

Evaluation of the Networks for School Improvement (NSI) Initiative

NSI Impacts on Students and the Aspects of NSI
Implementation Related to Impacts

FINAL REPORT APPENDIX

April 2026 (updated July 2026)

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Appendix A

Additional Details for the Impact Analysis: Study Design, Data, and Analysis Methods

This appendix provides additional details on the study design, data, and methods for the impact analysis.

1. 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 college-ready on-track and 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. By using a within-district approach, the study avoids potentially misattributing impacts if only an NSI district or only a comparison district introduced new initiatives that might affect student outcomes during the study period. However, the college-ready on-track and well-matched postsecondary enrollment NSI partnered with districts in which all or almost all of their high schools participated 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 enabled the study team to use a more rigorous study design for the Cohort 3 NSI. For these NSI, the study team randomly assigned schools for 8th- or 9th-grade on-track NSI 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. This study design allows us to compare impacts from the more rigorous random assignment approach to the impacts from the matched comparison approach; if results are similar, it provides evidence of the validity of the main matched comparison approach.

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 nonparticipating 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. Matching at

both the school and student level helps ensure that comparison students are similar to NSI students in terms of their individual characteristics and that they experience similar learning environments. This section describes our approach to matching schools and students.

Step 1: Matching NSI schools to nonparticipating schools. To match each NSI school in a district to three nonparticipating schools in the same district, we used 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 participated in an NSI in the following year.¹ 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 similar students in the comparison schools. This matching was based on the baseline school and student characteristics listed under Step 2 in Exhibit A.1.² 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 with which their school was matched. When matching students, we required an exact match on students' race and ethnicity and economically disadvantaged status because we also examined impacts separately by these characteristics.

We measured economically disadvantaged status based on students' free or reduced-price lunch eligibility where available. In cases where free or reduced-price lunch eligibility was not available, we used other district- or state-provided indicators of economic disadvantage.

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 student 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)^a
- 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 earned at least five 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 the school-level characteristics listed in Step 1 as well as the following student characteristics:
- Gender
 - Economically disadvantaged status
 - Race and ethnicity (indicators for Black, Latino, 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. 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 were 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.

^a 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 be representative of 8th-grade achievement at the school (see section on “Sample restrictions and exceptions for matching” for more details).

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 improves

the average quality of matches and therefore reduces 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:

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

where x is a vector containing values of each of the matching variables and S is a diagonal weighting matrix that includes 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 Euclidean 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 comparison students being 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. This weight was scaled by the inverse of the number of comparison students to which the matched NSI student was matched. For example, suppose comparison student A is a match for NSI students B and C. Assume NSI student B attends a school with 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 $(1/35 \times 1/5) + (1/60 \times 1/5)$.

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 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 come 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 analysis.
 - For the two districts with an end-of-course algebra exam, we matched schools on participation rate of the 8th-grade math test before the start of the NSI grant (for the 8th-grade on-track NSI).³ 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 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 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.
 - The district was not able to provide suspension data for the 2022-23 and 2023-24 school years. We therefore excluded NYC from the analysis of impacts on student suspension rates for those years.

College-ready on-track and well-matched postsecondary enrollment NSI (all cohorts): Between-district matched comparisons

We used a between-district matched comparison analysis for the college-ready on-track and 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 up to 10 non-NSI districts in the same state based on the baseline district-level characteristics under Step 1 in Exhibit A.2.⁴ We conducted this match separately for each college-ready on-track and well-matched postsecondary enrollment 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.

For college-ready on-track NSI, data on different outcomes were available depending on the state where the NSI schools were located. Exhibit A.3 provides additional detail about the availability of data from each state.

For well-matched postsecondary enrollment NSI, the study team collected student-level data from all three states where the NSI were located (Arizona, California, and Texas) to analyze college enrollment outcomes. FAFSA completion data were available for the three states at the school level.

Exhibit A.2. Characteristics used to match NSI districts, schools, and students with comparison districts, schools, and students for the college-ready on-track and well-matched postsecondary enrollment and 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
- District averages for test-taking rates (for math and ELA test score outcomes)*
- Percentage of students who are economically disadvantaged
- Percentage of students who are Black
- Percentage of students who are Latino
- 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 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
- School averages for test-taking rates (for math and ELA test score outcomes)*
- Percentage of students who are economically disadvantaged
- Percentage of students who are Black
- Percentage of students who are Latino
- 11th- or 12th-grade student enrollment**
- Indicator for whether the school was an alternative school

Step 3: District, school, and student characteristics used to match students in NSI schools to students in comparison schools

- All the district match variables listed in Step 1 for the district match
- All the school match variables listed in Step 2 for the school match
- Economically disadvantaged status
- 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
- Grade level*

Source: Administrative student records.

Note: All student characteristics are measured in 8th grade (the baseline grade for the college-ready on-track and well-matched postsecondary enrollment analyses).

* For college-ready on-track only.

** 11th- and 12th-grade enrollment for college-ready on-track analysis and 12th-grade enrollment for well-matched postsecondary enrollment analysis.

Exhibit A.3. Data collection for college-ready on-track outcomes

	California	Colorado	Florida	Minnesota
GPA	X		X	X
Advanced course taking	X		X	X
Advanced Placement exam taking	X	X	X	
Math test scores	X	X		X
ELA test scores	X	X		
High school graduation	X	X	X	X
College enrollment	X	X	X	X

Note: Data were only available for one NSI and one comparison district from the American Institutes for Research NSI in Florida. The Tulare NSI operated in California. The Denver Public Schools NSI operated in Colorado. The BARR NSI operated in California, Illinois, and Minnesota, but we were only able to obtain data from California and Minnesota. For California and Minnesota, the study team constructed student GPA based on course and grade data.

The matching methodology we used for the college-ready on-track and well-matched postsecondary enrollment 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 up to 10 closest comparison districts based on the Euclidean distance. For the school-level match, for each state, we conducted separate matches for each outcome and used the Euclidean distance to select the five 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 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. These pairs were based on publicly available information from the U.S. Department of Education's Common Core of Data and *EDFacts*, as well as state databases.
- The NSI provided feedback on whether we had paired two schools 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, we assigned up to two schools 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 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 schools had closed permanently. 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.4 shows that school-level attrition was 21 percent for 8th-grade on-track outcomes and 16 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 both 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.4. 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	63	62	125
9th-grade on-track outcomes	47	44	91
Number of schools in the three-year impact analysis sample			
8th-grade on-track outcomes	49	50	99
9th-grade on-track outcomes	39	37	76

Source: NSI school rosters.

Note: The three-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. The sample size for 8th-grade on-track analysis for test score outcomes was lower than the sample size shown in this exhibit due to missing data for some schools. Forty-five NSI schools had enough students with non-missing data to be included in the math test score analysis, and 48 NSI schools were included in the ELA test score analysis. Forty-six 8th-grade on-track comparison schools were included in the math test score analysis, and 49 comparison schools were included in the ELA test score analysis. The analysis sample size for the 9th-grade on-track analysis was the same for all outcomes.

Random assignment is expected to produce two groups that are as similar as possible on both observed and unobserved measures. Exhibits A.5 and A.6 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.⁵ 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). 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 the NSI intervention affected families' decisions to enroll in or leave NSI schools.

Exhibit A.5. 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		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Mean	Standard deviation		
Students						
Demographic characteristics						
Female	46	50	48	50	-2	-0.04
Economically disadvantaged	80	40	82	38	-2	-0.05
Race/ethnicity						
Black	43	50	42	49	1	0.03
Hispanic	46	50	47	50	-1	-0.02
Other	10	29	10	29	0	0.00
English language learner	12	33	15	35	-2	-0.07
Received special education services	18	38	19	39	-1	-0.03
Baseline outcomes						
GPA for core courses (4-point GPA scale)	2.59	0.94	2.62	0.94	-0.04	-0.04
Attendance rate	91	9	91	9	0	-0.04
No out-of-school suspensions	95	23	93	26	2	0.08
Share of math and ELA courses passed	81	32	81	33	-1	-0.02
Math test score (standard deviation units)	-0.29	0.89	-0.36	0.90	0.07	0.08
ELA test score (standard deviation units)	-0.26	0.95	-0.30	0.93	0.03	0.04
Student sample size	5,376		5,500			
Schools						
Percentage economically disadvantaged students	80	16	83	15	-3	-0.20
Percentage Black students	43	37	43	36	0	0.00
Percentage Latino students	44	32	44	33	0	0.00
Percentage English language learners	11	10	14	12	-4	-0.33
Average 8th-grade enrollment (number of students)	148	127	153	122	-6	-0.04
Math proficiency rate	26	17	26	18	0	-0.01

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Mean	Standard deviation		
ELA proficiency rate	36	20	35	18	1	0.07
Chronic absenteeism rate	9	7	7	5	2	0.32
Suspension rate	4	4	4	5	-1	-0.13
Average GPA (4-point GPA scale)	2.50	0.45	2.54	0.41	-0.04	-0.09
Course pass rate	78	13	80	13	-1	-0.09
School sample size	49		50			

Source: District administrative records for the 2019-20 through 2023-24 school years.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for five NSI in six districts.

Exhibit A.6. 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		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Mean	Standard deviation		
Students						
Demographic characteristics						
Female	47	50	50	50	-2	-0.05
Economically disadvantaged	92	27	93	25	-1	-0.05
Race/ethnicity						
Black	41	49	47	50	-6	-0.12
Latino	49	50	45	50	5	0.09
Other	7	25	6	24	1	0.02
English language learner	17	38	16	37	1	0.04
Received special education services	21	41	21	41	0	0.00
Baseline outcomes						
GPA for all courses (4-point GPA scale)	2.68	0.90	2.69	0.89	-0.01	-0.01
Attendance rate	89	10	89	10	0	0.00
No out-of-school suspensions	95	21	95	22	0	0.02
Share of core courses passed	77	33	78	32	-1	-0.04
Math test score (standard deviation units)	-0.43	0.90	-0.46	0.90	0.03	0.03
ELA test score (standard deviation units)	-0.47	0.92	-0.49	0.92	0.03	0.03
Took algebra in 8th grade	14	35	17	37	-3	-0.07
Algebra test score, among those who took algebra in 8th grade	-0.05	0.39	-0.08	0.46	0.03	0.08
Student sample size	5,267		5,291			
Schools						
Percentage economically disadvantaged students	92	9	90	10	2	0.19
Percentage Black students	39	33	46	33	-7	-0.22
Percentage Latino students	49	34	44	32	4	0.13
Percentage English language learners	18	15	14	17	3	0.20
Average 8th-grade enrollment (number of students)	201	162	208	181	-7	-0.04

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Mean	Standard deviation		
Math proficiency rate	42	36	42	36	-1	-0.02
ELA proficiency rate	49	36	52	36	-3	-0.09
Chronic absenteeism rate	36	29	36	28	1	0.03
Suspension rate	5	4	6	6	-1	-0.16
Average GPA (4-point GPA scale)	2.29	0.55	2.26	0.45	0.03	0.06
Course pass rate	62	18	63	15	-1	-0.07
Percentage of 9th graders who earned at least five credits	80	18	81	15	-1	-0.05
School sample size	39		37			

Source: District administrative records for the 2019-20 through 2023-24 school years.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for four NSI in four districts.

2. 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.7). For example, the 8th- and 9th-grade on-track 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.

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. These NSI districts were also much less likely to have in-person instruction during the COVID-19 pandemic. The 8th- and 9th-grade on-track NSI districts provided in-person instruction for less than 30 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 college-ready on-track and well-matched postsecondary enrollment NSI in the analysis partnered with districts that differed from those in the 8th- and 9th-grade on-track analysis. The districts in the college-ready on-track and well-matched postsecondary enrollment analysis served fewer students, had a larger proportion of Latino students and a lower proportion of Black students, and were more likely to be located in suburban areas. These districts provided in-person instruction during the 2020-21 school year at a higher rate than the 8th- and 9th-grade on-track NSI districts, but a somewhat lower rate compared to the national average.

Exhibit A.7. Characteristics of districts included in the analysis compared to districts nationwide, by outcome area

Characteristic	NSI districts in the 8th-grade on-track analysis	NSI districts in the 9th-grade on-track analysis	NSI districts in college-ready on-track analysis	NSI districts in well-matched postsecondary enrollment analysis	All public school districts nationwide	100 largest public school districts nationwide
Student enrollment (median)	76,000	75,000	10,000	19,000	1,000	73,000
Race/ethnicity (%)						
Black	30	28	10	12	15	23
Latino	45	47	57	69	26	38
Other	12	13	8	6	10	12
Students attending high-poverty schools (%)	66	69	39	50	23	36
District proficiency and graduation rates						
Proficient in math (%)	31	32	36	48	45	46
Proficient in ELA (%)	42	42	44	42	49	49
Graduation rate (%)	76	78	85	87	87	84
District locale						
Urban	89	95	35	51	29	48
Suburban	11	5	54	44	44	52
Rural	0	0	11	5	27	0
Percentage of in-person instruction during 2020-21	29	29	41	43	53	50
Number of districts	11	9	31	36	14,034	100

Source: Common Core of Data for the 2017-18 school year; EDData 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.

3. 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.8 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 whether 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 “Description of outcome used to measure NSI impacts” column).

Exhibit A.8. 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	8th-grade GPA based on math, ELA, science, and social studies 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 five course credits	Whether a student earned at least five course credits	Earned at least five 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

Source: Gates Foundation NSI documentation.

Exhibit A.9 shows the outcomes we analyzed for the college-ready on-track NSI and provides details about how each measure was defined. ELA and math test scores were either scores from the state standardized test or SAT scores, depending on the state.

Exhibit A.9. College-ready on-track outcome measures

Outcome used to measure NSI impacts	Description of outcome used to measure NSI impacts
GPA	Cumulative GPA based on all courses for 11th- and 12th-grade students (4-point scale)
Advanced course taking	Share of 11th- and 12th-grade students completing at least one advanced course (Advanced Placement, International Baccalaureate, or dual enrollment course)
Advanced Placement exam taking	Share of 11th- and 12th-grade students taking at least one Advanced Placement exam
Math test scores	Score on the state standardized math assessment or SAT math score for 11th-grade students
ELA test scores	Score on the state standardized ELA assessment or SAT ELA score for 11th-grade students
High school graduation	Share of students graduating from high school on time (within four years of the students' 9th-grade year)
Postsecondary enrollment at any institution	Share of 12th-grade students enrolled in any postsecondary institution in the fall following their 12th-grade year
Postsecondary enrollment at an institution with at least a 50 percent graduation rate	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

Source: Gates Foundation NSI documentation.

Note: Postsecondary enrollment is based on student-level data from the National Student Clearinghouse for all states. Advanced placement exam taking is measured using school-level data from the College Board.

Exhibit A.10 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 the foundation emphasized, except that the foundation also expected these NSI to improve the share of 12th-grade students who had submitted applications to at least three colleges and completed at least one college entrance exam. We were unable to analyze whether students submitted applications to at least three colleges because we did not have access to data on students' college applications.

College exam taking was not a relevant outcome for measuring impacts of the NSI initiative in the states where the well-matched postsecondary enrollment NSI implemented their grants (Arizona, California, 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- and 12th-grade students

for free during school hours (Texas Education Agency 2023). The study team examined this outcome in the evaluation’s interim report but found consistently high ACT or SAT exam-taking rates in both NSI and comparison schools in Texas, leaving little room for NSI to impact these rates (Johnson et al. 2024). For these reasons, the study does not analyze the impacts of well-matched postsecondary enrollment NSI on college entrance exam taking.

Exhibit A.10. Well-matched postsecondary enrollment outcome measures

Outcome used to measure NSI impacts	Description of outcome used to measure NSI impacts
FAFSA completion rate as of December of the senior year	Share of 12th-grade students who completed a FAFSA form by December of the school year
Postsecondary enrollment at any institution	Share of 12th-grade students enrolled in any postsecondary institution in the fall following their 12th-grade year
Postsecondary enrollment at an institution with at least a 50 percent graduation rate	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

Source: Gates Foundation NSI documentation.

Note: FAFSA completion rates are measured using school-level data, whereas postsecondary enrollment is measured using student-level data. Postsecondary enrollment is 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.11. provides additional information about the data sources used to measure outcomes and baseline characteristics for the impact analysis.

Exhibit A.11. Data sources for the impact analysis

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 2023-24	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 and college-ready on-track analysis	2017-18 through 2022-23	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 college-ready on-track and well-matched postsecondary enrollment analysis	2015-16 through 2022-23	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 analysis	2017-18 through 2023-24	Student administrative data collected from districts participating in the 8th- and 9th-grade on-track NSI
Student-level demographic data and data on courses, test scores, high school graduation, and postsecondary enrollment ^b	Provide baseline and outcome measures of districts, schools, and students for the college-ready on-track and well-matched postsecondary enrollment analysis	2014-15 through 2023-24	Student administrative data collected from state education agencies for the college-ready on-track and well-matched postsecondary enrollment analysis
School-level data on the number of students taking at least one Advanced Placement exam	Provide baseline and outcome measures of Advanced Placement exam-taking rates for schools in the college-ready on-track analysis	2016-17 through 2023-24	College Board
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 enrollment analysis	2015-16 through 2023-24	Federal Student Aid Office, U.S. Department of Education
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 2021-22	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 1. 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 the well-matched postsecondary enrollment analysis in Texas only include in-state college enrollment. Postsecondary data for the college-ready on-track and well-matched postsecondary enrollment analyses in other states include both in-state and out-of-state college enrollment. Data for the college-ready on-track analysis in Florida were collected directly from one NSI and one comparison district.

^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 COVID

The COVID-19 pandemic affected the availability of data needed to measure students’ outcomes and baseline characteristics. Exhibit A.12 shows the availability of the four types of data used in the 8th- and 9th-grade on-track and college-ready on-track analyses: (1) suspensions and attendance, (2) course grades and credit completion, and (3) 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.12. Effect of COVID-19 pandemic on data availability

	2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
Suspensions and attendance	Available	Available	Not available	Available	Available	Available
Course grades and completion	Available	Available ^a	Available	Available	Available	Available
State test scores	Available	Not available	Not available	Available	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.13 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. For example, the three-year impact analysis is based on the 2022-23 school year for 61 percent of 8th-grade on-track NSI schools and 45 percent of 9th-grade on-track NSI schools. Schools in the three-year impact analysis for the college-ready on-track outcome area are spread across the 2021-22 through 2023-24 school years. The three-year impact analysis is based on the 2021-22 school year for the large majority of well-matched postsecondary enrollment NSI schools.

Exhibit A.13. Percentage of schools by participation year and school year

	Percentage of schools in the analysis in each school year						Total number of schools
	2018–19	2019–20	2020–21	2021–22	2022–23	2023–24	
8th-grade on track							
Year 1	5	15	51	9	3	17	176
Year 2	n.a.	6	17	59	13	4	140
Year 3	n.a.	n.a.	6	18	61	14	126
Year 4	n.a.	n.a.	n.a.	9	26	66	93
9th-grade on track							
Year 1	25	20	39	8	6	2	133
Year 2	n.a.	28	22	42	9	0	120
Year 3	n.a.	n.a.	28	21	45	5	110
Year 4	n.a.	n.a.	n.a.	40	27	32	77
College-ready on track							
Year 1	n.a.	35	19	33	8	5	79
Year 2	n.a.	n.a.	38	20	37	6	71
Year 3	n.a.	n.a.	n.a.	45	21	34	62
Well-matched postsecondary enrollment							
Year 1	6	66	8	21	0	0	143
Year 2	n.a.	6	66	8	21	0	143
Year 3	n.a.	n.a.	7	83	10	0	113
Year 4	n.a.	n.a.	n.a.	8	92	0	102

Source: Administrative student records for the 2018-19 through 2023-24 school years.

Note: The number of NSI schools in the sample for each year varied for college-ready on-track and well-matched postsecondary enrollment NSI depending on the outcome. Statistics in this table are calculated for the analysis where we had the largest sample of NSI schools for each outcome area, which was the high school graduation outcome for the college-ready on-track analysis and the FAFSA completion outcome for the well-matched postsecondary enrollment analysis.

n.a. = not applicable

4. Analysis methods

In this section we first 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 8th- and 9th-grade on-track random assignment study. Next we describe the regression models used to estimate impacts for the college-ready on-track and well-matched postsecondary enrollment analyses, followed by the methodology for aggregating results across states for those outcome areas. Finally, we describe our approach to estimating results separately for NSI that prioritized certain outcomes as well as the methodology for calculating NSI- and group-specific impacts.

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 student-level 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-, three-, and four-year impacts, separately for each outcome:

$$y_{ist} = \beta_0 + \beta_1 NSI_{st} + \beta X_{ist} + \gamma S_{st} + \theta_{st} + \delta R_{ist} + \varepsilon_{ist}$$

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.8. The regression included an indicator of whether a school participated in the NSI (NSI_{st}), 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 (θ_{st}) to account for differences in district policies that may have changed over time, separate repeater status (R_{ist}) indicator variables for each year entering the analysis, as well as interactions between year fixed effects and baseline variables for 2020-21 and subsequent years. 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 NSI being a school-level intervention.

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

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.⁶ 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 $1/(\text{total number of students at school } S \text{ in the analysis sample})$.

We required that at least one NSI school and one comparison school from a random assignment block was in the analysis. Therefore, if either the NSI school or the comparison school in the random assignment block had fewer than 16 students with non-missing outcome and baseline data, we dropped both schools from the regression for that outcome.⁷ The analysis sample can differ across outcomes depending on the number of students with non-missing data for each outcome.

C. Regression models used to estimate impacts for the college-ready on-track and well-matched postsecondary enrollment analysis

For college-ready on-track NSI, we estimated student-level regression models for advanced course taking, GPA, math and ELA achievement, on-time high school graduation and postsecondary enrollment, and school-level regression models for Advanced Placement exam taking.

For well-matched postsecondary enrollment NSI, we estimated student-level regression models for postsecondary enrollment and school-level regression models for FAFSA completion.

The regression models for estimating the impact of the college-ready on-track and well-matched postsecondary enrollment NSI differ from those for 8th-grade and 9th-grade on-track NSI in the following ways:

- Due to restrictions in accessing student-level data provided by the California and Texas state education agencies, we estimated the student-level regressions separately for those states and then aggregated the impacts with results based on data from other states. 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.⁸
- Similar to the 8th- and 9th-grade on-track analyses, we included baseline characteristics used for matching as covariates in the regression models. There were a relatively small number of NSI districts, so we excluded district-level covariates from the regression models because there was not enough variation to reliably identify the coefficients on these variables.

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

D. Aggregation of results across states for student-level college-ready on-track and well-matched postsecondary enrollment results

Due to restrictions in accessing student-level data from the California and Texas state education agencies, we estimated the college-ready on-track and well-matched postsecondary enrollment impacts separately for those states and then aggregated the impacts together. We calculated the overall impact 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 of the n state's impact estimate received (w_i) was proportional to the number of NSI schools in the state.⁹

We then calculated the standard error of the aggregate impact ($\bar{\beta}$) as the weighted average of standard errors of β_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. Regression models used to estimate impacts for NSI focused on improving specific outcomes

Although the foundation expected NSI to improve the full set of outcomes identified for each outcome area, each NSI ultimately prioritized a subset of the outcomes. Exhibits A.14 to A.17 show the number of intermediaries that prioritized each outcome for 8th-grade on-track, 9th-grade on-track, college-ready on-track and well-matched postsecondary enrollment NSI. The 8th-grade on-track NSI in the analysis

focused on improving a variety of outcomes, with three NSI focused on math test scores, five NSI focused on ELA test scores, and four NSI focused on one or more course-related outcome (Exhibit A.14). Only three NSI focused on at least one behavioral outcome—all three focused on attendance rates and two of those three focused on suspension rates.

The 9th-grade on-track NSI had a strong focus on academic outcomes, with all eight 9th-grade on-track NSI focused on at least one course-related outcome (Exhibit A.15). None of these NSI prioritized suspension rates, and only two focused on attendance.

All four of the college-ready on-track NSI in the analysis focused on improving math test scores (Exhibit A.16). One of those four NSI focused on improving ELA test scores, GPA, advanced course taking, and high school graduation in addition to improving math test scores. None of the college-ready on-track NSI directly focused on college application submission.

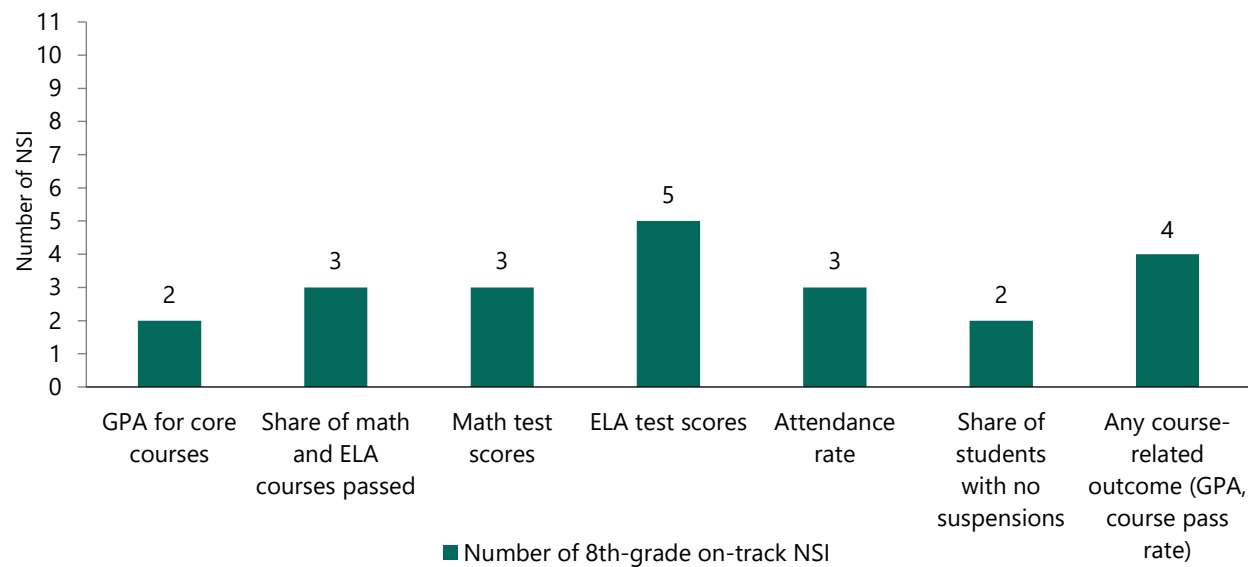
The four well-matched postsecondary enrollment NSI in the analysis focused on both completing the FAFSA and submitting college applications (Exhibit A.17). None of these NSI focused on college entrance exam taking.

In cases where NSI varied in the outcomes they prioritized, in addition to the main impact estimates that included all NSI, the study estimated separate impacts on each outcome for the subset of NSI that prioritized that outcome. For example, we estimated separate impacts on attendance rates for the three 8th-grade on-track NSI focused on improving student attendance. To conduct this analysis, we assigned each NSI school an indicator for whether it focused on the outcome of interest (F_s), and student-level impacts were estimated as:

$$y_{ist} = \beta_0 + \beta_1(NSI_{st} * F_s) + \beta_2(NSI_{st} * (1 - F_s)) + \beta X_{ist} + \gamma S_{st} + \theta_{st} + \delta R_{ist} + \varepsilon_{ist}$$

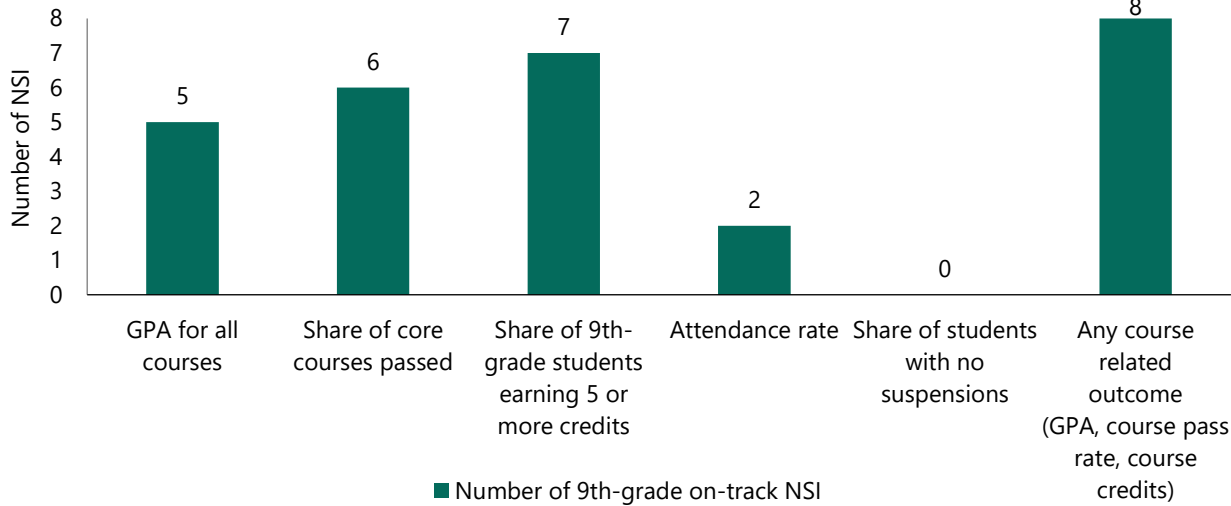
where all variables are defined as described above for the main impacts, and F_s is an indicator equal to 1 if the NSI focused on the outcome y_{ist} and 0 otherwise.

Exhibit A.14. Outcomes prioritized by the 8th-grade on-track NSI



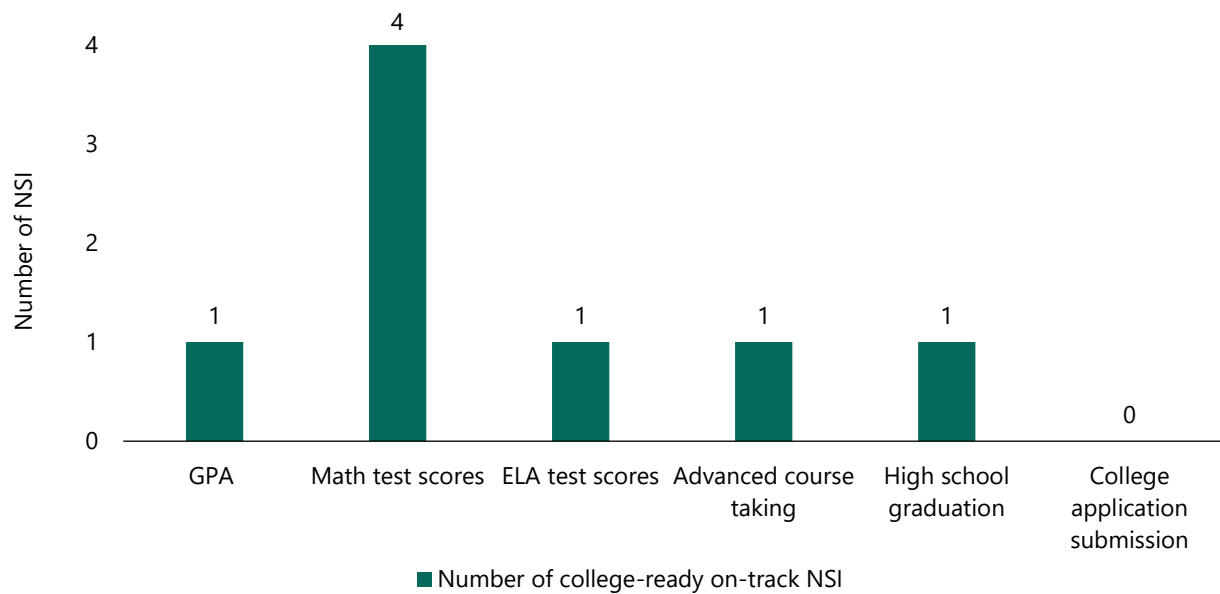
Source: The Gates Foundation’s project officers for the NSI initiative.
Note: The sample consists of 11 8th-grade on-track NSI.

Exhibit A.15. Outcomes prioritized by the 9th-grade on-track NSI



Source: The Gates Foundation’s project officers for the NSI initiative.
Note: The sample consists of eight 9th-grade on-track NSI. One 9th-grade on-track NSI focused on improving teachers’ ELA instruction and student ELA proficiency. No standardized ELA assessment was given to 9th-grade students, so we counted GPA, core course pass rate, and course credits as priority outcomes for this NSI under the assumption that these are the most closely related outcomes the NSI focused on improving.

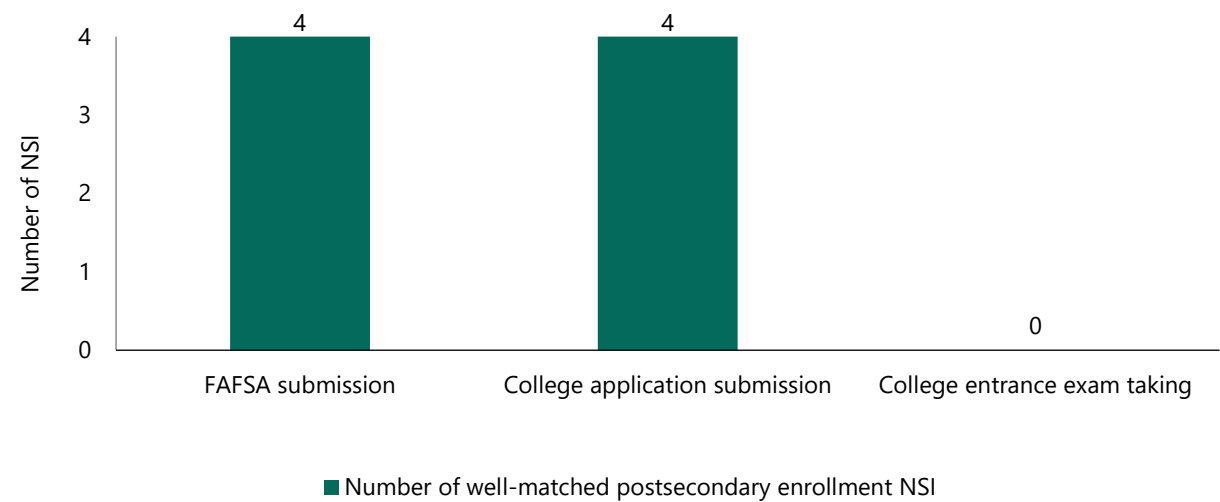
Exhibit A.16. Outcomes prioritized by the college-ready on-track NSI



Source: The Gates Foundation’s project officers for the NSI initiative.

Note: The sample consists of four college-ready on-track NSI.

Exhibit A.17. Outcomes prioritized by the well-matched postsecondary enrollment NSI



Source: The Gates Foundation’s project officers for the NSI initiative.

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

F. Group-, NSI-, and school-specific impacts

For the 8th-grade on track, 9th-grade on-track, and well-matched postsecondary enrollment analyses, we estimated the three-year impacts separately for students who are Black, Latino, and economically disadvantaged.¹⁰ For the regressions to estimate impacts for each student group, we used the same student-level weights as the main estimation and the same regression specification in terms of covariates and clustering.¹¹ 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 also 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 single 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.¹² We estimated heteroskedasticity-robust standard errors rather than clustering standard errors at the school level.

5. 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.18 and A.19 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.20 through A.27 present the baseline equivalence results for the college-ready on-track analysis. Exhibits A.28 through A.30 present the baseline equivalence results for the well-matched postsecondary enrollment analysis. We present separate baseline equivalence tables for each outcome for the college-ready on-track and well-matched postsecondary enrollment NSI for two reasons. The first reason is that for college-ready on-track NSI, the availability of outcome data differed across states (as described in Exhibit A.3), meaning different sets of NSI schools were included depending on the outcome being analyzed. The second reason is that we included three baseline years of the outcome of interest at the school- and district level in the matching, which resulted in including different sets of comparison schools in each analysis even if the same set of NSI schools was included.

Because we matched NSI schools to comparison schools across districts, and because we performed the match on a large number of variables, the college-ready on-track and well-matched postsecondary enrollment NSI schools were not as similar to their matched comparison schools as the 8th- and 9th-grade on-track NSI schools were. This was particularly true for college-ready on-track where, unlike other college-ready on-track and well-matched postsecondary enrollment NSI that worked with multiple school districts, two of the four NSI worked with a single school district in their state with characteristics that differed from most other districts in the state. However, for both outcome areas, all differences in student-level characteristics were less than 0.25 standard deviations, and only a subset of school- and district-level characteristics exceeded the 0.25 threshold.

Exhibit A.18. Baseline characteristics for the 8th-grade on-track analysis, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Mean	Standard deviation		
Students						
Demographic characteristics						
Female	47	50	48	50	-1	-0.02
Economically disadvantaged	88	33	88	33	0	0.00
Race/ethnicity						
Black	43	50	43	50	0	0.00
Hispanic	45	50	45	50	0	0.00
Other	8	27	8	26	0	0.01
English language learner	14	35	12	33	2	0.06
Received special education services	19	39	16	36	3	0.07
Baseline outcomes						
GPA for core courses (4-point GPA scale)	2.45	1.04	2.45	1.04	0.00	0.00
Attendance rate	91	9	92	7	-1	-0.10
No out-of-school suspensions	94	23	95	22	-1	-0.02
Share of math and ELA courses passed	75	37	76	37	-1	-0.02
Math test score (standard deviation units)	-0.43	0.93	-0.43	0.86	0.00	0.00
ELA test score (standard deviation units)	-0.42	0.97	-0.40	0.91	-0.02	-0.02
Student sample size	11,222		16,816			
Schools						
Percentage economically disadvantaged students	87	15	86	16	1	0.09
Percentage Black students	44	35	41	34	2	0.07
Percentage Latino students	44	33	43	31	1	0.02
Percentage English language learners	14	12	13	10	1	0.08
Average 8th-grade enrollment (number of students)	129	113	152	127	-23	-0.19
Math proficiency rate	20	17	21	17	-1	-0.06
ELA proficiency rate	30	19	31	18	-1	-0.03

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Mean	Standard deviation		
Chronic absenteeism rate	21	24	20	23	1	0.06
Suspension rate	6	8	6	7	0	0.05
Average GPA (4-point GPA scale)	2.35	0.50	2.40	0.43	-0.04	-0.09
Course pass rate	72	16	74	15	-1	-0.08
Alternative school	0	0	0	0	0	.
School sample size	126		249			

Source: District administrative records.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for 11 NSI in 10 districts.

Exhibit A.19. Baseline characteristics for the 9th-grade on-track analysis, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Mean	Standard deviation		
Students						
Demographic characteristics						
Female	50	50	49	50	0	0.01
Economically disadvantaged	90	30	90	30	0	0.00
Race/ethnicity						
Black	34	47	34	47	0	0.00
Latino	54	50	54	50	0	0.00
Other	10	30	11	31	0	-0.01
English language learner	15	36	13	34	2	0.05
Received special education services	22	41	18	39	3	0.08
Baseline outcomes						
GPA for all courses (4-point GPA scale)	2.69	0.92	2.72	0.88	-0.03	-0.03
Attendance rate	91	10	92	9	-1	-0.09
No out-of-school suspensions	95	21	96	20	0	-0.02
Share of core courses passed	77	33	79	31	-2	-0.05
Math test score (standard deviation units)	-0.39	0.94	-0.36	0.86	-0.04	-0.04
ELA test score (standard deviation units)	-0.42	0.94	-0.39	0.86	-0.04	-0.04
Took algebra in 8th grade	6	24	6	24	0	0.01
Algebra test score, among those who took algebra in 8th grade	-0.03	0.28	-0.02	0.23	-0.01	-0.04
Student sample size	18,953		24,392			
Schools						
Percentage economically disadvantaged	88	12	87	12	1	0.12
Percentage Black students	34	31	34	30	0	-0.01
Percentage Latino students	53	30	51	29	2	0.06
Percentage English language learners	16	13	13	12	3	0.20
9th-grade enrollment	261	248	312	253	-51	-0.20

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Mean	Standard deviation		
Math proficiency rate	47	38	47	37	0	-0.01
ELA proficiency rate	54	37	55	36	-1	-0.02
Chronic absenteeism rate	32	24	29	23	2	0.10
Suspension rate	7	6	7	6	0	0.02
GPA	2.34	0.55	2.31	0.50	0.03	0.05
Course pass rate	65	18	65	16	0	0.02
Percentage of 9th graders who earned at least five credits	81	17	82	15	-1	-0.05
Alternative school	8	27	8	27	0	0.00
School sample size	110		193			

Source: District administrative records.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for eight NSI in eight districts.

Exhibit A.20. Baseline characteristics for the college-ready on-track analysis of GPA, by study group

Characteristics	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Mean	Standard deviation		
Students						
Female	51	36	51	36	0	0.01
Economically disadvantaged	63	31	63	31	0	0.00
Race/ethnicity						
Black	11	21	11	21	0	0.00
Latino	60	32	60	32	0	0.00
Other	14	25	13	24	1	0.03
English language learner	15	25	13	24	1	0.06
Received special education services	13	24	9	21	4	0.19
8th-grade attendance rate	95	5	95	5	0	0.03
8th-grade math test score	-0.23	0.64	-0.22	0.58	-0.01	-0.01
8th-grade ELA test score	-0.26	0.67	-0.22	0.61	-0.04	-0.06
GPA	2.77	0.65	2.80	0.61	-0.03	-0.05
Student sample size	20,668		18,895			
Schools						
11th- and 12th-grade enrollment	836	244	891	270	-55	-0.21
Percentage Black students	9	7	11	7	-1	-0.18
Percentage Latino students	58	15	51	14	7	0.45
Percentage economically disadvantaged students	59	11	59	11	-1	-0.06
Alternative school	2	10	2	10	0	0.00
Baseline outcomes						
GPA						
One year before NSI	2.79	0.15	2.79	0.12	0.00	-0.02
Two years before NSI	2.79	0.15	2.79	0.12	0.00	0.01
Three years before NSI	2.78	0.15	2.78	0.13	0.01	0.04

Characteristics	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Mean	Standard deviation		
School sample size	42		124			
Districts						
Total district enrollment	29,000	14,000	62,000	43,000	-34,000	-1.08
Percentage Black students	9	5	11	4	-3	-0.53
Percentage Latino students	58	14	52	13	6	0.43
Percentage economically disadvantaged students	61	9	62	9	-1	-0.16
Urban district	79	29	85	26	-6	-0.22
Percentage in-person instruction during COVID-19 (2020-21)	47	15	45	14	2	0.14
Baseline outcomes						
GPA						
One year before NSI	2.71	0.13	2.73	0.12	-0.02	-0.20
Two years before NSI	2.70	0.14	2.72	0.12	-0.03	-0.22
Three years before NSI	2.68	0.15	2.72	0.12	-0.03	-0.24
District sample size	24		75			

Source: State and district administrative records.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for three NSI.

Exhibit A.21. Baseline characteristics for the college-ready on-track analysis of advanced course taking, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Students						
Female	51	35	48	35	3	0.07
Economically disadvantaged	60	31	60	31	0	0.00
Race/ethnicity						
Black	12	22	12	22	0	0.00
Latino	58	32	58	32	0	0.00
Other	14	25	12	23	3	0.11
English language learner	13	24	14	25	-1	-0.04
Received special education services	13	24	11	22	2	0.08
8th-grade attendance rate	95	5	95	5	0	0.00
8th-grade math test score	-0.18	0.65	-0.19	0.60	0.01	0.02
8th-grade ELA test score	-0.20	0.68	-0.23	0.65	0.03	0.04
Sample size	25,635		20,167			
Schools						
11th- and 12th-grade enrollment	827	242	859	261	-31	-0.12
Percentage Black students	11	8	16	8	-5	-0.61
Percentage Latino students	56	15	50	12	6	0.41
Percentage economically disadvantaged students	59	11	61	12	-2	-0.20
Alternative school	2	10	2	10	0	0.00
Baseline outcomes						
Advanced course-taking rate						
One year before NSI	35	8	36	6	0	-0.06
Two years before NSI	34	8	36	7	-2	-0.28
Three years before NSI	31	7	35	7	-3	-0.49
Sample size	44		96			

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Districts						
Total district enrollment	29,000	14,000	60,000	45,000	-31,000	-0.99
Percentage Black students	10	6	12	5	-3	-0.47
Percentage Latino students	56	14	50	11	6	0.48
Percentage economically disadvantaged students	60	9	62	10	-2	-0.19
Urban district	80	28	82	27	-2	-0.08
Percentage in-person instruction during COVID-19 (2020-21)	47	16	45	15	1	0.09
Baseline outcomes						
Advanced course-taking rate						
One year before NSI	33	7	38	7	-5	-0.76
Two years before NSI	32	7	36	7	-4	-0.65
Three years before NSI	29	5	35	6	-6	-1.06
Sample size	25		61			

Source: State and district administrative records.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for three NSI.

Exhibit A.22. Baseline characteristics for the college-ready on-track analysis of Advanced Placement exam taking, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Schools						
11th- and 12th-grade enrollment	616	408	694	359	-77	-0.21
Percentage Black students	10	9	8	7	2	0.22
Percentage Latino students	67	18	62	18	5	0.25
Percentage economically disadvantaged students	66	19	65	18	1	0.06
Alternative school	15	36	15	36	0	0.00
Baseline outcomes						
Advanced Placement exam taking						
One year before NSI	18	12	17	11	1	0.09
Two years before NSI	20	13	19	12	2	0.14
Three years before NSI	21	14	20	12	1	0.08
Sample size	53		161			
Districts						
Total district enrollment	54,000	35,000	36,000	38,000	18,000	0.49
Percentage Black students	9	5	7	6	2	0.36
Percentage Latino students	64	13	55	20	9	0.47
Percentage economically disadvantaged students	66	14	60	18	6	0.33
Urban district	85	36	88	32	-3	-0.10
Percentage in-person instruction during COVID-19 (2020-21)	40	31	46	30	-6	-0.18
Baseline outcomes						
Advanced Placement exam taking						
One year before NSI	24	6	23	7	1	0.15
Two years before NSI	26	6	24	8	1	0.18
Three years before NSI	26	5	25	8	1	0.09
Sample size	17		70			

Source: Derived from data provided by the College Board. Copyright © 2016-2024 The College Board. www.collegeboard.org.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for three NSI.

Exhibit A.23. Baseline characteristics for the college-ready on-track analysis of math test scores, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Students						
Female	50	33	51	33	-1	-0.04
Economically disadvantaged	76	26	76	26	0	0.00
Race/ethnicity						
Black	8	17	8	17	0	0.00
Latino	63	28	63	28	0	0.00
Other	15	24	14	24	1	0.04
English language learner	22	27	19	26	4	0.14
Received special education services	12	21	8	18	4	0.18
8th-grade attendance rate	96	5	96	3	-1	-0.17
8th-grade math test score	-0.19	0.61	-0.18	0.57	-0.01	-0.01
8th-grade ELA test score	-0.19	0.61	-0.18	0.57	-0.01	-0.01
Sample size	11,184		9,168			
Schools						
11th- and 12th-grade enrollment	712	225	789	214	-76	-0.35
Percentage Black students	8	5	8	4	0	0.08
Percentage Latino students	60	11	59	8	1	0.12
Percentage economically disadvantaged students	66	11	61	11	5	0.43
Alternative school	3	7	3	7	0	0.00
Baseline outcomes						
Math test score						
One year before NSI	28	7	27	6	1	0.14
Two years before NSI	26	6	26	6	0	-0.01
Three years before NSI	24	6	26	5	-2	-0.31
School math test participation rate	91	3	91	4	1	0.20

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Sample size	38		84			
Districts						
Total district enrollment	32,000	7,000	21,000	8,000	12,000	1.53
Percentage Black students	8	4	9	4	0	-0.03
Percentage Latino students	57	10	56	8	1	0.11
Percentage economically disadvantaged students	65	8	63	9	3	0.32
Urban district	76	30	83	27	-7	-0.24
Percentage in-person instruction during COVID-19 (2020-21)	30	8	29	8	1	0.17
Baseline outcomes						
Math proficiency rate						
One year before NSI	29	4	26	5	3	0.59
Two years before NSI	28	4	26	4	2	0.53
Three years before NSI	26	5	25	4	1	0.32
District math test participation rate	91	2	91	3	0	0.19
Sample size	23		59			

Source: State and district administrative records.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for three NSI.

Exhibit A.24. Baseline characteristics for the college-ready on-track analysis of ELA test scores, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Students						
Female	50	39	51	39	0	-0.01
Economically disadvantaged	85	30	85	30	0	0.00
Race/ethnicity						
Black	7	19	7	19	0	0.00
Hispanic	74	34	74	34	0	0.00
Other	15	29	12	26	2	0.08
English language learner	25	32	18	29	7	0.23
Received special education services	11	25	9	24	2	0.07
8th-grade math test score	-0.22	0.71	-0.23	0.67	0.01	0.02
8th-grade ELA test score	-0.13	0.75	-0.14	0.71	0.01	0.02
Sample size	9,156		7,202			
Schools						
11th- and 12th-grade enrollment	664	263	705	277	-41	-0.15
Percentage Black students	7	5	5	3	2	0.38
Percentage Hispanic students	71	14	73	13	-2	-0.15
Percentage economically disadvantaged students	73	13	69	14	4	0.31
Alternative school	3	9	3	9	0	0.00
Baseline outcomes						
ELA test score						
One year before NSI	52	11	51	8	1	0.09
Two years before NSI	43	10	45	8	-2	-0.18
Three years before NSI	46	12	49	11	-3	-0.27
School ELA test participation rate	92	3	94	3	-1	-0.46
Sample size	31		66			

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Districts						
Total district enrollment	37,000	8,000	19,000	10,000	18,000	1.98
Percentage Black students	7	4	6	3	2	0.41
Percentage Hispanic students	68	12	72	12	-5	-0.39
Percentage economically disadvantaged students	72	9	72	10	0	0.00
Urban district	74	35	82	32	-7	-0.22
Percentage in-person instruction during COVID-19 (2020-21)	27	10	26	12	1	0.11
Baseline outcomes						
ELA proficiency rate						
One year before NSI	51	7	47	5	4	0.60
Two years before NSI	44	8	42	7	3	0.37
Three years before NSI	46	10	44	8	2	0.23
District ELA test participation rate	93	2	93	2	-1	-0.31
Sample size	16		38			

Source: State and district administrative records.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for three NSI.

Exhibit A.25. Baseline characteristics for the college-ready on-track analysis of high school graduation, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Students						
Female	50	36	48	36	2	0.07
Economically disadvantaged	68	34	68	34	0	0.00
Race/ethnicity						
Black	11	24	11	24	0	0.00
Latino	61	35	61	35	0	0.00
Other	12	22	10	21	1	0.05
English language learner	22	30	21	30	1	0.03
Received special education services	13	24	10	21	3	0.14
8th-grade attendance rate	95	5	95	4	0	-0.04
8th-grade math test score	-0.21	0.71	-0.21	0.64	0.00	0.00
8th-grade ELA test score	-0.22	0.70	-0.24	0.64	0.02	0.03
Sample size	15,436		12,014			
Schools						
11th- and 12th-grade enrollment	664	288	698	302	-35	-0.12
Percentage Black students	12	8	10	6	2	0.24
Percentage Latino students	58	18	53	15	5	0.31
Percentage economically disadvantaged students	62	14	60	14	2	0.13
Alternative school	11	24	11	24	0	0.00
Baseline outcomes						
High school graduation rate						
One year before NSI	85	11	88	11	-2	-0.20
Two years before NSI	85	11	87	10	-2	-0.22
Three years before NSI	83	12	85	11	-2	-0.14
Sample size	62		96			

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Districts						
Total district enrollment	47,000	20,000	53,000	49,000	-5,000	-0.15
Percentage Black students	11	5	13	6	-2	-0.33
Percentage Latino students	55	14	50	12	5	0.40
Percentage economically disadvantaged	62	10	62	11	0	-0.02
Urban district	85	21	88	20	-3	-0.13
Percentage in-person instruction during COVID-19 (2020-21)	40	20	40	18	0	-0.01
Baseline outcomes						
High school graduation rate						
One year before NSI	82	5	83	5	-1	-0.25
Two years before NSI	81	5	83	6	-2	-0.39
Three years before NSI	80	6	81	6	-1	-0.21
Sample size	26		56			

Source: State and district administrative records.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for four NSI.

Exhibit A.26. Baseline characteristics for the college-ready on-track analysis of enrollment in any college, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Students						
Female	51	39	49	39	2	0.06
Economically disadvantaged	59	38	59	38	0	0.00
Race/ethnicity						
Black	14	28	14	28	0	0.00
Latino	55	38	55	38	0	0.00
Other	11	23	10	23	1	0.04
English language learner	18	30	19	31	-1	-0.04
Received special education services	14	27	10	23	3	0.14
8th-grade attendance rate	95	5	95	4	0	-0.05
8th-grade math test score	-0.17	0.76	-0.20	0.68	0.03	0.05
8th-grade ELA test score	-0.22	0.75	-0.25	0.67	0.02	0.03
Sample size	11,216		7,259			
Schools						
11th- and 12th-grade enrollment	761	306	823	336	-62	-0.19
Percentage Black students	14	10	13	7	1	0.14
Percentage Latino students	53	21	46	17	7	0.36
Percentage economically disadvantaged students	59	16	57	16	1	0.09
Alternative school	10	25	10	25	0	0.00
Baseline outcomes						
Enrollment in any postsecondary institution						
One year before NSI	51	10	50	12	1	0.06
Two years before NSI	52	11	52	11	0	0.00
Three years before NSI	54	10	50	12	4	0.38
Sample size	41		53			

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Districts						
Total district enrollment	48,000	24,000	70,000	63,000	-22,000	-0.49
Percentage Black students	13	6	16	6	-3	-0.55
Percentage Latino students	50	16	43	13	7	0.46
Percentage economically disadvantaged students	57	11	57	12	1	0.06
Urban district	90	18	96	14	-5	-0.32
Percentage in-person instruction during COVID-19 (2020-21)	46	24	47	22	-1	-0.04
Baseline outcomes						
Enrollment in any postsecondary institution						
One year before NSI	48	5	51	5	-3	-0.62
Two years before NSI	49	4	51	5	-2	-0.51
Three years before NSI	50	5	51	6	-1	-0.17
Sample size	18		30			

Source: State and district administrative records; U.S. Department of Education Integrated Postsecondary Education Data System.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for three NSI.

Exhibit A.27. Baseline characteristics for the college-ready on-track analysis of enrollment in colleges with at least a 50 percent graduation rate, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Students						
Female	51	39	49	39	1	0.04
Economically disadvantaged	59	38	59	38	0	0.00
Race/ethnicity						
Black	14	28	14	28	0	0.00
Latino	55	38	55	38	0	0.00
Other	11	23	10	23	1	0.05
English language learner	18	30	20	31	-2	-0.06
Received special education services	14	27	10	23	3	0.12
8th-grade attendance rate	95	5	95	4	0	-0.08
8th-grade math test score	-0.17	0.76	-0.18	0.68	0.01	0.01
8th-grade ELA test score	-0.22	0.75	-0.24	0.67	0.02	0.02
Sample size	11,216		6,059			
Schools						
11th- and 12th-grade enrollment	761	306	787	327	-26	-0.08
Percentage Black students	14	10	13	8	1	0.15
Percentage Latino students	53	21	48	18	5	0.23
Percentage economically disadvantaged students	59	16	57	16	2	0.13
Alternative school	10	25	10	25	0	0.00
Baseline outcomes						
Postsecondary enrollment rate in an institution with at least a 50 percent graduation rate						
One year before NSI	39	12	39	14	0	0.02
Two years before NSI	39	13	39	13	1	0.04

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Three years before NSI	40	13	36	13	4	0.28
Sample size	41		61			
Districts						
Total district enrollment	48,000	24,000	70,000	63,000	-21,000	-0.51
Percentage Black students	13	6	16	7	-3	-0.49
Percentage Latino students	50	16	44	13	6	0.39
Percentage economically disadvantaged students	57	11	57	12	0	-0.03
Urban district	90	18	96	14	-5	-0.32
Percentage in-person instruction during COVID-19 (2020-21)	46	24	44	22	1	0.06
Baseline outcomes						
Postsecondary enrollment rate in an institution with at least a 50 percent graduation rate						
One year before NSI	37	8	38	8	-2	-0.19
Two years before NSI	37	8	38	9	-1	-0.16
Three years before NSI	38	9	39	9	-1	-0.11
Sample size	18		34			

Source: State and district administrative records; U.S. Department of Education Integrated Postsecondary Education Data System.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for three NSI. We use baseline college enrollment rates in institutions with graduation rates of at least 50 percent where available. For states where this information was not available (Florida and Colorado), we matched on baseline college enrollment rates in any postsecondary institution.

Exhibit A.28. Baseline characteristics for the well-matched postsecondary enrollment analysis of FAFSA completion, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
School						
12th-grade enrollment	435	224	406	206	29	0.14
Percentage Black students	16	18	13	15	3	0.16
Percentage Latino students	69	22	66	24	3	0.11
Percentage economically disadvantaged students	71	17	68	21	3	0.16
Alternative school	1	9	1	9	0	0.00
Baseline outcomes						
FAFSA submission						
One year before NSI	38	14	37	13	1	0.06
Two years before NSI	36	13	35	13	1	0.04
Three years before NSI	31	15	31	14	0	-0.01
Sample size	113		265			
Districts						
Total district enrollment	66,000	57,000	68,000	77,000	-2,000	-0.02
Percentage Black students	15	14	12	11	3	0.23
Percentage Latino students	67	17	65	20	2	0.10
Percentage economically disadvantaged students	74	14	70	16	3	0.22
Urban district	95	23	94	24	1	0.04
Percentage in-person instruction during COVID-19 (2020-21)	47	25	53	25	-6	-0.22
Baseline outcomes						
FAFSA submission						
One year before NSI	35	6	34	5	1	0.21
Two years before NSI	33	6	33	6	0	-0.01
Three years before NSI	28	8	29	7	-1	-0.13
Sample size	28		109			

Source: State administrative records; U.S. Department of Education Federal Student Aid office data on FAFSA completion; Common Core of Data.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for four NSI.

Exhibit A.29. Baseline characteristics for the well-matched postsecondary enrollment analysis of enrollment in any college, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Students						
Female	50	36	49	36	1	0.02
Economically disadvantaged	80	29	80	29	0	0.00
Race/ethnicity						
Black	17	29	17	29	0	0.00
Latino	72	33	72	33	0	0.00
Other	20	30	17	28	3	0.09
English language learner	27	33	26	33	2	0.05
Received special education services	11	22	8	19	3	0.12
8th-grade attendance rate	96	3	96	3	0	-0.06
8th-grade math test score	-0.09	0.66	-0.11	0.59	0.02	0.04
8th-grade ELA test score	-0.27	0.65	-0.29	0.58	0.02	0.03
Sample size	32,013		21,338			
Schools						
12th-grade enrollment	445	156	436	156	9	0.06
Percentage Black students	15	14	13	12	3	0.21
Percentage Latino students	69	16	69	17	0	-0.01
Percentage economically disadvantaged students	71	12	70	11	1	0.09
Alternative school	1	8	1	8	0	0.00
Baseline outcomes						
Postsecondary enrollment rate in any college						
One year before NSI	45	9	44	8	0	0.05
Two years before NSI	43	8	43	8	0	0.01
Three years before NSI	42	9	43	9	-1	-0.09

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Sample size	110		201			
Districts						
Total district enrollment	65,000	40,000	60,000	51,000	5,000	0.11
Percentage Black students	14	10	13	10	2	0.17
Percentage Latino students	68	12	67	14	1	0.09
Percentage economically disadvantaged students	73	10	72	9	1	0.11
Urban district	95	18	90	19	4	0.23
Percentage in-person instruction during COVID-19 (2020-21)	47	16	50	16	-2	-0.15
Baseline outcomes						
Postsecondary enrollment rate in any institution						
One year before NSI	43	4	42	5	1	0.17
Two years before NSI	42	3	42	5	0	0.03
Three years before NSI	41	3	41	5	-1	-0.17
Sample size	28		95			

Source: State administrative records; U.S. Department of Education Integrated Postsecondary Education Data System.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for four NSI.

Exhibit A.30. Baseline characteristics for the well-matched postsecondary enrollment analysis of postsecondary enrollment in colleges with at least a 50 percent graduation rate, by study group

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Students						
Female	50	36	49	36	1	0.01
Economically disadvantaged	80	29	80	29	0	0.00
Race/ethnicity						
Black	17	29	17	29	0	0.00
Latino	72	33	72	33	0	0.00
Other	20	30	17	28	3	0.09
English language learner	27	33	23	31	5	0.14
Received special education services	11	22	9	20	1	0.07
8th-grade attendance rate	96	3	96	3	0	-0.07
8th-grade math test score	-0.09	0.66	-0.11	0.58	0.02	0.03
8th-grade ELA test score	-0.27	0.65	-0.29	0.57	0.01	0.02
Sample size	32,013		17,201			
Schools						
12th-grade enrollment	445	156	408	122	36	0.25
Percentage Black students	15	14	13	12	2	0.19
Percentage Latino students	69	16	69	17	0	0.01
Percentage economically disadvantaged students	71	12	69	14	2	0.18
Alternative school	1	8	1	8	0	0.00
Baseline outcomes						
Postsecondary enrollment rate in an institution with at least a 50 percent graduation rate						
One year before NSI	11	6	11	5	0	0.02
Two years before NSI	12	6	12	5	0	-0.05

Characteristics (percentage unless otherwise noted)	NSI		Comparison		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Comparison	Standard deviation		
Three years before NSI	11	4	12	5	-1	-0.15
Sample size	110		159			
Districts						
Total district enrollment	65,000	40,000	70,000	62,000	-5,000	-0.10
Percentage Black students	14	10	13	9	1	0.16
Percentage Latino students	68	12	66	15	1	0.10
Percentage economically disadvantaged students	73	10	71	11	2	0.21
Urban district	95	18	94	19	0	0.01
Percentage in-person instruction during COVID-19 (2020-21)	47	16	51	15	-3	-0.21
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	-0.12
Two years before NSI	12	3	12	3	0	-0.14
Three years before NSI	11	3	12	3	0	-0.16
Sample size	28		79			

Source: State administrative records; U.S. Department of Education Integrated Postsecondary Education Data System.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for four NSI.

Appendix B

Additional Details About the Impact Analysis Study Findings

This appendix provides additional details on the impact analysis findings described in the main report.

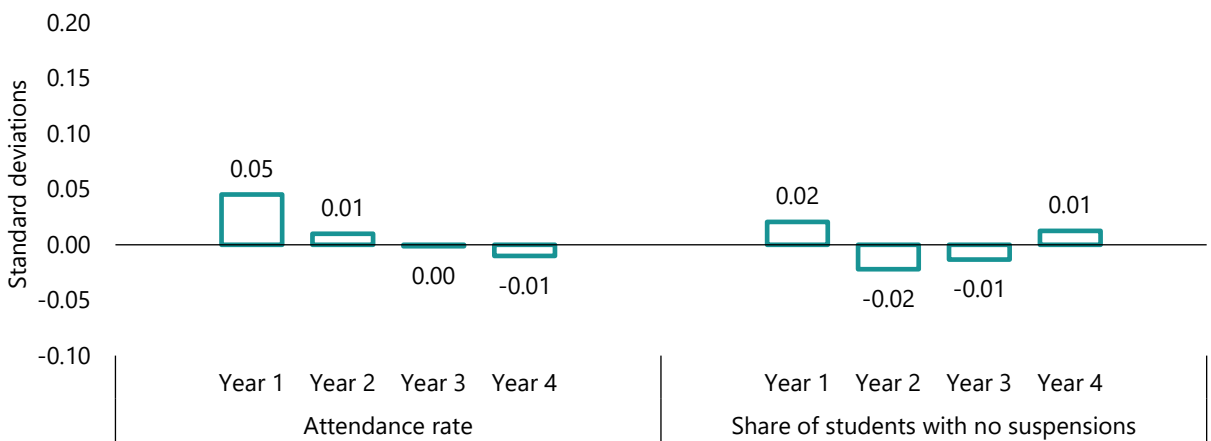
1. Additional impact findings for 8th-grade on-track and 9th-grade on-track NSI

The main report shows the year-by-year impacts of the 8th- and 9th-grade on-track NSI for outcomes where the NSI had a statistically significant impact in at least one year. This section provides details on the year-by-year impacts for outcomes where the 8th- and 9th-grade on-track NSI did not have a statistically significant impact. While the main report shows year-by-year impacts based on all NSI, this section also shows year-by-year impacts on each outcome for the subset of NSI that prioritized that particular outcome.

The 8th-grade on-track NSI did not impact student attendance or suspensions.

The 8th-grade on-track NSI did not have a statistically significant impact on student attendance or suspensions in any year of participation (Exhibit B.1; the hollow bars show impacts that are not statistically significant and can be interpreted as “no impact”).

Exhibit B.1. Impacts of the 8th-grade on-track NSI on attendance and suspensions by years of school participation



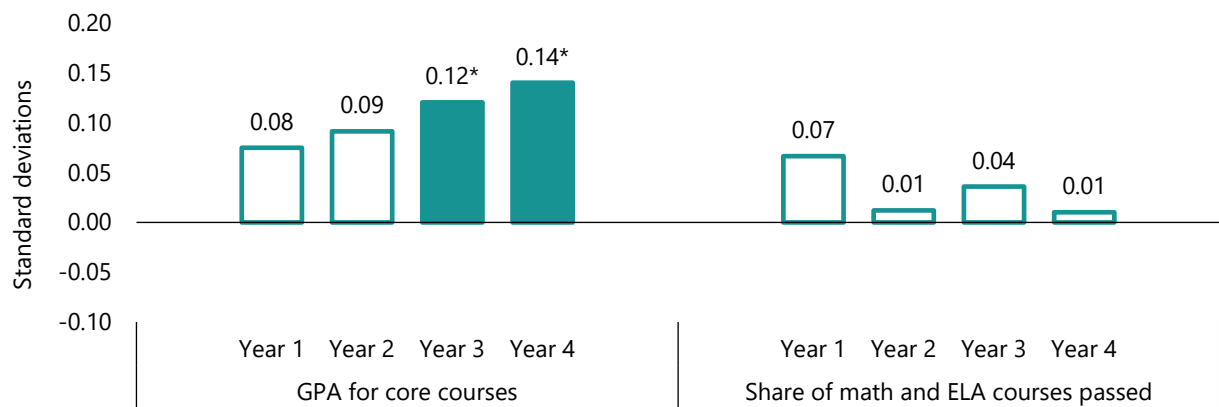
Source: Administrative student records for the 2019-20 through 2023-24 school years.
 Note: Differences between NSI schools and comparison schools are not statistically significant at the 0.05 level. The attendance sample consists of 87 NSI schools in Year 1, 116 NSI schools in Year 2, 118 NSI schools in Year 3, and 93 NSI schools in Year 4. The suspension sample consists of 69 NSI schools in Year 1, 103 NSI schools in Year 2, 75 NSI schools in Year 3, and 55 NSI schools in Year 4.

The 8th-grade on-track NSI generally did not impact the outcomes on which they focused, although the 8th-grade on-track NSI focused on improving course-related outcomes and math test scores had larger impacts on those outcomes.

Exhibits B.2 through B.5. show impacts of the 8th-grade on-track NSI on each outcome for the subset of NSI that prioritized that outcome. In most cases, the 8th-grade on-track NSI that prioritized a particular outcome did not have a consistent positive impact on those outcomes. However, the 8th-grade on-track NSI that prioritized course-related outcomes (GPA in core courses or the share of math and ELA courses passed) had a positive and significant impact on GPA in Year 3 and Year 4 (Exhibit B.2). Though these NSI had a positive impact on GPA, they did not have a statistically significant impact on the share of math and ELA courses passed. In addition, the 8th-grade on-track NSI that prioritized math scores generally had a

larger impact on students’ math test scores than the full sample of 8th-grade on-track NSI, although the impact was only statistically significant in Year 3 (Exhibit B.3). Some NSI that sought to improve teachers’ math instruction did not identify math test scores as a priority student outcome (for example, an NSI focused on improving students’ math course performance). The impacts on math test scores are similar in magnitude and statistically significant in Year 1 and Year 4 when including NSI that focused on either improving student math test scores or improving teachers’ math instruction (Exhibit B.4).

Exhibit B.2. Impacts of the 8th-grade on-track NSI on course-related outcomes for NSI focused on these outcomes



Source: Administrative student records for the 2019-20 through 2023-24 school years.
 Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample for each outcome consists of 54 NSI schools in Year 1, 39 NSI schools in Year 2, 37 NSI schools in Year 4, and 23 NSI schools in Year 4.

Exhibit B.3. Impacts of the 8th-grade on-track NSI on test score outcomes for NSI focused on these outcomes



Source: Administrative student records for the 2017-18 through 2023-24 school years.
 Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample for math test scores consists of 18 NSI schools in Year 1, 29 NSI schools in Year 2, 28 NSI schools in Year 3, and 19 NSI schools in Year 4. The sample for ELA test scores consists of 21 NSI schools in Year 1, 62 NSI schools in Year 2, 60 NSI schools in Year 3, and 51 NSI schools in Year 4.

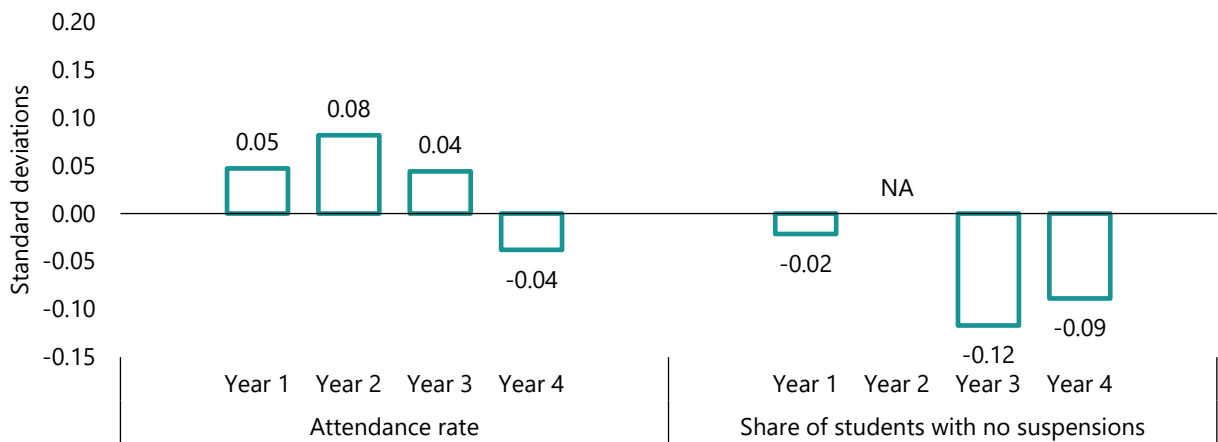
Exhibit B.4. Impacts of the 8th-grade on-track NSI on test score outcomes for NSI focused on improving either math or ELA test scores or teachers’ instruction in math or ELA



Source: Administrative student records for the 2017-18 through 2023-24 school years.

Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample for math test scores consists of 18 NSI schools in Year 1, 29 NSI schools in Year 2, 28 NSI schools in Year 3, and 19 NSI schools in Year 4. The sample for ELA test scores consists of 21 NSI schools in Year 1, 62 NSI schools in Year 2, 60 NSI schools in Year 3, and 51 NSI schools in Year 4. The math test score analysis includes NSI focused either on improving math test scores or on improving teacher math instruction. The ELA test score analysis includes NSI focused either on improving ELA test scores or on improving teacher ELA instruction.

Exhibit B.5. Impacts of the 8th-grade on-track NSI on attendance and suspension for NSI focused on these outcomes



Source: Administrative student records for the 2017-18 through 2023-24 school years.

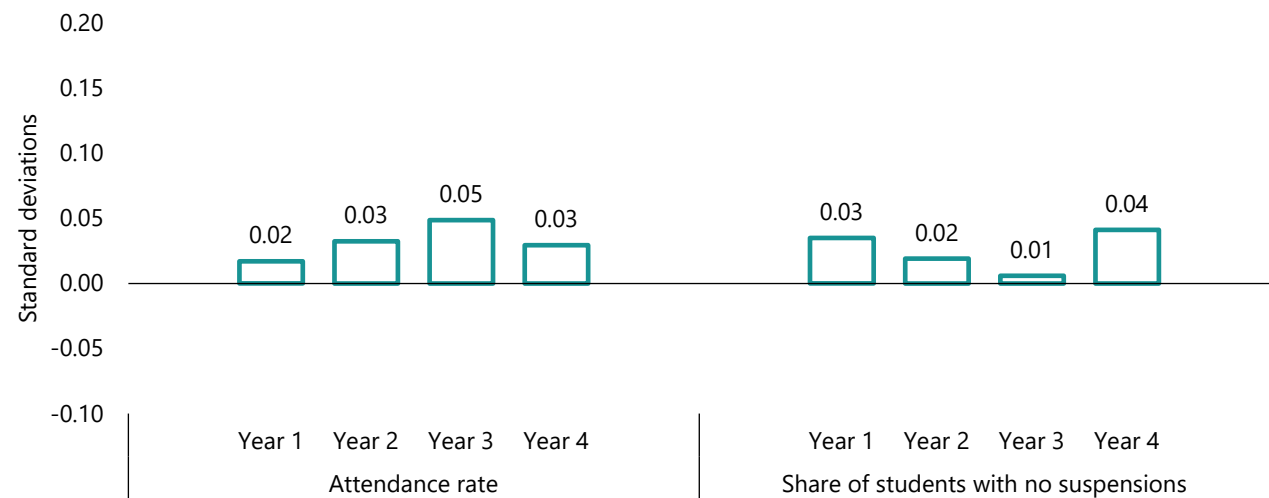
Note: Differences between NSI schools and comparison schools are not statistically significant at the 0.05 level. The attendance sample consists of 29 NSI schools in Year 1, 16 NSI schools in Year 2, 29 NSI schools in Year 3, and 24 NSI schools in Year 4. The suspensions sample consists of 17 NSI schools in Year 1, 17 NSI schools in Year 3, and 15 NSI schools in Year 4. Results are not displayed for suspension impacts in Year 2 because only 4 NSI schools could be included in that analysis. The sample size for Year 2 suspensions is small because that year was 2020-21, and suspension data are not available due to virtual schooling for most of the schools that were part of NSI that focused on suspension rates as a priority outcome.

NA = not available.

The 9th-grade on-track NSI did not impact student attendance or suspensions.

The 9th-grade on-track NSI overall did not have a statistically significant impact on attendance or suspensions (Exhibit B.6).

Exhibit B.6. Impacts of the 9th-grade on-track NSI on attendance and suspension outcomes



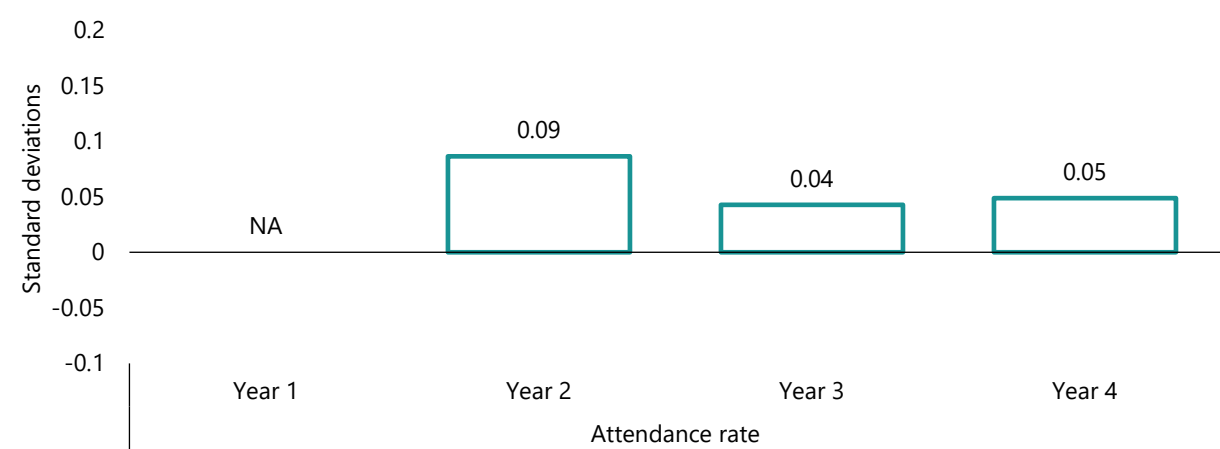
Source: Administrative student records for the 2017-18 through 2023-24 school years.

Notes: Differences between NSI schools and comparison schools are not statistically significant at the 0.05 level. The attendance sample consists of 81 NSI schools in Year 1, 94 NSI schools in Year 2, 79 NSI schools in Year 3, and 77 NSI schools in Year 4. The suspensions sample consists of 70 NSI schools in Year 1, 94 NSI schools in year 2, 59 NSI schools in Year 3, and 49 NSI schools in Year 4.

The two 9th-grade on-track NSI focused on improving student attendance did not have statistically significant impacts on that outcome.

Two 9th-grade on-track NSI focused on improving student attendance in addition to improving course-related outcomes.¹³ When we measure impacts on attendance separately for those two NSI, the impacts are positive, but not statistically significant (Exhibit B.7). However, the number of NSI schools included in this analysis ranged from 14 to 24 across years, which limited our ability to precisely measure impacts on attendance for these two NSI.

Exhibit B.7. Impacts of 9th-grade on-track NSI on attendance rates for NSI focused on improving student attendance



Source: Administrative student records for the 2017-18 through 2023-24 school years.
Note: Differences between NSI schools and comparison schools are not statistically significant at the 0.05 level. The sample consists of 24 NSI schools in Year 2, 22 NSI schools in Year 3, and 14 NSI schools in Year 4. Results are not displayed for attendance impacts in Year 1 because Year 1 was the 2020-21 school year when schooling was virtual for most NSI schools included in this analysis.
NA = not available.

2. Findings based on random assignment study

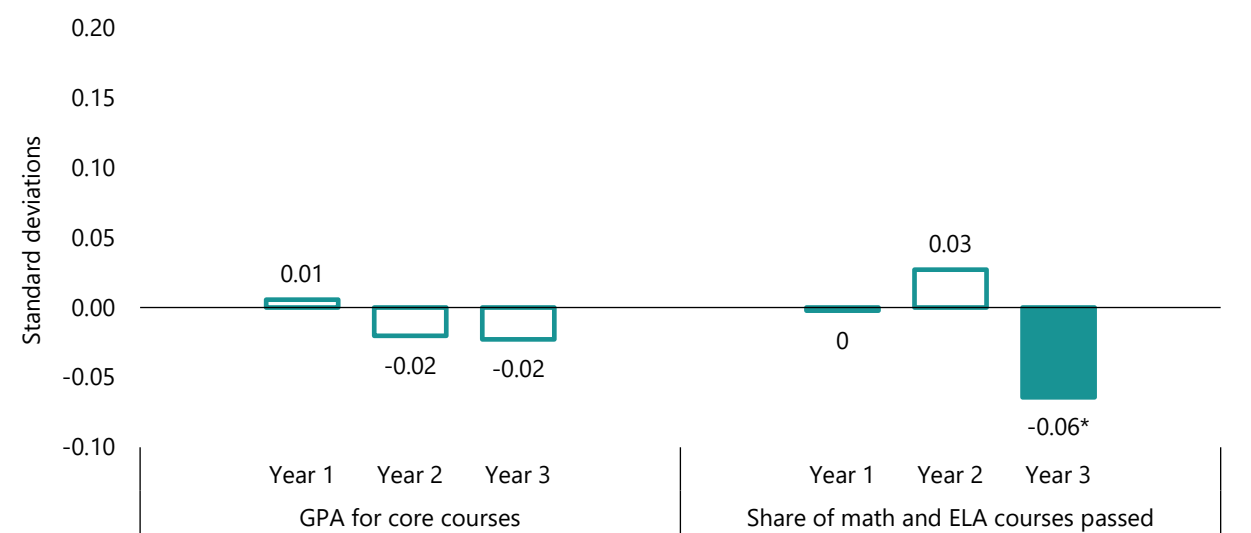
While the main report describes impacts for the 8th- and 9th-grade on-track NSI based on the matched comparison analysis, this section describes impacts based on the random assignment study. The random assignment study included the subset of 8th- and 9th-grade on-track NSI that received a Cohort 3 NSI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

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.

Similar to the main results based on the matched comparison analysis, the 8th-grade on-track NSI in the random assignment study generally did not have a statistically significant impact on GPA, course pass rate, ELA test scores, attendance rates, or suspension rates (Exhibits B.8–B.10). In contrast to the matched comparison results there were no impacts on math test scores in the random assignment study. This could be because the math test score impacts were driven primarily by NSI focused on improving that outcome, and only one of the five 8th-grade on-track NSI in the random assignment analysis were focused on improving math test scores.

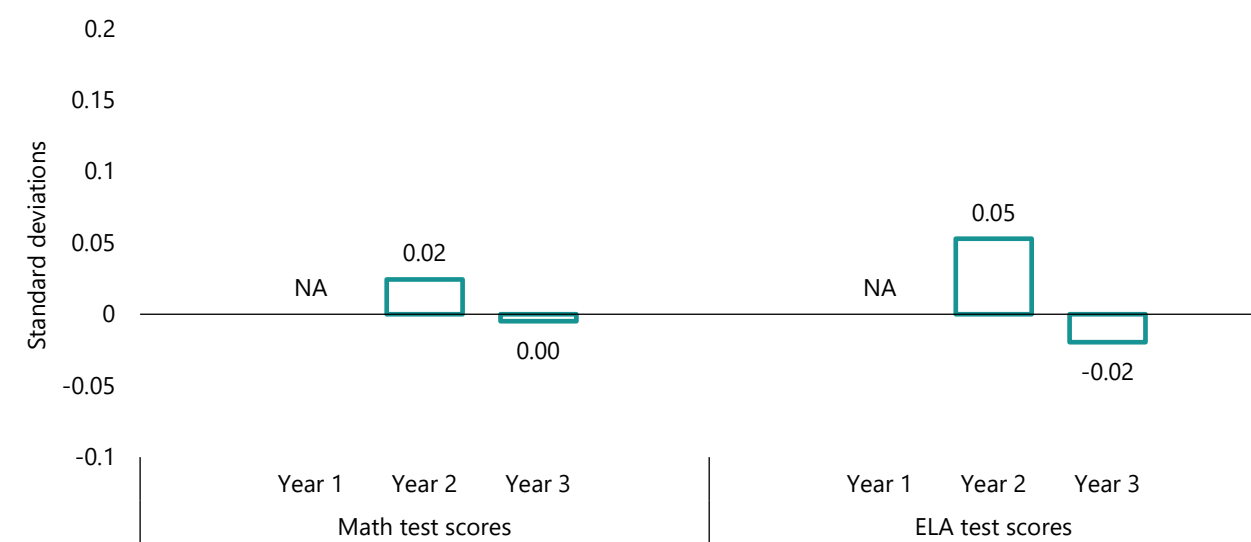
There was a moderate negative impact of the 8th-grade on-track NSI on share of math and ELA courses passed in schools’ third year of participation (Exhibit B.8), but impacts were small and not statistically significant in other years and there were no impacts on GPA across any participation year, so the statistical significance of this impact may have been due to chance.

Exhibit B.8. Impacts of 8th-grade on-track NSI on GPA and share of courses passed based on the random assignment study



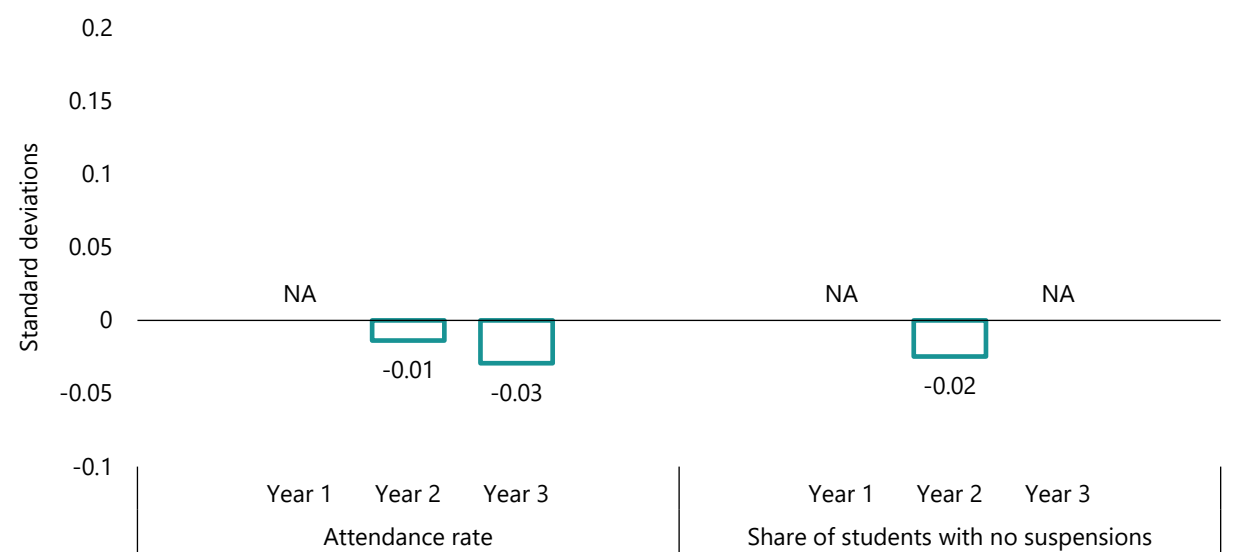
Source: Administrative student records for the 2020-21 through 2023-24 school years.
Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The GPA sample consists of 43 NSI schools in Year 1 and 49 NSI schools in Year 2 and Year 3. The sample for share of math and ELA courses passed consists of 42 NSI schools in Year 1 and 49 NSI schools in Year 2 and Year 3.

Exhibit B.9. Impacts of 8th-grade on-track NSI on math and ELA test scores based on the random assignment study



Source: Administrative student records for the 2019-20 through 2023-24 school years.
Note: Differences between NSI schools and comparison schools were not statistically significant at the 0.05 level. The sample for math test scores consists of 46 NSI schools in Year 2 and 45 NSI schools in Year 3. The sample for ELA test scores consists of 47 NSI schools in Year 2 and 48 schools in Year 3. Results are not displayed for Year 1 because that was the 2020-21 school year when standardized tests were not administered for most NSI schools included in this analysis.
NA = not available.

Exhibit B.10. Impacts of 8th-grade on-track NSI on behavioral outcomes based on the random assignment study



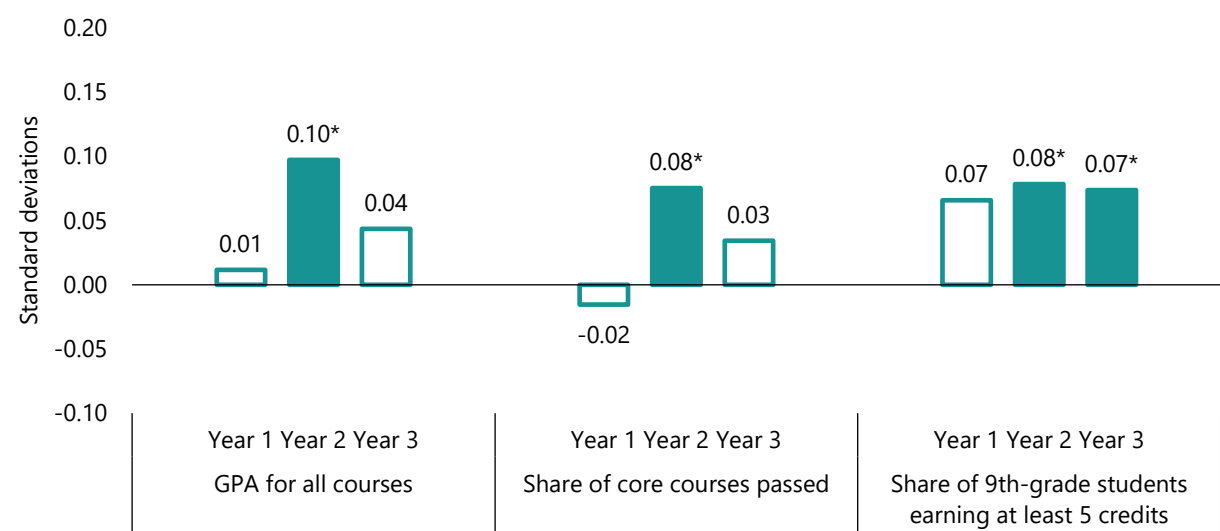
Source: Administrative student records for the 2019-20 through 2023-24 school years.

Note: Differences between NSI schools and comparison schools were not statistically significant at the 0.05 level. The sample consists of 49 NSI schools in Year 2 and 49 NSI schools in Year 3. Suspensions refer to out-of-school suspensions. Results are not displayed for Year 1 because Year 1 was the 2020-21 school year when schooling was virtual for most NSI schools included in this analysis. Suspension results are not reported for Year 3 because we were unable to obtain suspension data for the 2022-23 school year from one district, which resulted in a sample that was too small to estimate impacts on suspension rates in that year.

NA = not available.

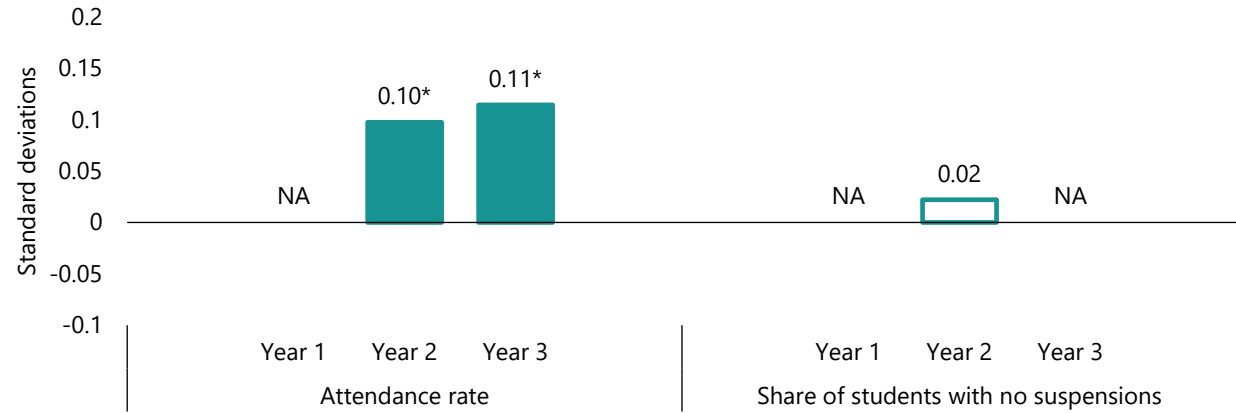
Similar to the main results based on the matched comparison analysis, the 9th-grade on-track NSI in the random assignment study had positive impacts on course-related outcomes (Exhibit B.11). The impacts were statistically significant for all course-related outcomes in Year 2 and for the share of 9th-grade students earning at least five credits in Year 3. In contrast to the main results, there was a moderate positive impact on attendance rates in Years 2 and 3 (Exhibit B.12). Two of the four 9th-grade on-track NSI in the random assignment study were focused on improving attendance rates, which may have contributed to the positive attendance impacts in this analysis.

Exhibit B.11. Impacts of 9th-grade on-track NSI on GPA, course pass rate, and credit completion based on the random assignment study



Source: Administrative student records for the 2019-20 through 2023-24 school years.
Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. In Year 1, the GPA sample consists of 45 NSI schools and the sample for other outcomes consists of 44 NSI schools. The sample across all outcomes in other years consists of 42 NSI schools in Year 2 and 39 NSI schools in Year 3.

Exhibit B.12. Impacts of 9th-grade on-track NSI on behavioral outcomes based on the random assignment study



Source: Administrative student records for the 2020-21 through 2023-24 school years.
Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample consists of 42 NSI schools in Year 2 and 39 NSI schools in Year 3. Suspensions refer to out-of-school suspensions. Results are not displayed for Year 1 because Year 1 was the 2020-21 school year when schooling was virtual for most NSI schools included in this analysis. Suspension results are not reported for Year 3 because we were unable to obtain suspension data for the 2022-23 school year from one district, which resulted in a sample that was too small to estimate impacts on suspension rates in that year.
NA = not available.

3. Impacts of the NSI on the proportion of students meeting on-track thresholds

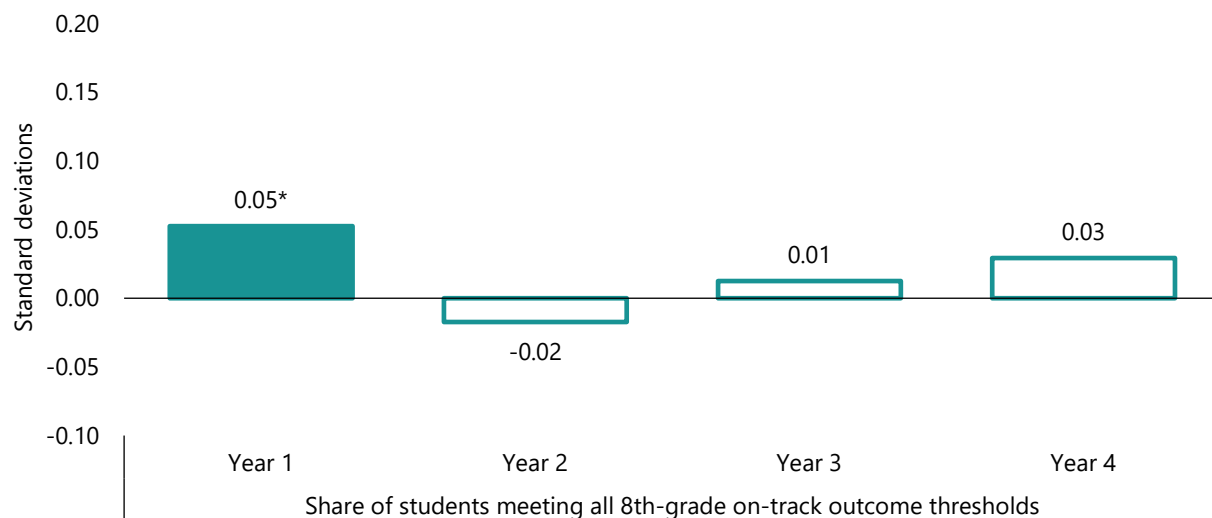
This section presents impacts of the 8th- and 9th-grade on-track NSI on the percentage of students who are on-track for high school graduation and college enrollment, which the foundation defined as meeting all the on-track thresholds for each outcome described in Exhibit A.8.¹⁴

When analyzing impacts on the overall on-track indicator, we only included students that had non-missing data on all outcomes that make up the indicator to ensure that on-track status was measured consistently for all students in the analysis. This restriction means that data from the 2019-20 school year are not included in the analysis for 8th-grade on track because no test score data were available that year due to the COVID-19 pandemic. Similarly, data from the 2020-21 school year are not included in either analysis because no attendance or suspension data were available that year.

The 8th-grade on-track NSI had a positive impact on the proportion of on-track students in schools' first year of participation.

The positive impacts 8th-grade on-track NSI had on GPA and the percentage of students passing math and ELA courses in Year 1 were large enough to increase the percentage of on-track students by 1 percentage point (from 7 percent to 8 percent). This impact is equivalent to an increase of 0.05 standard deviations (Exhibit B.13).

Exhibit B.13. Impact of the 8th-grade on-track NSI on the percentage of students meeting all on-track thresholds



Source: Administrative student records for the 2017-18 through 2023-24 school years.

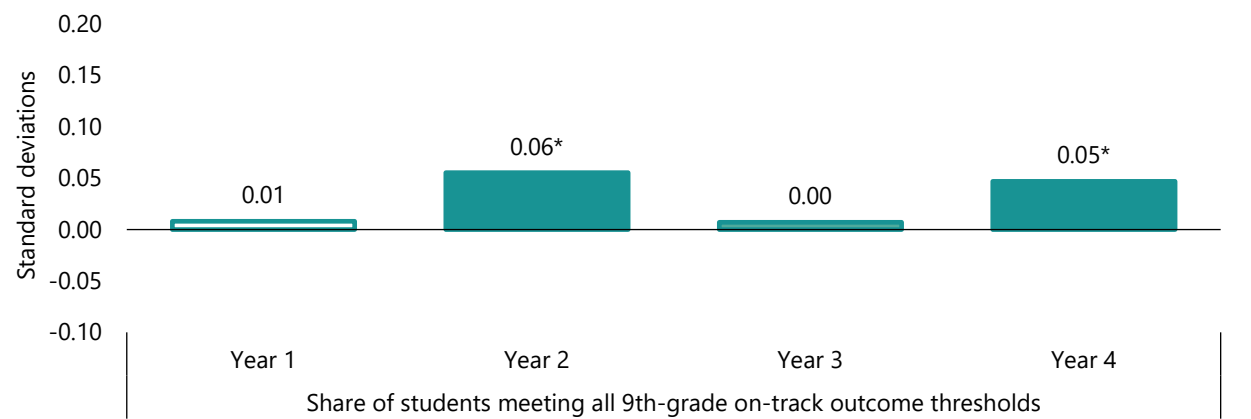
Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample consists of 60 NSI schools in Year 1, 105 NSI schools in Year 2, 117 NSI schools in Year 3, and 90 NSI schools in Year 4.

The 9th-grade on-track NSI had a positive impact on the proportion of on-track students in schools' second and fourth years of participation.

The positive impacts 9th-grade on-track NSI had on course-related outcomes in Year 2 and Year 4 were large enough to increase the percentage of on-track students by 2 percentage points (from 20 percent to

22 percent in Year 2 and from 16 percent to 18 percent in Year 4). These impacts are equivalent to an increase of 0.06 standard deviations in Year 2 and 0.05 standard deviations in Year 4 (Exhibit B.14).

Exhibit B.14. Impacts of the 9th-grade on-track NSI on the percentage of students meeting all on-track thresholds

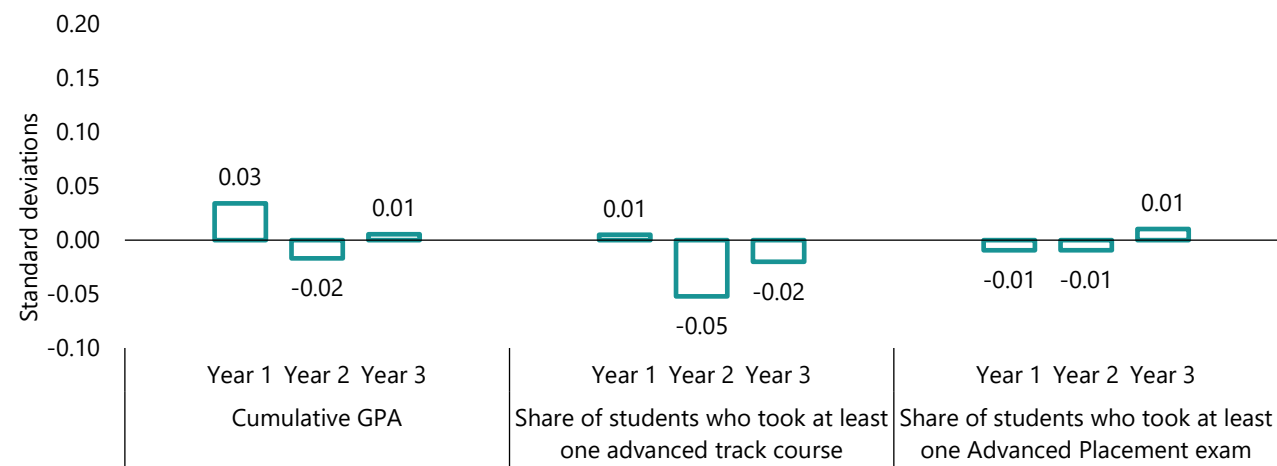


Source: Administrative student records for the 2017-18 through 2023-24 school years.
 Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample consists of 81 NSI schools in Year 1, 94 NSI schools in Year 2, 79 NSI schools in Year 3, and 77 NSI schools in Year 4.

4. Additional impacts for the college-ready on-track NSI

This section presents year-by-year impacts for college-ready on-track NSI on course-related outcomes (Exhibit B.15) and on high school graduation and college enrollment outcomes (Exhibit B.16). Though some bars show positive or negative estimated impacts, none of the estimates are statistically significant, so we conclude that the college-ready on-track NSI did not impact these outcomes.

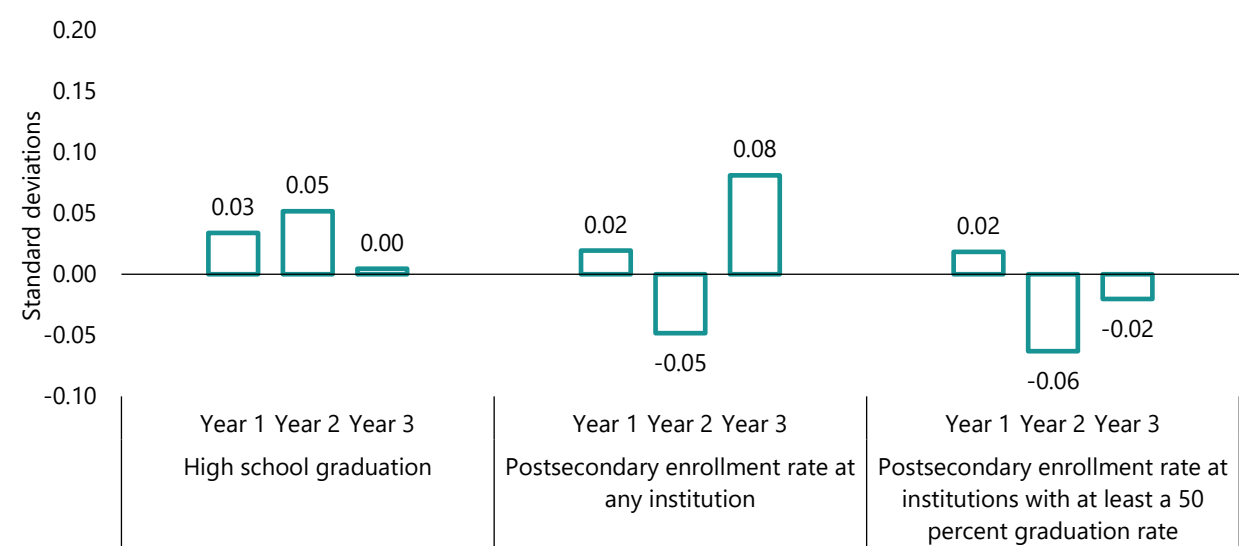
Exhibit B.15. Impacts of the college-ready on-track NSI on GPA, advanced course taking, and Advanced Placement exam taking, by years of school participation



Source: Administrative student records for the 2015-16 through 2023-24 school years.

Note: Differences between NSI schools and comparison schools are not statistically significant at the 0.05 level. The sample for cumulative GPA consists of 47 NSI schools in Year 1 and 42 NSI schools in Year 2 and Year 3. The sample for advanced track courses consists of 50 NSI schools in Year 1, 46 NSI schools in Year 2, and 44 NSI schools in Year 3. The sample for Advanced Placement exam taking consists of 70 NSI schools in Year 1, 63 NSI schools in Year 2, and 53 NSI schools in Year 3.

Exhibit B.16. Impacts of the college-ready on-track NSI on high school graduation and postsecondary enrollment



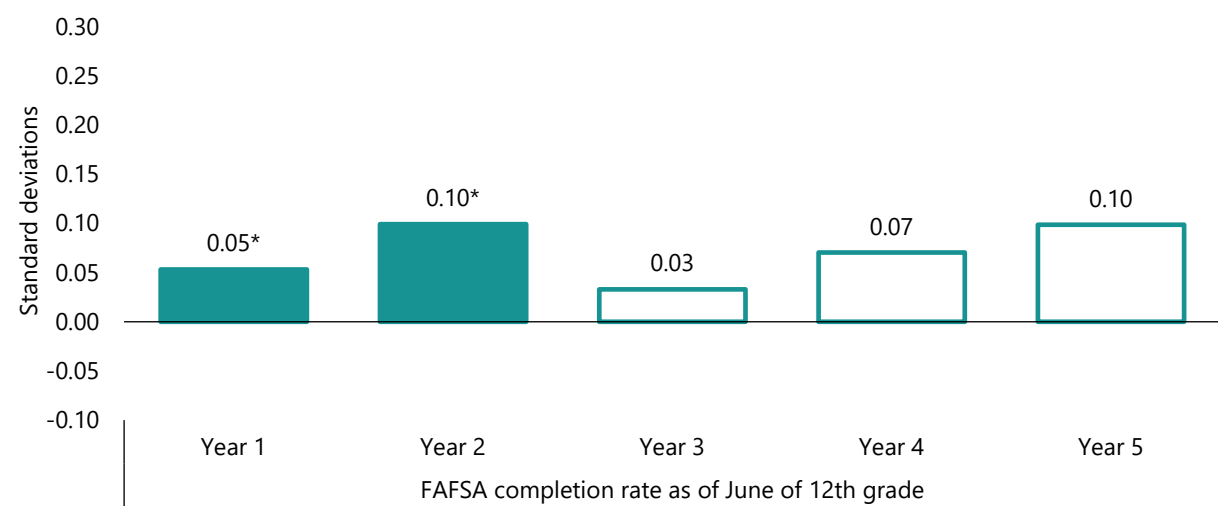
Source: Administrative student records for the 2015-16 through 2023-24 school years.
Note: Differences between NSI schools and comparison schools are not statistically significant at the 0.05 level. The sample for high school graduation consists of 79 NSI schools in Year 1, 71 NSI schools in Year 2, and 62 NSI schools in Year 3. The sample for postsecondary enrollment consists of 75 NSI schools in Year 1, 67 NSI schools in Year 2, and 41 NSI schools in Year 3.

5. Impacts on June FAFSA completion rates

The main report describes the impact of the well-matched postsecondary enrollment 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 enrollment NSI had a positive impact on the proportion of students completing the FAFSA by June of their 12th-grade year (Exhibit B.17). The impacts were statistically significant only in schools’ first and second years of participation. In the main report we could not present impacts on December FAFSA completion rates in Year 5, because for most schools Year 5 was 2023-24, and the FAFSA form was not available to students until December 30, 2023, due to technical challenges the U.S. Department of Education faced rolling out a new FAFSA form (U.S. Government Accountability Office 2024). The impacts on FAFSA completion by June of students’ 12th-grade year was 0.10 standard deviations but was not statistically significant in part due to the smaller number of NSI schools included in the analysis in Year 5 (97 NSI schools compared to 141 NSI schools in Years 1 and 2).

Exhibit B.17. Impacts of well-matched postsecondary enrollment NSI on FAFSA completion in June of students’ 12th-grade year, by years of NSI participation



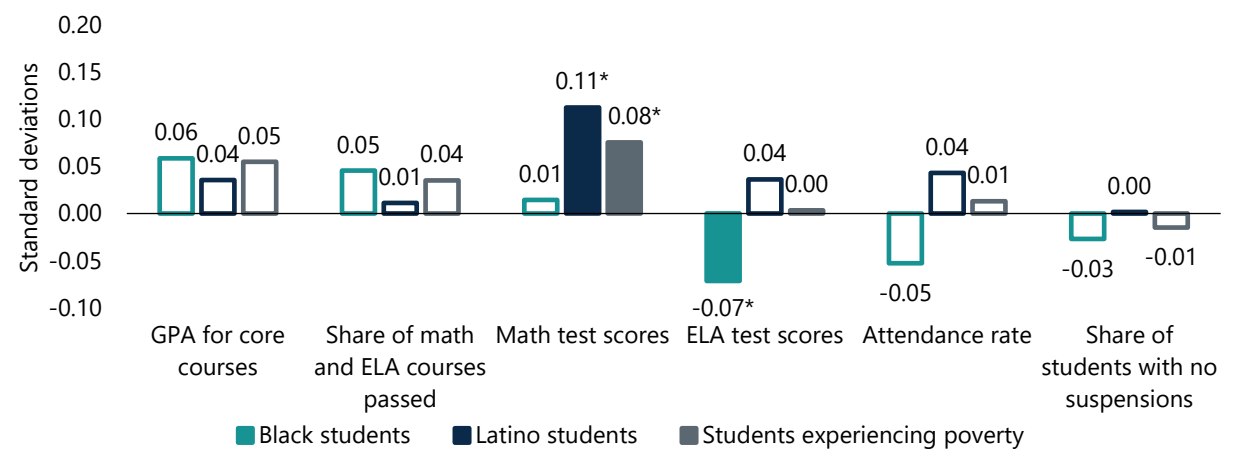
Source: Administrative student records for the 2015-16 through 2023-24 school years.
Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample consists of 141 NSI schools in Year 1, 141 NSI schools in Year 2, 131 NSI schools in Year 3, 110 NSI schools in Year 4, and 97 NSI schools in Year 5.

6. Impacts of the NSI on students who are Black, Latino, or experiencing poverty

The impacts of the 8th-grade on-track NSI on students who are Black, Latino, and experiencing poverty were similar to the overall impact (Exhibit B.18). For example, the overall impact on GPA for core courses in Year 3 was 0.05 (Exhibit 5), which is similar to the impact of 0.06 for Black students, 0.04 for Latino students, and 0.05 for students experiencing poverty. This impact was not statistically significant for either the overall sample or each student subgroup.

There was a moderate negative impact of the 8th-grade on-track NSI on ELA test scores for Black students in schools’ third year of participation. Although this raises some concern, the NSI did not have a statistically significant impact on Black students’ ELA scores in other years, and the magnitude of the impacts was similar to the overall impacts in those years (Exhibit B.19). The impact on math test scores in other years was also generally similar to the overall impacts, although there was a positive and statistically significant impact on Black students’ math test scores in Year 1. This suggests there is not a consistent pattern of differences in math or ELA test score impacts for Black students.

Exhibit B.18. Impacts of the 8th-grade on-track NSI on student outcomes in schools’ third year of participation, by student group



Source: Administrative student records for the 2017-18 through 2023-24 school years.
Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample consists of 126 NSI schools for course-related outcomes, 114 NSI schools for math test scores, 118 NSI schools for ELA test scores, 118 NSI schools for attendance, and 75 NSI schools for the suspension analysis.

Exhibit B.19. Impacts of the 8th-grade on-track NSI on math ELA test scores for Black students, by year

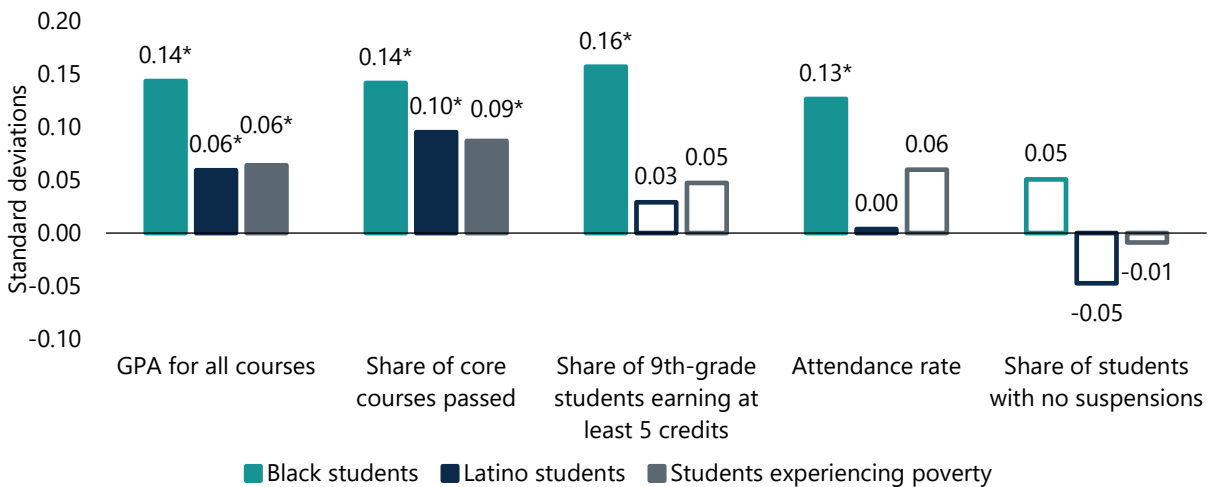


Source: Administrative student records for the 2017-18 through 2023-24 school years.
Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample for math test scores consists of 60 NSI schools in Year 1, 103 NSI schools in Year 2, 114 NSI schools in Year 3, and 87 NSI schools in Year 4. The sample for ELA test scores consists of 60 NSI schools in Year 1, 107 NSI schools in Year 2, 118 NSI schools in Year 3, and 92 NSI schools in Year 4.

Ninth-grade on-track NSI impacts on students who are Latino or experiencing poverty were generally similar to overall impacts in school’s third year of participation (shown in Exhibit 7). However, impacts for Black students were higher for GPA, credit completion, and attendance (Exhibit B.20). Sensitivity analyses showed that the higher impacts for Black students are in part due to the inclusion of one NSI that had substantial positive impacts and served a large number of Black students. Although there is some evidence of higher impacts for Black students in Year 3, the impacts of 9th-grade on-track NSI on Black

students are more similar to the overall impacts in other years, for example during schools' fourth year of participation (Exhibit B.21). This suggests there is not a consistent pattern of differences in the impact of 9th-grade on-track NSI for Black students.

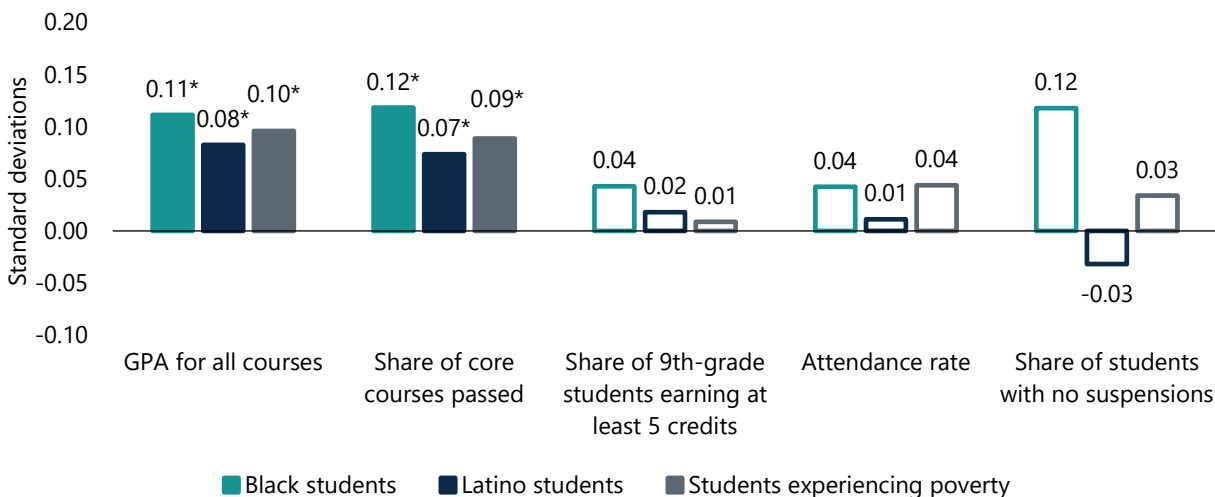
Exhibit B.20. Impacts of the 9th-grade on-track NSI on student outcomes in schools' third year of participation, by student group



Source: Administrative student records for the 2017-18 through 2023-24 school years.

Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample consists of 110 NSI schools for course-related outcomes, 79 NSI schools for attendance, and 59 students for the suspension analysis.

Exhibit B.21. Impacts of the 9th-grade on-track NSI on student outcomes in schools' fourth year of participation, by student group

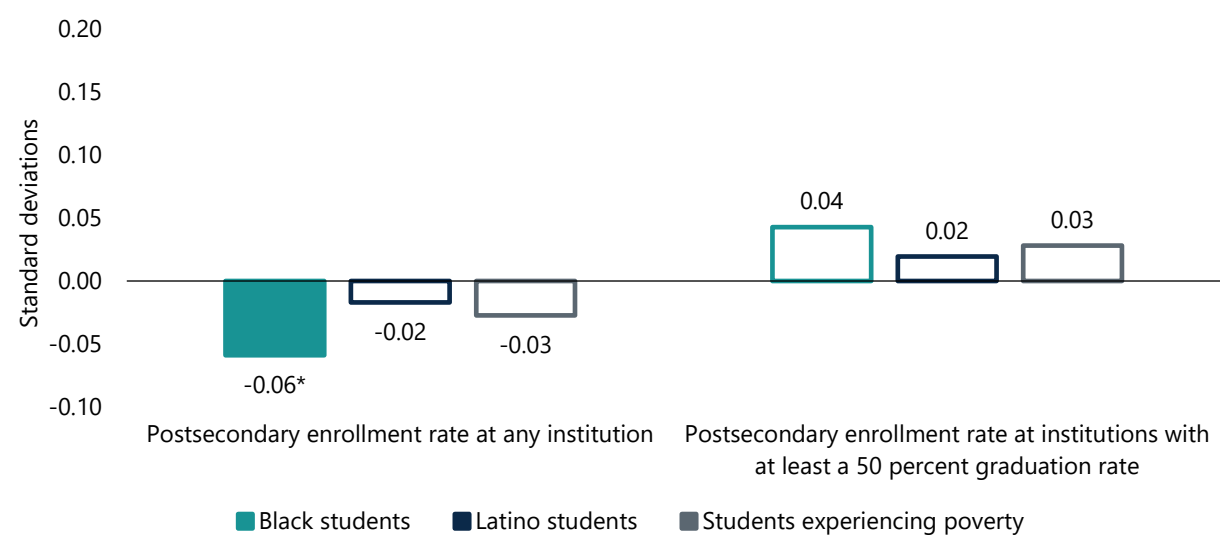


Source: Administrative student records for the 2017-18 through 2023-24 school years.

Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample for course-related outcomes and attendance is 77 NSI schools. The sample for the suspension analysis is 49 NSI schools.

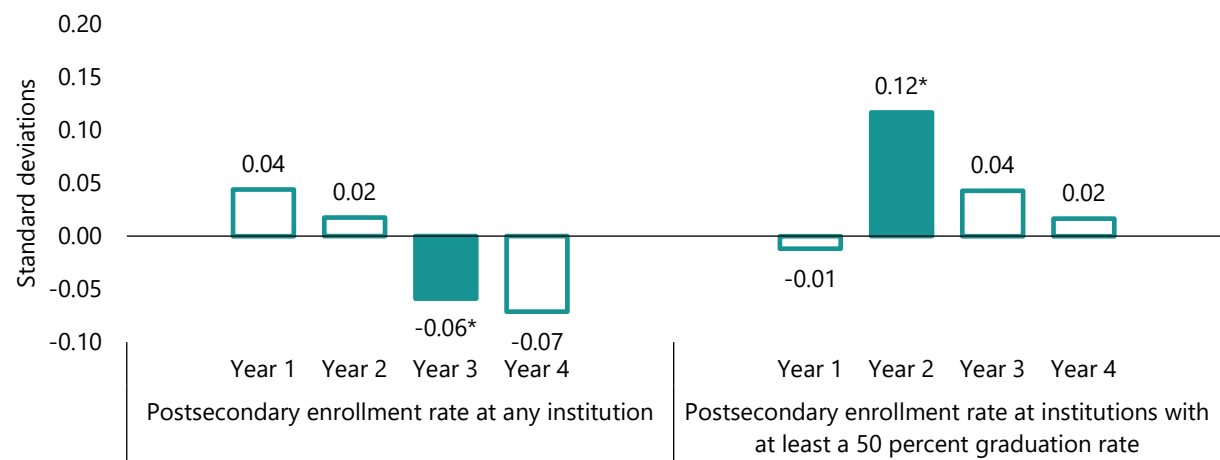
Similar to the overall finding, the well-matched postsecondary enrollment NSI generally did not have an impact on college enrollment for students who are Black, Latino, or experiencing poverty after schools’ third year of participation (Exhibit B.22). There is, however, a negative and significant impact on postsecondary enrollment at any institution for Black students in schools’ third year of participation. However, the impacts on postsecondary enrollment at any institution for Black students in other years are similar to the overall impacts and not statically significant (Exhibit B.23). In addition, the impact on postsecondary enrollment at institutions with at least a 50 percent graduation rate for Black students is similar to the main results in Years 1, 2, and 4 but is positive and statistically significant in Year 3. Together these results indicate that there are no consistent differences in impacts of the well-matched postsecondary enrollment NSI on college enrollment outcomes for Black students. It is also important to note that the Black students make up a relatively small share of students in the well-matched postsecondary enrollment analysis (17 percent of students), meaning the impacts for Black students are less precisely estimated than for other groups of students and tend to fluctuate more from year to year.

Exhibit B.22. Impacts of the well-matched postsecondary enrollment NSI on students in schools’ third year of participation, by student group



Source: Administrative student records for the 2019-20 through 2023-24 school years.
Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample consists of 110 NSI schools.

Exhibit B.23. Impacts of the well-matched postsecondary enrollment NSI on postsecondary enrollment for Black students, by year



Source: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. Administrative student records for the 2019-20 through 2023-24 school years. The sample consists of 139 NSI schools in Year 1, 141 NSI schools in Year 2, 110 NSI schools in Year 3, and 99 NSI schools in Year 4.

We were unable to measure the impact of the well-matched postsecondary enrollment NSI on FAFSA completion rates separately for students who are Black, Latino, or experiencing poverty 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.24; none of the interaction terms in the regression analysis were statistically significant). This suggests that the impact of the NSI on students who are Black, Latino, or experiencing poverty was similar to the impact of the NSI on all students.

Exhibit B.24. Assessing evidence of impacts for well-matched postsecondary enrollment NSI on FAFSA completion rate on students who are Black, Latino, or economically disadvantaged after schools’ third 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	2	3	-8	9
Latino	3	5	-4	8
Economically disadvantaged	7	4	-9	6

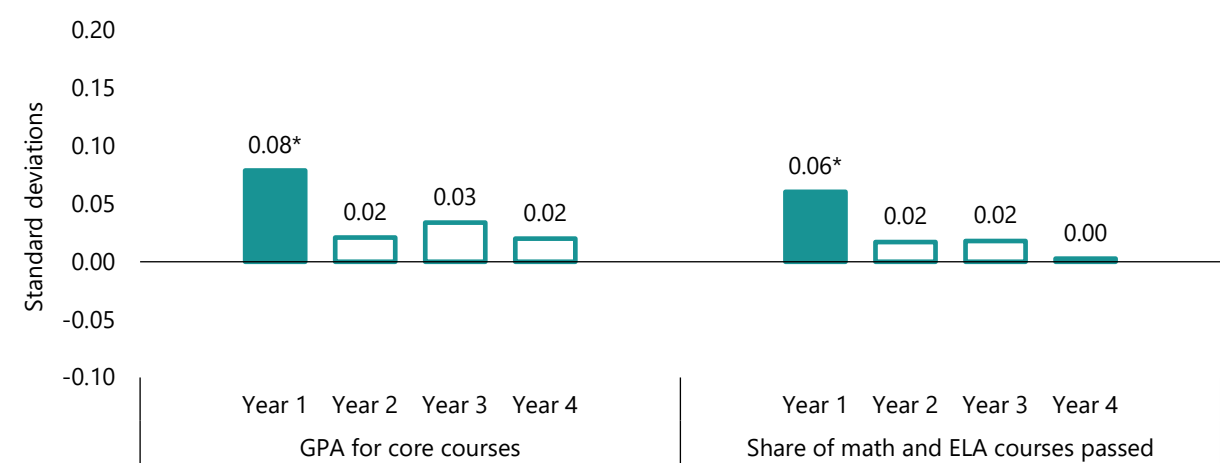
Source: Administrative student records from the 2015-16 through 2022-23 school years.

Note: The sample consists of 113 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. None of the coefficients is statistically significant at the 0.05 level based on a two-tailed test.

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

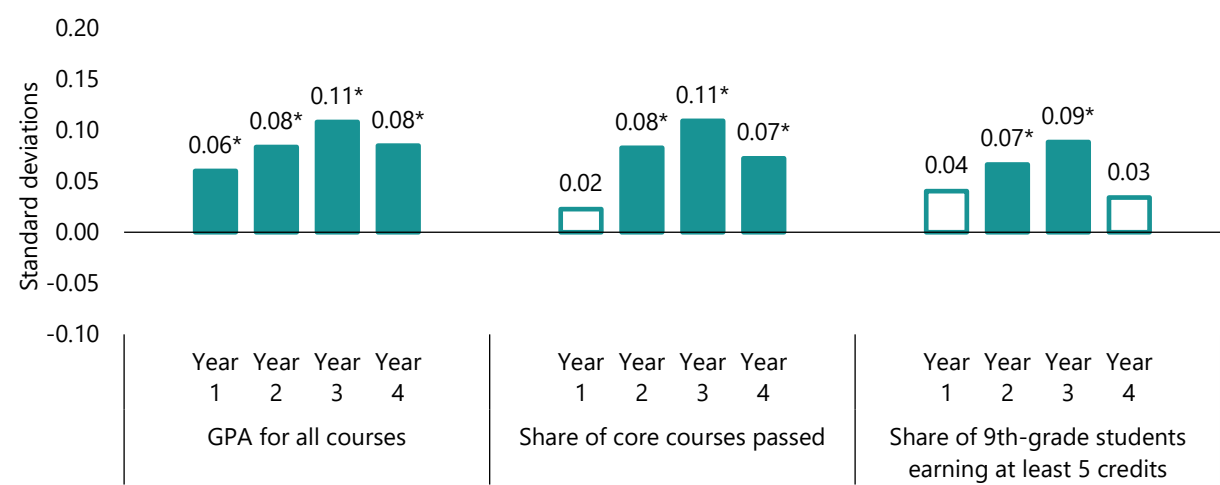
Two 8th-grade on-track and three 9th-grade on-track NSI tested change ideas related to equitable grading. The two 8th-grade on-track NSI focused on equitable grading tested change ideas that provided opportunities for students to improve their grades through retakes or completing missed assignments, and by making grading practices more transparent to students. For the 9th-grade on-track NSI, some of the change ideas also related to investigating educator biases in grading, while a small number involved replacing grades of zeros for missing assignments with a minimum grade such as 50 percent. To examine whether change ideas related to equitable grading practices affected the estimated impacts on course-related outcomes, we conducted a version of the analysis where we excluded these NSI from the sample (Exhibits B.25 and B.26). When excluding these NSI, the impacts on course-related outcomes for both 8th- and 9th-grade on-track NSI were similar to those shown in Exhibit 5 and Exhibit 7, suggesting that the improvements in course performance were not being driven by the NSI that tested change ideas related to equitable grading practices.

Exhibit B.25. Effects of 8th-grade on-track NSI on course-related outcomes, excluding NSI testing change ideas related to equitable grading practices



Source: Administrative student records for the 2017-18 through 2023-24 school years.
Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample consists of 142 NSI schools in Year 1, 120 NSI schools in Year 2, 106 NSI schools in Year 3, and 80 NSI schools in Year 4.

Exhibit B.26. Effects of 9th-grade on-track NSI on course-related outcomes, excluding intermediaries with equitable grading practices



Source: Administrative student records for the 2017-18 through 2023-24 school years.
Note: Filled bars and asterisks (*) indicate that the difference between NSI schools and comparison schools is statistically significant at the 0.05 level, two-tailed test. The sample consists of 94 NSI schools in Year 1, 82 NSI schools in Year 2, 78 NSI schools in Year 3, and 62 NSI schools in Year 4.

8. 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 Year 3 impacts, we tested whether the differences in impacts across NSI were statistically significant. The variation in impacts across NSI were statistically significant for two 8th-grade on-track outcomes (ELA test scores and the share of students with no suspensions), but not for any 9th-grade on-track outcomes (Exhibit B.27). We do not report on variation in impacts for college-ready on-track or well-matched postsecondary enrollment NSI because of the small number of NSI included in those analyses (three or four NSI, depending on the outcome).

Exhibit B.27. Tests of statistical significance for the variation in impacts across NSI after schools' third year of participation

	Number of NSI	p-value
8th-grade on-track outcomes		
GPA for core courses	11	0.34
Share of math and ELA courses passed	11	0.12
Math test scores	11	0.18
ELA test scores	11	0.04
Attendance rate	11	0.23
Share of students with no suspensions	8	0.02
9th-grade on-track outcomes		
GPA for all courses	8	0.06
Share of core courses passed	8	0.24
Share of 9th-grade students earning at least five credits	8	0.12
Attendance rate	6	0.14
Share of students with no suspensions	5	0.61

Source: Administrative student records for the 2019-20 through 2023-24 school years.

Note: Results are based on an F-test of equality of impacts after each regression.

Appendix C

Additional Details for the Correlational Analysis: Data, Sample, Measures, and Analysis Methods

This appendix provides additional details about the data, sample, measures, and analysis methods used to assess which aspects of implementation were related to whether schools achieved meaningful impacts on their priority outcomes, referred to in this appendix as the correlational analysis.

9. Data sources

This correlational analysis draws on five data sources to capture NSI implementation and impacts at the school level.

NSI impact estimates

Mathematica estimated school-level impacts of NSI participation for each outcome addressed by each outcome area, using administrative data at the student and school levels, as described in Appendix A. These estimates are from regression models adjusted for student and school characteristics, as described in Appendix A. The correlational analysis is based on impact estimates for the 2020-21 through 2023-24 school years. Schools with impact estimates formed the basis of the sample for the correlational analysis.

Team Connections Survey

The analysis measures schools' engagement in the network and supports using the Team Connections Survey designed and conducted by RAND. The survey also captures some enabling conditions for the NSI initiative. RAND asked the continuous improvement (CI) team leads at each NSI school to complete the survey. The analysis in this report is based on Team Connections Survey data for the 2020-21 through 2023-24 school years. See Bush-Mecenas et al. (2026) for additional details about the Team Connections Survey data.

School CI artifacts

The analysis measures schools' engagement in CI using CI artifacts—such as schools' fishbone diagrams from their root cause analysis and CI team meeting notes—that the American Institutes for Research (AIR) collected from intermediaries. AIR coded the CI artifacts to assess the extent to which schools implemented the core parameters of CI and the quality of implementation. Data elements within the artifact data set typically assume one of three values:

- One: Indicates there was evidence that a specific aspect of CI implementation was conducted.
- Zero: Indicates there was evidence that a specific aspect of CI implementation was not conducted.
- Missing: Indicates there was a lack of information on whether a specific aspect of CI implementation was conducted.

The analysis in the brief is based on AIR's artifact data for the 2020-21 through 2023-24 school years. See Garet et al. (2026) for additional details about the school CI artifacts data and coding.

School Leader Survey

AIR collected data on some enabling conditions for the NSI initiative through its School Leader Survey. The survey collected information from school leaders in NSI schools on their views on their school's context and participation in the NSI. We used School Leader Survey data to assess whether the school supported planning time for CI work and whether the principal was very involved in CI work.

School CI team rosters

RAND also collected data each year on the roster of staff who participated in the CI teams at each NSI school. We used these data to examine the enabling condition focused on the proportion of the CI team that remained on the team from year to year.

10. Study sample

The analysis relating implementation to impacts sought to include the same set of NSI and schools as the impact analysis, though this was not always possible due to limitations on the availability of implementation data. The correlational analysis includes schools that have estimated impacts for at least one of their priority outcomes and any implementation data from the same school year. Exhibit C.1 shows the number of schools in the analysis overall and separately by outcome area.

The sample for this analysis was ultimately smaller than the impact analysis because (1) the evaluation collected implementation data for a subset of school years for each school, and (2) schools that did not respond to the implementation data collection activities are not included in the analysis. (See Garet et al. 2026 and Bush-Mecenas et al. 2026 for information on respondent samples and response rates.) RAND and AIR collected implementation data in the 2020-21 school year and then in each network's third and fifth grant year. As a result, NSI schools have one to three years of implementation data available for the analysis. A school can appear multiple times in the analysis if it has implementation and impact data for multiple years. The main report describes NSI impacts through Year 4 because we could only measure impacts in Year 5 for a small sample of schools. Although the Year 5 sample is relatively small, we included the additional year of data in the correlational analysis because it increases the implementation data available and therefore the study's ability to identify relationships between implementation and impacts.

Although the initiative was centered on network-based CI—that is, the combination of schools' engagement in the network and supports provided by their intermediary and in CI processes led by the school's CI team—we analyzed school engagement in the network and supports separately from school engagement in CI. We used this approach because there was inadequate overlap in the data sources for these two aspects of implementation. Due to differences in the timing and response rates of the Team Connections Survey and CI artifact data collection, a limited number of schools had data on both engagement in the network and supports (from the Team Connections Survey) and engagement in CI (from the CI artifact data).

The analysis included 22 of the 26 NSI in the impact analysis. We excluded the four college-ready on-track NSI because their implementation contexts made it difficult to measure relationships between NSI implementation and impacts. As noted in the main report, two college-ready on-track NSI had a mismatch between the grade levels the NSI focused on (primarily with 9th- and 10th-grade students) and the grade levels in the impact analysis (11th- and 12th-grade students). This mismatch would weaken any relationship between implementation and impacts because the study measured impacts on students one to three years after they were affected by implementation. In addition, one college-ready on-track NSI paused its NSI activities in the third year of its grant because of turnover in district leadership.

Exhibit C.1. Number of NSI schools in the analysis relating NSI implementation and impacts by cohort, school year, and years of NSI implementation

	School year				Implementation year					Total	
	2020-21	2021-22	2022-23	2023-24	Year 1	Year 2	Year 3	Year 4	Year 5	Number of unique schools	Number of school-by-year records
All three outcome areas											
Schools with data on impacts											
Cohort 1	84	55	108	0	25	46	73	61	42	119	247
Cohort 1B/2	111	173	15	47	47	147	122	29	1	190	346
Cohort 3	52	90	94	80	90	93	80	53	0	131	316
Total	247	318	217	127	162	286	275	143	43	440	909
Schools with data on impacts and engagement in the network and supports											
Cohort 1	58	3	53	0	18	25	34	9	28	85	114
Cohort 1B/2	58	75	0	5	21	65	50	2	0	101	138
Cohort 3	2	61	50	0	9	61	43	0	0	73	113
Total	118	139	103	5	48	151	127	11	28	259	365
Schools with data on impacts and engagement in CI											
Cohort 1	83	52	104	0	23	46	70	60	40	115	239
Cohort 1B/2	111	173	15	47	47	147	122	29	1	190	346
Cohort 3	52	76	94	80	90	79	80	53	0	131	302
Total	246	301	213	127	160	272	272	142	41	436	887
8th-grade on-track											
Schools with data on impacts											
Cohort 1	0	1	17	0	0	0	1	9	8	18	18
Cohort 1B/2	10	51	15	47	16	46	31	29	1	68	123
Cohort 3	17	49	50	52	41	52	47	28	0	80	168
Total	27	101	82	99	57	98	79	66	9	166	309

	School year				Implementation year					Total	
	2020-21	2021-22	2022-23	2023-24	Year 1	Year 2	Year 3	Year 4	Year 5	Number of unique schools	Number of school-by-year records
Schools with data on impacts and engagement in the network and supports											
Cohort 1	0	1	4	0	0	0	1	0	4	5	5
Cohort 1B/2	7	9	0	5	0	13	6	2	0	20	21
Cohort 3	0	36	32	0	0	37	31	0	0	41	68
Total	7	46	36	5	0	50	38	2	4	66	94
Schools with data on impacts and engagement in CI											
Cohort 1	0	0	17	0	0	0	0	9	8	17	17
Cohort 1B/2	10	51	15	47	16	46	31	29	1	68	123
Cohort 3	17	40	50	52	41	43	47	28	0	80	159
Total	27	91	82	99	57	89	78	66	9	165	299
9th-grade on-track											
Schools with data on impacts											
Cohort 1	73	54	71	0	24	34	64	49	27	80	198
Cohort 1B/2	0	0	0	0	0	0	0	0	0	0	0
Cohort 3	35	41	44	28	49	41	33	25	0	51	148
Total	108	95	115	28	73	75	97	74	27	131	346
Schools with data on impacts and engagement in the network and supports											
Cohort 1	51	2	38	0	18	18	28	7	20	65	91
Cohort 1B/2	0	0	0	0	0	0	0	0	0	0	0
Cohort 3	2	25	18	0	9	24	12	0	0	32	45
Total	53	27	56	0	27	42	40	7	20	97	136
Schools with data on impacts and engagement in CI											
Cohort 1	73	52	68	0	22	34	63	48	26	78	193
Cohort 1B/2	0	0	0	0	0	0	0	0	0	0	0
Cohort 3	35	36	44	28	49	36	33	25	0	51	143

	School year				Implementation year					Total	
	2020-21	2021-22	2022-23	2023-24	Year 1	Year 2	Year 3	Year 4	Year 5	Number of unique schools	Number of school-by-year records
Total	108	88	112	28	71	70	96	73	26	129	336
Well-matched postsecondary enrollment											
Schools with data on impacts											
Cohort 1	11	0	20	0	1	12	8	3	7	21	31
Cohort 1B/2	101	122	0	0	31	101	91	0	0	122	223
Cohort 3	0	0	0	0	0	0	0	0	0	0	0
Total	112	122	20	0	32	113	99	3	7	143	254
Schools with data on impacts and engagement in the network and supports											
Cohort 1	7	0	11	0	0	7	5	2	4	15	18
Cohort 1B/2	51	66	0	0	21	52	44	0	0	81	117
Cohort 3	0	0	0	0	0	0	0	0	0	0	0
Total	58	66	11	0	21	59	49	2	4	96	135
Schools with data on impacts and engagement in CI											
Cohort 1	10	0	19	0	1	12	7	3	6	20	29
Cohort 1B/2	101	122	0	0	31	101	91	0	0	122	223
Cohort 3	0	0	0	0	0	0	0	0	0	0	0
Total	111	122	19	0	32	113	98	3	6	142	252

Source: Administrative student records for the 2018-19 through 2023-24 school years and school artifacts and Team Connections Survey data for 2020-21 through 2023-24.

Note: Schools are counted as having data on engagement in the network and supports or engagement in CI if they have data on one or more of the measures for that analysis.

11.Measures of NSI implementation and impacts

The analysis assessed relationships between schools' impacts and a number of implementation measures.

Implementation

To measure NSI implementation, we used items from the data sources described above that aligned with the dimensions of NSI implementation in the NSI conceptual framework. Exhibits C.2–C.4 show (1) the measures that make up each dimension of implementation and (2) how each measure is defined (based on the relevant items from the data collection instruments).

Exhibit C.2. Items used to measure school CI teams' engagement in the network and supports, by implementation dimension

Dimension	Measure	Definition
Engagement with the intermediary	Engaged with intermediary	The school CI team interacted with their intermediary to exchange advice, information, or resources, or to work together on shared tasks related to the network at least once over the past 12 months.
	Engaged with intermediary at least monthly	The school CI team interacted with their intermediary at least once per month over the past 12 months.
	Engaged with intermediary on most CI topics	The school CI team interacted with their intermediary on most CI topics (conducting a root cause analysis or creating a driver diagram, developing or implementing change ideas, developing or using practice measures, analyzing data, and incorporating student voice) over the past 12 months. ^a
	Received advice from intermediary	The school CI team received advice, information, or resources from their intermediary at least once over the past 12 months.
	Received coaching at least two times per month	The school's CI team lead met with a coach from their intermediary's network at least two times per month.
Engagement with other schools in the network	Engaged with one or more schools	The school CI team engaged with at least one other school in the network led by their intermediary to exchange advice, information, or resources, and/or to work together on shared tasks related to the network at least once over the past 12 months.
	Engaged with one or more schools at least monthly	The school CI team engaged with other schools in the network led by their intermediary at least once per month over the past 12 months.
	Worked with another school	The school CI team worked together with at least one other school in the network led by their intermediary on shared tasks at least once per month over the past 12 months.
	Provided advice to another school	The school CI team provided advice, information, or resources to at least one other school in the network led by their intermediary at least once per month over the past 12 months.
Network participation	Spent at least 8 hours per month on network activities	The school's CI team lead spent at least 8 hours in a typical month on activities related to their intermediary's NSI grant. For example, this could include attendance at convenings of the intermediary's school network, receipt of individualized coaching or supports from their intermediary, or participation in the school team's CI activities. Eight hours is the average hours per month spent on network activities, so this measure identifies schools where the CI team leads spent an above-average amount of time on network activities.

^a This measure examines whether schools engaged with intermediaries on at least three of five topics, the average for the NSI schools.

Exhibit C.3. Items used to measure school CI teams' engagement in CI, by implementation dimension

Dimension	Measure	Definition
Identifying a specific aim	Developed an aim statement	The school had an aim statement that describes the desired goal for the school's improvement effort. The aim statement may have been developed by the intermediary, the NSI school, multiple NSI schools, or a combination of the intermediary and its NSI schools.
	Aim statement had evidence of all five SMART goal elements	The school had an aim statement to guide its CI activities that was specific, measurable, achievable, relevant, and time-bound (SMART).
Defining a theory of practice	Developed a theory of practice improvement or driver diagram	The school had a theory of practice improvement to guide its CI activities. A theory of practice improvement describes the drivers, or factors, needed to achieve the aim (typically represented in a driver diagram). The theory of practice improvement may have been developed by the intermediary, the NSI school, multiple NSI schools, or a combination of the intermediary and its NSI schools.
Selecting change ideas	Identified a change idea that derived from drivers	The school's CI team identified at least one change idea that derived from the primary and second drivers in its theory of practice improvement.
Conducting inquiry cycles	Initiated at least one inquiry cycle	The school's CI team initiated at least one inquiry cycle
	Completed at least one inquiry cycle	The school's CI team completed at least one inquiry cycle during the school year. Schools completed a cycle if they had evidence from all four phases of a Plan-Do-Study-Act CI cycle.
	Completed at least one disciplined inquiry cycle	The school's CI team completed at least one inquiry cycle using a structured protocol (for example, a standardized template for conducting each phase of an inquiry cycle with separate sections for each relevant phase or other standardized tools or templates that support a structured approach to completing each phase).
	Adopted a change idea	The school's CI team adopted at least one change idea at the end of an inquiry cycle rather than modifying and testing it again or abandoning it.
Using data and measurement	Used data to inform CI work	The school's CI team used data to inform its CI work. For example, a school CI team may have used data to understand root causes or measure outcomes for the Study stage of an inquiry cycle.
Centering equity	Focused on equity in inquiry cycles	The school's CI team focused on any of the following four dimensions of equity during an inquiry cycle: access (providing students equitable access to resources and opportunities), achievement (helping students achieve equitable outcomes), identity (providing resources and interventions that are attentive to a student or teacher's background), or agency (providing students the opportunity to use their voices).

Note: Each measure is based on a school's implementation of CI in a given school year. Garet et al. (2024) found that schools were more likely to develop an understanding of the problem (in other words, conduct a root cause analysis) in earlier years of the grant. Given that data on this dimension were not always collected in the first year of implementation (particularly for Cohort 1 schools) and that data were missing for 50 percent of the analysis sample, we determined this dimension was not suitable for inclusion in this analysis.

Exhibit C.4. Items used to measure school CI teams’ enabling conditions, by implementation dimension

Dimension	Measure	Definition
School and district supports	School supported planning time for CI work	The school provided time for the CI team to work on CI activities by reducing teacher workloads to allow more planning time, providing time during after-school staff meetings, or creating a planning period for staff on the CI team.
	School had a stable CI team	Most members of the school’s CI team returned to the team from one school year to the next. ^a
	Principal was very involved in NSI work	The school’s principal reported being very involved or very actively involved in the NSI work (for example, attending or leading CI team meetings).
	School leaders actively supported or enabled NSI work	The leader of the CI team strongly agreed that school leaders actively supported or enabled the network-related work.
	District leaders actively supported or enabled NSI work	The leader of the CI team strongly agreed that staff from their district office actively supported or enabled the network-related work.
School climate ^b	School had collaborative teachers	The school had an above-average level of collaboration among teachers based on a composite measure that combines teacher reports of collaborative practices, collective responsibility, quality professional development, school commitment, and trust among teachers.
	School had effective leaders	The school had an above-average level of effective leadership based on a composite measure that combines staff reports of alignment between school initiatives and a central vision (program coherence), trust between teachers and the principal, teacher influence over decision making, and school leaders’ instructional leadership.

^a This measure examines whether the percentage of team members that remained consistent from one year to the next was above the school average of 53 percent.

^b These measures were not available for schools in the well-matched postsecondary enrollment NSI, for which the study team collected data from state education agencies rather than districts.

Impacts

This analysis focused on a school’s impact on the outcomes that its network prioritized (as described in the main report, each network prioritized a subset of the outcomes the foundation identified). The percentage of schools that prioritized each outcome (Exhibit C.5) varied by outcome area. Most 8th-grade on-track networks focused on student achievement (such as ELA scores and math scores) or course-related outcomes (such as GPA and course passing), while 9th-grade on-track networks focused on course-related outcomes (such as GPA, course passing, and credit completion). All four well-matched postsecondary enrollment networks in the analysis prioritized FAFSA completion and any postsecondary enrollment.

We categorized schools into two groups based on whether they had meaningful impacts on the outcomes prioritized by their network. We defined a school as having meaningful impacts in a given year if the average impact across its priority outcomes was positive and at least 0.05 standard deviations. Exhibit C.5 reports the average impacts on each outcome for schools that prioritized that outcome and shows the average separately for those with and without meaningful impacts. This approach resulted in 48 percent

of schools across years meeting our definition of meaningful impacts, with the remaining 52 percent being placed into a second group that did not achieve meaningful impacts. By construction, the two groups have substantially different average impacts on priority student outcomes across the years of data available for the correlational analysis. Schools deemed to have meaningful impacts achieved moderate-to-large *positive* impacts on most priority outcomes, while schools not deemed to have meaningful impacts tended to have small-to-moderate *negative* impacts, on average. Exhibit C.6 shows the percentage and number of school-by-year records in each group and their average impact across all priority outcomes combined, which we used to divide them into the two groups.¹⁵

Exhibit C.5. Percentage and average impacts of schools that prioritized each outcome

	Percentage of schools prioritized outcome	Average impact among schools that prioritized outcome across years	Average impact among schools that prioritized outcome across years, if had meaningful impacts	Average impact among schools that prioritized outcome across years, if did not have meaningful impacts
8th-grade on track				
GPA for core courses	31	0.06*	0.24*	-0.13*
Share of math and ELA courses passed	31	0.03	0.18*	-0.13*
Math test scores	24	0.08*	0.32*	-0.09*
ELA test scores	52	0.00	0.15*	-0.12*
Attendance rate	26	0.02	0.13*	-0.07*
Share of students with no suspensions	11	0.03	0.30*	-0.02
9th-grade on track				
GPA for all courses	100	0.07*	0.23*	-0.10*
Shares of courses passed	100	0.07*	0.22*	-0.11*
Share of students completing at least 5 credits	100	0.05*	0.17*	-0.09*
Attendance rate	22	0.04	0.09	-0.03
Share of students with no suspensions	0	NA	NA	NA
Well-matched postsecondary enrollment				
FAFSA completion	100	0.05*	0.17*	-0.04*
Enrollment in any college	100	-0.01	0.13*	-0.10*

Source: Administrative student records for the 2018-19 through 2023-24 school years.

Note: This table includes schools with any data on implementation and is therefore based on a subset of the sample with impacts. Impacts are measured in effect size (standard deviation) units.

* Impact is statistically significant at the 0.05 level, two-tailed test.

Exhibit C.6. Percentage of schools with meaningful impacts and their average impacts

	Schools with meaningful impacts on priority student outcomes			Schools without meaningful impacts on priority student outcomes		
	Percentage of school-by-year records	Average impacts on priority outcomes	Number of school-by-year records	Percentage of school-by-year records	Average impacts on priority outcomes	Number of school-by-year records
All three outcome areas	48	0.20	462	52	-0.09	505
8th-grade on track	47	0.21	147	53.33	-0.11	168
9th-grade on track	53	0.20	212	47	-0.10	186
Well-matched postsecondary enrollment	40	0.16	103	60	-0.07	151

Source: Administrative student records for the 2018-19 through 2023-24 school years.

Note: The number of year-records varies across schools depending on data availability but can include up to five years of a school's grant implementation. Schools with impacts on at least one priority outcome and at least one implementation measure are included. Schools were determined to have meaningful impacts on priority student outcomes if they had an average impact of at least 0.05 standard deviations across their NSI's priority outcomes. This table includes schools with any data on implementation and is therefore based on a subset of the sample with impacts.

12. Methods

To understand the relationship between implementation and impacts, the study compared average implementation for schools that did and did not have meaningful impacts on student outcomes. We used a simple regression analysis and descriptive statistics to describe these relationships. Our primary analysis combined schools across all three outcome areas to maximize the sample size and allow us to identify relationships between impacts and implementation across the initiative. We also measured these relationships by outcome area to understand any underlying patterns across outcome areas.

After categorizing schools into those with and without meaningful impacts, we compared the percentage of schools that implemented each aspect of implementation for schools with meaningful impacts versus without meaningful impacts. To do so, we used the regression model in Equation (1):

$$(1) Y_{it} = \alpha_0 + \alpha_1 x_{it} + \varepsilon_{it}$$

where Y_{it} is the implementation measure for school i in implementation year $t \in \{1,2,3,4,5\}$, x_{it} is an indicator for whether school i has meaningful impacts in year t , and ε_{it} is an error term. The coefficient of interest, α_1 , represents the difference in average implementation for schools with versus without meaningful impacts for a given implementation measure.

The analysis stacked school-level impact estimates from Years 1 through 5 (as available) and related these impacts to implementation measured in the same year. Given the stacked nature of the data, we clustered errors at the school level because a school could appear more than once in this regression if the school had impact and implementation data from more than one year of grant implementation.

This approach has some limitations that should be considered when interpreting the findings. We did not include covariates in the regression model in part because of the limited sample size available for this

analysis, which limited statistical power, so differences in implementation between schools with and without meaningful impacts may reflect other school characteristics that are associated with impacts. More broadly, the results should not be interpreted as reflecting causal relationships between implementation and impacts. Additionally, categorizing schools into two groups based on whether they achieved meaningful impacts, on average, above a certain threshold may mask more nuanced relationships. For example, if meaningful student impacts are associated with increased implementation in CI up to a certain point but not beyond that threshold, this approach would not accurately capture such a relationship. Also, defining meaningful impacts differently could result in schools being categorized into different groups. For example, if a school had a significant impact on an outcome they did not prioritize, it may be classified as not having meaningful impacts under our definition. Finally, we examined each implementation measure separately rather than in a single model to maximize the sample size, meaning the estimates do not account for potential interactions between measures.

To explore this last limitation, we conducted an exploratory analysis that examined whether schools with meaningful impacts were more likely to engage in both their network and in CI at higher levels. This analysis measures the overall approach of the NSI initiative—network-based school improvement. Schools that engaged more with their intermediary and other schools in their network may have been better able to implement CI processes effectively, and vice versa. In turn, higher levels of engagement in both the network and in CI were expected to support schools' success in improving student outcomes.

To explore this hypothesis, we created measures of schools' overall engagement in the network and supports and in CI that captured the proportion of implementation items they had in place (for example, a school that completed three of the 10 items of CI implementation would have an overall CI implementation of score of 30 percent). We then determined whether schools had "high" (defined as above-average) overall engagement and placed schools into four groups: (1) high engagement in both the network and CI, (2) high engagement in the network and low engagement in CI, (3) low engagement in the network and high engagement in CI, and (4) low engagement in both their network and CI. Exhibit C.7 summarizes the measures for this analysis.

Of note, the sample size for this analysis decreases substantially to 268 school-by-year records because schools are required to have data from multiple sources (Exhibit C.7). We explored whether the subset of schools included in this joint analysis of engagement in both the network and CI analysis systematically differ from the schools included in the previous analysis that examined each aspect of engagement separately in terms of their baseline characteristics. There were some differences of note; for example, schools in the joint analysis on average had a higher share of disadvantaged students (82 versus 78 percent) and lower rates of math proficiency (30 versus 39 percent) than schools in the separate analyses (Exhibit C.8). However, they tended to be similar on many baseline characteristics. Nevertheless, we treat this analysis as exploratory and thus focus only on the combined sample of schools across outcome areas.

We assessed differences in the percentage of schools in each implementation group (for example, those with high engagement in both the network and CI) between schools with and without meaningful impacts. To make this comparison, we used the same regression as in Equation (1), estimating differences separately for each of the four implementation groups (for example, where Y_{it} denotes whether a school had high engagement in both the network and CI).

Exhibit C.7. Overall engagement in CI and in the network and supports

	Mean	Number of school-by-year records
Average score on overall engagement in CI (0–100)	47	543
Average score on overall engagement in the network and supports (0–100)	36	365
Percentage of schools with low engagement in both their network and CI	18	268
Percentage of schools with high engagement in the network and low engagement in CI	14	268
Percentage of schools with low engagement in the network and high engagement in CI	33	268
Percentage of schools with high engagement in both their network and CI	35	268

Source: Administrative student records for the 2018-19 through 2023-24 school years and school artifacts and Team Connections Survey data for 2020-21 through 2023-24.

Note: High engagement is defined as above-average engagement compared to the sample average across years. Conversely, low engagement is defined as below-average engagement.

Exhibit C.8. Baseline characteristics for schools across all outcome areas, by analysis sample

Characteristics (percentage unless otherwise noted)	Main analysis sample		Exploratory analysis sample		Difference	Standardized difference (standard deviation units)
	Mean	Standard deviation	Mean	Standard deviation		
Percentage economically disadvantaged students ^a (mean)	82.43	15.69	77.66	18.48	4.77	0.29
Percentage Black students (mean)	31.51	30.91	24.55	29.90	6.95	0.23
Percentage Latino students (mean)	54.86	30.23	59.53	29.65	-4.68	-0.16
Percentage English language learners (mean)	14.79	12.65	15.50	13.04	-0.71	-0.06
Enrollment (mean number of students)	252.75	232.21	330.98	242.41	-78.23	-0.33
Math proficiency rate (mean)	39.05	34.17	29.62	29.12	9.44	0.28
ELA proficiency rate (mean)	46.55	33.07	39.11	30.67	7.44	0.23
Chronic absenteeism rate (mean)	24.93	21.35	25.27	24.65	-0.34	-0.02
Suspension rate (mean)	94.14	6.15	92.97	7.83	1.17	0.18
Average GPA (mean four-point GPA scale)	2.38	0.52	2.39	0.52	-0.01	-0.02
Course pass rate (mean)	70.13	17.30	70.22	16.81	-0.09	-0.00
FAFSA completion rate (mean)	35.91	14.52	32.51	11.86	3.40	0.25
College enrollment rate (mean)	37.96	8.45	38.83	7.53	-0.87	-0.11
School sample size (number of schools)	443		214			

Source: Administrative student records.

Note: Baseline characteristics are reported for the analysis of impacts after three years of implementation, based on data for 11 NSI in 10 districts.

^a Based on data measuring free or reduced-price lunch eligibility, where available, and district- or state-provided indicators of economic disadvantage otherwise.

Appendix D

Additional Details About the Correlational Analysis Findings

This appendix provides additional details on the findings in the main report about the relationship between NSI impacts and implementation. Throughout this appendix, we limit each analysis to the schools that have impacts for at least one of their priority outcomes and any implementation data on network engagement, engagement in continuous improvement (CI), or enabling conditions.¹⁶

13. Summary statistics on schools' engagement in the network, supports, and CI and schools' impacts

The report presents results on impacts for schools in the impact analysis sample and a high-level summary of schools' engagement in the network, intermediary supports, and CI. This section provides detailed information on schools' engagement in these aspects of the NSI based on each measure of implementation, as well as information on impacts for schools in the correlational analysis. Exhibit D.1 provides summary statistics for all three outcome areas combined while Exhibits D.2 through D.4 provide summary statistics separately for the 8th-grade on-track NSI schools (Exhibit D.2), 9th-grade on-track NSI schools (Exhibit D.3), and well-matched postsecondary enrollment NSI schools (Exhibit D.4). To assess whether patterns in implementation and impacts differ across samples used in the correlational analysis, each of these exhibits displays summary statistics for three different samples: schools with impacts and data on engagement in the network and supports, schools with impacts and data on engagement in CI, and schools with impacts and data on enabling conditions.

Implementation patterns were consistent across each of the outcome areas and for the different analysis samples. A large majority of NSI schools engaged with their intermediary, though fewer schools engaged with other schools in their network. For example, across outcome areas, on average, 70 percent of NSI schools engaged with their intermediary, while 50 percent of NSI schools engaged with another school in their network. Most NSI schools engaged in the core parameters of CI, with more than 60 percent of NSI schools developing a theory of practice improvement, selecting change ideas, initiating an inquiry cycle, and using data. However, fewer schools implemented these aspects of CI in depth. For example, only 35 percent of NSI schools had an aim statement with evidence of all SMART goal elements, and only 39 percent completed an inquiry cycle. Between 40 to 60 percent of NSI schools had each of the school- and district-level enabling conditions for the NSI work. For example, across outcome areas, 40 percent reported that district leaders actively supported or enabled the NSI work, and 61 percent reported that their school leaders actively supported or enabled the NSI work.

Exhibit D.1. Summary of NSI implementation and impact measures for all NSI

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
Schools with impacts and data on engagement in the network and supports					
Engagement in the network and supports					
Engagement with the intermediary					
Engaged with intermediary	0.70 (0.46)	0.00	1.00	365	259
Engaged with intermediary at least monthly	0.39 (0.49)	0.00	1.00	251	207
Engaged with intermediary on most CI topics	0.53 (0.50)	0.00	1.00	353	253
Received advice from intermediary	0.55 (0.50)	0.00	1.00	365	259
Received coaching at least two times per month	0.22 (0.42)	0.00	1.00	232	195
Engagement with other schools in the network					
Engaged with one or more schools	0.50 (0.50)	0.00	1.00	365	259
Engaged with one or more schools at least monthly	0.13 (0.33)	0.00	1.00	294	222
Worked with another school	0.24 (0.43)	0.00	1.00	365	259
Provided advice to another school	0.31 (0.46)	0.00	1.00	365	259
Network participation					
Spent at least 8 hours per month on network activities	0.41 (0.49)	0.00	1.00	230	195
Impacts on student outcomes					
Average across all outcomes	0.04 (0.16)	-0.57	0.86	967	443
Average across all priority outcomes	0.04 (0.19)	-0.81	0.98	967	443
Schools with impacts and data on engagement in CI					
Engagement in CI					
Identifying a specific aim					
Developed an aim statement	0.71 (0.45)	0.00	1.00	539	342
Aim statement had evidence of all five SMART goal elements	0.35 (0.48)	0.00	1.00	537	342

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
Defining a theory of practice					
Developed a theory of practice improvement or driver diagram	0.69 (0.46)	0.00	1.00	537	342
Selecting change ideas					
Identified a change idea that derived from drivers	0.62 (0.48)	0.00	1.00	535	342
Conducting inquiry cycles					
Initiated at least one inquiry cycle	0.73 (0.45)	0.00	1.00	405	312
Completed at least one inquiry cycle	0.39 (0.49)	0.00	1.00	405	312
Completed at least one disciplined inquiry cycle	0.28 (0.45)	0.00	1.00	405	312
Adopted a change idea	0.13 (0.34)	0.00	1.00	405	312
Using data and measurement					
Used data to inform CI work	0.86 (0.35)	0.00	1.00	543	342
Centering equity					
Focused on equity in inquiry cycles	0.43 (0.50)	0.00	1.00	405	312
Impacts on student outcomes					
Average across all outcomes	0.04 (0.16)	-0.57	0.86	967	443
Average across all priority outcomes	0.04 (0.19)	-0.81	0.98	967	443
Schools with impacts and data on enabling conditions					
School and district supports					
School supported planning time for CI work	0.53 (0.50)	0.00	1.00	361	272
School had a stable CI team	0.51 (0.50)	0.00	1.00	602	355
Principal was very involved in NSI work	0.40 (0.49)	0.00	1.00	376	279
School leaders actively supported or enabled NSI work	0.61 (0.49)	0.00	1.00	234	197
District leaders actively supported or enabled NSI work	0.40 (0.49)	0.00	1.00	234	197

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
School climate					
School had collaborative teachers	0.51 (0.50)	0.00	1.00	475	209
School had effective leaders	0.55 (0.50)	0.00	1.00	458	196

Source: Administrative student records and school CI team roster data for the 2018-19 through 2023-24 school years and school artifacts and Team Connections Survey data for 2020-21 through 2023-24.

Note: Schools are counted as having data on engagement in the network and supports or engagement in CI if they have data on one or more of the measures for that analysis.

Exhibit D.2. Summary of NSI implementation and impact measures for 8th-grade on-track NSI

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
Schools with impacts and data on engagement in the network and supports					
Engagement in the network and supports					
Engagement with the intermediary					
Engaged with intermediary	0.61 (0.46)	0.00	1.00	94	66
Engaged with intermediary at least monthly	0.39 (0.49)	0.00	1.00	83	57
Engaged with intermediary on most CI topics	0.51 (0.50)	0.00	1.00	90	63
Received advice from intermediary	0.46 (0.50)	0.00	1.00	94	66
Received coaching at least two times per month	0.27 (0.45)	0.00	1.00	82	57
Engagement with other schools in the network					
Engaged with one or more schools	0.44 (0.50)	0.00	1.00	94	66
Engaged with one or more schools at least monthly	0.17 (0.38)	0.00	1.00	88	62
Worked with another school	0.29 (0.45)	0.00	1.00	94	66
Provided advice to another school	0.27 (0.44)	0.00	1.00	94	66
Network participation					
Spent at least 8 hours per month on network activities	0.35 (0.48)	0.00	1.00	80	57
Impacts on student outcomes					
GPA for core courses	0.03 (0.31)	-1.11	1.22	315	167
Share of math and ELA courses passed	0.02 (0.29)	-1.21	0.89	315	167
Math test scores	0.05 (0.26)	-0.56	0.98	272	150
ELA test scores	0.00 (0.19)	-0.81	0.61	282	155
Attendance rate	0.01 (0.21)	-0.52	0.64	288	156
Share of students with no suspensions	0.02 (0.28)	-1.90	0.66	206	136

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
Average across all outcomes	0.03 (0.16)	-0.57	0.56	315	167
Average across priority outcomes	0.04 (0.21)	-0.81	0.98	315	167
Schools with impacts and data on engagement in CI					
Engagement in CI					
Identifying a specific aim					
Developed an aim statement	0.78 (0.42)	0.00	1.00	139	107
Aim statement had evidence of all five SMART goal elements	0.22 (0.41)	0.00	1.00	139	107
Defining a theory of practice					
Developed a theory of practice improvement or driver diagram	0.50 (0.50)	0.00	1.00	139	107
Selecting change ideas					
Identified a change idea that derived from drivers	0.56 (0.50)	0.00	1.00	139	107
Conducting inquiry cycles					
Initiated at least one inquiry cycle	0.65 (0.48)	0.00	1.00	100	85
Completed at least one inquiry cycle	0.58 (0.50)	0.00	1.00	100	85
Completed at least one disciplined inquiry cycle	0.35 (0.48)	0.00	1.00	100	85
Adopted a change idea	0.18 (0.39)	0.00	1.00	100	85
Using data and measurement					
Used data to inform CI work	0.81 (0.39)	0.00	1.00	139	107
Centering equity					
Focused on equity in inquiry cycles	0.39 (0.49)	0.00	1.00	100	85
Impacts on student outcomes					
GPA for core courses	0.03 (0.31)	-1.11	1.22	315	167
Share of math and ELA courses passed	0.02 (0.29)	-1.21	0.89	315	167
Math test scores	0.05 (0.26)	-0.56	0.98	272	150

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
ELA test scores	0.00 (0.19)	-0.81	0.61	282	155
Attendance rate	0.01 (0.21)	-0.52	0.64	288	156
Share of students with no suspensions	0.02 (0.28)	-1.90	0.66	206	136
Average across all outcomes	0.03 (0.16)	-0.57	0.56	315	167
Average across priority outcomes	0.04 (0.21)	-0.81	0.98	315	167
Schools with impacts and data on enabling conditions					
School and district supports					
School supported planning time for CI work	0.62 (0.49)	0.00	1.00	92	77
School had a stable CI team	0.64 (0.48)	0.00	1.00	129	97
Principal was very involved in NSI work	0.36 (0.48)	0.00	1.00	94	78
School leaders actively supported or enabled NSI work	0.60 (0.49)	0.00	1.00	82	57
District leaders actively supported or enabled NSI work	0.37 (0.48)	0.00	1.00	82	57
School climate					
School had collaborative teachers	0.59 (0.49)	0.00	1.00	215	118
School had effective leaders	0.58 (0.49)	0.00	1.00	209	112

Source: Administrative student records and school CI team roster data for the 2019-20 through 2023-24 school years and school artifacts and Team Connections Survey data for 2020-21 through 2023-24.

Note: Schools are counted as having data on engagement in the network and supports or engagement in CI if they have data on one or more of the measures for that analysis.

Exhibit D.3. Summary of NSI implementation and impact measures for 9th-grade on-track NSI

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
Schools with impacts and data on engagement in the network and supports					
Engagement in the network and supports					
Engagement with the intermediary					
Engaged with intermediary	0.74 (0.46)	0.00	1.00	136	97
Engaged with intermediary at least monthly	0.44 (0.50)	0.00	1.00	85	70
Engaged with intermediary on most CI topics	0.60 (0.49)	0.00	1.00	134	95
Received advice from intermediary	0.60 (0.49)	0.00	1.00	136	97
Received coaching at least two times per month	0.23 (0.42)	0.00	1.00	79	67
Engagement with other schools in the network					
Engaged with one or more schools	0.49 (0.50)	0.00	1.00	136	97
Engaged with one or more schools at least monthly	0.08 (0.28)	0.00	1.00	109	79
Worked with another school	0.21 (0.41)	0.00	1.00	136	97
Provided advice to another school	0.29 (0.46)	0.00	1.00	136	97
Network participation					
Spent at least 8 hours per month on network activities	0.44 (0.50)	0.00	1.00	78	66
Impacts on student outcomes					
GPA for all courses	0.07 (0.22)	-0.65	0.72	398	133
Shares of courses passed	0.07 (0.23)	-0.63	0.71	398	133
Share of students completing at least 5 credits	0.05 (0.26)	-2.42	1.02	398	133
Attendance rate	0.04 (0.22)	-0.94	0.81	290	128
Share of students with no suspensions	0.03 (0.24)	-1.21	0.77	218	118
Average across all outcomes	0.06 (0.17)	-0.41	0.76	398	133
Average across priority outcomes	0.06 (0.19)	-0.65	0.76	398	133

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
Schools with impacts and data on engagement in CI					
Engagement in CI					
Identifying a specific aim					
Developed an aim statement	0.68 (0.47)	0.00	1.00	166	94
Aim statement had evidence of all five SMART goal elements	0.27 (0.44)	0.00	1.00	164	94
Defining a theory of practice					
Developed a theory of practice improvement or driver diagram	0.82 (0.38)	0.00	1.00	164	94
Selecting change ideas					
Identified a change idea that derived from drivers	0.58 (0.50)	0.00	1.00	162	94
Conducting inquiry cycles					
Initiated at least one inquiry cycle	0.68 (0.47)	0.00	1.00	136	88
Completed at least one inquiry cycle	0.38 (0.49)	0.00	1.00	136	88
Completed at least one disciplined inquiry cycle	0.25 (0.43)	0.00	1.00	136	88
Adopted a change idea	0.15 (0.36)	0.00	1.00	136	88
Using data and measurement					
Used data to inform CI work	0.75 (0.44)	0.00	1.00	170	94
Centering equity					
Focused on equity in inquiry cycles	0.47 (0.50)	0.00	1.00	136	88
Impacts on student outcomes					
GPA for all courses	0.07 (0.22)	-0.65	0.72	398	133
Shares of courses passed	0.07 (0.23)	-0.63	0.71	398	133
Share of students completing at least 5 credits	0.05 (0.26)	-2.42	1.02	398	133
Attendance rate	0.04 (0.22)	-0.94	0.81	290	128
Share of students with no suspensions	0.03 (0.24)	-1.21	0.77	218	118

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
Average across all outcomes	0.06 (0.17)	-0.41	0.76	398	133
Average across priority outcomes	0.06 (0.19)	-0.65	0.76	398	133
Schools with impacts and data on enabling conditions					
School and district supports					
School supported planning time for CI work	0.59 (0.49)	0.00	1.00	157	107
School had a stable CI team	0.46 (0.50)	0.00	1.00	223	117
Principal was very involved in NSI work	0.49 (0.50)	0.00	1.00	163	110
School leaders actively supported or enabled NSI work	0.66 (0.48)	0.00	1.00	79	67
District leaders actively supported or enabled NSI work	0.41 (0.49)	0.00	1.00	79	67
School climate					
School had collaborative teachers	0.45 (0.50)	0.00	1.00	260	91
School had effective leaders	0.52 (0.50)	0.00	1.00	249	84

Source: Administrative student records and school CI team roster data for the 2018-19 through 2023-24 school years and school artifacts and Team Connections Survey data for 2020-21 through 2022-23.

Note: Schools are counted as having data on engagement in the network and supports or engagement in CI if they have data on one or more of the measures for that analysis.

Exhibit D.4. Summary of NSI implementation dimensions and measures for well-matched postsecondary enrollment NSI

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
Schools with impacts and data on engagement in the network and supports					
Engagement in the network and supports					
Engagement with the intermediary					
Engaged with intermediary	0.72 (0.46)	0.00	1.00	135	96
Engaged with intermediary at least monthly	0.35 (0.48)	0.00	1.00	83	80
Engaged with intermediary on most CI topics	0.47 (0.50)	0.00	1.00	129	95
Received advice from intermediary	0.56 (0.50)	0.00	1.00	135	96
Received coaching at least two times per month	0.15 (0.36)	0.00	1.00	71	71
Engagement with other schools in the network					
Engaged with one or more schools	0.54 (0.50)	0.00	1.00	135	96
Engaged with one or more schools at least monthly	0.13 (0.34)	0.00	1.00	97	81
Worked with another school	0.25 (0.44)	0.00	1.00	135	96
Provided advice to another school	0.35 (0.48)	0.00	1.00	135	96
Network participation					
Spent at least 8 hours per month on network activities	0.46 (0.50)	0.00	1.00	72	72
Impacts on student outcomes					
Enrollment in any college	-0.01 (0.19)	-0.60	0.58	242	141
Enrollment in college with a graduation rate $\geq$ 50%	0.08 (0.34)	-0.81	1.93	242	141
FAFSA completion	0.05 (0.17)	-0.44	0.68	254	143
Average across all outcomes	0.04 (0.16)	-0.37	0.86	254	143
Average across priority outcomes	0.02 (0.14)	-0.37	0.47	254	143

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
Schools with impacts and data on engagement in CI					
Engagement in CI					
Identifying a specific aim					
Developed an aim statement	0.70 (0.46)	0.00	1.00	234	141
Aim statement had evidence of all five SMART goal elements	0.49 (0.50)	0.00	1.00	234	141
Defining a theory of practice					
Developed a theory of practice improvement or driver diagram	0.71 (0.46)	0.00	1.00	234	141
Selecting change ideas					
Identified a change idea that derived from drivers	0.69 (0.46)	0.00	1.00	234	141
Conducting inquiry cycles					
Initiated at least one inquiry cycle	0.82 (0.39)	0.00	1.00	169	139
Completed at least one inquiry cycle	0.28 (0.45)	0.00	1.00	169	139
Completed at least one disciplined inquiry cycle	0.27 (0.44)	0.00	1.00	169	139
Adopted a change idea	0.09 (0.29)	0.00	1.00	169	139
Using data and measurement					
Used data to inform CI work	0.97 (0.17)	0.00	1.00	234	141
Centering equity					
Focused on equity in inquiry cycles	0.43 (0.50)	0.00	1.00	169	139
Impacts on student outcomes					
Enrollment in any college	-0.01 (0.19)	-0.60	0.58	242	141
Enrollment in college with a graduation rate $\geq$ 50%	0.08 (0.34)	-0.81	1.93	242	141
FAFSA completion	0.05 (0.17)	-0.44	0.68	254	143
Average across all outcomes	0.04 (0.16)	-0.37	0.86	254	143
Average across priority outcomes	0.02 (0.14)	-0.37	0.47	254	143

	Mean (standard deviation)	Minimum	Maximum	Number of school- by-year records	Number of unique schools
Schools with impacts and data on enabling conditions					
School and district supports					
School supported planning time for CI work	0.36 (0.48)	0.00	1.00	112	88
School had a stable CI team	0.48 (0.50)	0.00	1.00	250	141
Principal was very involved in NSI work	0.31 (0.46)	0.00	1.00	119	91
School leaders actively supported or enabled NSI work	0.56 (0.50)	0.00	1.00	73	73
District leaders actively supported or enabled NSI work	0.42 (0.50)	0.00	1.00	73	73
School climate					
School had collaborative teachers	NA	NA	NA	NA	NA
School had effective leaders	NA	NA	NA	NA	NA

Source: Administrative student records, school artifacts, and Team Connections Survey data for the 2020-21 through 2022-23 school years.

Note: Schools are counted as having data on engagement in the network and supports or engagement in CI if they have data on one or more of the measures for that analysis.

NA = not available.

Although we aimed to analyze the relationship between NSI implementation and impacts for all NSI schools in the impact analysis, we had fewer schools for the correlational analysis because of differences in data availability. To understand how the samples for the correlational analysis and the impact analysis differ, Exhibit D.5 compares average impacts from the main impact analysis to average impacts for the key samples in the correlational analyses. In addition to reporting average impacts by outcome, we also measure average impacts across all outcomes (not just those prioritized by a school's NSI), as well as across all prioritized outcomes, to assess whether there were notable differences across analysis samples. Although there are some minor differences in the average impacts across the samples used in the impact analysis and those in the correlational analysis—as might be expected given that impacts vary across schools and years—they are generally consistent in terms of sign and magnitude.

Exhibit D.5. NSI impacts for schools in the analysis relating NSI implementation to impacts compared with the analysis of NSI impacts, by year of implementation

	Average impacts among schools in the impact analysis (all years)	Average impacts among schools in the analysis of engagement in continuous improvement (all years)	Average impacts among schools in the analysis of engagement in the network and supports (all years)
All three outcome areas			
Average across all outcomes	0.04	0.04	0.05
<i>p</i> -value	0.00	0.00	0.00
Number of schools (unique count)	443	439	259
Number of school-by-year records	967	945	365
Average across all priority outcomes	0.04	0.04	0.05
<i>p</i> -value	0.00	0.00	0.00
Number of schools (unique count)	443	439	259
Number of school-by-year records	967	945	365
8th-grade on track			
GPA for core courses	0.03	0.02	0.07
<i>p</i> -value	0.14	0.27	0.03
Number of schools (unique count)	167	166	66
Number of school-by-year records	315	305	94
Share of math and ELA courses passed	0.02	0.01	0.04
<i>p</i> -value	0.24	0.44	0.23
Number of schools (unique count)	167	166	66
Number of school-by-year records	315	305	94
Math test scores	0.05	0.05	0.06
<i>p</i> -value	0.00	0.00	0.01
Number of schools (unique count)	167	166	66
Number of school-by-year records	315	305	94
ELA test scores	0.00	0.00	-0.04
<i>p</i> -value	0.67	0.95	0.10

	Average impacts among schools in the impact analysis (all years)	Average impacts among schools in the analysis of engagement in continuous improvement (all years)	Average impacts among schools in the analysis of engagement in the network and supports (all years)
Number of schools (unique count)	167	166	66
Number of school-by-year records	315	305	94
Attendance rate	0.01	0.01	0.02
<i>p</i> -value	0.33	0.42	0.27
Number of schools (unique count)	167	166	66
Number of school-by-year records	315	305	94
Share of students with no suspensions	0.02	0.03	0.00
<i>p</i> -value	0.21	0.15	0.95
Number of schools (unique count)	167	166	66
Number of school-by-year records	315	305	94
Average across all outcomes	0.03	0.03	0.04
<i>p</i> -value	0.00	0.00	0.02
Number of schools (unique count)	167	166	66
Number of school-by-year records	315	305	94
Average across priority outcomes	0.04	0.04	0.06
<i>p</i> -value	0.00	0.00	0.02
Number of schools (unique count)	167	166	66
Number of school-by-year records	315	305	94
9th-grade on track			
GPA for all courses	0.07	0.07	0.08
<i>p</i> -value	0.00	0.00	0.00
Number of schools (unique count)	133	131	97
Number of school-by-year records	398	388	136
Shares of core courses passed	0.07	0.06	0.08
<i>p</i> -value	0.00	0.00	0.00
Number of schools (unique count)	133	131	97

	Average impacts among schools in the impact analysis (all years)	Average impacts among schools in the analysis of engagement in continuous improvement (all years)	Average impacts among schools in the analysis of engagement in the network and supports (all years)
Number of school-by-year records	398	388	136
Share of students completing at least 5 credits	0.05	0.05	0.09
<i>p</i> -value	0.00	0.00	0.00
Number of schools (unique count)	133	131	97
Number of school-by-year records	398	388	136
Attendance rate	0.04	0.05	0.03
<i>p</i> -value	0.01	0.00	0.32
Number of schools (unique count)	133	131	97
Number of school-by-year records	398	388	136
Share of students with no suspensions	0.03	0.02	0.11
<i>p</i> -value	0.11	0.30	0.00
Number of schools (unique count)	133	131	97
Number of school-by-year records	398	388	136
Average across all outcomes	0.06	0.05	0.08
<i>p</i> -value	0.00	0.00	0.00
Number of schools (unique count)	133	131	97
Number of school-by-year records	398	388	136
Average across priority outcomes	0.06	0.06	0.08
<i>p</i> -value	0.00	0.00	0.00
Number of schools (unique count)	133	131	97
Number of school-by-year records	398	388	136
Well-matched postsecondary enrollment			
Enrollment in any college	-0.01	-0.01	-0.01
<i>p</i> -value	0.63	0.66	0.49
Number of schools (unique count)	143	142	96
Number of school-by-year records	254	252	135

	Average impacts among schools in the impact analysis (all years)	Average impacts among schools in the analysis of engagement in continuous improvement (all years)	Average impacts among schools in the analysis of engagement in the network and supports (all years)
Enrollment in college with a graduation rate $\geq$ 50%	0.08	0.08	0.01
<i>p</i> -value	0.00	0.00	0.76
Number of schools (unique count)	143	142	96
Number of school-by-year records	254	252	135
FAFSA completion	0.05	0.04	0.05
<i>p</i> -value	0.00	0.00	0.00
Number of schools (unique count)	143	142	96
Number of school-by-year records	254	252	135
Average across all outcomes	0.04	0.04	0.02
<i>p</i> -value	0.00	0.00	0.08
Number of schools (unique count)	143	142	96
Number of school-by-year records	254	252	135
Average across priority outcomes	0.02	0.02	0.02
<i>p</i> -value	0.01	0.01	0.04
Number of schools (unique count)	143	142	96
Number of school-by-year records	254	252	135

Source: Administrative student records for the 2018-19 through 2023-24 school years.

Note: Sample sizes differ across outcomes due to issues with data availability during the COVID-19 pandemic. Depending on data availability, the number of years varies across schools but can include up to 5 years of a school's grant implementation. Schools are counted as having data on engagement in the network and supports or engagement in CI if they have data on one or more of the measures for that analysis.

14. Additional findings

This section provides additional details on the findings from the correlational analysis described in the main report. The analysis compared the percentage of NSI schools with and without meaningful impacts that implemented each aspect of the NSI approach, as well as the percentage that had high or low overall levels of engagement in both the network and CI, based on all aspects of implementation.

Detailed results for the correlational analysis

The results comparing implementation of each aspect of the NSI approach show several positive relationships between implementation and impacts, though some results vary by outcome area. Exhibits D.6 through D.8 display the percentages of schools implementing each aspect and the differences between the two groups of schools (those with and without meaningful impacts on priority student outcomes). Although the main report showed these percentages for the three outcome areas combined, these exhibits show the overall results, as well as results for each outcome area separately. Exhibit D.6 describes schools' engagement in the network and intermediary supports, Exhibit D. 7 describes schools' engagement in continuous improvement, and Exhibit D.8 describes the enabling conditions for the NSI work. Each row in the exhibits represents a specific aspect of NSI implementation.

Most of the relationships discussed in the main text, which looked across all three outcome areas combined, appeared to be driven by schools in 8th-grade on-track NSI and well-matched postsecondary enrollment NSI. We focus on results that are statistically significant at the 0.05 level, or statistically significant at the 0.10 level with a difference of at least 10 percentage points between schools with and without meaningful impacts on students:

- Schools' engagement with another school in their network is related to impacts only for well-matched postsecondary enrollment NSI.
- Among the ten measures of CI engagement, four are related to impacts for the well-matched postsecondary NSI and three are related to impacts for the 8th-grade on-track NSI. Schools' engagement in CI is not related to impacts for 9th-grade on-track NSI schools (across any of the CI measures).
- For the enabling conditions, having a stable CI team is related to impacts for 8th-grade on-track NSI and the well-matched postsecondary NSI, but not the 9th-grade on-track NSI. Effective leadership is related to impacts for both 8th- and 9th-grade on-track NSI.

Exhibit D.6. Average implementation by whether schools had meaningful impacts on priority student outcomes: Engagement in the network and supports

	NSI schools that had meaningful impacts on priority student outcomes			NSI schools that did not have meaningful impacts on priority student outcomes			Difference in the percentage of schools implementing	<i>p</i> -value
	Percentage of schools implementing	Number of school-by-year records	Number of unique schools	Percentage of schools implementing	Number of school-by-year records	Number of unique schools		
All three outcome areas								
Engagement with the intermediary								
Engaged with intermediary	0.70	180	144	0.70	185	151	0.00	0.96
Engaged with intermediary at least monthly	0.43	130	109	0.35	121	108	0.08	0.19
Engaged with intermediary on most CI topics	0.53	176	141	0.54	177	145	-0.01	0.87
Received advice from intermediary	0.55	180	144	0.54	185	151	0.01	0.86
Received coaching at least two times per month	0.18	115	99	0.26	117	106	-0.07	0.20
Engagement with other schools in the network								
Engaged with one or more schools	0.56	180	144	0.43	185	151	0.13	0.01
Engaged with one or more schools at least monthly	0.15	143	118	0.10	151	128	0.05	0.16
Worked with another school	0.28	180	144	0.21	185	151	0.07	0.14
Provided advice to another school	0.38	180	144	0.24	185	151	0.14	0.00
Network participation								
Spent at least 8 hours per month on network activities	0.44	114	100	0.39	116	105	0.05	0.47
8th-grade on track								
Engagement with the intermediary								
Engaged with intermediary	0.66	47	36	0.55	47	41	0.11	0.31

	NSI schools that had meaningful impacts on priority student outcomes			NSI schools that did not have meaningful impacts on priority student outcomes			Difference in the percentage of schools implementing	p-value
	Percentage of schools implementing	Number of school-by-year records	Number of unique schools	Percentage of schools implementing	Number of school-by-year records	Number of unique schools		
Engaged with intermediary at least monthly	0.46	41	30	0.31	42	36	0.15	0.20
Engaged with intermediary on most CI topics	0.53	45	34	0.49	45	39	0.04	0.68
Received advice from intermediary	0.47	47	36	0.45	47	41	0.02	0.83
Received coaching at least two times per month	0.18	39	30	0.35	43	37	-0.17	0.09
Engagement with other schools in the network								
Engaged with one or more schools	0.51	47	36	0.36	47	41	0.15	0.14
Engaged with one or more schools at least monthly	0.21	43	33	0.13	45	39	0.08	0.37
Worked with another school	0.34	47	36	0.23	47	41	0.11	0.25
Provided advice to another school	0.32	47	36	0.21	47	41	0.11	0.21
Network participation								
Spent at least 8 hours per month on network activities	0.32	37	30	0.37	43	37	-0.05	0.70
9th-grade on track								
Engagement with the intermediary								
Engaged with intermediary	0.74	77	60	0.75	59	49	-0.01	0.94
Engaged with intermediary at least monthly	0.43	51	42	0.44	34	29	-0.01	0.93
Engaged with intermediary on most CI topics	0.57	77	60	0.65	57	47	-0.08	0.36
Received advice from intermediary	0.60	77	60	0.59	59	49	0	0.96

	NSI schools that had meaningful impacts on priority student outcomes			NSI schools that did not have meaningful impacts on priority student outcomes			Difference in the percentage of schools implementing	p-value
	Percentage of schools implementing	Number of school-by-year records	Number of unique schools	Percentage of schools implementing	Number of school-by-year records	Number of unique schools		
Received coaching at least two times per month	0.17	46	39	0.30	33	28	-0.13	0.23
Engagement with other schools in the network								
Engaged with one or more schools	0.55	77	60	0.42	59	49	0.12	0.18
Engaged with one or more schools at least monthly	0.13	62	49	0.02	47	39	0.11	0.02
Worked with another school	0.22	77	60	0.19	59	49	0.03	0.60
Provided advice to another school	0.34	77	60	0.24	59	49	0.10	0.21
Network participation								
Spent at least 8 hours per month on network activities	0.52	46	39	0.31	32	27	0.21	0.08
Well-matched postsecondary enrollment								
Engagement with the intermediary								
Engaged with intermediary	0.68	56	48	0.75	79	61	-0.07	0.40
Engaged with intermediary at least monthly	0.39	38	37	0.31	45	43	0.08	0.44
Engaged with intermediary on most CI topics	0.46	54	47	0.48	75	59	-0.02	0.85
Received advice from intermediary	0.55	56	48	0.56	79	61	0.00	0.97
Received coaching at least two times per month	0.20	30	30	0.12	41	41	0.08	0.39
Engagement with other schools in the network								
Engaged with one or more schools	0.63	56	48	0.48	79	61	0.14	0.09
Engaged with one or more schools at least monthly	0.13	38	36	0.14	59	50	0.00	0.96

	NSI schools that had meaningful impacts on priority student outcomes			NSI schools that did not have meaningful impacts on priority student outcomes			Difference in the percentage of schools implementing	<i>p</i> -value
	Percentage of schools implementing	Number of school-by-year records	Number of unique schools	Percentage of schools implementing	Number of school-by-year records	Number of unique schools		
Worked with another school	0.30	56	48	0.22	79	61	0.09	0.28
Provided advice to another school	0.48	56	48	0.25	79	61	0.23	0.01
Network participation								
Spent at least 8 hours per month on network activities	0.45	31	31	0.46	41	41	-0.01	0.92

Source: Administrative student records and Team Connections Survey data for the 2020-21 through 2023-24.

Note: Standard errors clustered at the school level. Schools are counted as having data on engagement in the network and supports, engagement in CI, or enabling conditions if they have data on one or more of the measures for that analysis.

Exhibit D.7. Average implementation by whether schools had meaningful impacts on priority student outcomes: Engagement in CI

	NSI schools that had meaningful impacts on priority student outcomes			NSI schools that did not have meaningful impacts on priority student outcomes			Difference in the percentage of schools implementing	<i>p</i> -value
	Percentage of schools implementing	Number of school-by-year records	Number of unique schools	Percentage of schools implementing	Number of school-by-year records	Number of unique schools		
All three outcome areas								
Identifying a specific aim								
Developed an aim statement	0.76	256	194	0.67	283	208	0.08	0.02
Aim statement had evidence of all five SMART goal elements	0.43	255	193	0.28	282	207	0.14	0.00
Defining a theory of practice								
Developed a theory of practice improvement or driver diagram	0.73	255	194	0.65	282	207	0.09	0.03
Selecting change ideas								
Identified a change idea that derived from drivers	0.65	254	193	0.60	281	206	0.06	0.19
Conducting inquiry cycles								
Initiated at least one inquiry cycle	0.76	199	163	0.70	206	173	0.06	0.17
Completed at least one inquiry cycle	0.44	199	163	0.34	206	173	0.09	0.05
Completed at least one disciplined inquiry cycle	0.29	199	163	0.27	206	173	0.02	0.66
Adopted a change idea	0.17	199	163	0.10	206	173	0.07	0.03
Using data and measurement								
Used data to inform CI work	0.85	258	195	0.87	285	209	-0.01	0.64
Centering equity								
Focused on equity in inquiry cycles	0.53	199	163	0.33	206	173	0.20	0.00

	NSI schools that had meaningful impacts on priority student outcomes			NSI schools that did not have meaningful impacts on priority student outcomes			Difference in the percentage of schools implementing	<i>p</i> -value
	Percentage of schools implementing	Number of school-by-year records	Number of unique schools	Percentage of schools implementing	Number of school-by-year records	Number of unique schools		
8th-grade on-track								
Identifying a specific aim								
Developed an aim statement	0.83	65	54	0.73	74	61	0.10	0.10
Aim statement had evidence of all five SMART goal elements	0.29	65	54	0.15	74	61	0.14	0.04
Defining a theory of practice								
Developed a theory of practice improvement or driver diagram	0.49	65	54	0.50	74	61	-0.01	0.93
Selecting change ideas								
Identified a change idea that derived from drivers	0.55	65	54	0.57	74	61	-0.01	0.88
Conducting inquiry cycles								
Initiated at least one inquiry cycle	0.69	49	41	0.61	51	50	0.09	0.36
Completed at least one inquiry cycle	0.65	49	41	0.51	51	50	0.14	0.13
Completed at least one disciplined inquiry cycle	0.37	49	41	0.33	51	50	0.03	0.72
Adopted a change idea	0.22	49	41	0.14	51	50	0.09	0.26
Using data and measurement								
Used data to inform CI work	0.77	65	54	0.85	74	61	-0.08	0.21
Centering equity								
Focused on equity in inquiry cycles	0.47	49	41	0.31	51	50	0.16	0.10

	NSI schools that had meaningful impacts on priority student outcomes			NSI schools that did not have meaningful impacts on priority student outcomes			Difference in the percentage of schools implementing	<i>p</i> -value
	Percentage of schools implementing	Number of school-by-year records	Number of unique schools	Percentage of schools implementing	Number of school-by-year records	Number of unique schools		
9th-grade on track								
Identifying a specific aim								
Developed an aim statement	0.72	94	62	0.63	72	51	0.10	0.16
Aim statement had evidence of all five SMART goal elements	0.30	93	61	0.23	71	50	0.08	0.26
Defining a theory of practice								
Developed a theory of practice improvement or driver diagram	0.85	93	62	0.79	71	50	0.06	0.28
Selecting change ideas								
Identified a change idea that derived from drivers	0.61	92	61	0.54	70	49	0.07	0.40
Conducting inquiry cycles								
Initiated at least one inquiry cycle	0.71	80	58	0.63	56	41	0.09	0.28
Completed at least one inquiry cycle	0.39	80	58	0.38	56	41	0.01	0.89
Completed at least one disciplined inquiry cycle	0.24	80	58	0.27	56	41	-0.03	0.69
Adopted a change idea	0.16	80	58	0.13	56	41	0.04	0.56
Using data and measurement								
Used data to inform CI work	0.77	96	63	0.72	74	52	0.05	0.41
Centering equity								
Focused on equity in inquiry cycles	0.50	80	58	0.43	56	41	0.07	0.43

	NSI schools that had meaningful impacts on priority student outcomes			NSI schools that did not have meaningful impacts on priority student outcomes			Difference in the percentage of schools implementing	<i>p</i> -value
	Percentage of schools implementing	Number of school-by-year records	Number of unique schools	Percentage of schools implementing	Number of school-by-year records	Number of unique schools		
Well-matched postsecondary enrollment								
Identifying a specific aim								
Developed an aim statement	0.74	97	78	0.67	137	96	0.07	0.22
Aim statement had evidence of all five SMART goal elements	0.64	97	78	0.39	137	96	0.25	0.00
Defining a theory of practice								
Developed a theory of practice improvement or driver diagram	0.78	97	78	0.65	137	96	0.13	0.02
Selecting change ideas								
Identified a change idea that derived from drivers	0.76	97	78	0.64	137	96	0.12	0.04
Conducting inquiry cycles								
Initiated at least one inquiry cycle	0.86	70	64	0.79	99	82	0.07	0.24
Completed at least one inquiry cycle	0.34	70	64	0.24	99	82	0.10	0.14
Completed at least one disciplined inquiry cycle	0.30	70	64	0.24	99	82	0.06	0.40
Adopted a change idea	0.14	70	64	0.06	99	82	0.08	0.09
Using data and measurement								
Used data to inform CI work	0.99	97	78	0.96	137	96	0.03	0.10
Centering equity								
Focused on equity in inquiry cycles	0.61	70	64	0.29	99	82	0.32	0.00

Source: Administrative student records and school artifacts data for the 2020-21 through 2023-24 school years.

Note: Standard errors clustered at the school level. Schools are counted as having data on engagement in the network and supports, engagement in CI, or enabling conditions if they have data on one or more of the measures for that analysis.

Exhibit D.8. Average implementation by whether schools had meaningful impacts on priority student outcomes: Enabling conditions

	NSI schools that had meaningful impacts on priority student outcomes			NSI schools that did not have meaningful impacts on priority student outcomes			Difference in the percentage of schools implementing	p-value
	Percentage of schools implementing	Number of school-by-year records	Number of unique schools	Percentage of schools implementing	Number of school-by-year records	Number of unique schools		
All three outcome areas								
School and district supports								
School supported planning time for CI work	0.54	183	151	0.51	178	150	0.03	0.57
School had a stable CI team	0.58	285	210	0.44	317	225	0.13	0.00
Principal was very involved in NSI work	0.43	190	155	0.37	186	154	0.06	0.23
School leaders actively supported or enabled NSI work	0.66	116	100	0.55	118	107	0.11	0.08
District leaders actively supported or enabled NSI work	0.38	116	100	0.42	118	107	-0.04	0.56
School climate								
School had collaborative teachers	0.51	234	133	0.51	241	143	0.00	0.96
School had effective leaders	0.62	227	127	0.48	231	135	0.14	0.01
8th-grade on track								
School and district supports								
School supported planning time for CI work	0.66	41	35	0.59	51	46	0.07	0.53
School had a stable CI team	0.75	59	48	0.56	70	58	0.19	0.05
Principal was very involved in NSI work	0.37	41	35	0.36	53	47	0.01	0.94
School leaders actively supported or enabled NSI work	0.62	39	30	0.58	43	37	0.03	0.76
District leaders actively supported or enabled NSI work	0.38	39	30	0.35	43	37	0.04	0.72
School climate								
School had collaborative teachers	0.55	100	70	0.63	115	77	-0.08	0.28

	NSI schools that had meaningful impacts on priority student outcomes			NSI schools that did not have meaningful impacts on priority student outcomes			Difference in the percentage of schools implementing	p-value
	Percentage of schools implementing	Number of school-by-year records	Number of unique schools	Percentage of schools implementing	Number of school-by-year records	Number of unique schools		
School had effective leaders	0.65	97	67	0.52	112	74	0.13	0.05
9th-grade on track								
School and district supports								
School supported planning time for CI work	0.60	87	67	0.59	70	58	0.01	0.87
School had a stable CI team	0.48	123	81	0.44	100	69	0.04	0.61
Principal was very involved in NSI work	0.50	90	69	0.48	73	59	0.02	0.78
School leaders actively supported or enabled NSI work	0.72	46	39	0.58	33	28	0.14	0.21
District leaders actively supported or enabled NSI work	0.41	46	39	0.39	33	28	0.02	0.86
School climate								
School had collaborative teachers	0.49	134	63	0.40	126	66	0.08	0.28
School had effective leaders	0.59	130	60	0.44	119	61	0.16	0.05
Well-matched postsecondary enrollment								
School and district supports								
School supported planning time for CI work	0.36	55	49	0.35	57	46	0.01	0.89
School had a stable CI team	0.59	103	81	0.39	147	98	0.20	0.00
Principal was very involved in NSI work	0.37	59	51	0.25	60	48	0.12	0.16
School leaders actively supported or enabled NSI work	0.65	31	31	0.50	42	42	0.15	0.22
District leaders actively supported or enabled NSI work	0.32	31	31	0.50	42	42	-0.18	0.13
School climate								
School had collaborative teachers	NA	0	0	NA	0	0	NA	NA

	NSI schools that had meaningful impacts on priority student outcomes			NSI schools that did not have meaningful impacts on priority student outcomes			Difference in the percentage of schools implementing	<i>p</i> -value
	Percentage of schools implementing	Number of school-by-year records	Number of unique schools	Percentage of schools implementing	Number of school-by-year records	Number of unique schools		
School had effective leaders	NA	0	0	NA	0	0	NA	NA

Source: Administrative student records and school CI team roster data for the 2018-19 through 2023-24 school years, and Team Connections Survey data for 2020-21 through 2023-24.

Note: Standard errors clustered at the school level. Schools are counted as having data on engagement in the network and supports, engagement in CI, or enabling conditions if they have data on one or more of the measures for that analysis.

NA = not available.

Exploratory analysis examining whether schools with meaningful impacts were more likely to engage in both their network and CI

The correlational analysis examined how schools' engagement in the network and intermediary supports, as well as schools' engagement in CI, related to their impacts on students. The analysis relied on different data sources for schools' engagement in the network and supports and schools' engagement in CI, and these data sources had limited overlap. As a result, we separately examined relationships for these two parts of the NSI initiative. However, the Gates Foundation expected these two aspects of the initiative to work together. For example, by conducting CI as part of a school network, schools could share what they learned from their inquiry cycles and spread change ideas that they found to be effective.

We conducted an exploratory analysis to examine whether NSI schools with meaningful impacts were more likely to have strong engagement in both the network and supports and in CI. Exhibit D.9 presents the results of this analysis by comparing engagement patterns for schools with and without meaningful impacts. We categorized NSI schools as having low (below-average) or high (above-average) engagement in the network and supports and in CI, as described in Appendix C. This allowed us to create four groups of NSI schools: (1) schools with low engagement in the network and supports and CI, (2) schools with high engagement in both, (3) schools with high engagement in the network and supports but low engagement in CI, and (4) schools with high engagement in CI but low engagement in the network and supports. We then compared the percentage of NSI schools in each group for schools with meaningful impacts and those without meaningful impacts.

When we conducted this analysis with NSI schools across the three outcome areas, we found that NSI schools without meaningful impacts were more likely to have low engagement in both the network and supports and CI. NSI schools with meaningful impacts appeared more likely to have high engagement in both the network and supports and CI, although this difference was not statistically significant. We found a similar pattern for the 8th-grade on-track NSI and the well-matched postsecondary enrollment NSI. High engagement in just one aspect of the NSI approach (either networks *or* CI) did not appear to relate to achieving meaningful impacts. This exploratory analysis suggests that engaging in both the network and supports and CI may be related to impacts on student outcomes, although additional research is needed to understand these relationships.

Exhibit D.9. Comparing engagement in the network and supports and in CI for schools with and without meaningful impacts

	Percentage of school-by-year records		Difference	p-value	Number of school-by-year records
	Schools with meaningful impacts on priority student outcomes	Schools without meaningful impacts on priority student outcomes			
All three outcome areas					
Low engagement in CI and low engagement in the network and supports	10	25	-15	0.00	49
Low engagement in CI and high engagement in the network and supports	14	15	-1	0.81	38
High engagement in CI and low engagement in the network and supports	37	29	7	0.20	88
High engagement in CI and high engagement in the network and supports	39	31	8	0.14	93
8th-grade on track					
Low engagement in CI and low engagement in the network and supports	8	36	-28	0.01	14
Low engagement in CI and high engagement in the network and supports	8	12	-4	0.64	6
High engagement in CI and low engagement in the network and supports	42	24	17	0.18	18
High engagement in CI and high engagement in the network and supports	42	27	14	0.27	19
9th-grade on track					
Low engagement in CI and low engagement in the network and supports	17	22	-5	0.60	16
Low engagement in CI and high engagement in the network and supports	22	22	-0	0.96	18
High engagement in CI and low engagement in the network and supports	28	28	0	0.96	23
High engagement in CI and high engagement in the network and supports	33	28	5	0.62	25
Well-matched postsecondary enrollment					
Low engagement in CI and low engagement in the network and supports	5	22	-16	0.01	19
Low engagement in CI and high engagement in the network and supports	9	12	-3	0.59	14
High engagement in CI and low engagement in the network and supports	42	32	9	0.27	47
High engagement in CI and high engagement in the network and supports	44	34	10	0.26	49

Source: Administrative student records for the 2018-19 through 2023-24 school years and school artifacts and Team Connections Survey data for 2020-21 through 2023-24.

Note: High (low) engagement is defined as having above-average (below-average) implementation across all relevant implementation measures combined as compared to other schools with implementation data.

Appendix E

List of Intermediaries and Networks in the NSI Initiative

Exhibit E.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 enrollment	Well-matched postsecondary enrollment	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 enrollment	Well-matched postsecondary enrollment	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

Appendix E List of 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
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 enrollment	Well-matched postsecondary enrollment	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 enrollment	College-ready on track; well-matched postsecondary enrollment			
New Tech Network	NTN College Access Network	1B	Well-matched postsecondary enrollment	Well-matched postsecondary enrollment	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

Appendix E List of 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
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
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 F

Glossary

This glossary provides definitions of key terms pertaining to networks and continuous improvement (CI) 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. Aim statements can be generated at various organizational levels (e.g., team-specific or network-wide).

Artifact. An artifact is a document that an intermediary, network, or CI team generates during continuous improvement work. For example, documents may include root cause diagrams or templates that teams used to plan inquiry cycles.

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 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 (CI). 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 (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. Intermediary organizations 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 categories based on their aim statements and change ideas when they entered the initiative (The Gates Foundation, personal correspondence with the authors, June 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 (EWR) 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 Enrollment (WMPS) 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.”

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 intermediary organizations use other conceptualizations of inquiry cycles—for example, Partners for School Innovation bases its work on Results-Oriented Cycles of Inquiry. 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.

Intermediary organization. An intermediary organization is an organization that received an NSI grant and is responsible for facilitating and supporting 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.

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

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

Network hub. A network hub is a leadership team created by intermediary organizations to recruit and support school CI teams. Network hubs consist of intermediary staff including a leader, coaches, and specialists in data and research, CI, and professional learning.

Network for School Improvement (NSI). An NSI is a network funded by the Gates Foundation. An NSI is a group of network hub 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 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 organization 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 high graduation rate (at least 50 percent).

Priority outcomes. The subset of academic and behavioral outcomes that a given NSI focused on improving. The Gates Foundation focused NSI in each outcome area on improving a specific set of academic and behavioral outcomes. In practice, most NSI prioritized a subset of those outcomes rather than the full set of outcomes. For example, while the Gates Foundation expected 9th-grade on-track NSI to improve a set of five outcomes, most 9th-grade on-track NSI focused on improving three of those outcomes: GPA, course pass rates, and credit completion.

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.¹⁷ A theory of improvement guides the work of the network and evolves as educators conduct and learn from inquiry cycles.

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Notes

¹ We did this in case the intermediary began doing some work with the school before the school officially joined the network. However, we did not impose this restriction for comparison schools that were part of the random assignment analysis and joined the NSI in the fourth year because the intermediaries agreed not to do any NSI work with these comparison schools for the first three years after random assignment.

² 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 four district-year combinations where state means and standard deviations were unavailable. In those cases we standardized test scores using the district mean and standard deviation.

³ As a sensitivity analysis, we also measured whether the 8th-grade on-track NSI had an impact on the percentage of students who took the algebra end-of-course exams in the two districts where these exams were offered in place of end-of-grade math exams. The estimated impact was close to 0 and not statistically significant.

⁴ We had data on only one NSI and one comparison district in Florida and one NSI and eight comparison districts in Colorado.

⁵ The baseline characteristic information is presented for schools that enter the analysis sample rather than for schools that were randomly assigned. Data were unavailable for many of the randomly assigned schools that did not enter the analysis.

⁶ 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 districts that had odd numbers of schools, we formed blocks of three schools.

⁷ If one school dropped out due to missing data from a random assignment block of three schools, we kept the other two schools in the analysis as long as one of those schools was an NSI and the other was a comparison school.

⁸ 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 two alternative methods for calculating standard errors when we had regression models with a small number of districts (fewer than 25 districts): (1) we used a small-cluster adjustment formula defined in the WWC Standards and Procedures, Version 5.0 (WWC 2022) and (2) we clustered standard errors at the school level. To be conservative, we used the larger of the standard error values across these methods as the standard error for the impact estimates, which in our case was the standard error based on clustering at the school level.

⁹ For the aggregation of subgroup results, the weight was proportional to the number of students at NSI schools in the subgroup of interest. This reflects the fact that NSI schools with more students in a particular subgroup receive more weight in the subgroup analysis.

¹⁰ We did not estimate these impacts for the college-ready on-track analysis because the sample sizes were too small to produce reliable estimates for specific groups.

¹¹ We excluded one NSI district from the analysis of impacts by student group because it did not provide data on whether students were economically disadvantaged.

¹² In cases where fewer than 20 NSI schools were in a regression measuring school-specific impacts, we excluded school baseline covariates from the analysis because there was insufficient variation across schools to reliably identify the coefficients on those variables.

¹³ We do not report separate impacts for 9th-grade on-track NSI focused on course-related outcomes because all 9th-grade on-track NSI focused on at least one course-related outcome, so the results would be the same as shown in Exhibit 7. We do not estimate separate impacts for 9th-grade on-track NSI focused on suspensions because none of the 9th-grade on-track NSI focused on that outcome.

¹⁴ We do not report on impacts for college-ready on-track NSI on the overall on-track threshold because data availability varied by state such that for most NSI schools, we did not have data on all outcomes that made up the overall on-track indicator. The foundation did not establish an overall on-track indicator for well-matched postsecondary enrollment NSI.

¹⁵ After estimating a school's impacts on each of their priority outcomes, the study team averaged these impacts to obtain the school's average impact on their priority outcomes. For example, if a school's network prioritized GPA and attendance rates, we averaged its impacts across those two outcomes. The school was then defined as having a meaningful impact if its average impact across GPA and attendance that year was at least 0.05 standard deviations.

¹⁶ We use a different sample for each analysis because we have nonaligned missingness (that is, when one measure is populated, another is sometimes missing). To maximize the sample size for each analysis, we examine measures separately.

¹⁷ <https://www.carnegiefoundation.org/resources/learning-to-improve-glossary/>.

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