade)	0.53** (0.04)	0.33** (0.03)	n/a	3,175
Four-year impact estimates (8th grade)	0.84**a (0.06)	0.33** (0.04)	0.69** (0.06)	2,505
Five-year impact estimates (9th grade)	0.80** (0.13)	0.61** (0.11)	1.05** (0.09)	1,300
Six-year impact estimates (10th grade)	n/a	0.60** (0.11)	n/a	435

Notes: This table displays impact estimates in effect-size units. Each row presents the average impact across all cohorts with available data. The fifth row presents the average five-year impact estimates of Cohorts I, II, and III 9th graders in Algebra I, Cohorts I and II in Biology, and Cohorts II and III 9th graders in English II. The final row presents the six-year impact estimates for Cohort I 10th graders (the only cohort that has taken the English II exam in the 10th grade in the Kauffman School). Standard errors are displayed in parentheses below each impact estimate. The sample size represents the total number of Kauffman and matched comparison students in each analysis. For the five-year impacts, the sample size is the average of the Algebra I, English II, and Biology analysis sample sizes.

[a] The four-year mathematics impact is based in part on imputed outcome data. See Appendix section C.4 for details.

**Significantly different from zero at the 1 percent level.

n/a = not applicable.

2.   Separate comparison to Kansas City district and charter schools

In Table A.6, we report the results for two alternative comparison groups. The first half of the table shows the effect-size estimates for the Kauffman School compared to district-operated (non-charter) schools in KCPS. The impact estimates in are generally higher when this comparison group is used. The second half of Table A.6 presents effect-size estimates for the Kauffman School compared to other charter schools in Kansas City. In this case, the effect-size estimates for the Kauffman School are generally lower, but the estimates remain positive and statistically significant for all durations and subjects. Thus, students at the Kauffman School are showing significantly higher growth than students in other Kansas City charter schools as well as in Kansas City district schools.

Table A.6. Alternative estimates of the impact of Kauffman School on MAP and EOC test scores (district and charter school comparisons)

	Mathematics/ Algebra I	ELA/ English II	Science/ Biology	Sample size
Compared to Kansas City district schools				
One-year impact estimates (5th grade)	0.44** (0.03)	0.29** (0.03)	0.51** (0.03)	3,980
Two-year impact estimates (6th grade)	0.41** (0.03)	0.18** (0.03)	n/a	3,108
Three-year impact estimates (7th grade)	0.57** (0.04)	0.39** (0.04)	n/a	2,154
Four-year impact estimates (8th grade)	0.94** (0.07)	0.40** (0.05)	0.81** (0.07)	1,618
Five-year impact estimates (9th grade)	0.80** (0.14)	0.62** (0.12)	1.14** (0.09)	932
Six-year impact estimates (10th grade)	n/a	0.67** (0.14)	n/a	329
Compared to Kansas City charter schools				
One-year impact estimates (5th grade)	0.39** (0.03)	0.25** (0.03)	0.42** (0.04)	2,541
Two-year impact estimates (6th grade)	0.41** (0.04)	0.24** (0.03)	n/a	2,122
Three-year impact estimates (7th grade)	0.49** (0.05)	0.30** (0.04)	n/a	1,602
Four-year impact estimates (8th grade)	0.77** (0.06)	0.26** (0.05)	0.55** (0.07)	1,401
Five-year impact estimates (9th grade)	0.80** (0.18)	0.62** (0.17)	0.93** (0.12)	570
Six-year impact estimates (10th grade)	n/a	0.46** (0.15)	n/a	174

Notes: This table displays impact estimates in effect-size units. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman and matched comparison students in each analysis. For the five-year impacts, the sample size is the average of the Algebra I, English II, and Biology analysis sample sizes.

**Significantly different from zero at the 1 percent level.
n/a = not applicable.

3. Comparison to KIPP science and EOC exam impacts

In Table A.7, we report the four-year science impact of the Kauffman School and its impacts on EOC exams, as well as comparable impacts from studies of KIPP middle and high schools (Tuttle et al. 2013; Tuttle et al. 2015).

Table A.7. Kauffman School and KIPP impacts on achievement in science and on EOC exams

	Kauffman School	KIPP schools
Three- to four-year science impact	0.69	0.33
Mathematics EOC exam	0.80	0.34
ELA EOC exam	0.61/0.60	0.29
Science EOC exam	1.05	0.40

Notes: The science exam used to calculate the impact in the first row of the table is administered four years after enrollment at the Kauffman School, whereas the timing varies from three to four years after enrollment in KIPP schools. In the ELA EOC exam row, we report both the 9th- and 10th-grade impacts for the Kauffman School on the English II EOC exam. See Table C.2 of Tuttle et al. (2015) for details about the calculation of EOC exam impacts for KIPP schools. The calculations in Tuttle et al. (2015) are based on continuously enrolled students, and therefore the magnitude of the impacts may be overstated.

4. Results as years of learning growth

We can translate the effect sizes presented in the previous sections into an approximate measure of the years of additional learning growth experienced by Kauffman students based on results presented in Bloom et al. (2008).[27] Translating the results in this way allows us to evaluate whether the Kauffman School is achieving its goal of producing, on average, at least 1.25 years of learning growth for students during each year of instruction, or 0.25 years of growth beyond what a typical student in another school would achieve.

Conversion of the impact estimates for the main comparison group yields the results displayed in Figure II.1. The black horizontal lines show the growth of comparison students, under the assumption that they achieve one year of learning growth each school year. However, the accuracy of these conversions depends on the extent to which the achievement growth on the MAP and EOC exams is similar to the vertically scaled assessments analyzed in Bloom et al. (2008).[28] It is also worth noting that the results in Figure II.1 are a conservative estimate of the years of learning growth achieved by Kauffman students who remain enrolled in the school because students who leave are also included in the Kauffman student sample in the analysis. To obtain a more complete picture of the Kauffman

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[27] See Gleason et al. (2012), Clark et al. (2013), and Tuttle et al. (2013) for examples of other studies that perform conversions between effect-size estimates and years of learning growth. Using a set of widely administered vertically scaled assessments, Bloom et al. (2008) estimated that the typical 5th grader grows 0.56 standard deviations in mathematics, 0.40 standard deviations in ELA, and 0.40 standard deviations in science. They also estimated that the typical 6th grader grows 0.41 standard deviations in mathematics, 0.32 standard deviations in ELA, and 0.27 standard deviations in science, whereas a typical 7th grader grows 0.30 standard deviations in mathematics, 0.23 standard deviations in ELA, and 0.28 standard deviations in science. A typical 8th grader grows 0.32 standard deviations in mathematics, 0.26 standard deviations in ELA, and 0.26 standard deviations in science. A typical 9th grader grows 0.22 standard deviations in mathematics, 0.24 standard deviations in ELA, and 0.22 standard deviations in science. A typical 10th grader grows 0.19 standard deviations in ELA. To convert the one-year impact estimates of the Kauffman School into units of years of learning, we divided the impact estimates by the typical growth of 5th graders in each subject, then added one to represent the annual growth students normally achieve after one year. We used a similar method to convert the two- through six-year impact estimates into years of learning growth. For these results, we divided the impact estimates by the average of the typical growth across all grades included in each analysis, and added the number of school years that elapsed since students enrolled in 5th grade.

[28] If typical achievement growth on the MAP and EOC exams is less than growth on the assessments analyzed in Bloom et al. (2008), the conversion underestimates the additional years of learning growth achieved by Kauffman students, and vice versa.

School's progress toward its goal, we also use—in other reports—the results from the NWEA exams and STEP literacy assessments that are administered to Kauffman students. See Johnson and Demers (2016) for details.

5. Grade-level attendance and suspension impacts

In Figure A.1, we present the 2017–18 attendance impacts separately for each grade level. Similarly, in Figures A.2 through A.4, we show separate grade-level impacts for overall, in-school, and out-of-school suspensions. Caution should be used when drawing conclusions based on the statistical significance of grade-level comparisons. More than 20 comparisons are being made, so it is expected that at least one would arise due to random chance.

Figure A.1. The Kauffman School had no impact on student attendance overall during 2017–18, and there were no differences in impacts across grade levels
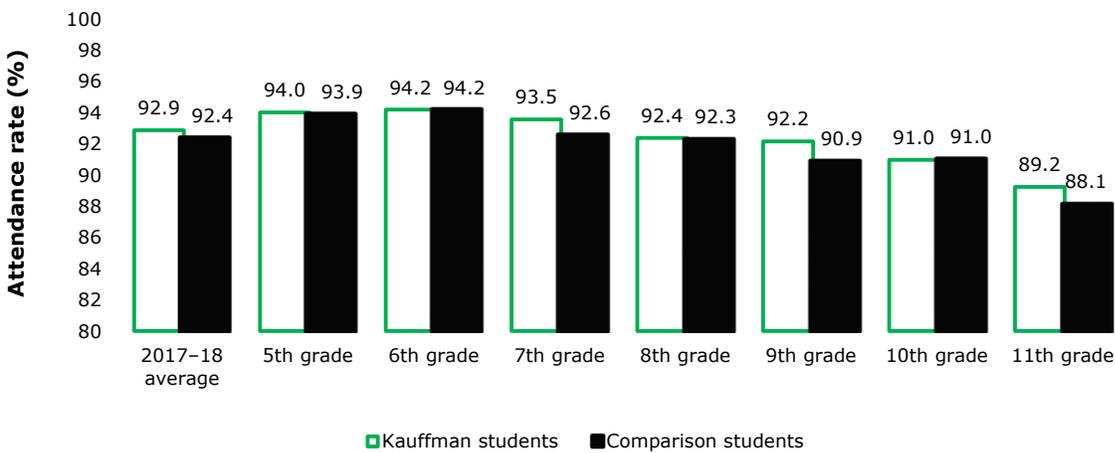
Figure A.2. Kauffman students and comparison students had similar overall suspension rates during 2017–18; there were some differences across grade levels
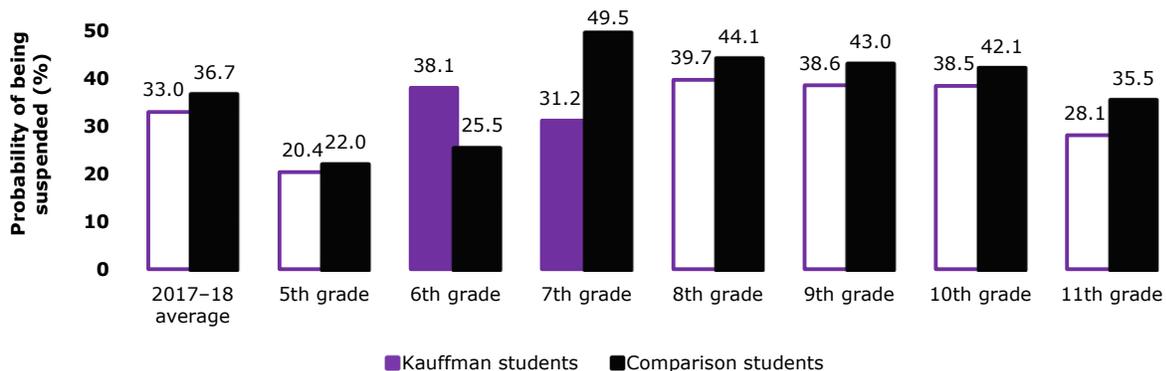
Note: The solid purple bars indicate that the impact of the Kauffman School is statistically significant at the 0.05 level.

Figure A.3. Kauffman students had significantly lower rates of in-school suspensions than comparison students during 2017–18; there were some differences across grade levels
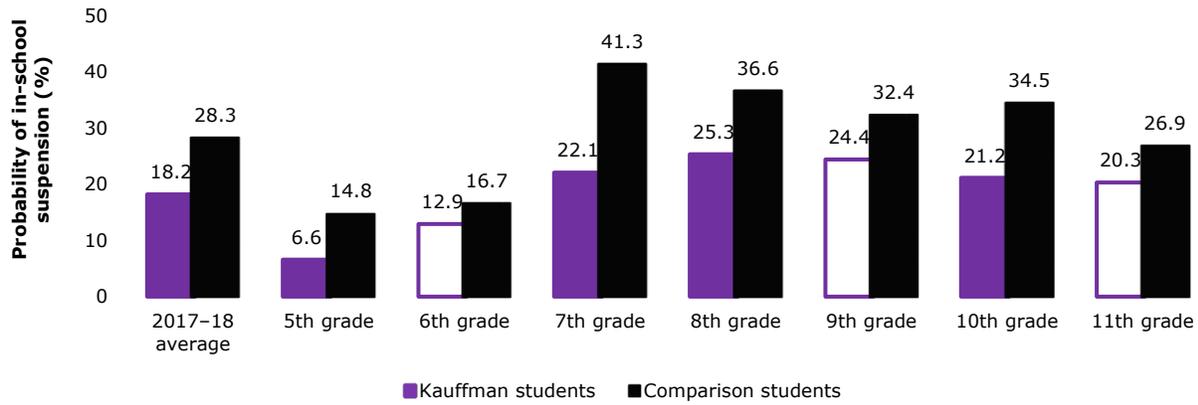
Note: The solid purple bars indicate that the impact of the Kauffman School is statistically significant at the 0.05 level.

Figure A.4. Kauffman students had significantly higher rates of out-of-school suspensions than comparison students during 2017–18; there were some differences across grade levels
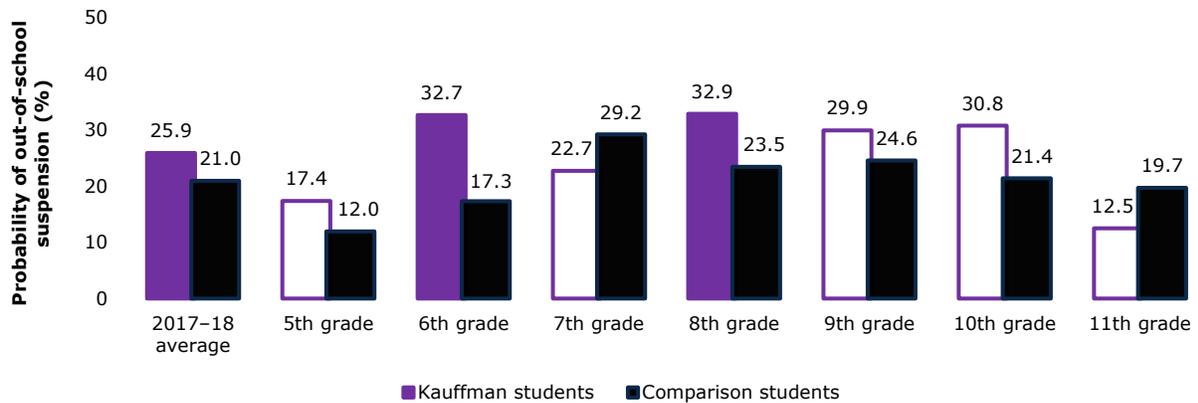
Note: The solid purple bars indicate that the impact of the Kauffman School is statistically significant at the 0.05 level.

E. Additional proficiency rate calculations

In this section we report on proficiency rates separately for each cohort used in the proficiency rate calculations in Section II.C. When interpreting differences in proficiency rates across cohorts, it is important to note that the Missouri state assessments changed over time. New MAP assessments were administered starting in 2014–15 and changed again in 2015–16. In 2017–18 the state adopted revised Missouri Learning Standards and administered another new MAP assessment, which will be the version administered in future years (Missouri Department of Elementary and Secondary Education 2017). New EOC exams were also administered starting in 2017–18. Table A.8 shows how the proficiency rates on these assessments for other Kansas City students changed over time, to provide an indication of the changes in the difficulty levels of these exams.

Table A.8. Proficiency rates on statewide assessments for other Kansas City students

	2013-14	2014-15	2015-16	2016-17	2017-18
ELA					
7th-grade ELA MAP (%)	29	34	36	41	25
8th-grade ELA MAP (%)		35	37	39	33
English II EOC (%)			57	n/a	35
Mathematics					
7th-grade Mathematics MAP (%)	29	14	19	23	19
8th-grade Mathematics MAP (%)		11	8	7	15
Algebra I EOC (%)			43	n/a	28
Science					
8th-grade Science MAP (%)		20	21	23	n/a
Biology EOC (%)			34	33	n/a

Note: Cells with values of "n/a" indicate that that proficiency rates were not publicly released either due to statewide issues with the exams that year or because new exams were being field-tested.

The proficiency rates of the first four cohorts (the only cohorts that have been enrolled for three years) are summarized in the first section of Table A.9.[29] The first column displays the percentage of these students who scored proficient or advanced on the MAP exams taken in the spring before they entered the Kauffman School (that is, in 4th grade). This column provides an indication of how ambitious the 75 percent goal is: Of incoming students in Cohorts I through IV, only 36 percent had achieved proficient or advanced in mathematics and 39 percent in ELA on their prior-year MAP exams.

The Kauffman School did not meet its goal of 75 percent of students achieving at the proficient or advanced levels after three years of consecutive enrollment. However, among students who were enrolled in the Kauffman School for three consecutive years, 57 percent achieved proficient or advanced on the mathematics MAP exam, and 61 percent scored at that level on the ELA MAP exam—an increase of more than 20 percentage points in each subject after three years. These calculations are based primarily on students enrolling consecutively in 5th, 6th, and 7th grades, although students who repeated a grade during their first three years are also included. To further

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[29] The results from this analysis are based only on data obtained from the Kauffman School, so no students were removed from the sample because of DESE's data redaction policy.

illustrate the progress that Kauffman students made toward the 75 percent goal, we also report the results separately for each cohort.

Table A.9. Percentage of Kauffman students scoring proficient or advanced on MAP exams after three years of continuous enrollment

	Proficient/ advanced at time of entry	Proficient/ advanced after three years of enrollment	Change in proficiency rate after three years	Approximate annual increase in proficiency rate
Cohort I, through V students combined				
Mathematics MAP (%)	36	57	21	7
ELA MAP (%)	39	61	22	7
Both mathematics and ELA MAP (%)	25	47	22	7
Sample size	**511**	**571**		
Cohort I students (7th graders in 2013–14)				
Mathematics MAP (%)	32	69	37	12
ELA MAP (%)	30	55	25	8
Both mathematics and ELA MAP (%)	20	51	31	10
Sample size	**74**	**74**		
Cohort II students (7th graders in 2014–15)				
Mathematics MAP (%)	45	68	23	8
ELA MAP (%)	44	78	34	11
Both mathematics and ELA MAP (%)	32	62	30	10
Sample size	**66**	**78**		
Cohort III students (7th graders in 2015–16)				
Mathematics MAP (%)	34	58	24	8
ELA MAP (%)	39	63	24	8
Both mathematics and ELA MAP (%)	23	46	23	8
Sample size	**134**	**143**		
Cohort IV students (7th graders in 2016–17)				
Mathematics MAP (%)	35	58	23	8
ELA MAP (%)	37	64	27	9
Both mathematics and ELA MAP (%)	23	49	26	9
Sample size	**120**	**143**		
Cohort V students (7th graders in 2017–18)				
Mathematics MAP (%)	34	42	8	3
ELA MAP (%)	45	50	5	2
Both mathematics and ELA MAP (%)	26	33	7	2
Sample size	**117**	**133**		

Notes: The sample includes 571 Cohort I, II, III, IV, and V students who were enrolled at the Kauffman School for three consecutive years. The scores at time of entry are based on 4th-grade MAP scores for most students, and 3rd- or 5th-grade MAP scores for students who skipped or repeated a grade when they joined the Kauffman School. Twelve Cohort II, 9 Cohort III, 23 Cohort IV, and 16 Cohort V students are missing baseline MAP exam scores. The scores after three years of enrollment are based on 7th-grade MAP exams for 541 students and 6th-grade MAP exams for 30 students who repeated a grade while at the Kauffman School.

Table A.10 shows the percentage of Kauffman students scoring proficient or advanced in 8th grade after four years of continuous enrollment. The Kauffman School nearly achieved 75 percent

proficiency on each state test for these students, with 76 percent scoring proficient or better in mathematics, 73 percent in ELA, and 83 percent in science.

Table A.10. Percentage of Kauffman students scoring proficient or advanced on MAP exams after four years of continuous enrollment

	Proficient/ advanced at time of entry	Proficient/ advanced after four years of enrollment	Change in proficiency rate after four years	Approximate annual increase in proficiency rate
Cohort I through IV students combined				
Mathematics MAP (%)	34	76	42	11
ELA MAP (%)	35	73	38	10
Science MAP (%)	n/a	83	n/a	n/a
All available MAP assessments (%)	21	62	41	10
Sample size	**331**	**365**		
Cohort I students (8th graders in 2014–15)				
Mathematics MAP (%)	32	81	49	12
ELA MAP (%)	27	76	49	12
Science MAP (%)	n/a	78	n/a	n/a
All available MAP assessments (%)	19	66	47	12
Sample size	**59**	**59**		
Cohort II students (8th graders in 2015–16)				
Mathematics MAP (%)	44	86	42	11
ELA MAP (%)	40	81	41	10
Science MAP (%)	n/a	85	n/a	n/a
All available MAP assessments (%)	27	68	41	10
Sample size	**52**	**63**		
Cohort III students (8th graders in 2016–17)				
Mathematics MAP (%)	31	70	39	10
ELA MAP (%)	35	74	39	10
Science MAP (%)	n/a	85	n/a	n/a
All available MAP assessments (%)	19	63	44	11
Sample size	**113**	**120**		
Cohort IV students (8th graders in 2017–18)				
Mathematics MAP (%)	35	73	38	10
ELA MAP (%)	37	65	28	7
Science MAP (%)	n/a	n/a	n/a	n/a
All available MAP assessments (%)	23	55	32	8
Sample size	**107**	**123**		

Notes: The sample includes 365 Cohort I, II, III, and IV students who were enrolled at the Kauffman School for four consecutive years. The scores at time of entry are based on 4th-grade MAP scores for most students, and 3rd- or 5th-grade MAP scores for students who skipped or repeated a grade when they joined the Kauffman School. Eleven Cohort II, 7 Cohort III, and 16 Cohort IV students are missing baseline MAP exam scores. The scores after four years of enrollment are based on 8th-grade MAP exams for 339 students, and 7th-grade MAP exams for 26 students who repeated a grade during their time at the Kauffman School. These 26 students are included in the calculation of overall proficiency rates in the first row of the table, with results based only on mathematics and ELA scores because 8th-grade science MAP scores are unavailable for them.

n/a = not applicable.

Table A.11 displays the percentage of Kauffman students scoring proficient or advanced in 9th grade after five years of continuous enrollment.[30]

Table A.11. Percentage of Kauffman students scoring proficient or advanced on EOC exams after five years of continuous enrollment

	Proficient/ advanced at time of entry	Proficient/ advanced after five years of enrollment	Change in proficiency rate after five years	Approximate annual increase in proficiency rate
Cohort I, II, and III students combined				
Algebra I EOC/mathematics MAP (%)	35	73	38	8
English II EOC/ELA MAP (%)	34	50	16	3
Biology EOC/science MAP (%)	n/a	89	n/a	n/a
All available EOC/MAP assessments (%)	20	68	48	10
Sample size	**182**	**197**		
Cohort I students (9th graders in 2015–16)				
Algebra I EOC/mathematics MAP (%)	34	94	60	12
English II EOC/ELA MAP (%)	26	n/a	n/a	n/a
Biology EOC/Science MAP (%)	n/a	92	n/a	n/a
All available EOC/MAP assessments (%)	18	92	74	15
Sample size	**50**	**50**		
Cohort II students (9th graders in 2016–17)				
Algebra I EOC/mathematics MAP (%)	44	n/a	n/a	n/a
English II EOC/ELA MAP (%)	39	n/a	n/a	n/a
Biology EOC/science MAP (%)	n/a	86	n/a	n/a
All available EOC/MAP assessments (%)	24	86	62	12
Sample size	**41**	**50**		
Cohort III students (9th graders in 2017–18)				
Algebra I EOC/mathematics MAP (%)	31	64	33	7
English II EOC/ELA MAP (%)	36	53	17	3
Biology EOC/science MAP (%)	n/a	n/a	n/a	n/a
All available EOC/MAP assessments (%)	19	45	26	5
Sample size	**91**	**97**		

Notes: The sample includes 197 Cohort I, II, and III students who were enrolled at the Kauffman School for five consecutive years. The scores at time of entry are based on 4th-grade MAP scores for most students, and 3rd- or 5th-grade MAP scores for students who skipped or repeated a grade when they joined the Kauffman School. Nine Cohort II and 6 Cohort III students are missing baseline MAP exam scores. The scores after five years of enrollment are based on 9th-grade EOC exams for 185 students, and 8th-grade MAP exams for 12 students who repeated a grade during their time at the Kauffman School. These 12 students are included in the calculation of overall proficiency rates, with results based on 8th-grade mathematics, science, and ELA scores. Algebra I and English II proficiency rates from the 2016–17 school year are not included in our calculations because of statewide problems with the exam, such that proficiency rates were not comparable to previous years.

n/a = not applicable.

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[30] For students who were enrolled for five years but repeated a grade, we used their 8th-grade MAP scores in place of the EOC exam scores to calculate the proficiency rates.

F.   Changes in the impacts of the Kauffman School over time

In this section, we report estimates of the Kauffman School's impact on achievement, attendance, and suspensions separately for each cohort and year. We also test whether the impacts during each year were significantly different from those in the previous year.

Tables A.12 through A.16 display in effect size units the year-by-year impacts presented in Figure III.1 in the main text.

Table A.12. Comparison of one-year MAP test score impacts: Cohorts I through VII 5th graders

	Cohort I (2011–12)	Cohort II (2012–13)	Cohort III (2013–14)	Cohort IV (2014–15)	Cohort V (2015–16)	Cohort VI (2016–17)	Cohort VII (2017–18)
5th-grade mathematics effect size	0.13 (0.06)	0.15 (0.07)	0.09 (0.06)	0.42** (0.06)	0.80** (0.07)	0.58* (0.07)	0.47 (0.06)
5th-grade ELA effect size	0.06 (0.07)	0.18 (0.06)	0.14 (0.05)	0.44** (0.06)	0.44 (0.05)	0.36 (0.05)	0.16** (0.06)
5th-grade science effect size	0.40 (0.07)	0.54 (0.07)	0.40 (0.07)	0.52 (0.07)	0.40 (0.06)	0.52 (0.06)	n/a
Sample size	**677**	**617**	**948**	**714**	**820**	**826**	**899**

Notes: The table displays impact estimates in effect-size units. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman students and matched comparison students in each analysis.

*Significantly different from the prior cohort at the 5 percent level.

**Significantly different from the prior cohort at the 1 percent level.

Table A.13. Comparison of two-year MAP test score impacts: Cohorts I through VI 6th graders

	Cohort I (2012–13)	Cohort II (2013–14)	Cohort III (2014–15)	Cohort IV (2015–16)	Cohort V (2016–17)	Cohort VI (2017–18)
6th-grade mathematics effect size	0.33 (0.08)	0.20 (0.07)	0.43* (0.06)	0.48 (0.07)	0.49 (0.07)	0.43 (0.06)
6th-grade ELA effect size	0.18 (0.07)	0.20 (0.07)	0.17 (0.06)	0.21 (0.06)	0.24 (0.06)	0.24 (0.06)
Sample size	**596**	**585**	**1,024**	**691**	**851**	**761**

Notes: The table displays impact estimates in effect-size units. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman students and matched comparison students in each analysis.

*Significantly different from the prior cohort at the 5 percent level.

Table A.14. Comparison of three-year MAP test score impacts: Cohort I though V 7th graders

	Cohort I (2013–14)	Cohort II (2014–15)	Cohort III (2015–16)	Cohort IV (2016–17)	Cohort V (2017–18)
7th-grade mathematics effect size	0.57 (0.07)	0.80* (0.09)	0.56 (0.09)	0.43 (0.07)	0.45 (0.07)
7th-grade ELA effect size	0.41 (0.08)	0.66* (0.09)	0.26** (0.07)	0.18 (0.07)	0.31 (0.06)
Sample size	**534**	**580**	**590**	**700**	**771**

Notes: The table displays impact estimates in effect-size units. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman students and matched comparison students in each analysis.

*Significantly different from the prior cohort at the 5 percent level.

**Significantly different from the prior cohort at the 1 percent level.

Table A.15. Comparison of four-year MAP test score impacts: Cohort I through IV 8th graders

	Cohort I (2014–15)	Cohort II (2015–16)	Cohort III (2016–17)	Cohort IV (2017–18)
8th-grade mathematics effect size	0.96 (0.10)	0.97 (0.15)	0.84 (0.11)	0.71 (0.10)
8th-grade ELA effect size	0.53 (0.08)	0.39 (0.10)	0.27 (0.08)	0.23 (0.07)
8th-grade science effect size	0.66 (0.10)	0.61 (0.11)	0.74 (0.10)	n/a
Sample size	**748**	**459**	**608**	**690**

Notes: The table displays impact estimates in effect-size units. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman students and matched comparison students in each analysis.

Table A.16. Comparison of EOC test score impacts: Cohort I, II, and III 9th graders

	Cohort I 9th graders (2015–16)	Cohort II 9th graders (2016–17)	Cohort III 9th graders (2017–18)
9th-grade Algebra I effect size	0.94 (0.15)	0.73 (0.14)	0.77 (0.24)
9th-grade English II effect size	n/a	0.51 (0.10)	0.67 (0.17)
9th-grade Biology effect size	1.25 (0.13)	0.86* (0.12)	n/a
Sample size	**315**	**454**	**527**

Notes: The table displays impact estimates in effect-size units. Standard errors appear in parentheses below each impact estimate. The sample size row displays the average number of Kauffman and matched comparison students in the available EOC analyses each year.

*Significantly different from the prior cohort at the 5 percent level.

Table A.17 shows the yearly impacts of the Kauffman School on attendance and overall suspensions, as well as separately for in-school and out-of-school suspensions.

Table A.17. Comparison of impacts of the Kauffman School on attendance and suspensions across years

	2011–12 average	2012–13 average	2013–14 average	2014–15 average	2015–16 average	2016–17 average	2017–18 average
Attendance rate (%)	−0.83 (0.48)	0.87** (0.31)	0.72 (0.27)	0.87 (0.23)	0.96 (0.22)	1.06 (0.25)	0.48 (0.27)
Probability of being suspended (%)	13.4 (5.2)	7.22 (3.5)	24.7** (2.6)	8.85** (2.4)	1.72* (2.4)	−3.20 (2.1)	-3.64 (1.9)
Probability of in-school suspension (%)	0.27 (3.9)	−1.27 (2.2)	24.8** (2.6)	10.5** (2.1)	−1.29** (2.1)	1.39 (2.0)	-10.12** (1.6)
Probability of out-of-school suspension (%)	14.2 (4.7)	8.97 (3.4)	16.6 (2.8)	4.51** (2.3)	2.8 (2.2)	−4.29* (1.8)	4.95** (1.7)
Sample size	**677**	**1,213**	**2,067**	**3,066**	**3,156**	**4,064**	**4,877**

Notes: The suspension results are marginal effects from logit models in which the outcome variable is an indicator for receiving a suspension during the year. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman students and matched comparison students in each analysis.

*Significantly different from the prior school year's outcomes at the 5 percent level.

**Significantly different from the prior school year's outcomes at the 1 percent level.