# Evaluation of the Networks for School Improvement Initiative— Impacts on Student Outcomes

Appendices

**Interim Report, April 2024**

Matthew Johnson, Jeffrey Max, Tareena Musaddiq, Breyon Williams, Silvia Robles, and Michelle Bennett

# Contents

# Exhibits

# Appendix A:
# Additional Details on the Study Design, Data, and Analysis Methods

This appendix provides additional details about the study design, the data used in the analysis, and the analysis methods.

## Study design

The study measured the impact of the NSI by comparing students' outcomes at NSI schools to students' outcomes at similar schools that did not participate in the NSI. We compared NSI schools to similar schools *within the same district* for the 8th- and 9th-grade on-track NSI (a within-district matched comparison analysis), and compared NSI schools to similar schools in *different districts* in the same state for the well-matched postsecondary enrollment NSI (a between-district matched comparison analysis).

We prioritized the within-district approach, when possible, to reduce the likelihood that the impacts were affected by (1) baseline differences between districts in their policies, practices, or characteristics; or (2) districtwide shifts in policy in either the NSI districts or comparison districts that occurred at the same time as the NSI initiative. However, the well-matched postsecondary enrollment NSI partnered with districts that had all or almost all of their high schools participating in the NSI. As a result, it was not feasible to make comparisons within these districts. Instead, we matched NSI districts to districts that had similar student characteristics and outcomes before the grants started.

One benefit of the between-district matched comparison approach is that it reduces concerns that the impacts are affected by the spread of the NSI initiative to comparison schools. For the NSI where we used a within-district approach, we asked the NSI at the beginning of the study about the extent to which they planned to expand the NSI work beyond the schools in their grants. As a result, we excluded six 8th- or 9th-grade on-track NSI from the within-district analysis, either because all district schools participated in the NSI or the district planned to spread the NSI work to the full district.

The NSI evaluation began after the Cohort 1, 1B, and 2 grants had started, but before the Cohort 3 grants had been awarded. This provided an opportunity for the study team to use a more rigorous study design for the Cohort 3 NSI. For these NSI, the study team randomly assigned schools within a district to either participate in the NSI right away or to delay participation for three years. Randomly assigning schools to participate ensures that differences in outcomes between NSI schools and comparison schools are due to the NSI and not due to differences in other school characteristics.

We provide more details about each of these approaches below.

### 8th- and 9th-grade on-track NSI (all cohorts): Within-district matched comparison

For the 8th- and 9th-grade on-track NSI, we matched NSI schools to non-participating schools in the same district based on their characteristics and outcomes before the grant. We then matched students in the NSI schools to students in the comparison schools who had similar baseline characteristics. This section describes our approach to matching schools and students.

***Step 1: Matching NSI schools to non-participating schools.*** We matched each NSI school in a district to three non-participating schools in the same district using the baseline school characteristics listed under

Step 1 in Exhibit A.1. We excluded potential comparison schools from this matching process if (1) they participated in any NSI (including NSI in a different outcome area), or (2) they were expected to participate in an NSI in the following year. We also excluded charter schools from the analysis because many districts could not provide student data for these schools and it was often difficult to find comparable charter schools in the same district.

***Step 2: Matching students in NSI and comparison schools.*** After we matched NSI schools to comparison schools, we then matched students in the NSI schools to five similar students in the comparison schools based on the baseline school and student characteristics listed under Step 2 in Exhibit A.1.[1] For this student-level match, we followed the same approach as the school-level match, but identified the five closest matches (instead of three).

To improve the quality of the student-level matches, we matched NSI students to students from *any* of the comparison schools identified in Step 1—rather than limiting student matches to the three comparison schools that were the best match for each NSI school. In other words, if the best match for an NSI student was in a comparison school that had been matched to a different NSI school, we prioritized the best student match and allowed the NSI student to match with the student in that comparison school. Because the student match included school characteristics as well (See Exhibit A.1), it was more likely for students to be matched to one of the three comparison schools their school was matched with. When matching students, we required an exact match on students' race/ethnicity and economically disadvantaged status because we also examined impacts separately by these characteristics.

**Exhibit A.1.** Characteristics used to match NSI schools and students with comparison schools and students for the 8th- and 9th-grade on-track analysis

| Step 1: School characteristics used to match NSI schools to comparison schools |
| --- |
| Percentage of students who are economically disadvantaged |
| Percentage of students who are Black |
| Percentage of students who are Latino |
| Percentage of students who are English language learners |
| 8th- or 9th-grade enrollment |
| Proficiency rate on the math state assessment (7th-grade assessment for 8th-grade on track; state assessment administered to high school students for 9th-grade on track) |
| Proficiency rate on the 8th-grade ELA state assessment (8th-grade assessment for 8th-grade on track; state assessment administered to high school students for 9th-grade on track) |
| Average 8th- or 9th-grade GPA |
| Average core course pass rate |
| Chronic absenteeism rate |
| Percentage of students with no out-of-school suspensions |
| Percentage of students who completed earned at least 5 credits (for 9th-grade on track only) |
| Indicator for whether the school was an alternative school |

| **Step 2: Student and school characteristics used to match students in NSI schools to students in comparison schools** |
|---|
| All of the school-level characteristics listed in Step 1 as well as the following student characteristics: |
| Gender |
| Economically disadvantaged |
| Race and ethnicity (indicators for Latino, Black, and other race) |
| English language learner status |
| Whether student received special education services |
| Whether student repeated the grade |
| GPA for core courses |
| Share of math and ELA courses passed |
| Attendance rate |
| Indicator for no out-of-school suspensions |
| Score on math state assessment |
| Score on ELA state assessment |

Source:   Administrative student records.

Note:   School-level baseline characteristics are based on the year before the school first joined the NSI. For the 8th-grade on-track NSI, we used school-level math proficiency rates from 7th grade instead of 8th grade because students in some districts had the option of taking an end-of-course Algebra assessment instead of the 8th-grade math assessment in some districts. If different students took different assessments, the 8th-grade math proficiency rate would not to be representative of 8th-grade achievement at the school (see section on "Sample restrictions and exceptions for matching" for more details). We measured students' baseline characteristics and outcomes in the grade level a student completed just before we measured impacts. For example, for the 8th-grade on-track analysis, we used students' baseline characteristics from 7th grade. For the 2020-21 and 2021-22 school years, prior-year data on attendance, suspension, and student test scores was not available in some districts because of the COVID-19 pandemic. For these cases, we used data from two or three grades prior, depending on availability.

***Matching methodology.*** When matching NSI schools to comparison schools, we allowed multiple NSI schools to be matched to the same comparison school (referred to as matching with replacement). We used the same approach when matching NSI students to comparison students. This approach helps improve the average quality of matches and therefore reduce bias because it ensures that each NSI school/student is matched to the most similar comparison school/student even if the school/student has already been matched to another NSI school. However, this approach can reduce the precision of the analysis if it results in a low number of schools/students in the comparison group.

We used a measure known as Euclidean distance to determine which comparison schools and students were the best match for NSI schools and students based on their baseline characteristics and outcomes. The Euclidean distance between two schools $i$ and $j$ is calculated as follows:

$$\delta[x_{i,}x_{j,}] = \sqrt{(x_i - x_j)'\boldsymbol{S^{-1}}(x_i - x_j)}$$

where x is a k x1 vector containing values of each of the k matching variables and S is a diagonal weighting matrix of the variances of each variable pooled across the NSI and comparison groups. For each NSI school we identified a set of three comparison schools that were the closest matches based on the Euclidian distance.

***Weighting.*** We weighted each NSI school in the analysis equally because the NSI initiative is a school-level intervention, so the study focused on measuring the impacts of the NSI on schools. If we had

weighted each student in the analysis equally, schools with more students would have greater weight in the results than schools with fewer students. To assign an equal weight to each NSI school, each NSI student received a weight equal to the inverse of the number of students in the analysis from that student's school.

To account for the fact that comparison students can be matched to multiple NSI students, comparison students received a weight equal to the sum of the weights for the NSI students they were matched to, scaled by the inverse of the number of comparison students the matched NSI student was matched to. For example, suppose comparison student A is a match for NSI students B and C. Assume NSI school B has 35 students in the analysis (such that NSI student B has weight equal to 1/35) and that NSI student B has been matched to five comparison students. If NSI student C attends a school with 60 students entering the analysis (such that NSI student C has a weight equal to 1/60) and has been matched to five comparison students, then comparison student A will have a weight equal to (1/35 x 1/5)+(1/60 x 1/5).

***Sample restrictions and exceptions for matching.*** We excluded schools and students when fewer than 16 students in a school had data on a baseline or outcome measure. We did this to avoid matching schools based on imprecise baseline measures and to prevent NSI schools with small numbers of students from entering the impact analysis, given that each NSI school receives equal weight in the analysis. Students were included in the matching and analysis samples if they had non-missing data on all baseline and outcome variables, with one exception. In the 8th-grade on-track analysis some students had a missing math test score because they took an Algebra end-of-course exam in place of the 8th-grade math standardized test. These students were excluded from the 8th-grade on-track math analysis due to a missing score, but were included in the analysis for other outcomes if all of their other outcome data were available.

Additionally, for the 8th- and 9th-grade on-track analysis, if a student repeated a grade, we took their baseline information from two years ago instead of one year ago. For example, for 8th graders in 2020-21, baseline information will typically be taken from 7th grade in 2019-20. However, if the student repeated 8th grade in 2020-21, we took their baseline information from 2018-19 instead, when the student attended 7th grade. To account for differences in the source of baseline data for grade repeaters, we included a repeater indicator in the baseline match.

We also adjusted the matching process for schools and students to account for two exceptions:

- **Algebra in 8th grade.** We adjusted the matching process to accommodate two districts that used end-of-course exams for 8th-grade students taking Algebra and end-of-grade math exams for all other 8th-grade students. Some of the schools in these districts had many students with missing 8th-grade math test scores, so we made two adjustments:

  – We matched schools based on their baseline 7th-grade average math test scores instead of 8th-grade average math test scores for all districts in the 8th-grade on-track NSI analysis.

  – For the two districts with an end-of-course Algebra exam, we matched schools on 8th-grade math test participation rates before the start of the NSI grant (for the 8th-grade on-track NSI). For the 9th-grade on-track analysis, we also matched students on an indicator for whether the student took Algebra in 8th grade.

- **New York City (NYC) Schools.** We made the following adjustments to the analysis for NYC schools.

  – In addition to the school characteristics listed in Exhibit A.1, we also matched on geographic region (borough) to help ensure NSI and comparison schools shared similar neighborhood characteristics.

  – We adjusted the matching process to account for high schools with specialized admissions processes and/or special areas of focus. We excluded potential comparison schools that were specialized schools with special admission requirements because the NSI schools did not have these requirements. Similarly, we excluded schools that specifically served students who were older than typical students in their grade or behind on credits, because none of the NSI schools in the analysis focused on these students.

  – For the 9th-grade on-track sample, we matched on two additional school characteristics. We included an indicator for whether the school is a "screened" school. These schools screen students who apply based on GPA and other characteristics. We also included an indicator for an early college focus school which has specialized curriculum.

**Well-matched postsecondary enrollment grantees (all cohorts): Between-district matched comparisons**

We used a between-district matched comparison analysis for the well-matched postsecondary enrollment NSI. The between-district approach is similar to the within-district approach, but includes an additional step to first match NSI districts to similar districts in the state. This provides the pool of comparison districts for conducting the school-level match.

We matched NSI districts to ten non-NSI districts in the same state based on the baseline district-level characteristics under Step 1 in Exhibit A.2. We conducted this match separately for each well-matched postsecondary outcome so that districts were matched on three baseline years of the focal outcome for each analysis. After identifying a set of comparison districts, we matched NSI schools to schools in the comparison districts on the baseline district-level and school-level characteristics under Step 2 in Exhibit A.2. After the school match, NSI students were matched to students in comparison schools on the baseline district-, school-, and student-level characteristics under Step 3 in Exhibit A.2.

The study team collected student-level data from all three states (Arizona, Texas, and California) to analyze enrollment in any postsecondary institution and enrollment in a postsecondary institution with a graduation rate above 50 percent. FAFSA completion data was available for the three states at the school-level. College entrance exam taking data was available at the school-level only for Texas.

**Exhibit A.2.** Characteristics used to match NSI districts, schools, and students with comparison districts, schools, and students for the well-matched postsecondary enrollment analysis

| Step 1: District characteristics used to match NSI districts to comparison districts in the same state |
| --- |
| District averages for the outcome one, two and three years before the start year for the NSI |
| Percentage of students who are economically disadvantaged |
| Percentage of students who are Black |
| Percentage of students who are Latino |
| Percentage of students who are female |
| Total student enrollment |
| Indicator for whether the district was located in an urban area |
| Percentage of the 2020-21 academic year schools operated in-person |

| Step 2: School and district characteristics used to match NSI schools to comparison schools |
| --- |
| All of the district match variables listed in Step 1 for the district match |
| School averages for the outcome one, two and three years before the start year for the NSI |
| Percentage of students who are economically disadvantaged |
| Percentage of students who are Black |
| Percentage of students who are Latino |
| Percentage of students who are female |
| 12th-grade student enrollment |
| Indicator for whether the school was an alternative school |
| Indicator for whether college entrance exam taking rate in the prior year was 100% (included only for the college exam entrance analysis) |

| Step 3: Student, school and district characteristics used to match students in NSI schools to students in comparison schools |
| --- |
| All of the district match variables listed in Step 1 for the district match |
| All of the school match variables listed in Step 2 for the school match |
| Gender |
| Economically disadvantaged |
| Race and ethnicity (indicators for Black, Latino, and other race) |
| English language learner status |
| Whether student received special education services |
| Score on the 8th-grade state math assessment |
| Score on the 8th-grade state ELA assessment |
| 8th-grade attendance rate |
| Indicator for no out-of-school suspensions |

Source:   Administrative student records.

Note:     All student characteristics are measured in 8th grade (the baseline grade for the well-matched postsecondary enrollment analysis).

The matching methodology we used for the well-matched postsecondary analysis was similar to the methodology described for the 8th and 9th-grade on-track analysis. For district-level matching, we matched each NSI district with the 10 closest comparison districts based on the Euclidean distance. For the school-level match, for each state, we conducted separate matches for each outcome. We used the Euclidean distance to select the three best matches for each NSI school.

For the student-level match, we used the same matching approach described above and selected the five best matches for each NSI student. We then created student-level weights that ensured each NSI school had equal weight in the analysis and applied the same weighting for comparison students used in the 8th- and 9th-grade on-track analysis.

**8th- and 9th-grade on-track grantees (Cohort 3 only): Random assignment study**

Random assignment provides a rigorous approach to measuring the impact of the NSI on student outcomes because it creates two groups of schools that are similar on key characteristics related to on-track outcomes at the start of the study. This allows the study to attribute any differences in outcomes between the two groups to the effect of the NSI. We used a matched-pair random assignment design that first matched similar schools on a set of baseline characteristics and then randomly selected one of the schools to participate in the NSI immediately and the other to delay participation for at least three years. This matched-pair design reduces pre-existing differences and improves precision of the estimates (Bai 2020). We used the following process to conduct the random assignment:

- For each participating district, we created pairs of schools (or occasionally a group of three if the district had an odd number of schools) with similar characteristics based on publicly available information from the U.S. Department of Education's Common Core of Data and ED*Facts*, as well as state databases.

- The NSI provided feedback on whether we had paired two schools together that looked similar based on the publicly available data, but differed in other ways that could affect students' on-track outcomes. For example, the NSI provided information about current or future district initiatives that might affect some schools, but not others. Based on this additional information from the NSI, we then revised the pairings to improve balance.

- Once the pairs were finalized, the study team randomly assigned one school within each pair to join the NSI in the first year and the other school to join the NSI in the fourth year (so the study could measure impacts after three years). If schools were matched in a group of three, up to two schools were assigned to participate in the NSI.

The attrition of schools from the study can bias the impact estimates because it affects the balance in baseline characteristics achieved through the random assignment process. In addition, the schools that remain in the analysis could differ substantially from the group initially included in the study. To limit the effect of attrition on differences in baseline characteristics, we dropped the entire matched pair (or group of three) from the analysis if at least one school in the pair left the study. See the Analysis Methods section for additional detail.

School-level attrition primarily occurred because districts could not provide data for the evaluation, schools had missing data for too many students, or school closures. In a small number of cases where we randomly assigned a school to the NSI group, but the school ultimately decided not to participate in the NSI, that school remained in the analysis as part of the treatment group. The results from the random assignment study therefore represent the effect of being assigned to join the NSI group (also known as intent-to-treat impact estimates).

Exhibit A.3 shows that school-level attrition was 24 percent for 8th-grade on-track outcomes and 18 percent for 9th-grade on-track outcomes. We also examined differences in attrition between the NSI

schools and comparison schools. Differential attrition was 3 percent for 8th-grade on-track outcomes and for 9th-grade on-track outcomes. These are low levels of school attrition according to the U.S. Department of Education's What Works Clearinghouse (WWC) Procedures and Standards Handbook, Version 5.0 using either the cautious or optimistic boundary (WWC 2022).

**Exhibit A.3.** Sample sizes and attrition for the random assignment study

| Number | NSI schools | Comparison schools | Total |
|---|---|---|---|
| Number of schools randomly assigned | | | |
|     8th-grade on-track outcomes | 61 | 57 | 125 |
|     9th-grade on-track outcomes | 36 | 35 | 71 |
| Number of schools in the two-year impact analysis sample | | | |
|     8th-grade on-track outcomes | 45 | 46 | 91 |
|     9th-grade on-track outcomes | 30 | 28 | 58 |

Note:    The two-year impact estimates are based on an intent-to-treat analysis that includes schools in their randomly assigned treatment group regardless of whether they participated in the NSI or not. All NSI schools in the analysis sample participated in the NSI for two years except for two schools in the 9th-grade on-track analysis. The analysis sample size for all 9th-grade on-track outcomes was the same as what is reported in this exbibit. The analysis sample size for 8th-grade on track reported in this exhibit is based on the GPA and course pass rate analyses. The sample size for 8th-grade on track varied for the other outcomes due to missing data for some schools. Forty-three NSI schools had data for math test scores, 44 schools had data for ELA test scores, 45 schools had data on GPA and pass rates and 47 schools had data on attendance and suspension rates. Forty-four comparison schools had data for math test scores, 45 schools had data for ELA test scores, 46 schools had data on GPA and pass rates and 47 schools had data on attendance and suspension rates.

Random assignment is expected to produce two groups that are as similar as possible on both observed and unobserved measures. Exhibits A.4 and A.5 show how the schools randomly assigned to the NSI compared to the schools randomly assigned to the comparison group on key characteristics before the NSI grant. The final column in both exhibits shows that students in the NSI group and comparison group had similar demographic characteristics and baseline outcomes, with no differences greater than 0.25 standard deviations. Although a small number of school-level characteristics exceeded this threshold, this should not affect the rigor of the analysis if (1) there is low school-level attrition, and (2) there is limited scope for bias due to students leaving or joining the study schools after random assignment (WWC 2022).[2] Because district participation in the NSI intervention was not widely publicized, and the list of schools randomly assigned to join the NSI was not publicly available, it is unlikely that the NSI intervention affected families' decisions to enroll in or leave NSI schools.

**Exhibit A.4.** Baseline characteristics for students and schools in the 8th-grade on-track random assignment study, by study group

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
| | Mean | Standard deviation | Mean | Standard deviation | Difference | |
|---|---|---|---|---|---|---|
| **Students** | | | | | | |
| **Demographic characteristics** | | | | | | |
| Female | 50 | 50 | 49 | 50 | 1 | 0.03 |
| Economically disadvantaged[a] | 74 | 44 | 70 | 46 | 3 | 0.07 |
| Race/ethnicity | | | | | | |
|    Black | 42 | 49 | 41 | 49 | 1 | 0.02 |
|    Latino | 49 | 50 | 47 | 50 | 2 | 0.04 |
|    Other | 5 | 21 | 6 | 24 | -2 | -0.07 |
| English language learner | 12 | 33 | 13 | 33 | -1 | -0.02 |
| Received special education services | 17 | 37 | 16 | 37 | 1 | 0.02 |
| **Baseline outcomes** | | | | | | |
| GPA for core courses (four-point GPA scale) | 2.24 | 1.09 | 2.36 | 1.03 | -0.12 | -0.11 |
| Attendance rate | 95 | 6 | 95 | 5 | -1 | -0.11 |
| No out-of-school suspensions | 97 | 17 | 98 | 14 | -1 | -0.05 |
| Share of math and ELA courses passed | 67 | 41 | 73 | 39 | -6 | -0.14 |
| Math test score (standard deviation units) | -0.36 | 0.91 | -0.29 | 0.95 | -0.07 | -0.07 |
| ELA test score (standard deviation units) | -0.34 | 0.95 | -0.32 | 0.95 | -0.02 | -0.02 |
| Student sample size (number of students) | 4,183 | | 4,531 | | | |
| **Schools** | | | | | | |
| Percentage economically disadvantaged students[a] | 80 | 16 | 83 | 16 | -3 | -0.18 |
| Percentage Black students | 43 | 37 | 43 | 36 | 0 | 0.01 |

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
| --- | --- | --- | --- | --- | --- | --- |
| | Mean | Standard deviation | Mean | Standard deviation | Difference | |
| Percentage Latino students | 47 | 34 | 45 | 33 | 2 | 0.05 |
| Percentage English language learners | 11 | 12 | 14 | 12 | -3 | -0.24 |
| Average 8th-grade enrollment (number of students) | 128 | 103 | 133 | 109 | -4 | -0.04 |
| Math proficiency rate | 26 | 16 | 26 | 17 | 0 | -0.01 |
| ELA proficiency rate | 34 | 19 | 34 | 18 | 0 | 0.00 |
| Chronic absenteeism rate | 9 | 7 | 6 | 5 | 3 | 0.50 |
| Suspension rate | 4 | 4 | 4 | 4 | 0 | 0.05 |
| Average GPA (four-point GPA scale) | 2.48 | 0.49 | 2.58 | 0.41 | -0.10 | -0.22 |
| Course pass rate | 77 | 15 | 81 | 12 | -4 | -0.27 |
| School sample size (number of schools) | 46 | | 45 | | | |

Source:   Administrative student records for the 2019-20 through 2021-22 school years.

Note:   Baseline characteristics are reported for the analysis of impacts after two years of implementation, based on data for 6 NSI in 8 districts. The number in the difference column may not equal the difference between the NSI mean and comparison mean columns due to rounding.

[a] Based on data measuring free or reduced-price lunch eligibility, where available, and district-provided economically disadvantaged indicators otherwise.

**Exhibit A.5.** Baseline characteristics for students and schools in the 9th-grade on-track random assignment study, by study group

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
| --- | --- | --- | --- | --- | --- | --- |
| | Mean | Standard deviation | Mean | Standard deviation | Difference | |
| **Students** | | | | | | |
| **Demographic characteristics** | | | | | | |
| Female | 48 | 50 | 50 | 50 | -2 | -0.04 |
| Economically disadvantaged[a] | 92 | 27 | 92 | 27 | 0 | -0.01 |
| Race/ethnicity | | | | | | |
| Black | 41 | 49 | 54 | 50 | -12 | -0.25 |
| Latino | 48 | 50 | 38 | 49 | 9 | 0.18 |
| Other | 7 | 25 | 6 | 23 | 1 | 0.06 |

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
|---|---|---|---|---|---|---|
| | Mean | Standard deviation | Mean | Standard deviation | Difference | |
| English language learner | 15 | 36 | 14 | 34 | 1 | 0.03 |
| Received special education services | 23 | 42 | 21 | 41 | 2 | 0.05 |
| **Baseline outcomes** | | | | | | |
| GPA for all courses (four-point GPA scale) | 2.25 | 1.03 | 2.29 | 1.01 | -0.04 | -0.04 |
| Attendance rate | 93 | 9 | 93 | 9 | 0 | -0.02 |
| No out-of-school suspensions | 96 | 21 | 95 | 22 | 1 | 0.03 |
| Share of core courses passed | 63 | 39 | 66 | 38 | -2 | -0.06 |
| Math test score (standard deviation units) | -0.60 | 0.90 | -0.60 | 0.92 | 0.00 | 0.00 |
| ELA test score (standard deviation units) | -0.62 | 0.94 | -0.56 | 0.93 | -0.06 | -0.06 |
| Sample size (number of students) | 4,683 | | 4,808 | | | |
| **Schools** | | | | | | |
| Percentage economically disadvantaged students[a] | 80 | 28 | 71 | 34 | 9 | 0.29 |
| Percentage Black students | 42 | 32 | 52 | 32 | -11 | -0.33 |
| Percentage Latino students | 45 | 30 | 39 | 32 | 5 | 0.17 |
| Percentage English language learners | 15 | 15 | 14 | 18 | 1 | 0.05 |
| 9th-grade enrollment (number of students) | 228 | 175 | 230 | 200 | -3 | -0.01 |
| Math proficiency rate | 47 | 36 | 47 | 37 | 0 | 0.00 |
| ELA proficiency rate | 52 | 38 | 54 | 38 | -2 | -0.05 |
| Chronic absenteeism rate | 26 | 17 | 27 | 16 | -1 | -0.06 |
| Suspension rate | 6 | 4 | 7 | 6 | -1 | -0.13 |
| Average GPA (four-point GPA scale) | 2.22 | 0.59 | 2.21 | 0.49 | 0.01 | 0.03 |

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
|---|---|---|---|---|---|---|
| | Mean | Standard deviation | Mean | Standard deviation | Difference | |
| Course pass rate | 60 | 19 | 60 | 16 | -1 | -0.03 |
| Percentage of 9th-grade students earning at least 5 credits | 81 | 18 | 82 | 16 | -1 | -0.06 |
| School sample size (number of schools) | 28 | | 30 | | | |

Source: Administrative student records for the 2019-20 through 2021-22 school years.

Note: Baseline characteristics are reported for the analysis of impacts after two years of implementation, based on data for 6 NSI in 5 districts. The number in the difference column may not equal the difference between the NSI mean and comparison mean columns due to rounding.

[a] Based on data measuring free or reduced-price lunch eligibility, where available, and district-provided economically disadvantaged indicators otherwise.

## Study sample

We examined the characteristics of the NSI districts in the analysis to understand the context in which the NSI initiative was implemented. The 8th- and 9th-grade on-track NSI partnered with large, mostly urban districts that served a high proportion of students who are Black, Latino, or experiencing poverty compared to districts nationally (Exhibit A.6). For example, the NSI districts had almost double the percentage of Black and Latino students and three times the percentage of students attending high poverty schools than districts nationally. Compared to 9th-grade on-track NSI districts, the 8th-grade on-track NSI districts served a higher proportion of Black students and slightly lower proportion of Latino students. The 8th- and 9th-grade on-track NSI districts had similar characteristics to the 100 largest districts in the country, although NSI districts were more likely to be located in urban areas and had lower student achievement and graduation rates. The NSI districts were also much less likely to have in-person instruction during the COVID-19 pandemic. NSI districts provided in-person instruction for 27 percent of the year in the 2020-21 school year, compared to about half of the year for districts nationwide and the 100 largest districts.

The well-matched postsecondary NSI in the analysis partnered with districts that differed from those in the 8th- and 9th-grade on-track analysis. The districts in the well-matched postsecondary analysis served fewer students, had substantially more Latino students, and were more likely to be located in suburban areas. They also served a lower proportion of Black students.

Compared to districts nationally, the NSI districts in the well-matched postsecondary analysis served more students, had a much higher proportion of Latino students, and were more likely to be located in urban areas. These districts provided in-person instruction during the 2020-21 school year at a rate that was higher than 8th- and 9th-grade on-track NSI districts, but somewhat lower than the national average.

**Exhibit A.6.** Characteristics of districts included in the 8th- and 9th-grade on-track and well-matched postsecondary analyses compared to districts nationwide

| Characteristic | NSI districts in the 8th-grade on-track analysis | NSI districts in the 9th-grade on-track analysis | NSI districts in well-matched postsecondary analysis | All public school districts nationwide | 100 largest public school districts nationwide |
|---|---|---|---|---|---|
| Student enrollment (median) | 78,000 | 75,000 | 19,000 | 1,000 | 73,000 |
| **Race/ethnicity (%)** | | | | | |
| Black | 34 | 28 | 13 | 15 | 23 |
| Latino | 42 | 48 | 69 | 26 | 38 |
| Other | 12 | 13 | 6 | 10 | 12 |
| Students attending high-poverty schools (%) | 71 | 70 | 51 | 23 | 36 |
| **District proficiency & graduation rates** | | | | | |
| Proficient in math (%) | 29 | 31 | 49 | 45 | 46 |
| Proficient in ELA (%) | 41 | 41 | 41 | 49 | 49 |
| Graduation rate (%) | 74 | 77 | 87 | 87 | 84 |
| **District locale** | | | | | |
| Urban | 100 | 95 | 54 | 29 | 48 |
| Suburban | 0 | 5 | 41 | 44 | 52 |
| Rural | 0 | 0 | 5 | 27 | 0 |
| Percentage of in-person instruction during 2020-21 | 29 | 28 | 45 | 53 | 50 |
| Number of districts | 10 | 9 | 36 | 14,034 | 100 |

Source: Common Core of Data for the 2017-18 school year; ED*Facts* data for the 2017-18 school year; Return 2 Learn Tracker for the 2020-21 school year.

Note: High-poverty schools are defined as schools with at least 75 percent of students eligible for free or reduced-price lunch. Statistics shown are weighted averages, with the exception of enrollment for which the median enrollment is shown. Districts with zero or missing total student enrollment are excluded from this table. We weighted each NSI district by the number of students in the NSI schools in the district. We weighted each district nationwide and in the sample of 100 largest districts by the total number of students in the district.

## Data

The foundation focused the NSI grants on a set of outcomes that aligned with the initiative's ultimate goal of increasing college enrollment and retention among students who are Black, Latino, or experiencing poverty. The NSI were expected to improve multiple outcomes in each outcome area. The study aimed to measure impacts on all of these outcomes.

Exhibit A.7 lists the focal outcomes for the 8th- and 9th-grade on-track NSI, the foundation's approach to defining those outcomes, and the thresholds for each outcome to determine if a student was on track for high school graduation and college enrollment. We prioritized measuring impacts on continuous versions of the outcome measures in the main analysis when possible (as shown in the "Outcome used to measure NSI impacts" column), and analyzed impacts on the threshold for a student to be on track as a sensitivity analysis in Exhibits B.9 and B.10.

**Exhibit A.7.** 8th- and 9th-grade on-track outcome measures

| Outcome area | Outcome used to measure NSI impacts | Description of outcome used to measure NSI impacts | Threshold for a student to be on track |
|---|---|---|---|
| 8th-grade on track | GPA for core courses (math, ELA, science, and social studies) | 8th grade GPA based on core courses (4-point scale) | GPA for core courses of at least 3.0 |
| | Share of math and ELA courses passed | The proportion of math and ELA courses for which students earned at least a C | Received no Ds or Fs in math and ELA courses |
| | Math test scores | Score on the state standardized math assessment | Scoring at least proficient on the state math assessment and earning at least a 3.0 GPA in math |
| | ELA test scores | Score on the state standardized ELA assessment | Scoring at least proficient on the state ELA assessment and earning at least a 3.0 GPA in ELA |
| | Attendance rate | Percentage of days a student attended school | Attendance rate of at least 96 percent |
| | Share of students with no suspensions | Whether a student received no out-of-school suspensions | Received no out-of-school suspensions |
| 9th-grade on track | GPA for all courses | 9th grade GPA based on all courses (4-point scale) | GPA of at least 3.0 for all courses |
| | Share of core courses passed | The proportion of core courses for which a student earned at least a C | Received one or fewer Ds or Fs in the core subject areas |
| | Share of 9th-grade students earning at least 5 course credits | Whether a student earned at least 5 course credits | Earned at least 5 course credits |
| | Attendance rate | Percentage of days a student attended school | Attendance rate of at least 96 percent |
| | Share of students with no suspensions | Whether a student received no out-of-school suspensions | Received no out-of-school suspensions |

Exhibit A.8 shows the outcomes we analyzed for the well-matched postsecondary enrollment NSI and provides details about how each measure was defined. The outcomes listed in the table match those focused on by the foundation, except that the foundation also expected these NSI to improve the share of 12th-grade students who had secured a postsecondary plan, meaning they had completed the FAFSA, submitted applications to at least three colleges, and completed at least one college entrance exam. We were unable to analyze this outcome because we did not have access to data on students' college applications.

**Exhibit A.8.** Well-matched postsecondary outcome measures

| Outcome used to measure NSI impacts | Description of outcome used to measure NSI impacts |
|---|---|
| ACT and SAT exam-taking rate | The share of 12th-grade students taking the SAT and/or ACT. In this report we only examined this outcome for Texas. |
| FAFSA completion rate as of December of the senior year | The share of 12th-grade students who completed a FAFSA form by December of the school year |
| Postsecondary enrollment rate at any institution | The share of 12th-grade students enrolled in any postsecondary institution in the fall following their 12th-grade year |
| Postsecondary enrollment rate at an institution with at least a 50 percent graduation rate | The share of 12th-grade students enrolled in a postsecondary institution with a graduation rate of at least 50 percent in the fall following their 12th-grade year |

Note: Postsecondary enrollment rates are based only on in-state colleges for Texas because the state did not match its data to the National Student Clearinghouse for recent cohorts of high school graduates. However, data on in-state college enrollment should capture a large majority of college enrollment in Texas. A report by the Texas Higher Education Coordinating Board using National Student Clearinghouse data for cohorts of high school graduates from 2011 through 2015 found that only 5 percent of high school graduates attend college out of state (Brunner 2017).

Exhibit A.9 describes the data sources used to measure outcomes and baseline characteristics for the impact analysis.

**Exhibit A.9.** Data sources

| Type of data | Purpose | School years of data | Source |
|---|---|---|---|
| NSI school rosters | Identify the schools that participated in the NSI each year[a] | 2018-19 through 2021-22 school years | NSI school rosters provided by intermediaries |
| Students' math and ELA test score proficiency rates | Provide a school-level baseline measure of student achievement for the 9th-grade on-track analysis | 2017-18 through 2020-21 school years | EDFacts Data (U.S. Department of Education) |
| Student enrollment and demographic characteristics at the district and school levels | Provide baseline measures of districts and schools in the well-matched postsecondary NSI analysis | 2015-2016 through 2020-21 school years | Common Core of Data (U.S. Department of Education) |
| Student-level demographic, course, and test score data | Provide baseline and outcome measures of schools and students for the 8th- and 9th-grade on-track NSI analysis | 2017-2018 through 2021-22 school years | Student administrative data collected from districts participating in the 8th- and 9th-grade on-track NSI |
| Student-level demographic, test score, and postsecondary enrollment data[b] | Provide baseline and outcome measures of districts, schools, and students for the well-matched postsecondary NSI analysis | 2014-15 through 2020-21 school years | Student administrative data collected from state education agencies for well-matched postsecondary NSI |
| School-level data on the number of students who completed a FAFSA application | Provide baseline and outcome measures of FAFSA completion rates for schools in the well-matched postsecondary NSI analysis | 2015-16 through 2021-22 | Federal Student Aid Office, U.S. Department of Education |

| Type of data | Purpose | School years of data | Source |
|---|---|---|---|
| District-level data on the share of instruction conducted in-person (by week) | Measure the share of instruction conducted in-person[c] | 2020-21 | Return 2 Learn Tracker, American Enterprise Institute |
| College graduation rates | Determine whether a college had a graduation rate of at least 50 percent in the school year before students in the analysis graduated from high school | 2015-16 through 2019-20 | Integrated Postsecondary Education Data System (U.S. Department of Education) |

[a] We defined schools as participating in the NSI for a given school year if they joined the NSI on or before April 1st. If a school stopped participating in the NSI before December 1, we defined the school as not participating in the NSI that year.

[b] The postsecondary data for NSI in Texas only include in-state college enrollment. Postsecondary data in Arizona and California include both in-state and out-of-state college enrollment.

[c] To calculate the overall percentage of in-person instruction during the 2020-21 school year we assigned each school week a value of 100 percent if instruction was in-person that week, 50 percent if instruction was hybrid that week, and 0 percent if instruction was remote that week. We then averaged across weeks within districts to calculate the share of in-person instruction. If a district was not included in this data set, we set that district's percentage of in-person instruction equal to the median value among districts in the same state in the same urban locale.

**Data availability and the COVID-19 pandemic**

The COVID-19 pandemic affected the availability of data needed to measure students' outcomes and baseline characteristics. Exhibit A.10 shows the availability of the four types of data used in the 8th- and 9th-grade on-track analysis: (1) suspensions, (2) attendance, (3) course grades and credit completion, and (4) state test scores.

Data availability affected both outcomes and baseline characteristics. When outcome data were not available for certain school years due to pandemic-related disruptions, we excluded those outcomes from the analysis for the affected school years. When baseline data were not available for certain years, we used the most recent prior year available. For example, we used baseline suspension data from the first three quarters of the 2019-20 school year to estimate impacts on outcomes in the 2021-22 school year. Similarly, we used baseline assessment data from the 2018-19 school year for measuring impacts in the 2020-21 and 2021-22 school years.

**Exhibit A.10.** Effect of COVID-19 pandemic on data availability

| | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|
| Suspension and attendance | Available | Available | Not available | Available |
| Course grades and completion | Available | Available[a] | Available | Available |
| State test scores | Available | Not available | Not available | Available |

[a] One district was unable to provide course grade data for middle school students during the 2019-20 school year

**Timing of school participation**

Exhibit A.11 shows the school years that correspond to each impact year in the analysis, along with the percentage of schools entering the analysis from each year. The main two-year impact analysis is based on the 2021-22 school year for 72 percent of 8th-grade on-track NSI schools and 46 percent of 9th-grade on-track NSI schools. The two-year impact analysis is based on the 2020-21 school year for the large majority of well-matched postsecondary enrollment NSI schools.

**Exhibit A.11.** Percentage of schools by participation year and school year

| Model and outcome | Percentage of schools in the analysis in each school year | | | | Total number of schools |
| | 2018-19 | 2019-20 | 2020-21 | 2021-22 | |
|---|---|---|---|---|---|
| **8th-grade on track** | | | | | |
| Year 1 | 6 | 19 | 63 | 12 | 136 |
| Year 2 | N/A | 7 | 21 | 72 | 109 |
| **9th-grade on track** | | | | | |
| Year 1 | 27 | 21 | 43 | 9 | 122 |
| Year 2 | N/A | 30 | 24 | 46 | 109 |
| **College enrollment** | | | | | |
| Year 1 | 7 | 86 | 7 | N/A | 107 |
| Year 2 | 0 | 8 | 92 | 0 | 100 |
| **FAFSA completion** | | | | | |
| Year 1 | 6 | 66 | 7 | 22 | 143 |
| Year 2 | N/A | 7 | 84 | 9 | 112 |
| Year 3 | N/A | N/A | 8 | 92 | 102 |
| **College entrance exam taking** | | | | | |
| Year 1 | N/A | 88 | 12 | N/A | 78 |
| Year 2 | N/A | N/A | 100 | N/A | 69 |

Note: Percentages may not total to 100 percent due to rounding.

## Analysis methods

We present the regression models used to estimate impacts for the 8th- and 9th-grade on-track matched comparison analysis, followed by estimation models for the random assignment study.

### A. Regression models used to estimate impacts for the 8th- and 9th-grade on-track matched comparison analysis

The sample for estimating impacts of the NSI included all NSI students and matched comparison students with non-missing baseline and outcome data. Impacts were estimated using ordinary least squares regressions, weighted so that each NSI school received equal weight in the analysis (as described above).

We estimated the following equation for one-, two-, and three-year impacts, separately for each outcome:

$$y_{ist} = \beta_0 + \beta_1 NSI_{st} + \beta X_{ist} + \gamma S_{st} + \theta_{st} + \delta \left( TX_{is(t-n)} \right) + \varepsilon_{ist}$$

Where $y_{ist}$ is an outcome for student $i$ in school $s$ in school year $t$. Outcomes for the 8th- and 9th-grade on-track analyses are listed in Exhibit A.7. The regression included the main variable of interest, an indicator of whether a school participated in the NSI ($NSI_{ist}$), as well as the following covariates: all of the student- ($X_{ist}$) and school-level baseline ($S_{st}$) characteristics used for matching, district-by-school year fixed effects ($\theta_{st}$) to account for differences in district policies that may have changed over time, interaction between year fixed effects for school years 2020-21 and 2021-22 and student-level baseline measures of the outcome, as well as repeater status ($TX_{is(t-n)}$) where n is the number of years since baseline). These interaction variables account for differences in the relationships between baseline and outcome variables

that may have been caused by the COVID-19 pandemic. For example, pandemic-induced declines in student test scores could cause the correlation between baseline and outcome test scores to differ before and after the onset of the pandemic. Standard errors were clustered at the school-level to account for the fact that the NSI is a school-level intervention.

### B. Regression models used to estimate impacts for the random assignment study

The regressions for the random assignment study excluded all NSI and comparison schools from the NSI school's random assignment block if *any* of the schools in the random assignment block had fewer than 16 students with non-missing outcome and baseline data for that regression.[3] The sample for this analysis included all NSI students and matched comparison students with non-missing baseline data. The analysis sample can differ across outcomes depending on the number of students with non-missing data for each outcome.

Regression models for the random assignment study were similar to the matched comparison regressions described above with a few exceptions. We included assignment block fixed effects as covariates in the regressions for the random assignment study in addition to the student-level baseline covariates included in the matched comparison regressions. Similar to the matched comparison design, each school received equal weight in the analysis. To do this, we rescaled the weight for each NSI and comparison student in the random assignment study based on the total number of students in their school who were included in the analysis. For example, we calculated the weight for a student at school *S* as 1/(total number of students at school *S* in the analysis sample).

### C. Regression models used to estimate impacts for the well-matched postsecondary analysis

We estimated student-level regression models for postsecondary enrollment and college entrance exam rates, and school-level regression models for FAFSA completion. The regression models for estimating the impact of the well-matched postsecondary NSI differ from those for 8th-grade and 9th-grade on-track NSI in the following ways:

- For the student-level analyses, we included the variables capturing district characteristics in addition to the school- and student-level variables.

- Due to restrictions in accessing student-level data provided by state education agencies, we estimated the student-level regressions separately for each state and then aggregated the impacts. This differed from the 8th- and 9th-grade on-track analyses where we estimated the impact on each outcome in a single model that combined data across all districts.

- We clustered standard errors at the district level instead of the school level.

- Because there were a relatively small number of NSI districts in Arizona and California, we excluded district-level covariates from those states' analyses because there was not enough variation across the small number of districts to reliably identify the coefficients on these variables.[4] However, we still included the district-level variables in the matching for these states and obtained good balance on most of those variables (Exhibit A.14 and Exhibit A.15). Therefore, excluding these variables from the regression models should not introduce a substantial amount of bias in the analysis.

We used a similar regression approach as the student-level analyses for the school-level analyses for FAFSA completion rates and college entrance exam taking, except that each observation was an individual school and we only included school- and district-level covariates in the model. We combined data from all three states into a single regression model for the FAFSA analysis, and state fixed effects were included as additional covariates.

### D.  Aggregation of results across states for student-level well-matched postsecondary results

Due to restrictions in accessing student-level data from state education agencies noted above, we estimated the well-matched postsecondary impacts separately for each state and then aggregated the impacts together. We calculated the overall impact for well-matched postsecondary analysis as the weighted average of the estimated impacts calculated for each state using the following formula: $\bar{\beta} = \sum_{i=1}^{n} w_i \beta_i$

Consistent with the approach of giving equal weight to each NSI school in the analysis, the weight each state's impact estimate received ($w_i$) was proportional to the number of NSI schools in the state.

We then calculated the standard error of the aggregate impact ($\bar{\beta}$) as the weighted average of standard errors of $\beta_i$ for each state using the formula below, under the assumption that the impact estimates from each state are independent of each other.

$$SE(\bar{\beta}) = \sqrt{\sum_{i=1}^{n} (w_i)^2 (SE(\beta_i))^2}$$

### E.  Group-, NSI-, and school-specific impacts

We estimated the two-year impacts separately for students who were Black, Latino, and economically disadvantaged. For the regressions to estimate impacts for each group, we used the same student-level weights as the main estimation and the same regression specification in terms of covariates and clustering.[5] To estimate the group-specific impact, we added an interaction term between the NSI indicator and the group indicator. We report the group-specific impacts as the coefficient on the NSI indicator plus the coefficient on the NSI and group interaction term.

We measured NSI-level impacts to describe the variation in impacts across NSI. We estimated a set of regressions using the same model and sample for the matched comparison regression, except we replaced the NSI indicator with a set of indicators for each NSI.

We used a similar approach for school-level impacts, except we replaced the NSI indicators with a set of indicators for each NSI school. We estimated heteroskedasticity-robust standard errors rather than clustering standard errors at the school level.

### F.  Baseline equivalence

A key assumption of the matched comparison approach is that students and schools in the NSI group and comparison group had similar characteristics and outcomes before the NSI started. Exhibits A.12 and A.13 compare the baseline characteristics and outcomes for NSI schools and comparison schools in the 8th-

and 9th-grade on-track matched comparison analysis. Standardized differences between the NSI and comparison group were below the conventional 0.25 standard deviation threshold defined by the WWC for all student and school characteristics.

Exhibits A.14 through A.17 present the baseline equivalence results for the well-matched postsecondary analysis. For the FAFSA completion rate and the college entrance exam taking rate, we only compared school- and district-level baseline characteristics because we did not have access to student-level data.

Because we matched NSI schools to comparison schools across districts, and because we performed the match on a large number of variables, the well-matched postsecondary NSI schools were not as similar to their matched comparison schools as the 8th- and 9th-grade on-track NSI schools were. However, all differences in student-level characteristics were less than 0.25 standard deviations, and only a small number of school- and district-level characteristics exceeded the 0.25 threshold.

**Exhibit A.12.** Baseline characteristics for the 8th-grade on-track analysis, by study group

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
| | Mean | Standard deviation | Comparison | Standard deviation | Difference | |
|---|---|---|---|---|---|---|
| **Students** | | | | | | |
| **Demographic characteristics** | | | | | | |
| Female | 49 | 50 | 48 | 50 | 1 | 0.01 |
| Economically disadvantaged[a] | 82 | 38 | 82 | 38 | 0 | 0.00 |
| Race/ethnicity | | | | | | |
|    Black | 46 | 50 | 46 | 50 | 0 | 0.00 |
|    Latino | 42 | 49 | 42 | 49 | 0 | 0.00 |
|    Other | 7 | 25 | 6 | 24 | 0 | 0.01 |
| English language learner | 12 | 33 | 10 | 30 | 2 | 0.06 |
| Received special education services | 18 | 39 | 15 | 36 | 3 | 0.08 |
| **Baseline outcomes** | | | | | | |
| GPA for core courses (four-point GPA scale) | 2.26 | 1.06 | 2.27 | 1.04 | -0.02 | -0.02 |
| Attendance rate | 94 | 7 | 94 | 6 | -1 | -0.09 |
| No out-of-school suspensions | 95 | 23 | 95 | 21 | -1 | -0.03 |
| Share of math and ELA courses passed | 69 | 40 | 70 | 40 | -1 | -0.02 |
| Math test score (standard deviation units) | -0.46 | 0.94 | -0.46 | 0.86 | 0.00 | 0.01 |
| ELA test score (standard deviation units) | -0.47 | 0.97 | -0.47 | 0.90 | 0.00 | 0.00 |
| Student sample size (number of students) | 8,109 | | 11,482 | | | |

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
|---|---|---|---|---|---|---|
| | Mean | Standard deviation | Comparison | Standard deviation | Difference | |
| **Schools** | | | | | | |
| Percentage economically disadvantaged students[a] | 84 | 19 | 84 | 18 | 0 | -0.02 |
| Percentage Black students | 47 | 36 | 46 | 35 | 1 | 0.02 |
| Percentage Latino students | 40 | 33 | 39 | 32 | 1 | 0.03 |
| Percentage English language learners | 13 | 13 | 12 | 11 | 1 | 0.09 |
| 8th-grade student enrollment (number of students) | 108 | 89 | 126 | 91 | -17 | -0.19 |
| Math proficiency rate | 20 | 18 | 20 | 18 | 0 | -0.03 |
| ELA proficiency rate | 30 | 20 | 29 | 19 | 1 | 0.03 |
| Chronic absenteeism rate | 18 | 16 | 17 | 15 | 1 | 0.08 |
| Suspension rate | 7 | 9 | 6 | 8 | 0 | 0.05 |
| Average GPA (four-point GPA scale) | 2.37 | 0.53 | 2.42 | 0.44 | -0.05 | -0.10 |
| Course pass rate | 74 | 17 | 75 | 14 | -1 | -0.09 |
| School sample size (number of schools) | 109 | | 227 | | | |

Source:  Administrative student records for the 2017-18 through 2021-22 school years.

Note:  Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for 10 NSI in 10 districts. For both the student- and school-level characteristics, weighted averages using the same weights as in the regression model are shown. The number in the difference column may not equal the difference between the NSI mean and comparison mean columns due to rounding.

[a] Based on data measuring free or reduced-price lunch eligibility, where available, and district-provided economically disadvantaged indicators otherwise.

**Exhibit A.13.** Baseline characteristics for the 9th-grade on-track analysis, by study group

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
|---|---|---|---|---|---|---|
| | Mean | Standard deviation | Comparison | Standard deviation | Difference | |
| **Students** | | | | | | |
| **Demographic characteristics** | | | | | | |
| Female | 49 | 50 | 49 | 50 | 1 | 0.01 |
| Economically disadvantaged[a] | 85 | 35 | 85 | 36 | 0 | 0.00 |
| Race/ethnicity | | | | | | |
| Black | 33 | 47 | 33 | 47 | 0 | 0.00 |
| Latino | 54 | 50 | 54 | 50 | 0 | 0.00 |
| Other | 11 | 31 | 11 | 31 | 0 | -0.01 |
| English language learner | 13 | 34 | 11 | 32 | 2 | 0.06 |

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
|---|---|---|---|---|---|---|
| | Mean | Standard deviation | Comparison | Standard deviation | Difference | |
| Received special education services | 21 | 41 | 18 | 38 | 3 | 0.07 |
| **Baseline outcomes** | | | | | | |
| GPA for all courses (four-point GPA scale) | 2.54 | 0.98 | 2.57 | 0.94 | -0.03 | -0.03 |
| Attendance rate | 92 | 10 | 93 | 9 | -1 | -0.07 |
| No out-of-school suspensions | 95 | 22 | 96 | 21 | -1 | -0.03 |
| Share of core courses passed | 73 | 35 | 74 | 34 | -1 | -0.04 |
| Math test score (standard deviation units) | -0.40 | 0.96 | -0.36 | 0.87 | -0.05 | -0.05 |
| ELA test score (standard deviation units) | -0.44 | 0.94 | -0.41 | 0.87 | -0.03 | -0.03 |
| Took Algebra in 8th grade | 3 | 16 | 2 | 15 | 0 | 0.02 |
| Algebra test score, among those who took Algebra in 8th grade | -0.01 | 0.18 | -0.01 | 0.13 | -0.01 | -0.04 |
| Student sample size (number of students) | 20,555 | | 26,287 | | | |
| **Schools** | | | | | | |
| Percentage economically disadvantaged students[a] | 82 | 21 | 80 | 23 | 3 | 0.12 |
| Percentage Black students | 34 | 30 | 34 | 30 | -1 | -0.02 |
| Percentage Latino students | 53 | 29 | 51 | 29 | 2 | 0.07 |
| Percentage English language learners | 15 | 13 | 13 | 11 | 3 | 0.23 |
| 9th-grade student enrollment (number of students) | 268 | 247 | 312 | 253 | -45 | -0.18 |
| Math proficiency rate | 49 | 37 | 49 | 37 | 0 | 0.00 |
| ELA proficiency rate | 55 | 37 | 56 | 36 | 0 | -0.01 |
| Chronic absenteeism rate | 27 | 18 | 26 | 17 | 2 | 0.09 |
| Suspension rate | 7 | 5 | 7 | 7 | 0 | 0.00 |
| GPA | 2.34 | 0.56 | 2.30 | 0.51 | 0.04 | 0.07 |
| Course pass rate | 66 | 18 | 65 | 16 | 1 | 0.06 |
| Percentage of 9th-graders who earned at least 5 credits | 82 | 17 | 83 | 14 | -1 | -0.05 |
| School sample size (number of schools) | 109 | | 189 | | | |

Source:   Administrative student records for the 2017-18 through 2021-22 school years.

Note:   Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for 7 NSI in 9 districts. The number in the difference column may not equal the difference between the NSI mean and comparison mean columns due to rounding.

[a] Based on data measuring free or reduced-price lunch eligibility, where available, and district-provided economically disadvantaged indicators otherwise.

**Exhibit A.14.** Baseline characteristics for the well-matched postsecondary analysis of postsecondary enrollment in colleges with at least a 50 percent graduation rate, by study group

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
| | Mean | Standard deviation | Mean | Standard deviation | Difference | |
|---|---|---|---|---|---|---|
| **Students** | | | | | | |
| **Demographic characteristics** | | | | | | |
| Female | 51 | 36 | 51 | 36 | 0 | -0.01 |
| Economically disadvantaged[a] | 79 | 28 | 79 | 28 | 0 | 0.00 |
| Race/ethnicity | | | | | | |
| Black | 19 | 30 | 19 | 30 | 0 | 0.00 |
| Latino | 70 | 33 | 70 | 33 | 0 | 0.00 |
| Other | 21 | 30 | 20 | 30 | 1 | 0.02 |
| English language learner | 26 | 32 | 22 | 31 | 3 | 0.11 |
| Received special education services | 10 | 21 | 8 | 18 | 2 | 0.12 |
| **8th-grade baseline outcomes** | | | | | | |
| Attendance rate | 97 | 3 | 97 | 2 | 0 | -0.09 |
| Suspension rate | 93 | 23 | 95 | 21 | -2 | -0.07 |
| Math test score (standard deviation units) | -0.13 | 0.66 | -0.13 | 0.61 | 0.00 | 0.00 |
| ELA test score (standard deviation units) | -0.26 | 0.67 | -0.27 | 0.61 | 0.01 | 0.02 |
| Student sample size (number of student) | 30,255 | | 24,908 | | | |
| **Schools** | | | | | | |
| Percentage economically disadvantaged students[a] | 71 | 12 | 68 | 16 | 3 | 0.21 |
| Percentage Black students | 50 | 4 | 50 | 4 | 0 | 0.06 |
| Percentage Latino students | 67 | 15 | 63 | 17 | 4 | 0.23 |
| 12th-grade enrollment (number of students) | 447 | 147 | 431 | 121 | 16 | 0.11 |
| Alternative school | 0 | 0 | 0 | 0 | 0 | 0 |

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard |
| | Mean | Standard deviation | Mean | Standard deviation | Difference | deviation units) |
|---|---|---|---|---|---|---|
| **Baseline outcomes** | | | | | | |
| Postsecondary enrollment rate in an institution with at least a 50 percent graduation rate | | | | | | |
|    One year before NSI | 12 | 6 | 12 | 5 | 0 | 0.04 |
|    Two years before NSI | 13 | 6 | 12 | 6 | 0 | 0.03 |
|    Three years before NSI | 12 | 5 | 12 | 5 | 0 | -0.02 |
| School sample size (number of schools) | 100 | | 221 | | | |
| **Districts** | | | | | | |
| Percentage economically disadvantaged students[a] | 73 | 10 | 71 | 10 | 3 | 0.26 |
| Percentage Black students | 16 | 10 | 15 | 8 | 1 | 0.16 |
| Percentage Latino students | 66 | 11 | 64 | 12 | 2 | 0.15 |
| Total district enrollment (number of students) | 68,000 | 40,000 | 73,000 | 58,000 | -5,000 | -0.11 |
| Urban district | 96 | 16 | 96 | 16 | 0 | 0.01 |
| Percentage in-person instruction | 50 | 15 | 53 | 14 | -3 | -0.24 |
| **Baseline outcomes** | | | | | | |
| Postsecondary enrollment rate in an institution with at least a 50 percent graduation rate | | | | | | |
|    One year before NSI | 11 | 3 | 12 | 3 | 0 | -0.14 |
|    Two years before NSI | 12 | 3 | 13 | 3 | 0 | -0.11 |
|    Three years before NSI | 12 | 3 | 12 | 3 | 0 | -0.16 |
| District sample size (number of districts) | 24 | | 102 | | | |

Source: Administrative student records for the 2014-15 through 2020-21 school years.

Note: The school characteristic averages are weighted by the number of NSI schools from each district entering the analysis sample, based on data for 4 NSI in 3 states. School demographic characteristics are based on school-wide averages reported in the Common Core of Data. The district characteristic averages are weighted by the number of NSI schools from each district entering the analysis sample. District demographic characteristics are based on district-wide averages reported in the Common Core of Data. Each NSI school in the analysis sample receives equal weight of the averages presented in this table. The number in the difference column may not equal the difference between the NSI mean and comparison mean columns due to rounding.

[a] Based on data measuring free or reduced-price lunch eligibility, where available, and state-provided economically disadvantaged outcomes otherwise.

**Exhibit A.15.** Baseline characteristics for the well-matched postsecondary analysis of enrollment in any college, by study group

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
|---|---|---|---|---|---|---|
| | Mean | Standard deviation | Mean | Standard deviation | Difference | |
| **Students** | | | | | | |
| **Demographic characteristics** | | | | | | |
| Female | 51 | 36 | 51 | 36 | 0 | 0.00 |
| Economically disadvantaged[a] | 79 | 28 | 79 | 28 | 0 | 0.00 |
| Race/ethnicity | | | | | | |
|    Black | 19 | 30 | 19 | 30 | 0 | 0.00 |
|    Latino | 70 | 33 | 70 | 33 | 0 | 0.00 |
|    Other | 21 | 30 | 18 | 28 | 3 | 0.10 |
| English language learner | 26 | 32 | 22 | 31 | 4 | 0.12 |
| Received special education services | 10 | 21 | 8 | 18 | 3 | 0.13 |
| **8th-grade baseline outcomes** | | | | | | |
| Attendance rate | 97 | 3 | 97 | 2 | 0 | -0.09 |
| Suspension rate | 93 | 23 | 95 | 20 | -2 | -0.09 |
| Math test score (standard deviation units) | -0.13 | 0.66 | -0.10 | 0.62 | -0.03 | -0.04 |
| ELA test score (standard deviation units) | -0.26 | 0.67 | -0.25 | 0.62 | -0.01 | -0.02 |
| Student sample size (number of students) | 30,255 | | 20,582 | | | |
| **Schools** | | | | | | |
| Percentage economically disadvantaged students[a] | 71 | 12 | 68 | 14 | 3 | 0.24 |
| Percentage Black students | 17 | 14 | 14 | 12 | 3 | 0.20 |
| Percentage Latino students | 67 | 15 | 64 | 17 | 2 | 0.14 |
| 12th-grade enrollment (number of students) | 447 | 147 | 388 | 133 | 59 | 0.41 |
| Alternative school | 0 | 0 | 0 | 0 | 0 | 0 |
| **Baseline outcomes** | | | | | | |
| Postsecondary enrollment rate | | | | | | |
|    One year before NSI | 45 | 9 | 44 | 7 | 1 | 0.14 |
|    Two years before NSI | 43 | 8 | 43 | 7 | 0 | 0.04 |
|    Three years before NSI | 42 | 9 | 43 | 8 | -1 | -0.09 |
| School sample size (number of schools) | 100 | | 195 | | | |

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
|---|---|---|---|---|---|---|
| | Mean | Standard deviation | Mean | Standard deviation | Difference | |
| **Districts** | | | | | | |
| Percentage economically disadvantaged students | 73 | 10 | 72 | 8 | 1 | 0.12 |
| Percentage Black students | 16 | 10 | 14 | 8 | 2 | 0.18 |
| Percentage Latino students | 66 | 11 | 63 | 12 | 3 | 0.24 |
| Total district enrollment (number of students) | 68,000 | 40,000 | 67,000 | 53,000 | 1,000 | 0.02 |
| Urban district | 96 | 16 | 94 | 17 | 2 | 0.13 |
| Percentage in-person instruction | 50 | 15 | 52 | 14 | -3 | -0.19 |
| **Baseline outcomes** | | | | | | |
| Postsecondary enrollment rate | | | | | | |
| One year before NSI | 43 | 4 | 42 | 5 | 1 | 0.24 |
| Two years before NSI | 41 | 3 | 40 | 5 | 1 | 0.23 |
| Three years before NSI | 40 | 3 | 41 | 4 | -1 | -0.15 |
| District sample size (number of districts) | 24 | | 97 | | | |

Source: Administrative student records for the 2014-15 through 2020-21 school years.

Note: The school characteristic averages are weighted by the number of NSI schools from each district entering the analysis sample, based on data for 4 NSI intermediaries in 3 states. School demographic characteristics are based on school-wide averages reported in the Common Core of Data. The number in the difference column may not equal the difference between the NSI mean and comparison mean columns due to rounding.

[a] Based on data measuring free or reduced-price lunch eligibility, where available, and state-provided economically disadvantaged outcomes otherwise.

**Exhibit A.16.** Baseline characteristics for the well-matched postsecondary analysis of FAFSA completion rates, by study group

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
|---|---|---|---|---|---|---|
| | Mean | Standard deviation | Mean | Standard deviation | Difference | |
| **School** | | | | | | |
| Percentage economically disadvantaged[a] | 71 | 17 | 68 | 20 | 2 | 0.13 |
| Percentage Black | 16 | 18 | 14 | 16 | 2 | 0.14 |
| Percentage Latino | 69 | 22 | 67 | 23 | 1 | 0.06 |
| 12th-grade enrollment (number of students) | 435 | 225 | 396 | 205 | 38 | 0.18 |
| **Baseline outcomes** | | | | | | |
| FAFSA completion | | | | | | |
| One year before NSI | 38 | 14 | 37 | 14 | 1 | 0.05 |
| Two years before NSI | 36 | 13 | 35 | 13 | 1 | 0.05 |
| Three years before NSI | 31 | 15 | 31 | 14 | 0 | 0.01 |
| School sample size (number of schools) | 112 | | 266 | | | |
| **Districts** | | | | | | |
| Percentage economically disadvantaged students[a] | 74 | 14 | 70 | 16 | 4 | 0.24 |
| Percentage Black students | 15 | 14 | 13 | 10 | 2 | 0.21 |
| Percentage Latino students | 67 | 17 | 65 | 19 | 2 | 0.10 |
| Total district enrollment (number of students) | 67,000 | 57,000 | 68,000 | 75,000 | -1,000 | -0.02 |
| Urban district | 95 | 23 | 93 | 26 | 2 | 0.08 |
| Percentage in-person instruction | 48 | 25 | 54 | 26 | -6 | -0.23 |
| **Baseline outcomes** | | | | | | |
| FAFSA completion | | | | | | |
| One year before NSI | 35 | 6 | 34 | 5 | 1 | 0.18 |
| Two years before NSI | 33 | 6 | 33 | 6 | 0 | 0.02 |
| Three years before NSI | 28 | 8 | 29 | 7 | 0 | -0.04 |
| District sample size (number of districts) | 27 | | 121 | | | |

Source: Administrative student records for the 2015-16 through 2021-22 school years.

Note: School and district demographic characteristics are based on averages reported in the Common Core of Data. Table includes data based on 4 NSI in 3 states. The number in the difference column may not equal the difference between the NSI mean and comparison mean columns due to rounding.

[a] Based on data measuring free or reduced-price lunch eligibility, where available, and state-provided economically disadvantaged outcomes otherwise.

**Exhibit A.17.** Baseline characteristics for the well-matched postsecondary analysis of college entrance exam taking, by study group

| Characteristics (percentage unless otherwise noted) | NSI | | Comparison | | | Standardized difference (standard deviation units) |
|---|---|---|---|---|---|---|
| | Mean | Standard deviation | Mean | Standard deviation | Difference | |
| **School** | | | | | | |
| Percentage economically disadvantaged students[a] | 72 | 17 | 67 | 21 | 4 | 0.22 |
| Percentage Black students | 22 | 21 | 20 | 16 | 2 | 0.10 |
| Percentage Latino students | 64 | 22 | 62 | 21 | 2 | 0.09 |
| **Baseline outcomes** | | | | | | |
| SAT/ACT exam taking rate | | | | | | |
| One year before NSI | 96 | 11 | 96 | 10 | 0 | -0.01 |
| Two years before NSI | 96 | 12 | 95 | 12 | 1 | 0.05 |
| Three years before NSI | 94 | 12 | 95 | 11 | 0 | -0.04 |
| School had 100% exam taking rate | 74 | 44 | 71 | 45 | 3 | 0.06 |
| School sample size (number of schools) | 69 | | 102 | | | |
| **Districts** | | | | | | |
| Percentage economically disadvantaged students[a] | 75 | 15 | 75 | 13 | 0 | 0.00 |
| Percentage Black students | 21 | 15 | 19 | 11 | 1 | 0.11 |
| Percentage Latino students | 62 | 16 | 63 | 16 | -1 | -0.05 |
| Total district enrollment (number of students) | 90,000 | 61,000 | 102,000 | 77,000 | -12,000 | -0.17 |
| Urban district | 94 | 24 | 98 | 15 | -3 | -0.18 |
| Percentage in-person instruction | 61 | 21 | 65 | 17 | -4 | -0.20 |
| **Baseline outcomes** | | | | | | |
| SAT/ACT exam taking rate | | | | | | |
| One year before NSI | 95 | 11 | 93 | 10 | 2 | 0.21 |
| Two years before NSI | 94 | 13 | 93 | 12 | 1 | 0.07 |
| Three years before NSI | 93 | 12 | 91 | 11 | 1 | 0.12 |
| District sample size (number of districts) | 14 | | 37 | | | |

Source:   Administrative student records for the 2016-17 through 2020-21 school years.

Note:    School and district demographic characteristics are based on in the Common Core of Data. Table includes data for 2 NSI in Texas. The number in the difference column may not equal the difference between the NSI mean and comparison mean columns due to rounding.

[a] Based on data measuring free or reduced-price lunch eligibility, where available, and state-provided economically disadvantaged outcomes otherwise.

**Bayesian interpretation of impacts**

The main report describes the statistical significance of the impact estimates using $p$-values. This section presents an alternative approach to statistical inference known as BAyeSian Interpretation of Estimates (BASIE). This approach provides additional information for understanding the likelihood that the NSI impacts were larger than various thresholds (Deke et al. 2022). BASIE uses findings from education studies to determine the probability that education interventions have effects of different sizes. In the absence of additional information, this prior distribution of effects is the best information available on whether a given education intervention is likely to be effective. The study team used the BASIE tool from the U.S. Department of Education's Institute of Education Sciences to obtain an updated posterior distribution that describes the likelihood that NSI participation in the study's context led to positive effects, given what was observed in this study's data and the findings from previous studies.

We present the BASIE results for the two-year impacts of the 8th-grade and 9th-grade on-track NSI in Exhibit A.18 and for the well-matched postsecondary NSI in Exhibit A.19. We show the probability that the impact of participating in an NSI is positive, positive and at least moderately sized (above 0.05 standard deviations), positive and large (greater than at least 0.2 standard deviations), negative, and negative and at least moderately sized (less than -0.05 standard deviations). We interpret probabilities between 35 and 65 percent to be relatively close to even odds and have more uncertainty. Probabilities closer to 100 percent indicate impacts of that size are increasingly likely, while those closer to zero percent indicate impacts of that size are increasingly unlikely.

The main report describes how the 8th-grade on-track NSI did not impact student outcomes. Exhibit A.18 confirms that the probability the 8th-grade on-track NSI had a moderate positive effect is low (no higher than 22 percent). The BASIE results suggest there is a higher chance the impact of these NSI on ELA test scores and attendance rates is small and positive. The table also shows that there is a very high probability that the 9th-grade on-track NSI had a moderate impact on GPA, the share of core courses passed, and earning sufficient credits for promotion to 10th grade. In addition, the BASIE results suggest that there is a low probability these NSI had moderate positive impacts on attendance and out-of-school suspension rates.

Exhibit A.19 shows there is a relatively low likelihood that well-matched postsecondary NSI had a moderate impact on postsecondary enrollment but a 55 percent probability they had a moderate impact on FAFSA completion rates.

**Exhibit A.18.** Probability that effects of NSI on 8th- and 9th-grade on-track outcomes after two years of implementation exceed various magnitudes

| Outcome | Effect | p-value | Probability that the true effect is: | | | | |
|---|---|---|---|---|---|---|---|
| | | | Moderate and negative (less than -0.05) | Negative (less than 0) | Positive (greater than 0) | Moderate (greater than 0.05) | Large (greater than 0.2) |
| **8th-grade on-track outcomes** | | | | | | | |
| GPA for core courses | 0.01 | 0.67 | 2 | 34 | 66 | 12 | 0 |
| Share of math and ELA courses passed | -0.01 | 0.71 | 11 | 60 | 40 | 4 | 0 |
| Math test score | -0.01 | 0.87 | 7 | 55 | 45 | 5 | 0 |
| ELA test score | 0.01 | 0.66 | 1 | 30 | 70 | 9 | 0 |
| Attendance rate | 0.03 | 0.42 | 1 | 19 | 81 | 22 | 0 |
| Share of students with no suspensions | -0.04 | 0.39 | 30 | 78 | 22 | 2 | 0 |
| **9th-grade on-track outcomes** | | | | | | | |
| GPA for all courses | 0.11 | 0.00 | 0 | 0 | 100 | 100 | 0 |
| Share of core courses passed | 0.12 | 0.00 | 0 | 0 | 100 | 100 | 0 |
| Share of 9th-grade students earning at least 5 credits | 0.10 | 0.00 | 0 | 0 | 100 | 97 | 0 |
| Attendance rate | 0.01 | 0.57 | 0 | 27 | 73 | 7 | 0 |
| Share of students with no suspensions | 0.03 | 0.39 | 1 | 19 | 81 | 26 | 0 |

Source: Administrative student records for the 2017-18 through 2021-22 school years.

**Exhibit A.19.** Probability that effects of NSI on well-matched postsecondary enrollment measures after two years of implementation exceed various magnitudes

| Outcome | Effect | p-value | Probability that the true effect is: | | | | |
|---|---|---|---|---|---|---|---|
| | | | Moderate and negative (less than -0.05) | Negative (less than 0) | Positive (greater than 0) | Moderate (greater than 0.05) | Large (greater than 0.2) |
| Postsecondary enrollment in an institution with at least a 50 percent graduation rate | 0.04 | 0.08 | 0 | 4 | 96 | 29 | 0 |
| Postsecondary enrollment in any institution | -0.01 | 0.81 | 5 | 57 | 43 | 2 | 0 |
| FAFSA completion rate as of December of the senior year | 0.05 | 0.01 | 0 | 1 | 100 | 55 | 0 |

Source:   Administrative student records for the 2014-15 through 2021-22 school years.

# Appendix B:
# Additional Details About the Study Findings

This section includes additional details about the findings presented in the main report and analyses that test the sensitivity of the findings.

## Outcomes prioritized by the NSI

The Bill & Melinda Gates Foundation identified a set of outcomes for each outcome area, and each NSI focused on a subset of these outcomes. We describe the number of NSI that focused on each outcome to better understand how impacts of the NSI may be related to these focal outcomes. As shown in Exhibit B.1, all 11 of the 8th-grade on-track NSI in the analysis focused on one or more course- or achievement-related outcomes. Only three NSI focused on a behavioral outcome—all three focused on attendance rates and two focused on suspension rates.

**Exhibit B.1.** Outcomes prioritized by the 8th-grade on-track NSI
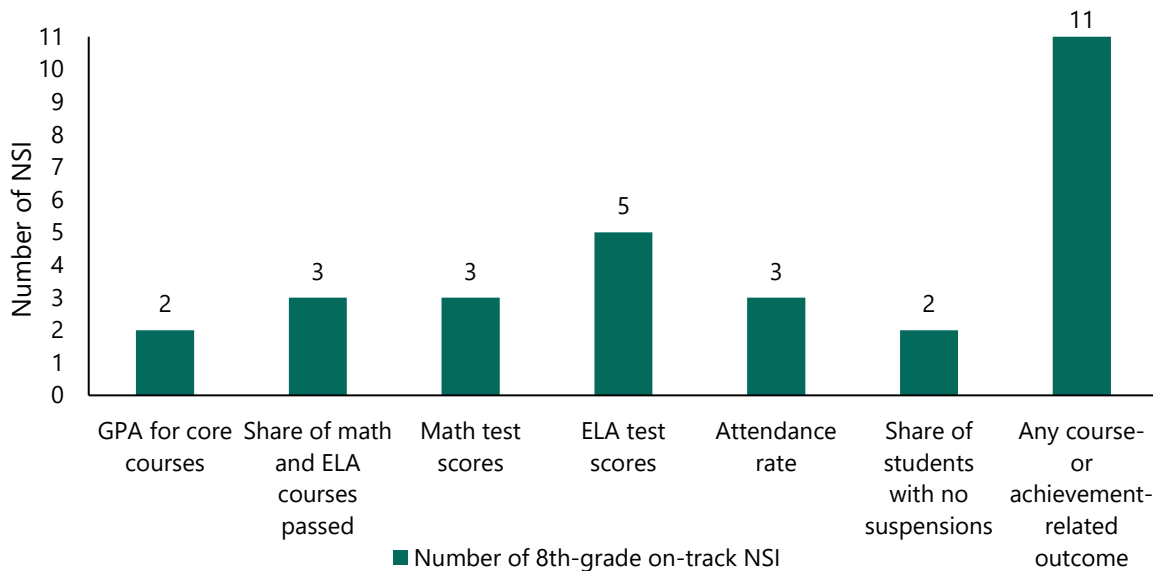


Source:   The Bill & Melinda Gates Foundation's project officers for the NSI initiative.
Notes:    The sample consists of 11 8th-grade on-track NSI.

Exhibit B.2 shows that the 9th-grade on-track NSI also had a strong focus on academic outcomes. Seven of the eight NSI focused on at least one course-related outcome. The one NSI that did not focus on any course-related outcome focused on ELA proficiency. None of these NSI prioritized suspension rates and only two focused on attendance.

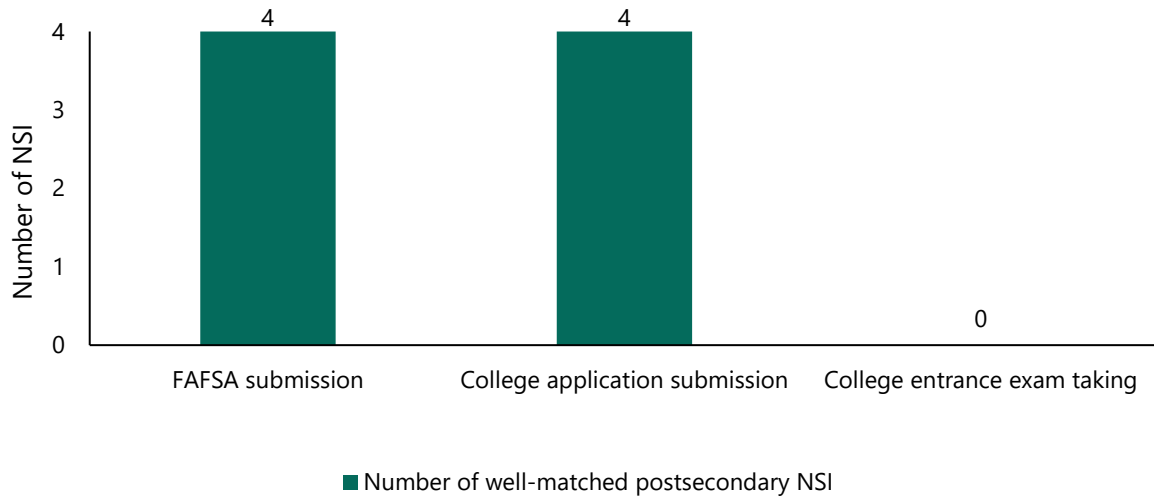**Exhibit B.2.** Outcomes prioritized by the 9th-grade on-track NSI
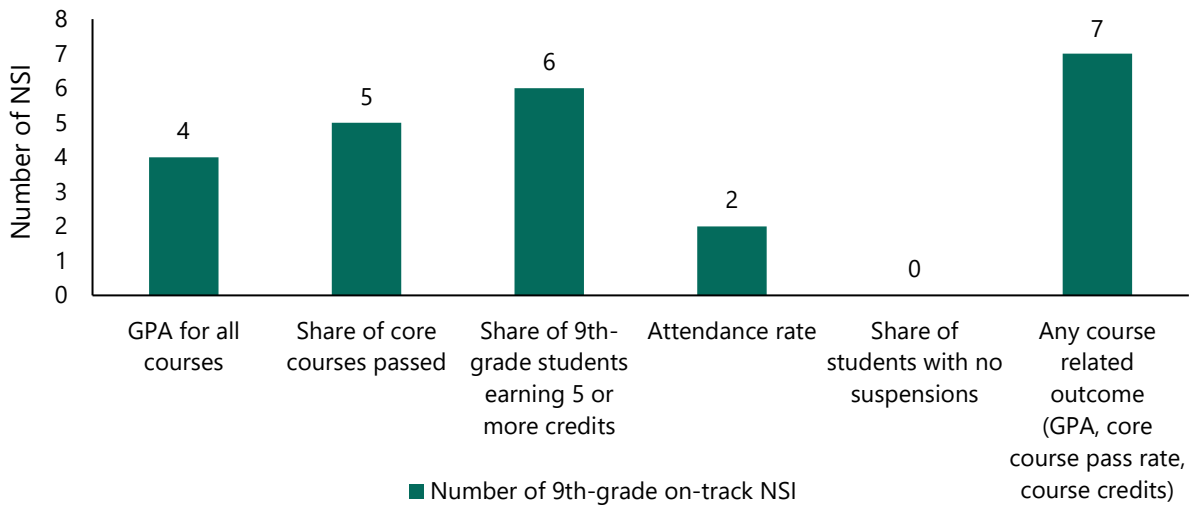


Source: The Bill & Melinda Gates Foundation's project officers for the NSI initiative.

Notes: The sample consists of eight 9th-grade on-track NSI.

The four well-matched postsecondary NSI in the analysis focused on both completing the FAFSA and submitting college applications (Exhibit B.3). None of these NSI focused on college entrance exam taking.

**Exhibit B.3.** Outcomes prioritized by the well-matched postsecondary NSI



Source: The Bill & Melinda Gates Foundation's project officers for the NSI initiative.

Notes: The sample consists of four well-matched postsecondary NSI.

### Findings based on random assignment study

**The findings from the random assignment study were consistent with the findings from the matched comparison analyses for the 8th- and 9th-grade on-track NSI.** While the main report describes impacts for the 8th- and 9th-grade on-track NSI based on the matched comparison analysis, this section describes impacts based on the random assignment study. The random assignment study included the subset of 8th- and 9th-grade on-track NSI that received a cohort 3 NSI grant.

After two years of participation, the 8th-grade on-track NSI in the random assignment study did not have a statistically significant impact on GPA, course pass rate, math or ELA test scores, attendance rate, or suspension rates (Exhibit B.4).

**Exhibit B.4.** Impacts of 8th-grade on-track NSI on students in schools' second year of participation based on the random assignment study
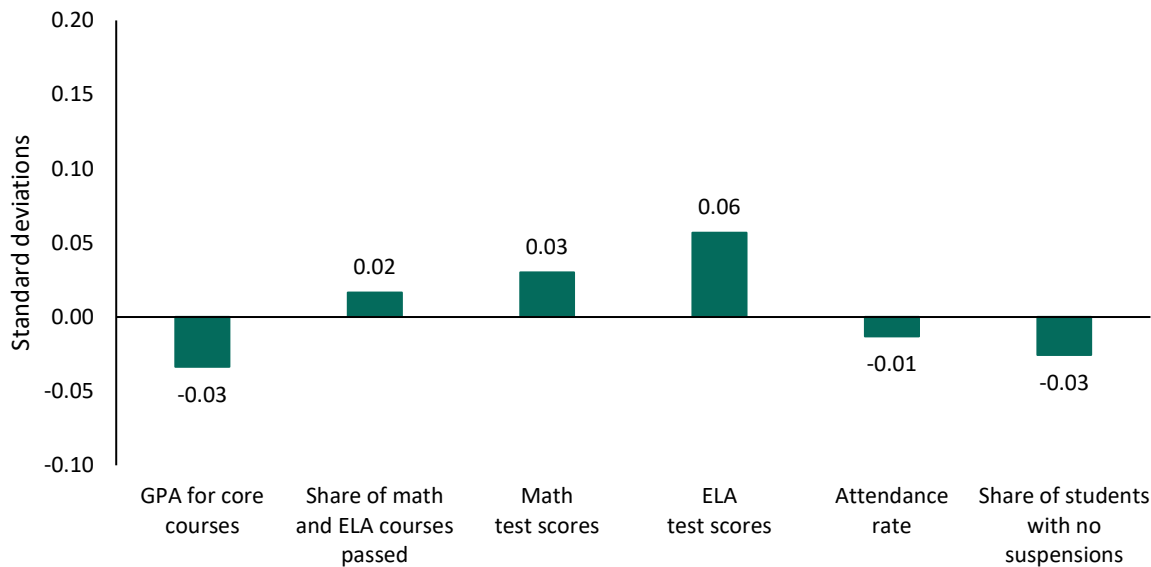


Source:  Administrative student records for the 2019-20 through 2021-22 school years.

Notes:  Differences between NSI schools and comparison schools were not statistically significant at the 0.05 level. The sample consists of 43 to 47 NSI schools, depending on the outcome. Suspensions refer to out-of-school suspensions.

After two years of participation, the 9th-grade on-track NSI in the random assignment study had positive impacts on GPA, core course pass rate, and credit completion (Exhibit B.5). These impacts are moderate in size and similar to the findings from the matched comparison analysis.

The random assignment study also found moderate impacts of the 9th-grade on-track NSI on attendance. These impacts are equivalent to a 2-percentage point increase in students' attendance rate from 79 to 81 percent.

**Exhibit B.5.** Impacts of 9th-grade on-track NSI on students in schools' second year of participation based on the random assignment study
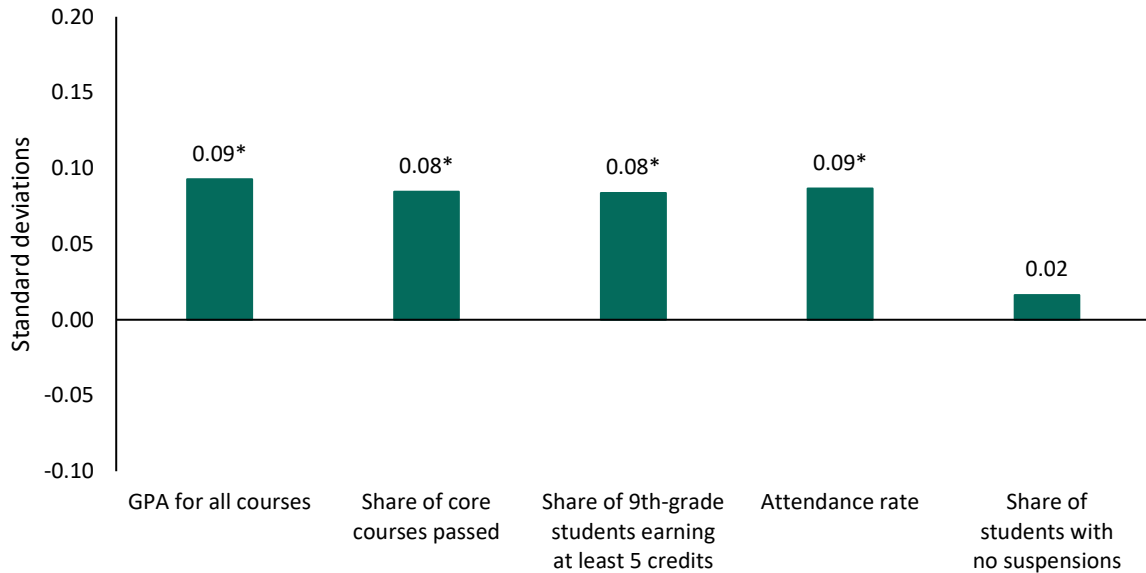


Source:   Administrative student records for the 2019-20 through 2021-22 school years.

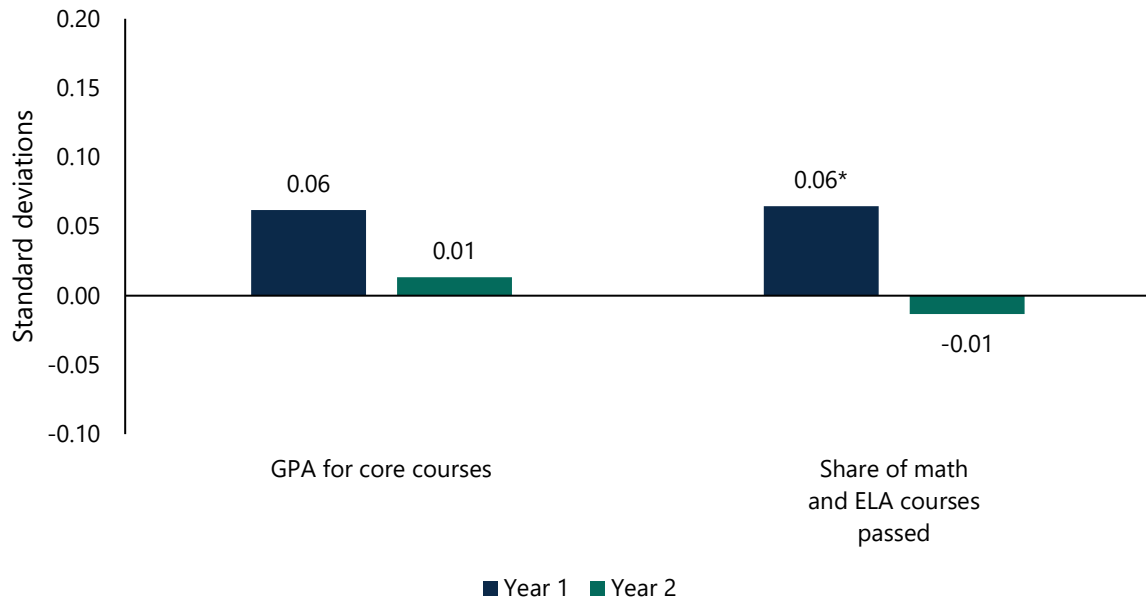Notes:    The sample consists of 32 NSI schools. Suspensions refer to out-of-school suspensions.

* Difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test.

## Change in impacts between schools' first and second year of participation for a consistent set of schools

The main report described how the impacts of the NSI changed between schools' first and second years of participation. The analysis in the main report included all NSI schools, regardless of how many years the schools participated in the NSI. As a result, the sample of schools in the year 1 impacts could differ from the sample in the year 2 impacts (for NSI schools that had only participated for one year, or for which data was only available for one year because of the COVID-19 pandemic). This section compares impacts after schools' first and second years of participation for the subset of schools that participated in the NSI for two years. This approach ensures that any changes from year 1 to year 2 are due to changes in impacts over time and not differences in the schools included in the year 1 and year 2 impact analyses.

**The changes in impacts from schools' first to second year of participation were similar when including all NSI schools and just those that participated for two years.** Similar to the findings based on all schools, the 8th-grade on-track NSI had a larger impact in year 1 than in year 2 for GPA and the share of math and ELA courses passed when focusing on the subset of NSI schools that participated for two years and for which data were available in both years (Exhibit B.6). We are not able to compare impacts on the other 8th-grade on-track outcomes for a consistent sample of schools because the COVID-19 pandemic affected the availability of these data.

**Exhibit B.6.** Impacts of the 8th-grade on-track NSI on student outcomes, by years of school participation for a consistent set of schools
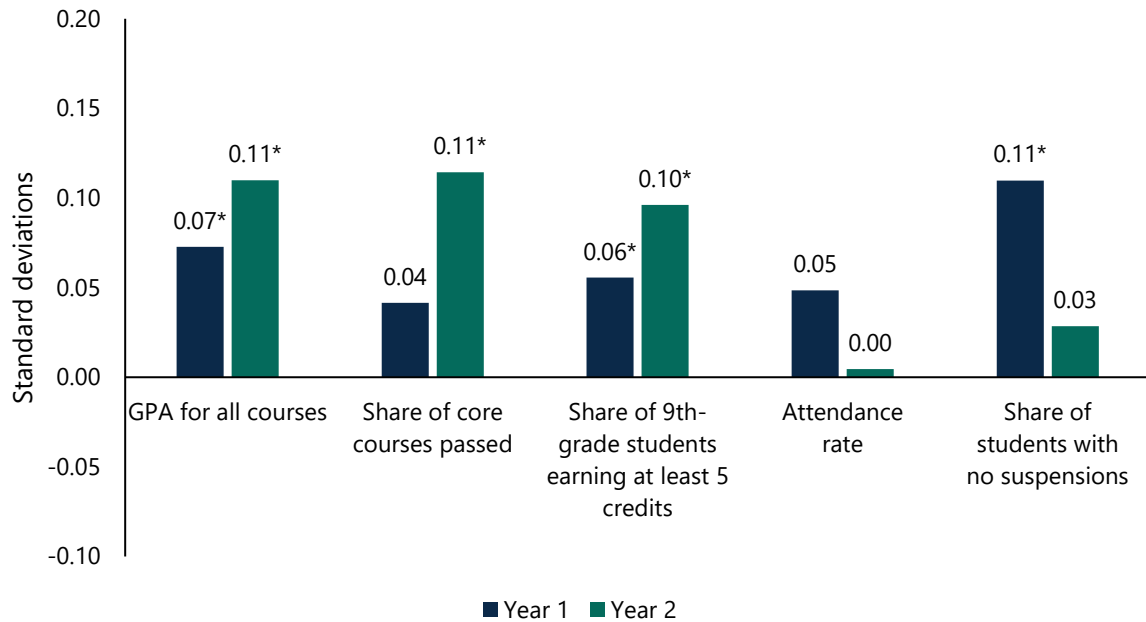


Source:   Administrative student records for the 2017-18 through 2021-22 school years.
Notes:    The sample consists of 109 NSI schools.
* Difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test.

When focusing on a consistent set of NSI schools, the impact of the 9th-grade on-track NSI on course-related outcomes appeared to increase over time (Exhibit B.7). This finding is similar to the finding in the main report that compared outcomes across years 1 and 2 for all NSI schools. However, the impacts on attendance and suspension rates differ from the main report—when focusing on a consistent sample of NSI schools, the impacts also appear to decrease over time for these outcomes. Results from the main report found no changes over time for these outcomes when including all NSI schools in the analysis. The difference in findings may be due to changes in the schools included in the analysis when including a consistent sample over time compared to the full sample, or it may be due to the small sample of schools that had data on attendance and suspension rates for both the first and second year of participation (only 33 NSI schools due to the pandemic's effect on the availability of data).

**Exhibit B.7.** Impacts of the 9th-grade on-track NSI on student outcomes, by years of school participation for a consistent set of schools
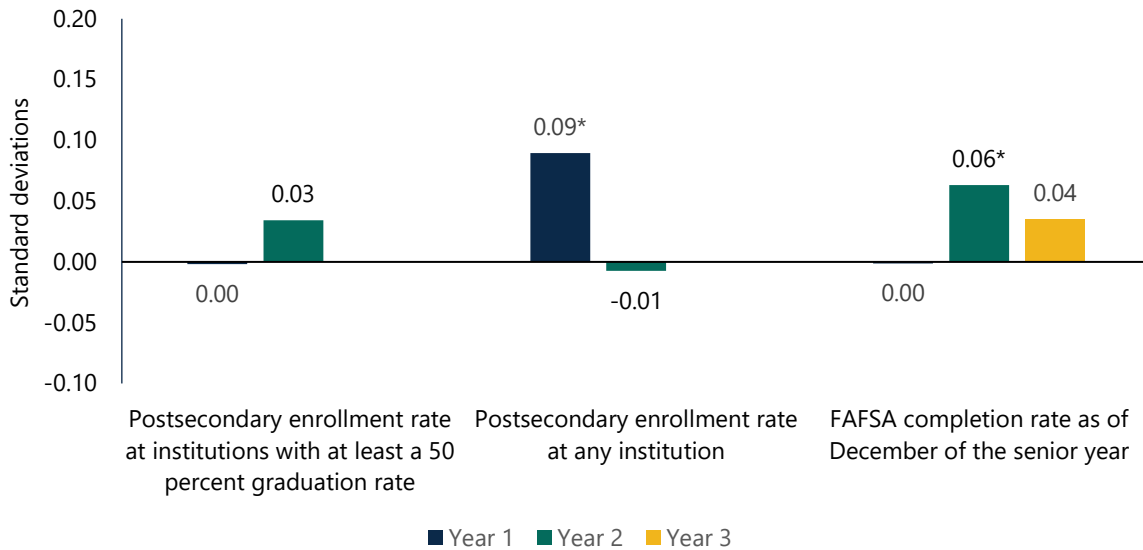


Source:   Administrative student records for the 2017-18 through 2021-22 school years.

Notes:   The sample consists of 108 NSI schools for the course-related outcomes (GPA, share of core courses passed, and share of students earning at least 5 credits), and 33 NSI schools for attendance and suspension outcomes. Suspensions refer to out-of-school suspensions.

* Difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test.

The change in impact from schools' first to second year of participation was similar when including all well-matched postsecondary NSI schools (Exhibit 16) and the subset of schools that participated for two years (Exhibit B.8). Similar to the main analysis of FAFSA completion, we also examined impacts on FAFSA completion after three years using a consistent set of schools, because we have three years of FAFSA data for most NSI schools in the analysis.

**Exhibit B.8.** Impacts of well-matched postsecondary NSI on student outcomes, by years of school participation for a consistent set of schools



Source: Administrative student records for the 2014-15 through 2021-22 school years.

Notes: The sample consists of 98 NSI schools for the postsecondary enrollment outcomes and 102 NSI schools for FAFSA completion.
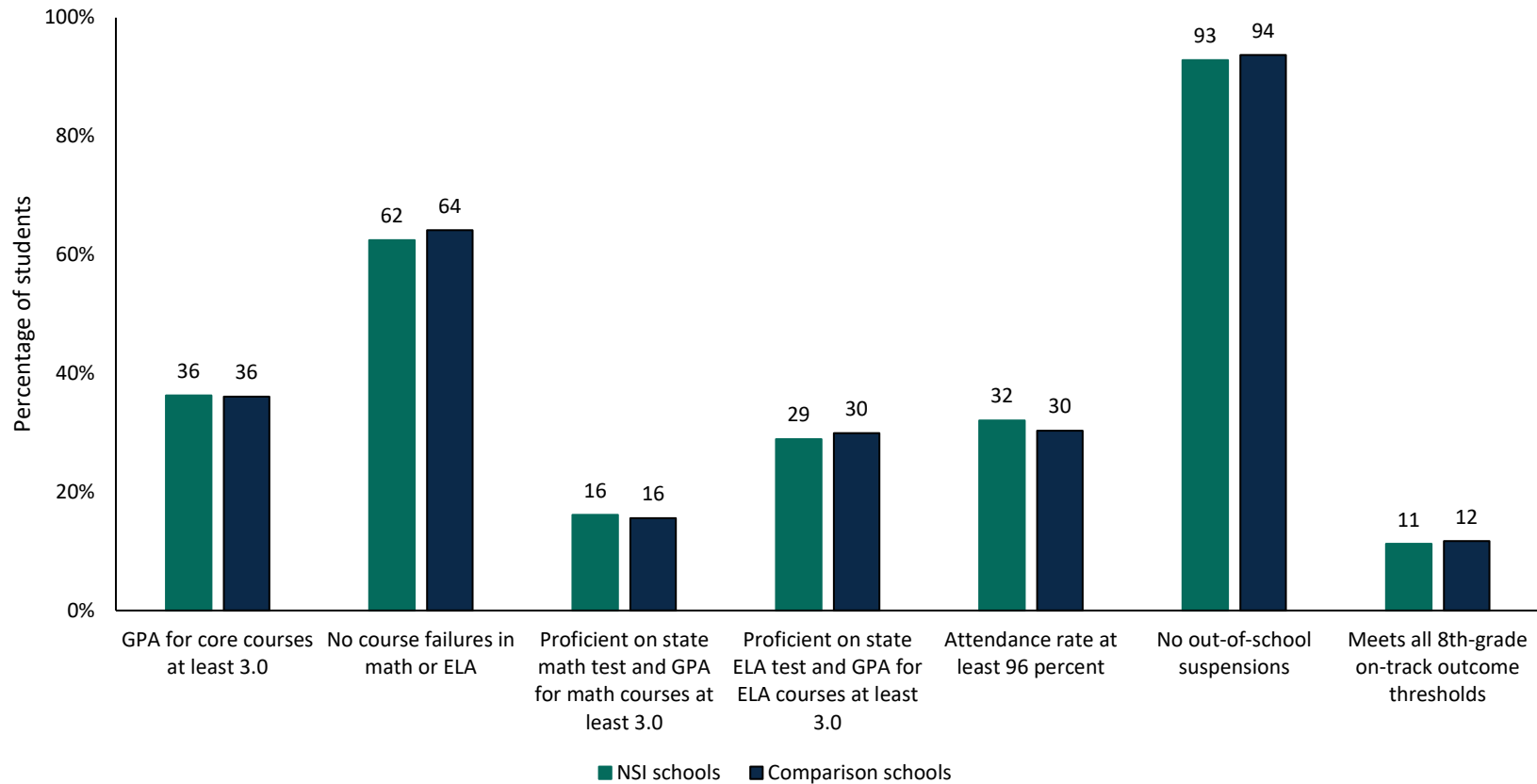
* Difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test.

## Impacts of the NSI on the proportion of students meeting on-track thresholds

**The 8th-grade on-track NSI did not impact the proportion of students who were on track for high school graduation**. The foundation focused the 8th-grade on-track NSI on a set of outcomes that previous research suggests are strong predictors of whether students are on track to graduate high school. To determine whether the NSI increased the proportion of students who were on track, the foundation set thresholds for each outcome that determined whether a student was on track. In addition to examining impacts on continuous versions of the outcomes, we also examined impacts on the proportion of students meeting the foundations' on-track threshold for each outcome and the proportion meeting the thresholds for all outcomes.

Consistent with the findings in the main report that showed the 8th-grade on-track NSI did not impact continuous versions of the student outcomes, these NSI also did not have a statistically significant impact on the proportion of students meeting any of the outcome thresholds (Exhibit B.9). The differences between NSI schools and comparison schools were small and not statistically significant.

**Exhibit B.9.** Impact of the 8th-grade on-track NSI on the percentage of students meeting 8th-grade on-track thresholds after two years of participation
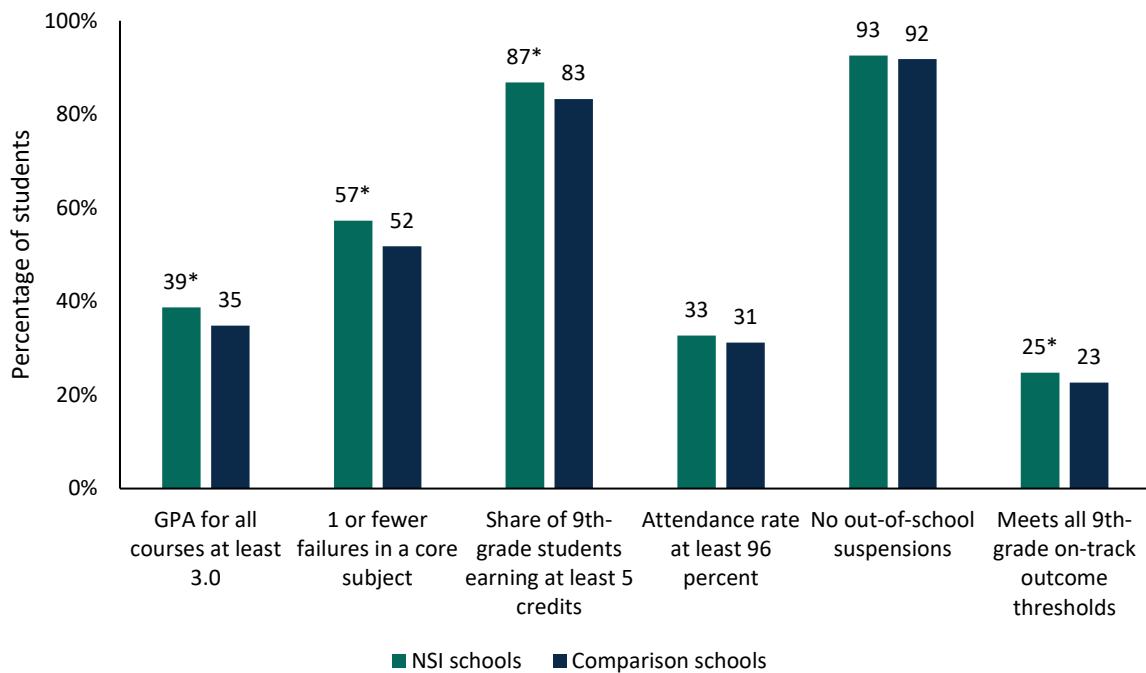


Source: Administrative student records for the 2017-18 through 2021-22 school years.

Notes: Differences between NSI schools and comparison schools were not statistically significant at the 0.05 level. The sample consists of 77 to 109 NSI schools depending on the outcome. Sample sizes differ across outcomes due to issues in data availability during the COVID-19 pandemic. Additionally, students in two districts had the option of taking the 8th-grade end-of-year exam or an Algebra I end-of-course exam. We excluded students who took the Algebra I exam from the analysis of math test scores due to small sample sizes. This reduces the sample of NSI schools for the math analysis if nearly all 8th-grade students in a school take Algebra I. Suspensions refer to out-of-school suspensions.

**The 9th-grade on-track NSI had a positive impact on the proportion of students who were on track for high school graduation.** The 9th-grade on-track NSI increased the proportion of students who met all of the on-track thresholds by 2 percentage points, from 23 to 25 percent (Exhibit B.10). Similar to findings in the main report that showed impacts on each outcome (Exhibit 7), the NSI had a positive impact on the proportion of students meeting the on-track thresholds for GPA, core course pass rates, and credit completion. The NSI did not impact the proportion of students who were on track based on student attendance or out-of-school suspensions.

**Exhibit B.10.** Impacts of the 9th-grade on-track NSI on the percentage of students meeting 9th-grade on-track thresholds after two years of participation



Source: Administrative student records for the 2017-18 through 2021-22 school years.

Notes: The sample consists of 83 to 109 NSI schools depending on the outcome. Sample sizes differ across outcomes due to issues in data availability during the COVID-19 pandemic. Suspensions refer to out-of-school suspensions.

* Difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test.

## Sensitivity checks and additional analyses

We checked the sensitivity of the study results to different study design decisions and conducted additional analyses not included in the main report. This section describes the results of the sensitivity checks and additional analyses.

**Impacts of the NSI on FAFSA completion rate for students who are Black, Latino, and experiencing poverty.** We were unable to measure the impact of the well-matched postsecondary NSI on FAFSA completion rates separately for students who were Black, Latino, or economically disadvantaged because student-level data on FAFSA completion were not available. To understand whether impacts may have been higher or lower for these groups of students, we conducted a version of the main regression analysis for FAFSA completion that included an interaction term between the NSI indicator and the school-level

share of students from each group. This analysis found that the NSI impacts were not related to the proportion of Black, Latino, or economically disadvantaged students in schools (Exhibit B.11; none of the interaction terms in the regression analysis were statistically significant). This suggests that the impact of the NSI on students who were Black, Latino, or experiencing poverty was similar to the impact of the NSI on all students.

**Exhibit B.11.** Assessing evidence of impacts for well-matched postsecondary NSI on FAFSA completion rate on students who were Black, Latino, or economically disadvantaged students after schools' second year of participation

| Variable | Estimated coefficient on the NSI indicator (percentage points) | Standard error (percentage points) | Estimated coefficient on the NSI indicator and school-level student share (percentage points) | Standard error (percentage points) |
|---|---|---|---|---|
| Black | 3.0* | 1.4 | -3.4 | 4.5 |
| Latino | 4.5 | 2.9 | -2.9 | 4.7 |
| Economically disadvantaged | 6.9* | 2.5 | -6.3 | 3.6 |

Source:   Administrative student records from the 2015-16 through 2021-22 school years.

Notes:   The sample consists of 112 NSI schools for each of the three analyses. Results are based on three separate regression models where interaction terms are added to the main regression model.

* Difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test.

**Impact of the 8th-grade on-track NSI on student outcomes when controlling for 6th-grade baseline measures instead of 7th-grade baseline measures.** Some of the middle schools participating in 8th-grade on-track NSI worked with teachers in 6th, 7th, and 8th grades rather than focusing on 8th-grade teachers. For these schools, it is possible that participating in the NSI affected their 6th- and 7th-grade students. Our analysis in the main report measures impacts of the NSI in 8th grade and does not capture any effects of the NSI when students were in 7th grade (because we control for students' 7th-grade baseline characteristics and outcomes). This could reduce the estimated effect of the NSI in 8th grade because the analysis does not incorporate growth caused by participating in the NSI the year before.

We conducted a sensitivity analysis that measured the impact of the NSI across 7th and 8th grade by using students' baseline characteristics from 6th grade instead of 7th grade. We focused on measuring impacts of the NSI on 8th-grade outcomes after two years. We used 6th grade as the baseline year because the schools were not yet participating in the NSI when 8th-grade students were in 6th grade.

The impact of the 8th-grade on-track NSI did not substantially change when using baseline characteristics from 6th grade rather than 7th grade. Similar to the main findings, the impacts of the NSI on most outcomes were small and not statistically significant.

**Measuring impacts on June FAFSA completion rates.** The main report describes the impact of the well-matched postsecondary NSI on FAFSA completion by December of students' 12th-grade year. The impact on FAFSA completion by December could result from (1) an overall increase in FAFSA completion rates, or (2) an increase in the proportion of students completing the FAFSA by December (with the proportion of students completing the FAFSA by the end of the school year remaining the same). We examined impacts of the NSI on FAFSA completion rates by June of students' 12th-grade year to see if the NSI increased the

overall proportion of students completing the FAFSA or the timing of when they completed it. Similar to the results in the main report, the well-matched postsecondary NSI increased the proportion of students completing the FAFSA by June in schools' first and second year of participation, but not in schools' third year of participation (Exhibit B.12).

**Exhibit B.12.** Impacts of well-matched postsecondary NSI on FAFSA completion in December and June of students' senior year, by years of NSI participation
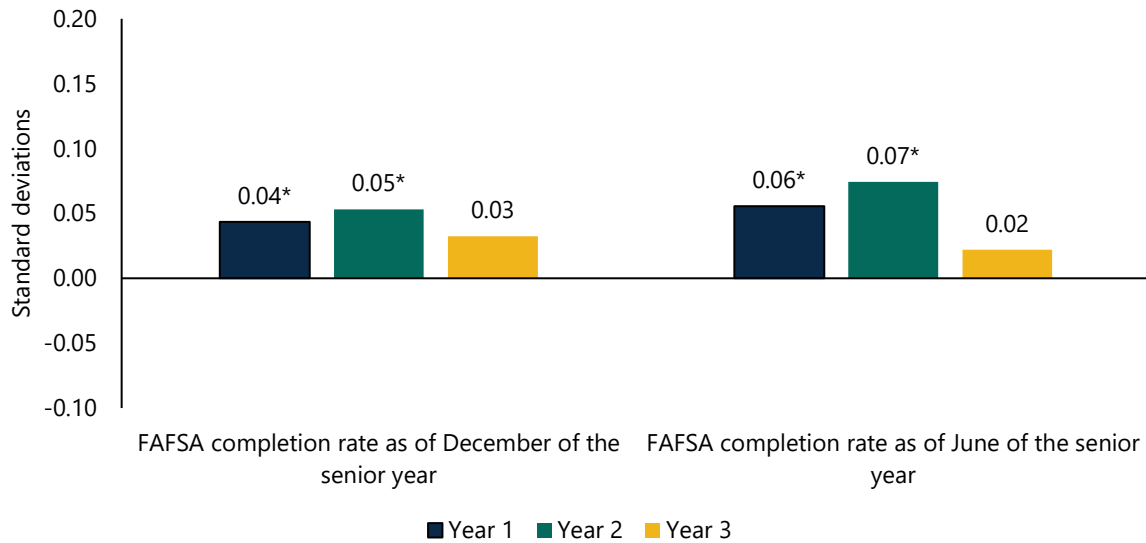


Source: Administrative student records from the 2015-16 through 2021-22 school years.

Notes: The sample consists of 143 NSI schools in year 1, 112 NSI schools in year 2, and 102 NSI schools in year 3 for the FAFSA completion rate as of December, and 141 NSI schools in year 1, 110 NSI schools in year 2, and 99 NSI schools in year 3 for the FAFSA completion rate as of June. Sample sizes differ across outcomes because of differences in the timing of when data are available.

\* Difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test.

**Measuring impacts on college entrance exam taking.** Although the foundation included college entrance exam taking as a focal outcome for the well-matched postsecondary enrollment NSI, the main report does not describe impacts on this outcome. We excluded college entrance exam taking rates from the main analysis because it was not a relevant outcome in the states where the well-matched postsecondary enrollment NSI implemented their grants (California, Arizona, and Texas). In California, the state's public universities no longer require that students submit a college entrance exam score (University of California Office of the President 2020). Therefore, taking the ACT or SAT is less important for the college application process for many students in California. In Arizona the ACT is currently the state's school accountability measure for 11th-grade students (Arizona Department of Education 2022). Given that all students are required to take the ACT, one would not expect the NSI intervention to impact college entrance exam taking rates in Arizona.

There are also potential issues with analyzing ACT or SAT taking as an outcome for NSI schools in Texas. Many state universities made these exams optional for college admissions in Texas after the COVID-19 pandemic (McGee 2022). In addition, many districts offer SAT testing days where the assessment is offered to all 11th- or 12th-grade students for free during school hours (Texas Education Agency 2023).

The proportion of students in our sample taking either the ACT or SAT was roughly 95 percent across Texas schools, and at least 70 percent of NSI and comparison schools had 100 percent of students taking the ACT or SAT. This means there is little room for the NSI schools to increase ACT or SAT exam taking rates. Impacts on this measure might only be observed if ACT or SAT exam taking rates declined in the NSI or comparison groups.

Despite these limitations, we present the impacts of the well-matched postsecondary enrollment NSI on college entrance exam taking rates in Texas. The NSI did not impact college entrance exam taking rates in Texas in schools' first or second year of participation (Exhibit B.13). The NSI schools had a higher proportion of students taking a college entrance exam than comparison schools, but this difference was not statistically significant. These results are consistent with the fact that none of the well-matched postsecondary enrollment NSI focused on that outcome.

**Exhibit B.13.** Impacts of well-matched postsecondary NSI on college entrance exam taking, by years of school participation
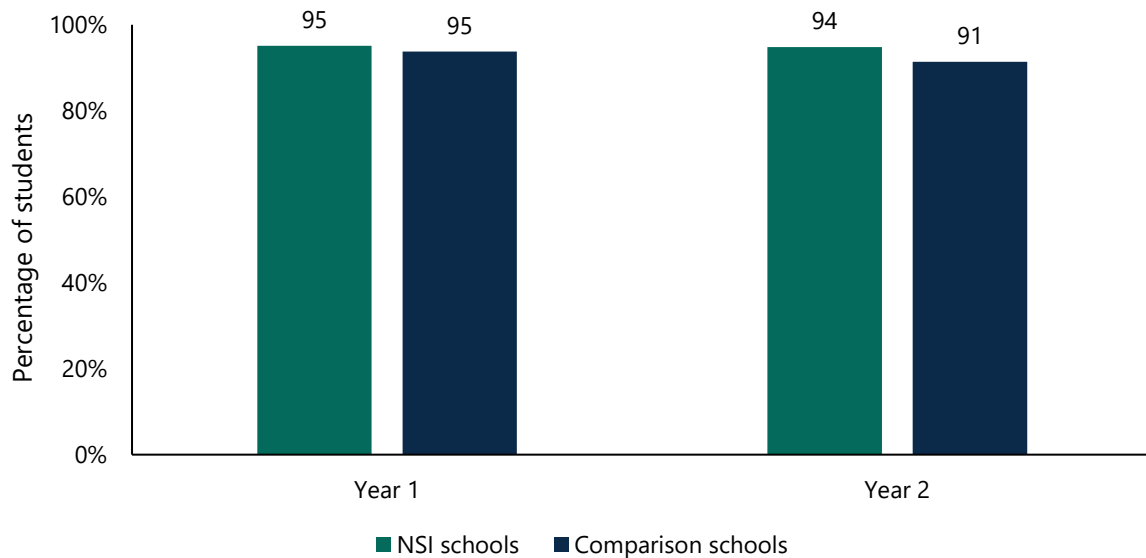


Source: Administrative student records from the 2016-17 through 2020-21 school years.
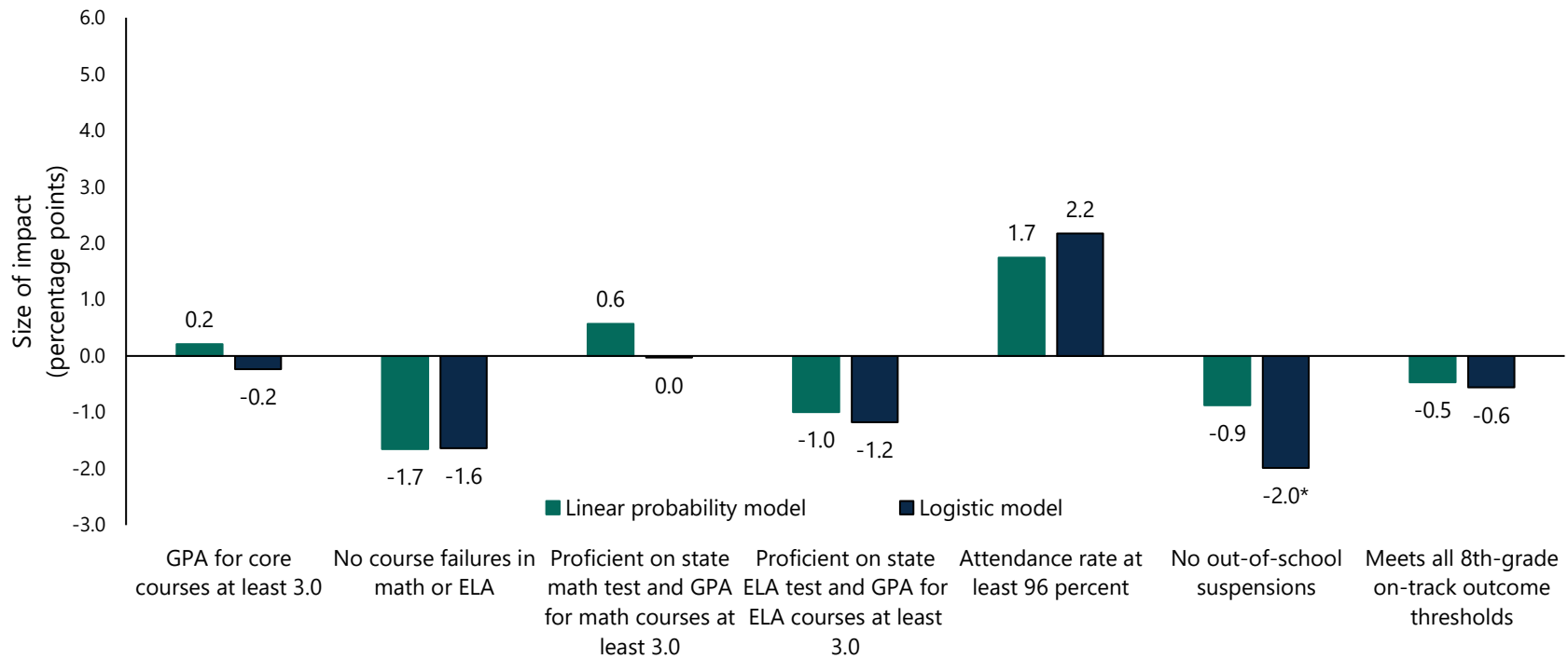
Notes: Differences between NSI schools and comparison schools were not statistically significant at the 0.05 level. The sample consists of 78 NSI schools in year 1 and 69 NSI schools in year 2.

**Logistic models for binary outcomes for the 8th- and 9th-grade on-track analyses.** As a sensitivity check, we estimated the impact of the 8th- and 9th-grade on-track NSI on binary outcomes using a logistic model instead of a linear probability model. Logistic models and linear probability models often lead to similar results in terms of estimated impacts (Hellevik 2009; Angrist and Pischke 2009; Wooldridge 2010). However, there are certain cases where the results from the two approaches can differ—for example, when the probability of an outcome is close to zero or one (Long 1997).

In the main analysis, we used the linear probability model because it is easier to interpret. Because some outcomes such as the share of students meeting all 8th-grade on-track indicator thresholds and the share of students receiving no suspensions were close to zero or one hundred percent, we also checked

whether these results were sensitive to the choice of analysis model by estimating a logistic model for the 8th- and 9th-grade on-track threshold analysis. We found that the results were similar when using the logistic model (Exhibit B.14 and B.15). The bars in Exhibit B.14 and B.15 show the estimated impact of the NSI on the share of students meeting each on-track threshold, measured in percentage points.

**Exhibit B.14.** Impacts of 8th-grade on-track NSI on the percentage of students meeting on-track thresholds after two years after implementation, linear probability model and logistic model
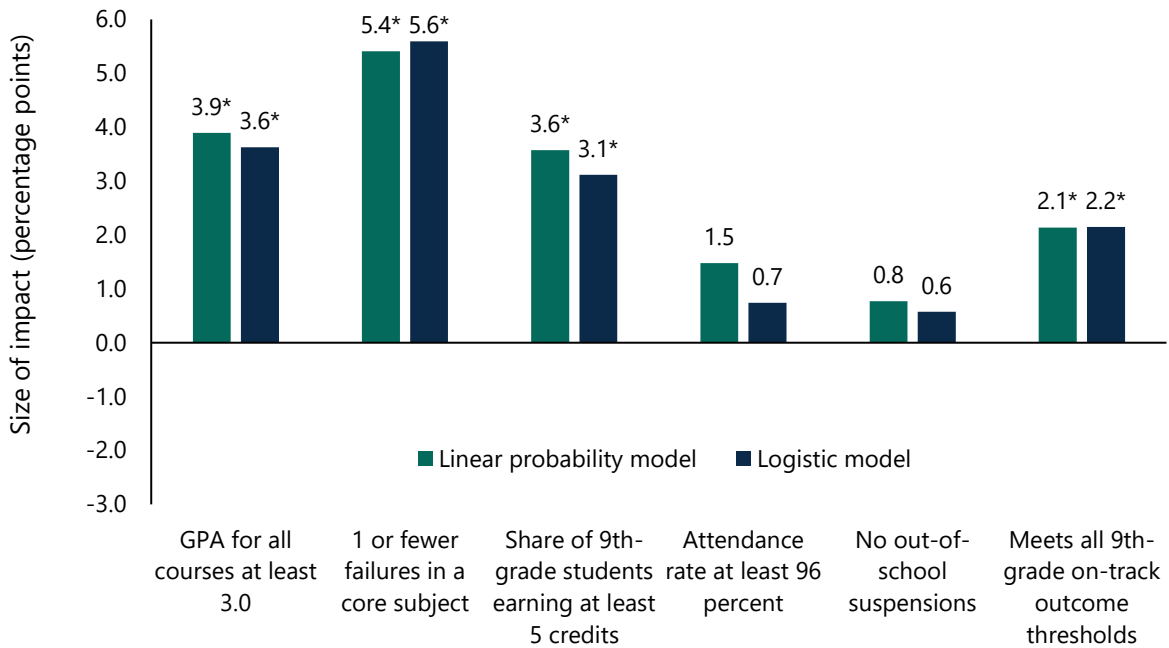


Source:   Administrative student records from the 2017-18 through 2021-22 school years.

Note:   This figure compares the estimated impacts, measured in percentage point units, between the linear probability regression model used in the main analyses and a logistic regression model.  The sample consists of 77 to 109 NSI schools depending on the outcome. Sample sizes differ across outcomes due to issues in data availability during the COVID-19 pandemic.

* Difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test.

**Exhibit B.15.** Impacts of 9th-grade on-track NSI on the percentage of students meeting on-track thresholds after two years after implementation, linear probability model and logistic model



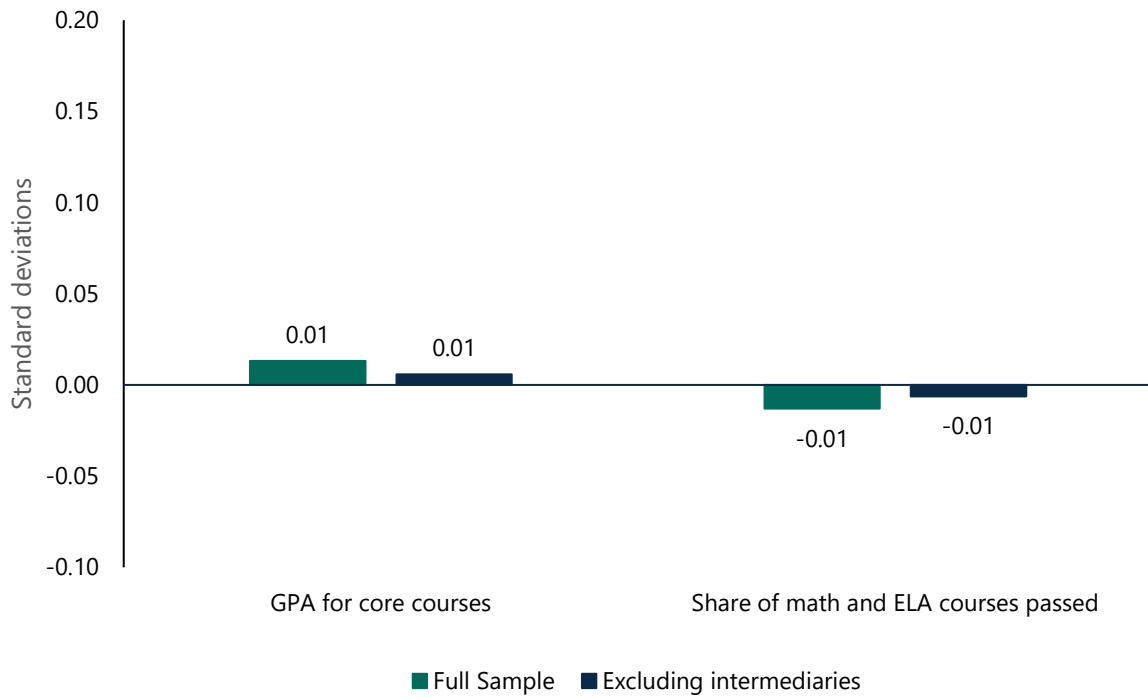Source:   Administrative student records from the 2017-18 through 2021-22 school years.

Note:   This figure compares the estimated impacts, measured in percentage point units, between the linear probability regression model used in the main analyses and a logistic regression model.  The sample consists of 83 to 109 NSI schools depending on the outcome. Sample sizes differ across outcomes due to issues in data availability during the COVID-19 pandemic.

\* Difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test.

## Excluding intermediaries with equitable grading practices from the 8th- and 9th-grade on track analyses

The main report notes that some NSI tested change ideas related to equitable grading practices. Two 8th-grade on-track NSI and three 9th-grade on-track NSI focused on implementing change ideas related to equitable grading policies. Because these change ideas could influence the impact of the NSI on course-related outcomes, we estimated impacts on the course-related outcomes when excluding these intermediaries from the sample. Exhibits B.16 and B.17 show that the impact estimates after dropping these intermediaries from the sample are very similar to the results based on the full sample.

**Exhibit B.16.** Effects of NSI on 8th-grade on-track outcomes after two years of implementation, excluding intermediaries with equitable grading practices



Source:   Administrative student records for the 2017-18 through 2021-22 school years.

Notes:   Differences between NSI schools and comparison schools were not statistically significant at the 0.05 level. The sample consists of 109 NSI schools for the full sample and 93 NSI schools after excluding intermediaries with equitable grading practices.

**Exhibit B.17.** Effects of NSI on 9th-grade on-track outcomes after two years of implementation, excluding intermediaries with equitable grading practices
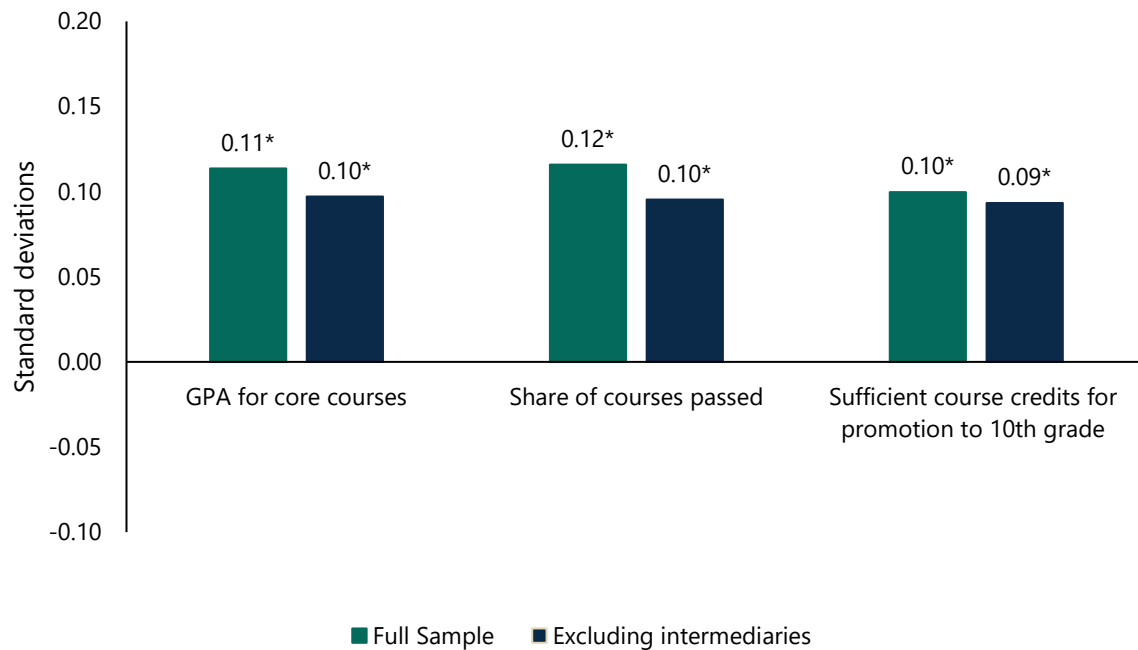


Source: Administrative student records for the 2017-18 through 2021-22 school years.

Notes: The sample consists of 109 NSI schools for the full sample and 82 NSI schools after excluding intermediaries with equitable grading practices.

* Difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test.

**Variation in impacts across NSI.** The main report described the extent to which NSI varied in their impacts on student outcomes. To examine the extent of variation across NSI in their two-year impacts, we tested whether the differences in impacts across NSI were statistically significant. Exhibit B.18 shows that the variation in impacts across NSI were statistically significant for three 8th-grade on-track outcomes (math test scores, ELA test scores, and attendance rate), one 9th-grade on-track outcome (attendance rate), and two well-matched postsecondary outcomes (postsecondary enrollment in an institution with at least a 50 percent graduation rate and FAFSA completion rates).

**Exhibit B.18.** Tests of statistical significance for the variation in impacts across NSI

| | Number of NSI | p-value |
|---|---|---|
| **8th-grade on-track outcomes** | | |
| GPA for core courses | 10 | 0.09 |
| Share of math and ELA courses passed | 10 | 0.38 |
| Math test scores | 7 | 0.04 |
| ELA test scores | 7 | 0.01 |
| Attendance rate | 8 | 0.01 |
| Share of students with no suspensions | 8 | 0.22 |
| **9th-grade on-track outcomes** | | |
| GPA for all courses | 7 | 0.87 |
| Share of core courses passed | 7 | 0.50 |
| Share of 9th-grade students earning at least 5 credits | 7 | 0.59 |
| Attendance rate | 6 | 0.01 |
| Share of students with no suspensions | 6 | 0.26 |
| **Well-matched postsecondary outcomes** | | |
| Postsecondary enrollment in an institution with at least a 50 percent graduation rate | 4 | 0.02 |
| Postsecondary enrollment in any institution | 4 | 0.30 |
| FAFSA completion rates as of December of the senior year | 4 | 0.00 |

Source:  Administrative student records for the 2014-15 through 2021-22 school years.

Notes:  Results are based on an F-test of equality of impacts after each regression for the 8th-grade on-track, 9th-grade on-track, and FAFSA completion outcomes. For the two college enrollment outcomes where impacts of each NSI are calculated from separate regression models using data from each state, the p-values are based on an analysis of variance (ANOVA) test for significant differences. NSI are excluded from these significance tests if they had fewer than five schools entering the two-year impact analysis.

# Appendix C:
## List of Intermediaries and Networks in the NSI Initiative

**Exhibit C.1.** Key details for the intermediaries and networks in the NSI initiative

| Intermediary name | Network name | Cohort | Entry point | Outcome domain | Included in the RQ1 analysis | Included in the RQ2 analysis | Included in the RQ3 analysis |
|---|---|---|---|---|---|---|---|
| Access ASU | Arizona Meta Network (AZ Meta Network) | 2 | Well-matched postsecondary | Well-matched postsecondary | X | X | X |
| American Institutes for Research | Florida Network for School Improvement (FNSI) | 1B | Instructional | College-ready on track | | | X |
| American Institutes for Research | Long Beach Network for School Improvement (LBNSI) | 3 | Instructional | 8th-grade on track | X | X | X |
| Baltimore City Public Schools | 9th Grade On Track to Graduate Improvement Network (OTG Network) | 3 | Early warning and response | 9th-grade on track | X | X | X |
| Baltimore City Public Schools | Baltimore Secondary Literacy Improvement Community Network (BSLIC) | 1 | Instructional | 8th-grade on track; 9th-grade on track | X | X | X |
| Bank Street College of Education | Brooklyn South Network for School Improvement (BKS NSI) | 3 | Instructional | 8th-grade on track | X | X | X |
| Bank Street College of Education | Yonkers Public Schools Network for School Improvement (YPS NSI) | 2 | Instructional | 8th-grade on track | | | |
| BARR Center | BARR Network for School Improvement (BARR) | 1B | Early warning and response | College-ready on track | X | X | X |
| California Education Partners | On-Track Improvement Collaborative | 1 | Early warning and response | 8th-grade on track; 9th-grade on track | | | |
| City Year | City Year Network for School Improvement (City Year NSI) | 2 | Early warning and response | 8th-grade on track | | | X |
| The Commit Partnership | Promise Network for School Improvement (Promise Network) | 1B | Well-matched postsecondary | Well-matched postsecondary | X | X | X |
| Connecticut RISE Network | Connecticut RISE Network (RISE or RISE Network) | 2 | Early warning and response | 9th-grade on track | X | X | |
| CORE | Breakthrough Success Community (BTSC) Cohort 1 | 1 | Early warning and response | 9th-grade on track | X | X | X |
| CORE | Breakthrough Success Community (BTSC) Cohort 3 | 3 | Early warning and response | 9th-grade on track | X | X | X |

| Intermediary name | Network name | Cohort | Entry point | Outcome domain | Included in the RQ1 analysis | Included in the RQ2 analysis | Included in the RQ3 analysis |
|---|---|---|---|---|---|---|---|
| Denver Public Schools | College Ready On Track Network (NIC) | 1B | Instructional | College-ready on track | X | X | X |
| Eskolta School Research and Design | Eskolta Network | 2 | Instructional | College-ready on track | | | |
| High Tech High Graduate School of Education | CARE Network | 3 | Instructional | 8th-grade on track | X | X | X |
| High Tech High Graduate School of Education | CARPE College Access Network (CARPE) | 1 | Well-matched postsecondary | Well-matched postsecondary | X | X | X |
| Institute for Learning | Dallas ISD/IFL Network for School Improvement (Dallas ISD/IFL NSI) | 1 | Instructional | 8th-grade on track; 9th-grade on track | | | |
| KIPP Foundation | Academics and Counseling Excellence Network (ACE Network) | 2 | Well-matched postsecondary | College-ready on track; well-matched postsecondary | | | |
| New Tech Network | NTN College Access Network | 1B | Well-matched postsecondary | Well-matched postsecondary | X | X | X |
| New Visions for Public Schools | College Readiness Network for School Improvement (CR NSI) | 1 | Early warning and response | 9th-grade on track | X | X | X |
| New Visions for Public Schools | Instructional Network for School Improvement (INSI) | 3 | Instructional | 9th-grade on track | X | X | X |
| New York City Department of Education | Networked Improvement Community for Multilingual Learners (CL ML NIC) | 2 | Instructional | 8th-grade on track | | | X |
| Partners in School Innovation | East Side Alliance Transformation Network (ESA Transformation Network) | 2 | Instructional | 8th-grade on track | X | X | |
| Partners in School Innovation | Middle Grade Improvement Team Network | 2 | Instructional | 8th-grade on track | X | X | X |
| Partners in School Innovation | Middle Grades Success Network | 2 | Instructional | 8th-grade on track | X | X | X |
| Partners in School Innovation | On-Track for Success Network | 2 | Instructional | 8th-grade on track | X | X | X |

| Intermediary name | Network name | Cohort | Entry point | Outcome domain | Included in the RQ1 analysis | Included in the RQ2 analysis | Included in the RQ3 analysis |
|---|---|---|---|---|---|---|---|
| Teach Plus | Teacher-Led Network for School Improvement in Chicago | 3 | Instructional | 8th-grade on track | X | X | X |
| Teaching Matters | Teaching Matters Network for School Improvement (Teaching Matters NSI) | 3 | Instructional | 8th-grade on track | X | X | X |
| Texas Network for School Improvement | Texas Network for School Improvement (TXNSI) | 2 | Instructional | 8th-grade on track | | | |
| Tulare County Office of Education | Central Valley Networked Improvement Community: College-Ready (CVNIC: College-Ready) | 3 | Instructional | College-ready on track | X | X | X |
| UChicago Network for College Success | Chicago School Partner Network or Network for College Success (NCS) | 1 | Early warning and response | 9th-grade on track | X | X | X |
| UChicago Network for College Success | Freshman Success for Equity Improvement Network (FS4EIN) | 3 | Early warning and response | 9th-grade on track | X | X | X |

# Appendix D:
# Glossary

This glossary provides definitions of key terms pertaining to networks and continuous improvement as they are typically used in the Networks for School Improvement (NSI) initiative.

**Aim statement.** An aim statement articulates the goal for an improvement effort. An aim states what the network participants are trying to accomplish. An aim statement should clearly specify how much, for whom, and by when.[6] Aim statements can be generated at various organizational levels (e.g., team-specific or network-wide).

**Change idea.** A change idea is a specific practice or intervention that a CI team tests during inquiry cycles. Change ideas are typically designed to meet the goal outlined in the aim statement, focusing on the drivers that guide the network's theory of improvement.

**Cohort.** A cohort is a group of NSI grants that the Bill & Melinda Gates Foundation awarded around the same time. The foundation awarded the NSI grants in three cohorts: Cohort 1 grants were awarded in 2018, Cohort 1B and 2 grants were awarded in 2019, and Cohort 3 grants were awarded in 2020.

**Continuous improvement.** Continuous improvement (CI) is a process in which practitioners engage in iterative cycles of inquiry by defining local problems of practice, testing potential change ideas, studying the results, and improving on those change ideas.

**Continuous improvement team—referred to as CI team.** A group of educators that engage in CI (e.g., conduct root cause analysis and disciplined inquiry cycles) to address a local problem of practice.

**Educational equity**. Educational equity means providing students with resources, experiences and environments—allocated based on circumstances and needs—so that students have equal access to opportunities for success. One of the major goals of the NSI initiative is to promote educational equity for Black and Latino students and students experiencing poverty. Intermediaries and the CI teams they support were charged with applying an equity lens to all CI processes, such as the setting of aims and the development of change ideas.

**Entry point.** The foundation categorized the networks into three entry points based on their aim statements and change ideas (Bill & Melinda Gates Foundation 2021). The entry points are instructional, early warning and response, and well-matched postsecondary. The foundation defines the entry points as follows:

- **Instructional NSI** work with math or English-language-arts teams within schools, often including instructional coaches, special-education teachers, and English learner/multilingual teachers, to improve the quality of instruction within classrooms.

- **Early Warning and Response NSI** work with grade-level or cross-functional teams within schools to create more supportive school environments, where young people are connected to adults, each other, and the school community.

- **Well-Matched Postsecondary NSI** work with school-based teams of counselors, service providers, district and school leaders, teachers, and other staff on evidence-based strategies and processes that support postsecondary application, enrollment, and persistence.

**Intermediary.** An organization that received an NSI grant and is responsible for the facilitation and support of one or more networks and their activities. When multiple organizations work collectively to organize or support the network and its participants, we refer to the collective group as the intermediary.

**Inquiry cycles.** Inquiry cycles are repeated, iterative tests of change conducted by network participants. Inquiry cycles may be broken into four stages—Plan-Do-Study-Act (PDSA)—that entail the following:

- Selecting a change idea and developing a plan that determines how it will be tested (Plan)

- Implementing the change idea and collecting relevant data (Do)

- Assessing the results based on the collected data (Study)

- Using the results to determine whether to adapt, abandon, or adopt the change idea (Act).

Some intermediaries use other conceptualizations of inquiry cycles—for example, Partners for School Innovation base its work on Results-Oriented Cycles of Inquiry (ROCI). Cycles may have three or five stages, rather than four, or the separate stages may not be clearly defined. During each cycle, outcomes are compared with predictions, and discrepancies between the two become a major source of learning.

**Knowledge Management System (KMS).** A knowledge management system is as a digital platform used to organize, maintain, and share the knowledge, learning, and experiences of NSI participants.

**Network**. A network is a group including a facilitating organization and multiple schools that work together to share knowledge and practice.

**Network for School Improvement (NSI).** An NSI is a network funded by the Bill & Melinda Gates Foundation. An NSI is a group of intermediary staff and CI teams that work together to share knowledge and practice to produce more equitable student outcomes. An NSI may contain sub-networks of practitioners based on a variety of factors (e.g., school district, year in which schools entered the network).

**On-track threshold.** A threshold set by the Bill & Melinda Gates Foundation for each outcome used to measure whether a student is on-track to graduate high school and enroll in college. For example, students earning a grade point average (GPA) of 3.0 or higher are considered to be on track with respect to their GPA.

**Outcome area.** Each intermediary focused its grant on improving student outcomes in one or more of the following areas:

- **8th- or 9th-grade on track:** The proportion of 8th- or 9th-grade students who meet a set of academic and behavioral outcomes related to high school graduation and college enrollment.

- **College-ready on track:** The proportion of 11th- and 12th-grade students who are on track academically to enroll in a college with a graduation rate of at least 50 percent.

- **Well-matched postsecondary enrollment:** The proportion of 12th-grade students who complete the steps needed to enroll in a college with a graduation rate of at least 50 percent.

**Root cause.** A root cause is an underlying reason for an educational challenge. Network participants identify root causes to help them understand the systems that produce inequitable outcomes for Black

students, Latino students, and students experiencing poverty within their local setting.

**Theory of improvement.** A theory of improvement includes a set of interrelated hypotheses about how changes in certain practices or policies could lead to improved student outcomes.[7] A theory of improvement guides the work of the network and evolves as educators conduct and learn from inquiry cycles.

# References

Angrist, J.D., and J.S. Pischke. "Mostly Harmless Econometrics: An Empiricist's Companion." Princeton University Press, 2009.

Arizona Department of Education. "Assessments Overview – 2021-2022 School Year." 2022. https://www.azed.gov/sites/default/files/2021/07/Assessments%20Overview%20-%202021%20and%20Beyond.pdf.

Bai, Y. "Optimality of Matched Pair Designs in Randomized Controlled Trials." *American Economic Review, vol. 112*, no. 12, 2020, pp. 3911–3940. doi:10.1257/aer.20201856.

Bill & Melinda Gates Foundation. "Lessons from Networks for School Improvement: School Year 2020-2021." 2021. https://usprogram.gatesfoundation.org/-/media/usp/usp-resources/k12-resources/gatesfoundation_nsibrief-finalpdf.pdf.

Brunner, J. "Texas Public High School Graduates' Out-of-State College Matriculation: Class of 2011-2015." Texas Higher Education Coordinating Board, 2017. https://reportcenter.highered.texas.gov/reports/data/special-interest-brief-texas-public-high-school-graduates-out-of-state-college-matriculation/.

Cameron, A.C., and D.L. Miller. "Practitioner's Guide to Cluster-Robust Inference." *Journal of Human Resources*, vol. 50, no. 2, 2015, pp. 317–372.

Deke, J., M. Finucane, and D. Thal. "The BASIE (BAyeSian Interpretation of Estimates) Framework for Interpreting Findings from Impact Evaluations: A Practical Guide for Education Researchers." NCEE 2022-005. U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, 2022. https://ies.ed.gov/ncee/pubs/2022005/.

Hellevik, O. "Linear Versus Logistic Regression When the Dependent Variable Is a Dichotomy." *Quality & Quantity*, vol. 43, 2009, pp. 59–74.

Long, J.S. "Regression Models for Categorical and Limited Dependent Variables." *Advanced Quantitative Techniques in the Social Sciences*, vol. 7, 1997.

McGee, K. "The Pandemic Showed Some Texas Universities That They Didn't Need the SAT. They Might Never Go Back." *The Texas Tribune*, April 26, 2022. https://www.texastribune.org/2022/04/26/texas-universities-sat-act-test/.

Texas Education Agency. "SAT." 2023. https://tea.texas.gov/academics/college-career-and-military-prep/sat.

University of California Office of the President. "University of California Board of Regents Unanimously Approved Changes to Standardized Testing Requirement for Undergraduates." University of California, 2020. https://www.universityofcalifornia.edu/press-room/university-california-board-regents-unanimously-approved-changes-standardized-testing#:~:text=For%202023%20and%202024%2C%20UC,for%20the%20statewide%20admissions%20guarantee.

What Works Clearinghouse. "Procedures and Standards Handbook, Version 5.0." U.S. Department of Education, 2022. https://ies.ed.gov/ncee/WWC/Docs/referenceresources/Final_WWC-HandbookVer5_0-0-508.pdf.

Wooldridge, J.M. "Econometric Analysis of Cross Section and Panel Data." MIT Press, 2010.

# Endnotes

[1] In this report and appendix, we use the term "Latino" to refer to students who listed their ethnicity as "Hispanic." We standardized test scores using state means and standard deviation for all districts and years, except for two district-year combinations where state means and standard deviations were unavailable.

[2] We report student-level standard deviations of the school characteristics, which may appear to be low because all students in the same school have the same value of each school characteristic. Some differences in school characteristics may therefore appear large in standard deviation units, even if the magnitude of the overall difference is small. For example, the difference between students at NSI and comparison schools in the baseline school chronic absenteeism rate for the 8th-grade on-track analysis is 0.50 in standard deviation units, but this is only a 3 percentage point difference in the chronic absenteeism rate.

[3] The term "block" refers to the groups that schools were placed into before random assignment. In most cases schools were grouped into pairs, but in some cases where districts had odd numbers of schools, we formed blocks of three schools.

[4] A small number of districts can, in some cases, cause traditional methods of clustering standard errors to result in standard errors that are too small (Cameron and Miller 2015). Therefore, we tested calculating the standard error of the impact estimates using on a small-cluster adjustment formula defined in the WWC Standards and Procedures, Version 5.0 (WWC 2022). To be conservative, we took the larger of the two standard error values as the standard error for the impact estimates, which in our case was the standard error based on the traditional clustering method.

[5] We excluded one district from the analysis of impacts by student group because it did not provide data on whether students were economically disadvantaged.

[6] https://www.carnegiefoundation.org/resources/learning-to-improve-glossary/.

[7] https://www.carnegiefoundation.org/resources/learning-to-improve-glossary/.