TECHNICAL BRIEF

Technical appendix for: “Recovery still elusive: 2023-24 student achievement highlights persistent achievement gaps and a long road ahead”

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Megan Kuhfeld and Karyn Lewis

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1. Introduction

The purpose of this technical appendix is to share detailed results and to more fully describe the sample and methods used in the research included in the brief, **Recovery still elusive: 2023-24 student achievement highlights persistent achievement gaps and a long road ahead**. We investigated three main research questions in this brief:

1) How does growth in the 2023-24 school year compare to a typical school year?

2) How did achievement gaps change in the 2023-24 school year and how much additional schooling will be required to close these gaps?

3) How do these patterns differ by race/ethnicity and school poverty?

Additionally, we included a supplemental analysis that looked at trends by grade level from spring 2017 to spring 2024. Since this analysis involved a separate dataset from the three main research questions, we describe the data and methods for this analysis separately at the end.

2. Data

Sample

The data for this study are from the NWEA anonymized longitudinal student achievement database. School districts use NWEA® MAP® Growth™ assessments to monitor elementary and secondary students' reading and math achievement and gains, with assessments typically administered in the fall (usually between August and November), winter (usually December to March), and spring (late March through June). The NWEA data also include demographic information, including student race/ethnicity, gender, and age at assessment. An indicator of student-level socioeconomic status is not available. However, a set of school-level characteristics, including school-level free or reduced priced lunch (FRPL) eligibility was obtained from the 2019-20 school-level Common Core of Data (CCD) files from the National Center for Education Statistics.

To measure achievement gains across the course of the COVID-19 pandemic, we follow separate cohorts of students across the most recent three school years impacted by the pandemic. The left (dark green) side of the table below illustrates the grades and years used for the "COVID sample" of students. Each cell in this table indicates the grade level that a given cohort is in across the three school years in our panel. In total, our COVID analytic sample consists of approximately 7.7 million students in grades 3-8 in 22 thousand public schools who took MAP Growth reading and math assessments across the 2021-22 to 2023-24 school years. We did not require students to be present in all test seasons to be retained in the longitudinal COVID sample.

	COVID Sample (7.7 million students in 22K schools)			Pre-COVID Composite Sample (11 million students in 23K schools)		
Grades	2021-22	2022-23	2023-24	2016-17 2017-18 2018-19	2016-17 2017-18 2018-19	2016-17 2017-18 2018-19
1-3	1	2	3	1	2	3
2-4	2	3	4	2	3	4
3-5	3	4	5	3	4	5
4-6	4	5	6	4	5	6
5-7	5	6	7	5	6	7
6-8	6	7	8	6	7	8

We also defined a “pre-COVID composite sample” to serve as a reference for each of the grade cohorts from the COVID sample (see the right side of the table above in light green). The pre-COVID sample serves as a counterfactual for the achievement gains that may have been expected if the COVID-19 pandemic had not occurred. Because the sample is a composite, it groups together student data for the same grade across the three full school years that preceded the onset of the pandemic (2016-17, 2017-18, and 2018-19). The pre-COVID sample consisted of 11 million unique students in 23,000 public schools. Descriptive information for the students in our overall sample by cohort, subject, and pre-COVID/COVID sample is provided in Table 1. In comparison to the pre-COVID composite sample, the COVID sample reflects a lower percentage of White students and a slightly higher percentage of Hispanic students.

Descriptive information for the schools in our main sample along with comparison information on the population of U.S. schools is provided in Table 2. The schools in our sample represent roughly one in three U.S. public schools serving grades 3-8. Our sample reflects a diversity of schools from across various locales (urban, suburban, rural, and town). Relative to the population of U.S. schools, our sample reflects schools serving a slightly higher average percentage of White students and a lower average percentage of Hispanic students.

Measure of achievement

Student test scores from the NWEA MAP Growth reading and math assessments, called RIT scores, were used in this study. MAP Growth is a computer adaptive test that precisely measures achievement, even for students above or below grade level and is vertically scaled to allow for the estimation of gains across time. MAP Growth assessments are typically administered three times a year (fall, winter, and spring) and are aligned to state content standards. Test scores are reported on the RIT (Rasch unIT) scale, which is a linear transformation of the logit scale units from the Rasch item response theory model.

MAP Growth with Enhanced Item-Selection Algorithm (EISA)

In the 2023-24 school year, NWEA began the phased implementation of an enhanced item-selection algorithm for the MAP Growth assessment. This update more closely aligns the assessment with grade-level content to enhance its content validity. The enhanced item-selection algorithm (EISA) prioritizes grade-level content while still adapting to off-grade items

where necessary to provide items of appropriate difficulty for students. Nineteen states implemented MAP with EISA in the 2023-24 school year. NWEA conducted a comparability study of the scores with traditional MAP Growth and MAP with EISA and found that prioritization of grade-level test content appears to make the test more sensitive to instruction in math. As a result, fall-spring growth appears to be larger on the new version of the test in math. To account for the differences in test version, we converted the MAP with EISA math test scores to be on the traditional MAP Growth scale. For more detail on the score conversion process, please see NWEA's EISA documentation.

3. Methods

RQ1: How does growth in the 2023-24 school year compare to a typical school year?

Fall-spring achievement gains are calculated as the average difference between the fall and spring test scores in school year *y*, cohort *g* (1-3, 2-4, 3-5, 4-6, 5-7, 6-8) for sample *s* (where *s=PC* for the pre-COVID sample and *C* for the COVID sample).[1]

$$\overline{\text{Growth}}_{gys} = \frac{\sum_{i=1}^{N} RIT_{Si} - RIT_{Fi}}{N}$$

For the pre-COVID period, we created a composite estimate across 2016-17, 2017-18, and 2018-19 by taking a weighted average of $\overline{\text{Growth}}_{gyPC}$ across all three years. Table 3 displays the average growth rates for the 2023-24 school year (COVID sample) and the pre-COVID composite sample, as well as growth rates in 2022-23 for reference. We also calculated the ratio of COVID/pre-COVID fall-to-spring achievement gains by dividing the mean fall-to-spring growth of the COVID sample by the mean growth of students in the pre-COVID composite sample. Growth ratios for math and reading are reported in Table 3 for both 2022-23 and 2023-24 students. Bar graphs showing the achievement gains of the 2023-24 COVID sample as a percentage of average pre-COVID gains are shown in Figure 1 in the main brief.

RQ2: How did achievement gaps change in the 2023-24 school year and how much additional schooling will be required to close these gaps?

To track the size of achievement gaps (i.e., the difference between the pre-COVID and COVID sample) and how they have changed, we calculated the average test score ($\overline{\text{RIT}}_{tgs}$) in term *t* within cohort *g* (1-3, 2-4, 3-5, 4-6, 5-7, 6-8) for sample *s* (where *s=PC* for the pre-COVID sample and *C* for the COVID sample). Line plots connecting these mean RIT scores for all cohorts across both subjects are shown in Figure 2 in the main brief for the 1-3, 3-5, and 4-7 cohorts and in Figure A1 (for the remaining cohorts). RIT score means within each term of the COVID sample are plotted in darker shaded lines (blue for reading and magenta for math), while the lighter shaded lines represent the pre-COVID sample. RIT score means, SDs, and sample sizes are presented for each cohort/grade/term in Table 4 for reading and Table 5 for math. For simplicity, Figure A1 and Figure 2 (main brief) only depict 2022-23 and 2023-24, but for completeness Table 4 and 5 also include the 2021-22 school year.

Achievement gaps were calculated by computing the standardized mean difference between average test scores in a grade/term between the pre-COVID and COVID samples. For example,

[1] To be included in these gain estimates, students must have an observed test score in both the fall and spring terms of the same school year.

the achievement gap (as an effect size) in the most recent fall term *t* in grade *g* was calculated as:

$$ES_{tg} = \frac{\overline{\mathrm{RIT}}_{tgC} - \overline{\mathrm{RIT}}_{tgPC}}{\sqrt{\frac{(\mathrm{N}_{tgC} - 1)\mathrm{SD}_{tgC}^2 + (\mathrm{N}_{tgPC} - 1)\mathrm{SD}_{tgPC}^2}{\mathrm{N}_{tgC} + \mathrm{N}_{tgPC} - 2}}},$$

where $\overline{\mathrm{RIT}}_{tgC}$ is the average COVID sample (*t*=spring 2024) test score in grade *g*; $\overline{\mathrm{RIT}}_{tgPC}$ is the average pre-COVID (*t*=spring 2017 to spring 2019) composite test score in grade *g*; SD_{tgC} and SD_{tgPC} are the corresponding standard deviation (SD) estimates; and N_{tgC} and N_{tgPC} are the observed sample size in grade *g* in spring 2024 and 2017-2019, respectively. The standardized effect sizes by grade, term, and subject are reported in Tables 4 and 5, and are displayed below the points in Figure A1 in this technical appendix, as well as in Figure 2 in the main brief.

In order to contextualize the practical significance of our achievement gaps, we translated the standardized effect sizes into a metric that may be more familiar to educators: months of schooling.[2] This translation is calculated as a ratio of some effect (e.g., achievement gap or treatment effect) to typical growth on the same scale. For example, in spring 2024 we observe a 4.41 RIT score difference in 5th grade math and a typical pre-COVID fall-to-spring growth rate of 10.1 RIT points per school year for 5th graders. Therefore, we estimate that a student would need 4.41/10.1 = .44 additional years of learning to catch up. If we assume 9 months of instruction in a school year, this translates to 3.9 additional months of schooling that students would require to meet pre-pandemic levels of achievement. For a given term *t* and cohort *g*, the translation formula is:

$$\text{Months of additional schooling} = \frac{\overline{\mathrm{RIT}}_{tgC} - \overline{\mathrm{RIT}}_{gPC}}{\overline{\mathrm{Growth}}_{gPC}} * 9,$$

where $\overline{\mathrm{Growth}}_{gPC}$ is the average fall-to-spring change in RIT score for grade *g* across the pre-COVID school years of 2016-17 to 2018-19. The achievement gaps for each subject/grade/term combination, pre-COVID growth rates, and months needed for each cohort to catch up are shown in Table 6. These results are shown in Figure 3 in the main brief which depicts both the standardized achievement gaps for 2023-24 students (dark magenta and blue bar graphs) and the months of additional schooling required for those students to catch up (light green line plot).

RQ3: How do these patterns differ by race/ethnicity and school poverty?

Gain scores

[2] In previous reports, we estimated the years that students would need to close achievement gaps. Given the stalled progress and lack of positive improvement seen across cohorts, this approach was not feasible for this report. Instead, we calculated how many additional months of instruction students would need to offset the widening of these gaps. While months of learning metrics have known limitations (Baird & Pane, 2019; Kuhfeld et al., 2023), we chose to still translate our effect sizes into metrics of time to communicate the urgency of the issue in a metric that resonates more with educators and policymakers.

We disaggregated the growth results by race/ethnicity and school poverty level.[3] We first calculated mean fall-to-spring growth by subject, grade, and racial/ethnic subgroup for 2023-24 students. We then divided these values by national average growth rates in the pre-COVID composite sample to calculate a COVID growth ratio for each subgroup. For parsimony in presenting the results, we further aggregated our growth rates and ratios to elementary level (students in grades 3 to 5) and middle school level (students in grades 6 to 8). For each subgroup, mean growth rates, sample sizes, and growth ratios are reported in Table 7 (for reading and math, respectively). Racial/ethnic growth ratios are displayed in Figure 4 in the main paper. We include parallel analyses disaggregating growth ratios by school poverty level in Figure A2 in this paper.

To highlight the pre-existing disparities in gains across subgroups, we also calculated how each subgroup's average pre-COVID gains compared to national pre-COVID average growth rates. Pre-COVID gains for each subject, grade, and subgroup were estimated using the pre-COVID composite sample and dividing by national pre-COVID average growth rates. These estimates are shown as the lighter color bars in Figure 4 of the main brief for race/ethnicity and Figure A2 in this paper for school poverty level.

Achievement scores

To understand (a) subgroup differences that existed prior to the pandemic, as well as (b) how the pandemic has exacerbated achievement disparities, we standardized the pre-COVID and spring 2024 average test scores of each subgroup relative to national pre-COVID levels of achievement. Pre-COVID and COVID mean scores, sample sizes and SDs are presented in Table 8 for each grade band/subject/subgroup combination, as well as for the national pre-COVID sample.[4] Standardized estimates were calculated by subtracting mean scores for every subject/grade/subgroup/term combination from the average national pre-COVID achievement levels of that grade/term and dividing by the national pre-COVID SD. The grade-level standardized estimates were then averaged and collapsed across elementary and middle school grade bands.

These statistics are depicted in Figure A3, which displays each racial/ethnic subgroup's mean scores in the pre-COVID sample (base of each arrow) and standardized mean scores in spring 2024 (tip of each arrow) standardized relative to pre-COVID national achievement levels (where zero represents the pre-COVID national baseline). The differences between pre-COVID and COVID values are reported below each arrow. Figure A4 displays parallel trends broken out by school poverty level.

Months of schooling required to close gaps

Lastly, we examined months of additional schooling that students would require to reach pre-pandemic levels of achievement by racial/ethnic and school poverty demographics. In these calculations, we focused on two different pre-COVID baselines in our months of additional schooling calculations: (a) each subgroup's own pre-pandemic levels of achievement and (b)

[3] We reported two school poverty levels: (a) "Low Poverty" - less than 25% FRPL eligibility and (b) "High Poverty" - greater than 75% FRPL eligibility based on school-level Common Core of Data collected in 2019-20.

[4] The national pre-COVID estimates shown in Table 8 are the across-grade average of the spring pre-COVID estimates from Tables 4 & 5. For example, 211.3 for elementary math is the average of the grade 3 (202.2), grade 4 (211.9), and grade 5 (220.1) spring pre-COVID means in Table 5.

national pre-pandemic levels of achievement. In the first calculation, we subtracted the average spring 2024 subgroup achievement by the pre-COVID spring *subgroup* achievement and benchmarked against national pre-COVID fall-to-spring growth rates (i.e., how many months would it take to return to a subgroup's pre-COVID achievement level). In the second calculation, we subtracted the average spring 2024 achievement for a subgroup by the pre-COVID *national* spring achievement and then benchmarked against national pre-COVID fall-to-spring growth rates (i.e., how many months would it take for a subgroup to reach parity with national average pre-COVID levels of achievement). In both cases, we assume 9 months of instruction to translate our estimates to additional months of schooling needed.

The additional months of instruction that 2023-24 students would need to catch up to pre-COVID levels of achievement are presented in Figure 5 of the main brief for racial/ethnic subgroups and parallel analyses are included in Figure A5 of this paper for school poverty levels. Mean scores, absolute differences, and additional months required by both racial/ethnic and school poverty subgroups are shown in Table 9.

4. Supplemental Analysis

Sample. For our supplemental analysis, we limited the sample to schools that consistently tested with MAP Growth each spring between spring 2017 and spring 2024 (excluding spring 2020 given low testing in that term due to school closures). In total, our sample included 7.1 million students in seven thousand schools for reading and 7.2 students in seven thousand schools for math.

Analyses. Within each grade, subject, and spring term, we calculated the mean and standard deviation. We also calculated a standardized effect size to represent change since spring 2019 (subtracting off the spring 2019 mean and dividing by the spring 2019 SD):

$$ES_{tg} = \frac{\overline{\mathrm{RIT}}_{tgy} - \overline{\mathrm{RIT}}_{tg19}}{\mathrm{SD}_{tg19}}.$$

Mean RIT scores and standardized effect sizes are reported in Table 10 and shown in Figure 6 in the main paper.

Table 1. Description of the pre-COVID and COVID student samples

Subject	Sample	School Year	Grade	N	Asian	Black	Hispanic	White	Male
Reading	Pre-COVID	2017-2019	All Grades	10,673,338	4.0	17.4	18.3	47.8	51
Math	Pre-COVID	2017-2019	All Grades	10,778,268	4.1	17.0	18.7	47.6	51
Both	Pre-COVID (Combined)	2017-2019	All Grades	11,048,548	4.2	17.6	19.0	46.7	51
Reading	COVID	2022-2024	All Grades	7,432,745	4.7	15.8	22.9	45.2	51
Math	COVID	2022-2024	All Grades	7,647,516	4.7	15.7	23.7	44.5	51
Both	COVID (Combined)	2022-2024	All Grades	7,747,074	4.7	16.9	23.4	43.0	51
Reading	Pre-COVID	2017-2019	1	2,060,966	4.0	19.0	17.8	46.5	51
Reading	Pre-COVID	2017-2019	2	2,541,752	4.2	18.3	18.4	46.8	51
Reading	Pre-COVID	2017-2019	3	2,715,496	4.1	17.9	18.6	46.9	51
Reading	Pre-COVID	2017-2019	4	2,674,023	4.0	17.3	18.1	48.0	51
Reading	Pre-COVID	2017-2019	5	2,706,310	4.0	17.1	18.1	48.2	51
Reading	Pre-COVID	2017-2019	6	2,681,068	4.0	16.9	18.7	47.8	51
Reading	Pre-COVID	2017-2019	7	2,582,253	4.0	16.5	18.3	48.8	51
Reading	Pre-COVID	2017-2019	8	2,487,717	3.9	16.5	18.3	49.2	51
Reading	COVID	2022-2024	1	735,070	4.0	17.3	21.4	46.0	51
Reading	COVID	2022-2024	2	1,696,613	4.5	16.3	22.1	45.4	51
Reading	COVID	2022-2024	3	2,673,394	4.7	15.8	22.9	44.9	51
Reading	COVID	2022-2024	4	2,721,897	4.8	15.8	22.7	45.2	51
Reading	COVID	2022-2024	5	2,730,070	4.7	15.7	22.9	45.3	51
Reading	COVID	2022-2024	6	2,776,600	4.6	15.5	23.4	45.3	51
Reading	COVID	2022-2024	7	1,835,460	4.7	15.6	23.6	45.1	51
Reading	COVID	2022-2024	8	863,426	4.7	15.5	23.9	45.4	51
Math	Pre-COVID	2017-2019	1	2,152,594	4.2	18.8	18.6	45.9	51
Math	Pre-COVID	2017-2019	2	2,581,160	4.3	17.8	18.7	46.8	51
Math	Pre-COVID	2017-2019	3	2,717,311	4.2	17.5	18.8	46.8	51
Math	Pre-COVID	2017-2019	4	2,680,909	4.2	16.9	18.3	48.0	51
Math	Pre-COVID	2017-2019	5	2,719,582	4.1	16.6	18.4	48.1	51
Math	Pre-COVID	2017-2019	6	2,692,309	4.1	16.5	19.1	47.7	51
Math	Pre-COVID	2017-2019	7	2,578,484	3.9	16.1	18.8	48.7	51
Math	Pre-COVID	2017-2019	8	2,419,602	3.7	16.4	18.9	48.8	51
Math	COVID	2022-2024	1	836,327	4.2	16.7	23.6	44.1	51
Math	COVID	2022-2024	2	1,848,998	4.6	16.2	23.5	44.0	51
Math	COVID	2022-2024	3	2,779,785	4.8	15.6	23.8	44.2	51
Math	COVID	2022-2024	4	2,807,237	4.9	15.6	23.5	44.5	51
Math	COVID	2022-2024	5	2,814,041	4.8	15.5	23.7	44.6	51
Math	COVID	2022-2024	6	2,811,145	4.7	15.5	23.5	45.1	51
Math	COVID	2022-2024	7	1,841,646	4.5	15.7	24.1	44.7	51
Math	COVID	2022-2024	8	805,745	4.2	16.0	24.2	45.0	51

Note. N=number of students. The pre-COVID sample includes the 2016-17 to 2018-19 school years, while the COVID sample includes the 2021-22 to 2023-24 school years. Many students tested in both subjects, which is why the combined samples are not a sum of each math and reading sample.

Table 2. Sample school information relative to U.S. population of schools

Subject	Sample	Year	Grades	N. Schools	Average School Enrollment	% FRPL	% White	% Black	% Hispanic	% Asian	City	Suburb	Rural	Town
—	U.S. Public Schools	2019-20	All grades	76,960	472	0.55	0.49	0.15	0.25	0.04	0.28	0.32	0.28	0.12
—	Pre-COVID (Combined)	2017-2019	All grades	23,085	468	0.54	0.52	0.16	0.21	0.04	0.29	0.31	0.29	0.11
—	COVID (Combined)	2022-2024	All grades	22,401	491	0.54	0.51	0.15	0.23	0.04	0.29	0.32	0.28	0.11
Reading	Pre-COVID	2017	All grades	17,926	460	0.53	0.53	0.16	0.19	0.03	0.26	0.33	0.29	0.12
Reading	Pre-COVID	2018	All grades	18,962	466	0.54	0.53	0.16	0.20	0.03	0.28	0.32	0.29	0.11
Reading	Pre-COVID	2019	All grades	19,703	470	0.54	0.53	0.16	0.20	0.03	0.28	0.32	0.29	0.11
Reading	COVID	2022	All grades	19,148	490	0.54	0.51	0.15	0.23	0.04	0.29	0.33	0.28	0.11
Reading	COVID	2023	All grades	19,743	486	0.54	0.52	0.14	0.23	0.03	0.28	0.32	0.29	0.11
Reading	COVID	2024	All grades	17,855	496	0.54	0.51	0.15	0.23	0.04	0.29	0.33	0.28	0.10
Math	Pre-COVID	2017	All grades	17,890	460	0.53	0.54	0.15	0.20	0.04	0.27	0.32	0.30	0.12
Math	Pre-COVID	2018	All grades	19,010	466	0.54	0.53	0.16	0.20	0.04	0.29	0.32	0.29	0.11
Math	Pre-COVID	2019	All grades	19,750	469	0.54	0.53	0.16	0.20	0.04	0.29	0.31	0.29	0.11
Math	COVID	2022	All grades	19,487	493	0.54	0.51	0.15	0.23	0.04	0.29	0.33	0.27	0.10
Math	COVID	2023	All grades	19,990	487	0.54	0.52	0.14	0.23	0.04	0.28	0.32	0.29	0.11
Math	COVID	2024	All grades	18,056	497	0.54	0.50	0.15	0.24	0.04	0.29	0.33	0.28	0.10

Note: FRPL=free or reduced priced lunch. The NWEA pre-COVID sample is defined as schools that administered MAP Growth in a given grade (or grade range) during the 2016-17 to 2018-19 school years, while NWEA COVID sample is defined as schools that administered MAP Growth during the 2021-22 to 2023-24 school years. The source of the variables is the Common Core of Data (CCD) collected by the National Center for Educational Statistics. The U.S. public school population comparison was determined by limiting to the schools that were operational in 2019-20 and enrolled students in grades 3-8.

Table 3. Average fall-spring growth rates during the 2022-23 and 2023-24 school year relative to pre-COVID average gains

				Pre-COVID			COVID				
Subject	Cohort	School Year	Grade	N	Mean Growth	SD	N	Mean Growth	SD	Growth Ratio	% Above/ Below Average
Reading	1-3	2022-23	2	2,102,538	13.8	9.6	703,613	14.2	10.0	1.03	3
Reading	1-3	2023-24	3	2,129,697	10.7	9.5	645,384	11.1	9.7	1.04	4
Reading	2-4	2022-23	3	2,129,697	10.7	9.5	716,646	11.1	9.8	1.04	4
Reading	2-4	2023-24	4	2,072,377	7.8	9.0	666,001	7.7	9.1	0.99	-1
Reading	3-5	2022-23	4	2,072,377	7.8	9.0	719,634	7.6	9.0	0.98	-2
Reading	3-5	2023-24	5	2,079,196	6.3	8.8	665,690	5.8	8.8	0.91	-9
Reading	4-6	2022-23	5	2,079,196	6.3	8.8	717,651	5.7	8.8	0.91	-9
Reading	4-6	2023-24	6	1,984,214	4.7	8.9	652,381	3.7	8.7	0.79	-21
Reading	5-7	2022-23	6	1,984,214	4.7	8.9	700,672	3.8	8.8	0.80	-20
Reading	5-7	2023-24	7	1,843,967	3.9	9.0	640,487	3.1	8.9	0.80	-20
Reading	6-8	2022-23	7	1,843,967	3.9	9.0	681,605	3.1	9.0	0.81	-19
Reading	6-8	2023-24	8	1,734,390	3.3	9.0	610,503	2.7	9.3	0.81	-19
Math	1-3	2022-23	2	2,103,261	14.8	8.3	768,134	14.9	8.4	1.00	0
Math	1-3	2023-24	3	2,100,720	13.3	7.8	684,129	13.7	7.9	1.03	3
Math	2-4	2022-23	3	2,100,720	13.3	7.8	742,315	13.6	7.9	1.02	2
Math	2-4	2023-24	4	2,056,723	11.3	7.7	688,099	10.7	7.7	0.95	-5
Math	3-5	2022-23	4	2,056,723	11.3	7.7	740,411	10.6	7.6	0.94	-6
Math	3-5	2023-24	5	2,069,765	10.1	7.9	687,174	8.7	7.9	0.86	-14
Math	4-6	2022-23	5	2,069,765	10.1	7.9	739,138	8.6	7.7	0.85	-15
Math	4-6	2023-24	6	2,004,747	8.1	7.8	657,647	7.2	8.2	0.89	-11
Math	5-7	2022-23	6	2,004,747	8.1	7.8	706,362	7.7	7.8	0.95	-5
Math	5-7	2023-24	7	1,847,029	6.5	7.9	639,166	5.9	8.7	0.91	-9
Math	6-8	2022-23	7	1,847,029	6.5	7.9	687,184	5.9	8.0	0.90	-10
Math	6-8	2023-24	8	1,684,140	5.4	8.1	560,116	5.2	9.7	0.98	-2

Note. N=number of students. Mean Growth=average fall-to-spring change in RIT score for each grade/subject/year. The pre-COVID sample columns show average growth rates from 2016-17 to 2018-19 as a reference to the COVID sample's 2022-23 and 2023-24 achievement gains. Growth ratios are calculated by dividing COVID growth rates by pre-COVID growth rates. Data from this table are referenced in Figure 1 in the main brief.

Table 4. Student reading RIT score means, SDs by cohort and sample

Cohort	School Year	Term	Grade	Pre-COVID N	Pre-COVID M	Pre-COVID SD	COVID N	COVID M	COVID SD	Standardized difference between samples
1-3	2021-22	F21	1	1,890,510	156.3	13.2	667,520	155.2	13.8	-0.09
1-3	2021-22	S22	1	1,911,095	172.6	14.4	669,299	169.9	15.3	-0.18
1-3	2022-23	F22	2	2,332,563	173.0	16.3	775,326	170.1	16.9	-0.18
1-3	2022-23	S23	2	2,325,972	186.7	16.1	770,948	183.9	17.1	-0.17
1-3	2022-24	F23	3	2,502,585	187.4	16.9	774,430	184.7	17.7	-0.16
1-3	2022-24	S24	3	2,359,959	197.9	16.4	698,179	195.3	17.8	-0.15
2-4	2021-22	F21	2	2,332,563	173.0	16.3	785,743	170.0	17.2	-0.18
2-4	2021-22	S22	2	2,325,972	186.7	16.1	776,760	183.7	17.3	-0.18
2-4	2022-23	F22	3	2,502,585	187.4	16.9	859,057	184.7	18.0	-0.16
2-4	2022-23	S23	3	2,359,959	197.9	16.4	773,435	195.4	17.8	-0.15
2-4	2022-24	F23	4	2,471,041	197.6	16.6	809,961	195.7	17.7	-0.12
2-4	2022-24	S24	4	2,280,894	205.3	16.1	713,297	203.1	17.7	-0.14
3-5	2021-22	F21	3	2,502,585	187.4	16.9	871,293	185.2	18.0	-0.13
3-5	2021-22	S22	3	2,359,959	197.9	16.4	792,285	195.7	17.6	-0.13
3-5	2022-23	F22	4	2,471,041	197.6	16.6	875,369	195.9	17.7	-0.10
3-5	2022-23	S23	4	2,280,894	205.3	16.1	768,710	203.3	17.4	-0.12
3-5	2022-24	F23	5	2,499,490	205.0	16.4	810,251	203.3	17.4	-0.10
3-5	2022-24	S24	5	2,290,765	211.1	15.9	710,630	208.8	17.3	-0.14
4-6	2021-22	F21	4	2,471,041	197.6	16.6	882,872	196.1	17.3	-0.09
4-6	2021-22	S22	4	2,280,894	205.3	16.1	785,276	203.7	17.0	-0.10
4-6	2022-23	F22	5	2,499,490	205.0	16.4	874,045	203.5	17.2	-0.09
4-6	2022-23	S23	5	2,290,765	211.1	15.9	766,467	209.0	16.9	-0.13
4-6	2022-24	F23	6	2,450,709	210.3	16.2	816,552	209.0	16.5	-0.08
4-6	2022-24	S24	6	2,221,746	215.0	15.9	705,846	212.5	16.6	-0.15
5-7	2021-22	F21	5	2,499,490	205.0	16.4	894,481	203.4	16.8	-0.09
5-7	2021-22	S22	5	2,290,765	211.1	15.9	792,284	209.2	16.6	-0.12
5-7	2022-23	F22	6	2,450,709	210.3	16.2	885,660	209.1	16.6	-0.08
5-7	2022-23	S23	6	2,221,746	215.0	15.9	759,566	212.8	16.5	-0.14
5-7	2022-24	F23	7	2,348,897	214.6	16.3	827,963	212.6	16.3	-0.12
5-7	2022-24	S24	7	2,084,549	218.4	16.3	697,698	215.4	16.9	-0.18
6-8	2021-22	F21	6	2,450,709	210.3	16.2	890,854	209.0	16.5	-0.08
6-8	2021-22	S22	6	2,221,746	215.0	15.9	774,184	213.0	16.4	-0.12
6-8	2022-23	F22	7	2,348,897	214.6	16.3	890,728	212.7	16.6	-0.12
6-8	2022-23	S23	7	2,084,549	218.4	16.3	742,799	215.7	16.9	-0.16
6-8	2022-24	F23	8	2,258,800	218.4	16.4	810,598	215.9	16.5	-0.15
6-8	2022-24	S24	8	1,968,588	221.6	16.3	663,331	218.3	17.0	-0.20

Note. N=number of students, M=mean, SD=standard deviation, F21=fall of 2021, S22=spring of 2022. Data from this table are referenced in Figure 2 in the main brief.

Table 5. Student math RIT score means, SDs by cohort and sample

Cohort	School Year	Term	Grade	Pre-COVID N	Pre-COVID M	Pre-COVID SD	COVID N	COVID M	COVID SD	Standardized difference between samples
1-3	2021-22	F21	1	1,975,868	160.1	12.7	765,147	159.5	13.6	-0.05
1-3	2021-22	S22	1	1,970,904	177.5	13.7	754,003	175.8	14.7	-0.12
1-3	2022-23	F22	2	2,376,600	175.6	13.6	852,824	173.6	14.7	-0.15
1-3	2022-23	S23	2	2,322,320	190.4	13.8	829,938	188.2	14.8	-0.16
1-3	2022-24	F23	3	2,513,014	188.7	13.6	820,937	186.6	14.7	-0.15
1-3	2022-24	S24	3	2,322,268	202.0	14.3	731,968	200.1	15.6	-0.13
2-4	2021-22	F21	2	2,376,600	175.6	13.6	867,992	172.5	14.7	-0.23
2-4	2021-22	S22	2	2,322,320	190.4	13.8	841,421	187.2	15.1	-0.22
2-4	2022-23	F22	3	2,513,014	188.7	13.6	896,691	186.2	15.0	-0.18
2-4	2022-23	S23	3	2,322,268	202.0	14.3	793,131	199.6	15.8	-0.16
2-4	2022-24	F23	4	2,487,120	200.6	14.3	833,805	198.4	15.7	-0.16
2-4	2022-24	S24	4	2,256,078	211.9	15.8	736,235	208.8	17.0	-0.19
3-5	2021-22	F21	3	2,513,014	188.7	13.6	909,266	185.3	14.8	-0.25
3-5	2021-22	S22	3	2,322,268	202.0	14.3	812,566	198.9	15.8	-0.21
3-5	2022-23	F22	4	2,487,120	200.6	14.3	901,388	198.2	15.8	-0.17
3-5	2022-23	S23	4	2,256,078	211.9	15.8	791,365	208.6	16.9	-0.20
3-5	2022-24	F23	5	2,521,931	210.1	15.7	833,431	207.2	16.9	-0.18
3-5	2022-24	S24	5	2,272,299	220.1	17.6	732,974	215.7	18.5	-0.25
4-6	2021-22	F21	4	2,487,120	200.6	14.3	913,280	196.9	15.4	-0.26
4-6	2021-22	S22	4	2,256,078	211.9	15.8	810,710	208.4	17.1	-0.22
4-6	2022-23	F22	5	2,521,931	210.1	15.7	900,108	207.1	17.0	-0.19
4-6	2022-23	S23	5	2,272,299	220.1	17.6	789,414	215.5	18.2	-0.26
4-6	2022-24	F23	6	2,481,413	214.8	15.9	822,933	212.9	16.3	-0.12
4-6	2022-24	S24	6	2,223,036	222.8	17.5	710,183	219.8	18.5	-0.17
5-7	2021-22	F21	5	2,521,931	210.1	15.7	924,106	205.9	16.4	-0.27
5-7	2021-22	S22	5	2,272,299	220.1	17.6	818,267	215.6	18.4	-0.25
5-7	2022-23	F22	6	2,481,413	214.8	15.9	896,012	212.0	16.1	-0.17
5-7	2022-23	S23	6	2,223,036	222.8	17.5	763,990	219.6	17.9	-0.18
5-7	2022-24	F23	7	2,356,481	221.3	17.6	825,000	218.0	17.8	-0.19
5-7	2022-24	S24	7	2,076,552	227.7	18.8	696,271	223.6	19.7	-0.22
6-8	2021-22	F21	6	2,481,413	214.8	15.9	911,276	211.3	15.8	-0.22
6-8	2021-22	S22	6	2,223,036	222.8	17.5	788,668	219.1	17.5	-0.21
6-8	2022-23	F22	7	2,356,481	221.3	17.6	899,370	217.8	17.4	-0.20
6-8	2022-23	S23	7	2,076,552	227.7	18.8	748,979	223.4	19.1	-0.23
6-8	2022-24	F23	8	2,199,867	226.6	18.7	751,996	221.5	18.9	-0.27
6-8	2022-24	S24	8	1,908,945	231.8	19.8	613,865	226.3	20.7	-0.28

Note. N=number of students, M=mean, SD=standard deviation, F21=fall of 2021, S22=spring of 2022. Data from this table are referenced in Figure 2 in the main brief.

Table 6. Mean student RIT scores, achievement gaps, and months of additional instruction by subject and grade

Subject	School Year	Grade	Term	Pre-COVID Mean	COVID Mean	Standardized Effect Size	Difference	Pre-COVID Growth	Months
Reading	2023-24	3	F23	187.4	184.7	-0.16	2.71	10.7	2.3
Reading	2023-24	3	S24	197.9	195.3	-0.15	2.56	10.7	2.2
Reading	2023-24	4	F23	197.6	195.7	-0.12	1.96	7.8	2.3
Reading	2023-24	4	S24	205.3	203.1	-0.14	2.28	7.8	2.6
Reading	2023-24	5	F23	205.0	203.3	-0.10	1.66	6.3	2.4
Reading	2023-24	5	S24	211.1	208.8	-0.14	2.31	6.3	3.3
Reading	2023-24	6	F23	210.3	209.0	-0.08	1.36	4.7	2.6
Reading	2023-24	6	S24	215.0	212.5	-0.15	2.47	4.7	4.7
Reading	2023-24	7	F23	214.6	212.6	-0.12	1.98	3.9	4.6
Reading	2023-24	7	S24	218.4	215.4	-0.18	2.95	3.9	6.9
Reading	2023-24	8	F23	218.4	215.9	-0.15	2.53	3.3	6.9
Reading	2023-24	8	S24	221.6	218.3	-0.20	3.33	3.3	9
Math	2023-24	3	F23	188.7	186.6	-0.15	2.11	13.3	1.4
Math	2023-24	3	S24	202.0	200.1	-0.13	1.94	13.3	1.3
Math	2023-24	4	F23	200.6	198.4	-0.16	2.29	11.3	1.8
Math	2023-24	4	S24	211.9	208.8	-0.19	3.10	11.3	2.5
Math	2023-24	5	F23	210.1	207.2	-0.18	2.88	10.1	2.6
Math	2023-24	5	S24	220.1	215.7	-0.25	4.41	10.1	3.9
Math	2023-24	6	F23	214.8	212.9	-0.12	1.91	8.1	2.1
Math	2023-24	6	S24	222.8	219.8	-0.17	2.96	8.1	3.3
Math	2023-24	7	F23	221.3	218.0	-0.19	3.25	6.5	4.5
Math	2023-24	7	S24	227.7	223.6	-0.22	4.12	6.5	5.7
Math	2023-24	8	F23	226.6	221.5	-0.27	5.02	5.4	8.4
Math	2023-24	8	S24	231.8	226.3	-0.28	5.56	5.4	9.3

Note. Standardized Effect Size=standardized difference between COVID and pre-COVID means. Difference=unadjusted difference between COVID and pre-COVID means. Pre-COVID growth=average fall-to-spring change in RIT score for each grade/subject. Months=additional months of schooling that 2023-24 students would require to catch up to pre-COVID means. Months of additional schooling needed are calculated by dividing the unadjusted difference by the pre-COVID average growth rate and multiplying by 9, which is the number of months in a typical school year. Data from this table are referenced in Figure 3 in the main brief.

Table 7. Average fall-spring growth rates and ratios by school level and subgroup

			Pre-COVID (National)		Pre-COVID (Subgroup)		COVID (Subgroup)		Pre-COVID Ratio	COVID Ratio	% Above/Below Average	
Subject	Grade Band	Subgroup	N	Mean Growth	N	Mean Growth	N	Mean Growth			Pre-COVID	COVID
Reading	Elementary	Asian	6,281,270	8.3	238,804	8.0	98,628	7.8	0.97	0.94	-3	-7
Reading	Elementary	Black	6,281,270	8.3	1,064,061	8.0	291,969	7.7	0.96	0.93	-4	-8
Reading	Elementary	Hispanic	6,281,270	8.3	1,115,653	8.5	464,279	8.3	1.03	1.00	3	0
Reading	Elementary	White	6,281,270	8.3	3,088,156	8.3	896,835	8.3	1.01	0.99	0	-1
Reading	Middle	Asian	5,562,571	4.0	214,990	4.2	93,561	3.3	1.06	0.82	6	-18
Reading	Middle	Black	5,562,571	4.0	897,738	4.0	280,233	3.2	1.01	0.82	1	-18
Reading	Middle	Hispanic	5,562,571	4.0	972,324	4.1	454,368	3.3	1.04	0.83	4	-17
Reading	Middle	White	5,562,571	4.0	2,818,682	3.9	875,725	3.1	0.98	0.77	-2	-23
Math	Elementary	Asian	6,227,208	11.5	244,028	12.7	102,362	11.8	1.11	1.02	11	2
Math	Elementary	Black	6,227,208	11.5	1,023,317	10.3	302,226	9.9	0.89	0.85	-11	-15
Math	Elementary	Hispanic	6,227,208	11.5	1,120,669	11.4	503,623	10.8	0.98	0.93	-2	-7
Math	Elementary	White	6,227,208	11.5	3,065,425	11.9	916,917	11.4	1.04	0.98	4	-2
Math	Middle	Asian	5,535,916	6.6	205,579	8.0	85,508	7.5	1.21	1.13	21	13
Math	Middle	Black	5,535,916	6.6	876,673	5.9	280,105	5.4	0.89	0.82	-11	-18
Math	Middle	Hispanic	5,535,916	6.6	1,001,888	6.3	446,484	5.4	0.94	0.82	-6	-18
Math	Middle	White	5,535,916	6.6	2,791,190	6.9	848,764	6.6	1.04	0.99	5	-1
Reading	Elementary	High Poverty	6,281,270	8.3	1,615,300	8.5	441,554	7.9	0.96	0.94	-4	-6
Reading	Elementary	Low Poverty	6,281,270	8.3	1,268,069	8.0	505,235	8.3	1.03	1.00	3	0
Reading	Middle	High Poverty	5,562,571	4.0	1,166,931	4.3	413,056	2.9	0.93	0.72	-7	-28
Reading	Middle	Low Poverty	5,562,571	4.0	1,076,340	3.7	406,386	3.5	1.08	0.89	8	-11
Math	Elementary	High Poverty	6,227,208	11.5	1,590,611	10.9	455,591	11.6	1.06	1.01	6	1
Math	Elementary	Low Poverty	6,227,208	11.5	1,281,544	12.2	542,600	10.5	0.94	0.90	-6	-10
Math	Middle	High Poverty	5,535,916	6.6	1,172,562	6.2	394,847	7.1	1.10	1.07	10	7
Math	Middle	Low Poverty	5,535,916	6.6	1,068,058	7.3	402,888	5.3	0.94	0.81	-6	-19

Note. N=number of unique test events. The pre-COVID national columns show average growth rates from 2016-17 to 2018-19 for all students, while the pre-COVID (subgroup) and COVID (subgroup) columns show growth rates by racial/ethnic and school poverty demographics. COVID (subgroup) columns refer to 2023-24 student data. The pre-COVID growth ratio is pre-COVID (subgroup) divided by pre-COVID (national), and the COVID growth ratio is COVID (subgroup) divided by pre-COVID (national). Data from this table are referenced in Figure 4 in the main brief.

Table 8. Mean student RIT scores, achievement gaps, and SDs by school level and subgroup

			Pre-COVID (National)			Pre-COVID (Subgroup)			COVID (Subgroup)			Pre-COVID Effect	COVID Effect	
Subject	Grade Band	Subgroup	N	M	SD	N	M	SD	N	M	SD	Size	Size	Difference
Reading	Elementary	Asian	6,931,618	204.8	16.1	272,764	211.2	15.7	106,455	209.8	16.9	0.40	0.31	-0.09
Reading	Elementary	Black	6,931,618	204.8	16.1	1,202,377	198.5	16.0	324,005	196.2	17.6	-0.39	-0.53	-0.15
Reading	Elementary	Hispanic	6,931,618	204.8	16.1	1,261,357	199.8	16.2	509,006	196.9	18.3	-0.31	-0.48	-0.18
Reading	Elementary	White	6,931,618	204.8	16.1	3,330,165	208.5	14.8	942,259	206.6	15.9	0.24	0.11	-0.13
Reading	Middle	Asian	6,274,883	218.3	16.2	245,983	225.2	16.0	100,954	224.2	15.8	0.43	0.36	-0.06
Reading	Middle	Black	6,274,883	218.3	16.2	1,049,612	212.1	16.0	314,573	210.2	16.4	-0.38	-0.50	-0.12
Reading	Middle	Hispanic	6,274,883	218.3	16.2	1,148,388	213.5	16.6	504,072	210.0	17.5	-0.30	-0.51	-0.22
Reading	Middle	White	6,274,883	218.3	16.2	3,086,938	221.8	14.8	929,677	219.2	15.2	0.22	0.05	-0.17
Math	Elementary	Asian	6,850,645	211.3	15.9	277,857	221.3	16.8	110,013	218.9	17.2	0.62	0.48	-0.15
Math	Elementary	Black	6,850,645	211.3	15.9	1,150,519	203.4	15.2	332,368	200.1	16.8	-0.50	-0.70	-0.20
Math	Elementary	Hispanic	6,850,645	211.3	15.9	1,258,959	207.1	15.2	549,394	203.4	16.8	-0.26	-0.49	-0.23
Math	Elementary	White	6,850,645	211.3	15.9	3,300,883	215.0	14.6	960,127	212.4	15.3	0.24	0.07	-0.17
Math	Middle	Asian	6,208,533	227.5	18.7	235,432	239.8	20.1	92,705	237.7	21.0	0.66	0.55	-0.11
Math	Middle	Black	6,208,533	227.5	18.7	1,011,641	218.1	17.5	313,773	214.2	18.2	-0.51	-0.71	-0.20
Math	Middle	Hispanic	6,208,533	227.5	18.7	1,168,721	222.0	17.9	496,617	216.9	18.5	-0.29	-0.56	-0.27
Math	Middle	White	6,208,533	227.5	18.7	3,050,605	231.9	17.3	901,976	228.4	18.1	0.25	0.05	-0.19
Reading	Elementary	Low Poverty	6,931,618	204.8	16.1	1,399,703	212.3	13.6	462,285	210.2	14.8	0.48	0.34	-0.14
Reading	Elementary	High Poverty	6,931,618	204.8	16.1	1,835,233	198.2	16.5	557,452	195.1	18.4	-0.41	-0.59	-0.19
Reading	Middle	Low Poverty	6,274,883	218.3	16.2	1,200,682	225.4	13.7	437,485	222.5	14.4	0.45	0.26	-0.19
Reading	Middle	High Poverty	6,274,883	218.3	16.2	1,391,600	211.8	16.7	454,768	208.5	17.5	-0.40	-0.60	-0.20
Math	Elementary	Low Poverty	6,850,645	211.3	15.9	1,413,046	219.4	14.4	474,072	216.8	15.0	0.52	0.35	-0.17
Math	Elementary	High Poverty	6,850,645	211.3	15.9	1,794,973	204.5	15.5	595,678	200.9	17.2	-0.43	-0.64	-0.22
Math	Middle	Low Poverty	6,208,533	227.5	18.7	1,189,618	237.1	17.1	419,180	233.6	18.3	0.52	0.33	-0.19
Math	Middle	High Poverty	6,208,533	227.5	18.7	1,379,434	219.3	18.0	451,473	214.2	18.5	-0.44	-0.71	-0.27

Note. N=number of unique test events, M=mean, SD=standard deviation, Difference=difference between COVID and pre-COVID effect size. Pre-COVID (national) means are average RIT scores for all students across 2016-17 to 2018-19. Pre-COVID (subgroup) and COVID (subgroup) refer to means by racial/ethnic and school poverty demographics. COVID columns refer to 2023-24 student data. Effect sizes were calculated for each grade and subgroup, and then pooled across each grade band. Estimates may be slightly different if calculated with already pooled means and SDs. Data from this Table are referenced in Figure 6 in the main brief.

Table 9. Mean student RIT scores, achievement gaps, and months of additional instruction by school level and subgroup

Subject	Grade Band	Subgroup	M (Pre-COVID National)	M (Pre-COVID Subgroup)	M (COVID Subgroup)	Difference (Pre-COVID)	Difference (COVID)	Difference (Within Subgroup)	Months (Pre-COVID National)	Months (Pre-COVID Subgroup)
Reading	Elementary	Asian	204.8	211.2	209.8	6.4	5.0	-1.4	7.3	1.5
Reading	Elementary	Black	204.8	198.5	196.2	-6.3	-8.6	-2.4	7.1	2.6
Reading	Elementary	Hispanic	204.8	199.8	196.9	-5.0	-7.9	-2.9	5.6	3.3
Reading	Elementary	White	204.8	208.5	206.6	3.7	1.8	-1.9	4.2	2.2
Reading	Middle	Asian	218.3	225.2	224.2	6.9	5.9	-1.0	15.9	2.4
Reading	Middle	Black	218.3	212.1	210.2	-6.2	-8.2	-1.9	14.3	4.6
Reading	Middle	Hispanic	218.3	213.5	210.0	-4.8	-8.3	-3.5	11.2	8.3
Reading	Middle	White	218.3	221.8	219.2	3.5	0.9	-2.7	8.1	6.3
Math	Elementary	Asian	211.3	221.3	218.9	10.0	7.6	-2.4	8.0	1.9
Math	Elementary	Black	211.3	203.4	200.1	-7.9	-11.2	-3.3	6.4	2.7
Math	Elementary	Hispanic	211.3	207.1	203.4	-4.2	-7.9	-3.7	3.3	3.0
Math	Elementary	White	211.3	215.0	212.4	3.7	1.1	-2.6	2.9	2.2
Math	Middle	Asian	227.5	239.8	237.7	12.4	10.3	-2.1	17.4	3.1
Math	Middle	Black	227.5	218.1	214.2	-9.4	-13.2	-3.9	13.1	5.6
Math	Middle	Hispanic	227.5	222.0	216.9	-5.4	-10.6	-5.1	7.7	7.4
Math	Middle	White	227.5	231.9	228.4	4.5	1.0	-3.5	6.3	5.1
Reading	Elementary	Low Poverty	204.8	212.3	210.2	7.5	5.4	-2.1	8.6	2.4
Reading	Elementary	High Poverty	204.8	198.2	195.1	-6.6	-9.7	-3.1	7.6	3.5
Reading	Middle	Low Poverty	218.3	225.4	222.5	7.1	4.2	-2.9	16.4	6.9
Reading	Middle	High Poverty	218.3	211.8	208.5	-6.5	-9.8	-3.3	15.0	7.7
Math	Elementary	Low Poverty	211.3	219.4	216.8	8.1	5.5	-2.6	6.5	2.2
Math	Elementary	High Poverty	211.3	204.5	200.9	-6.8	-10.4	-3.6	5.4	2.9
Math	Middle	Low Poverty	227.5	237.1	233.6	9.7	6.2	-3.5	13.5	5.1
Math	Middle	High Poverty	227.5	219.3	214.2	-8.1	-13.2	-5.1	11.3	7.4

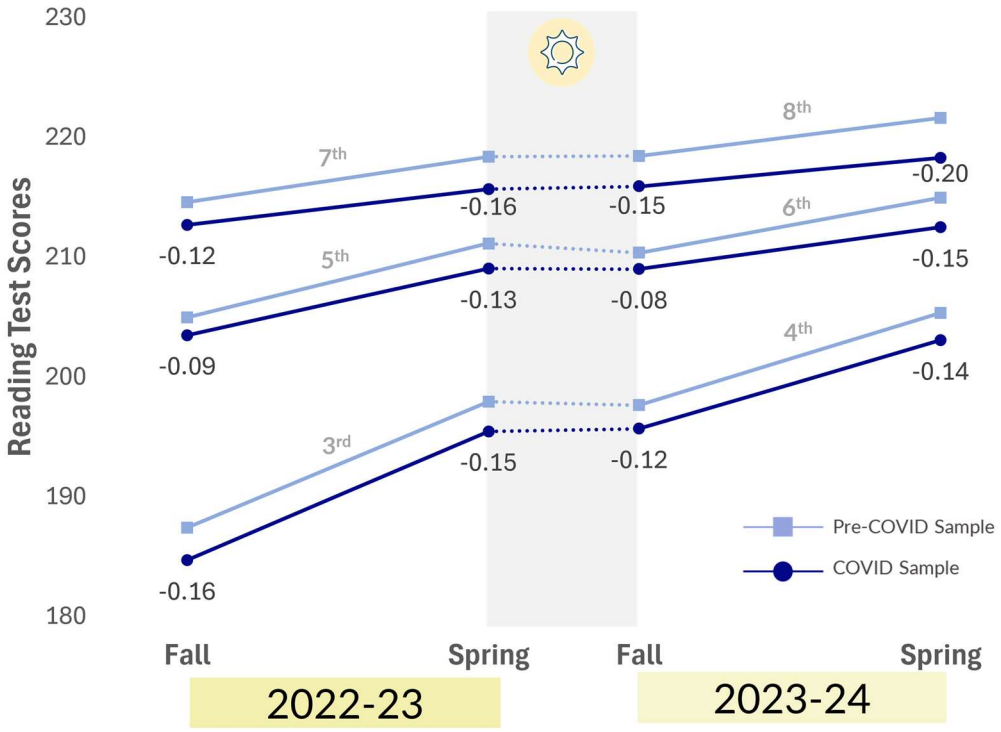
Note. M=mean. The pre-COVID national column shows mean scores from 2016-17 to 2018-19 for all students, while the pre-COVID (subgroup) and COVID (subgroup) columns show means by racial/ethnic and school poverty demographics. The COVID (subgroup) columns refer to 2023-24 student data. Difference (Pre-COVID)=difference between pre-COVID subgroup and national. Difference (COVID)=difference between COVID subgroup and pre-COVID national. Difference (Within Subgroup)=difference between COVID subgroup and pre-COVID subgroup. Months=months of additional schooling that 2023-24 students need to catch up to pre-COVID subgroup and national trends. Months are reported as an absolute value. Gray shading denotes instances where a subgroup's pre-COVID achievement levels exceeded national averages, and the value shown is the equivalent months of schooling that a subgroup was ahead of pre-COVID trends. Data from this table are referenced in Figure 5 in the main brief.

Table 10. Mean student RIT scores and effect sizes from Spring 2017 to Spring 2024

		RIT Score Means							SD	Effect Sizes						
Subject	Grade	S17	S18	S19	S21	S22	S23	S24	S19	S17	S18	S19	S21	S22	S23	S24
Reading	1	173.1	173.6	173.1	171.2	171.0	171.5	171.4	14.3	0.00	0.04	0.00	-0.13	-0.15	-0.11	-0.11
Reading	2	187.8	187.8	187.7	185.1	184.8	185.1	185.2	15.8	0.01	0.01	0.00	-0.16	-0.18	-0.16	-0.16
Reading	3	199.3	199.0	199.0	196.4	196.5	196.5	196.2	16.0	0.02	0.00	0.00	-0.16	-0.15	-0.16	-0.17
Reading	4	206.7	206.4	206.2	203.9	204.4	204.3	204.0	15.6	0.03	0.01	0.00	-0.15	-0.12	-0.12	-0.14
Reading	5	212.7	212.1	211.8	209.7	209.9	209.9	209.7	15.4	0.06	0.02	0.00	-0.14	-0.12	-0.12	-0.14
Reading	6	216.1	216.0	215.7	214.0	214.0	213.9	213.6	15.5	0.03	0.02	0.00	-0.11	-0.11	-0.11	-0.14
Reading	7	219.4	219.4	219.2	217.4	217.2	217.0	216.7	15.8	0.01	0.02	0.00	-0.12	-0.12	-0.14	-0.16
Reading	8	222.5	222.6	222.4	220.6	220.5	220.1	219.7	15.9	0.01	0.01	0.00	-0.11	-0.12	-0.14	-0.17
Math	1	178.0	178.4	178.7	176.7	177.1	177.8	177.7	13.7	-0.05	-0.02	0.00	-0.15	-0.11	-0.07	-0.07
Math	2	191.3	191.2	191.6	187.7	188.5	189.5	189.3	13.6	-0.02	-0.02	0.00	-0.28	-0.23	-0.15	-0.17
Math	3	203.4	203.0	203.1	198.9	200.0	200.8	201.0	14.2	0.02	-0.01	0.00	-0.30	-0.22	-0.16	-0.15
Math	4	213.5	213.0	212.8	208.3	209.5	209.7	209.8	15.7	0.05	0.01	0.00	-0.29	-0.21	-0.20	-0.19
Math	5	222.0	221.3	221.0	216.3	216.8	216.7	216.7	17.4	0.06	0.02	0.00	-0.27	-0.24	-0.24	-0.24
Math	6	224.2	223.9	223.7	220.3	220.3	220.9	221.0	17.3	0.03	0.02	0.00	-0.20	-0.20	-0.16	-0.15
Math	7	229.2	229.2	228.8	225.4	224.9	224.9	225.0	18.7	0.02	0.02	0.00	-0.18	-0.21	-0.21	-0.20
Math	8	233.6	233.3	232.9	229.8	228.5	228.3	228.1	19.8	0.04	0.02	0.00	-0.16	-0.22	-0.23	-0.24

Note. Effect sizes are based on unrounded RIT score means and are calculated by subtracting by the spring 2019 (S19) mean and dividing by the S19 standard deviation (SD).

Figure A1. Average MAP Growth achievement across three school years for even cohorts in both subjects



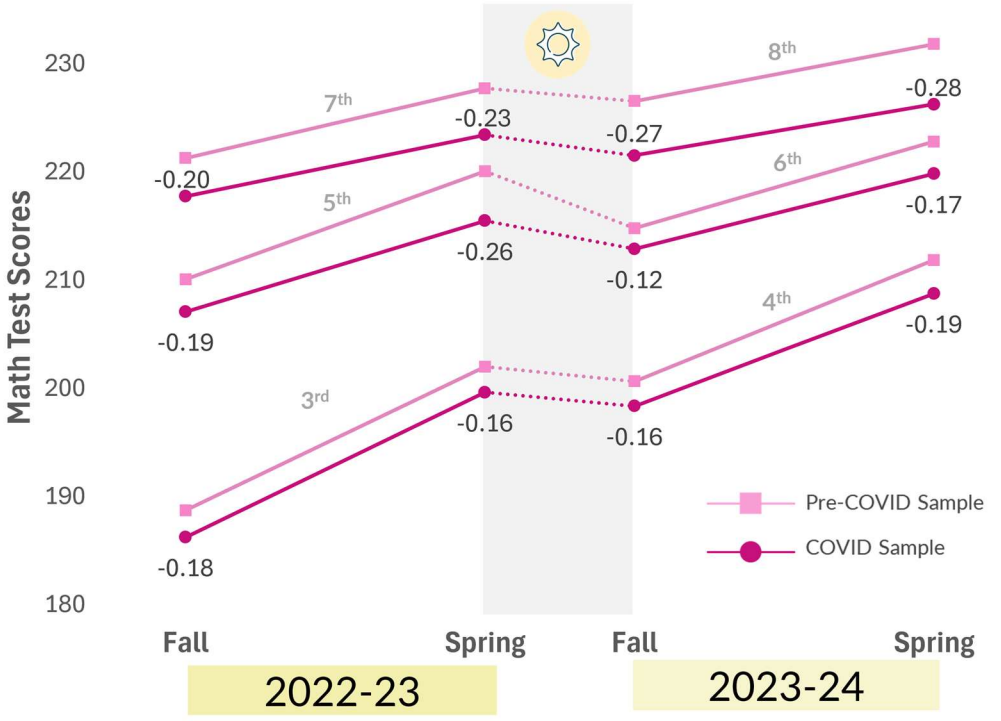
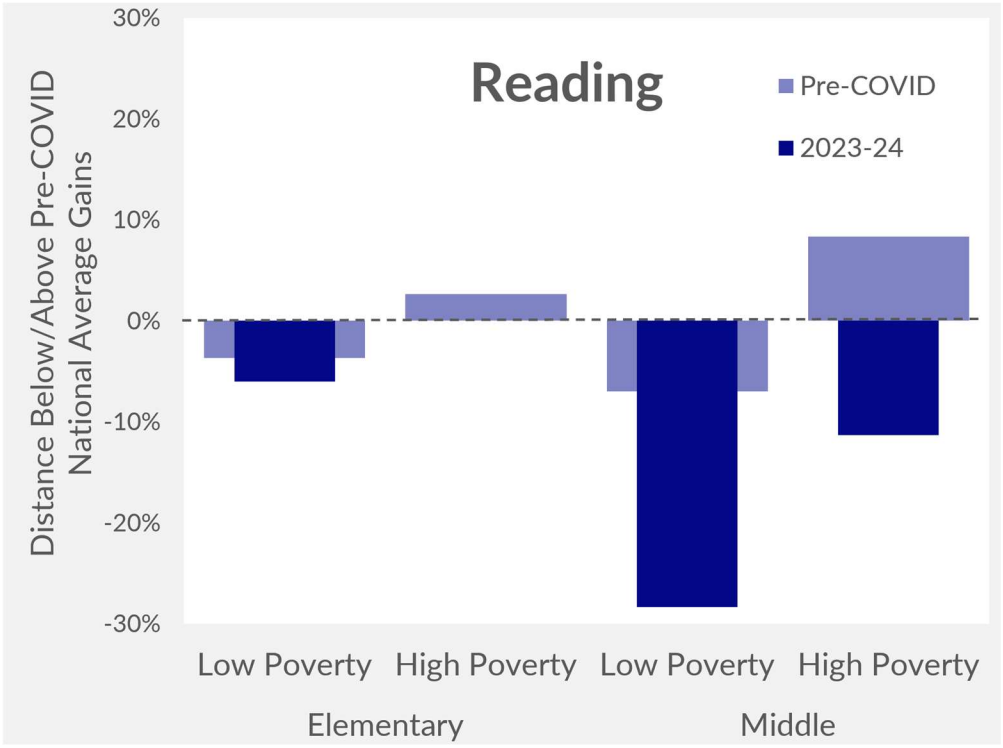


Figure A2. Achievement gains in 2023–24 and pre-COVID relative to overall pre-COVID national average by school poverty level



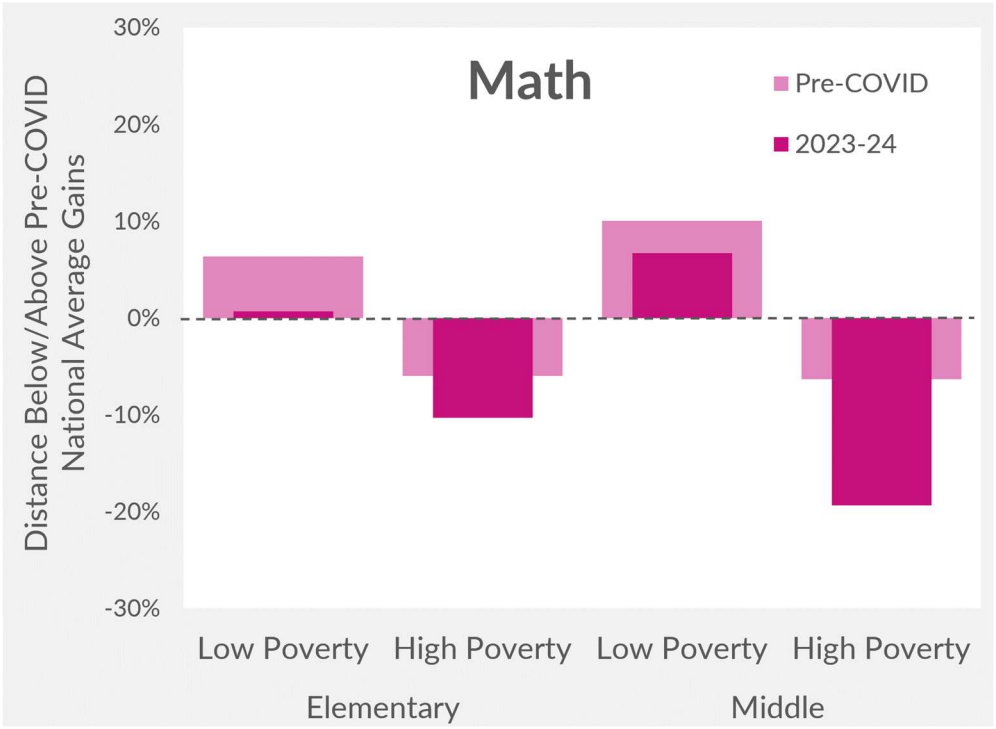


Figure A3. Average spring achievement levels pre-COVID and in 2023–24 relative to national pre-COVID averages by race/ethnicity

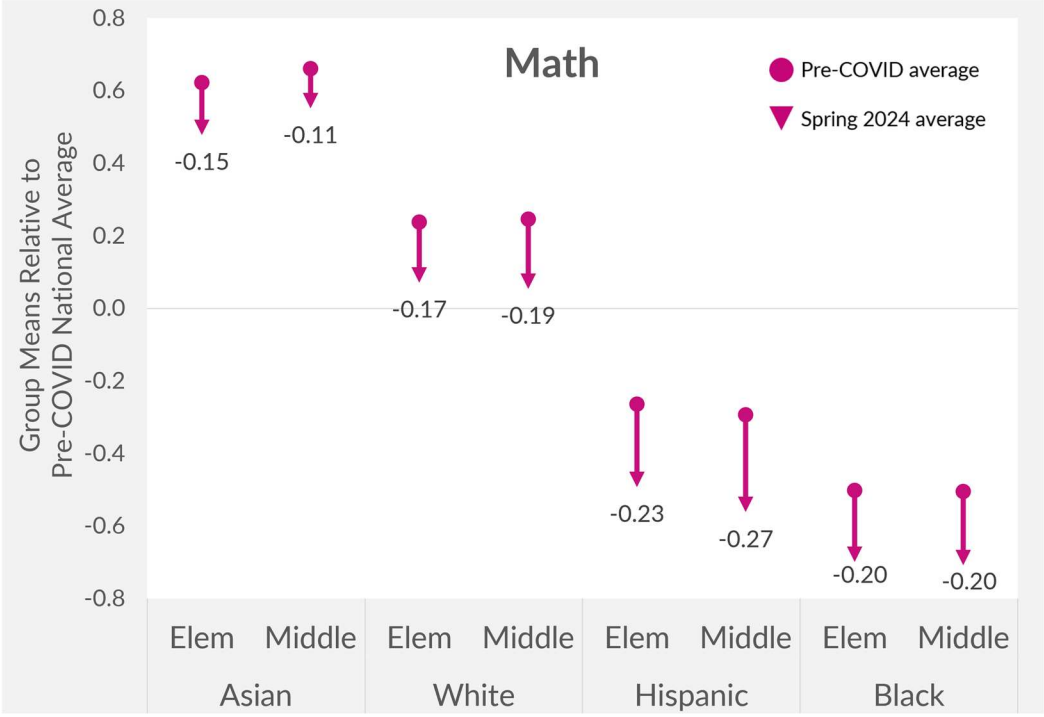
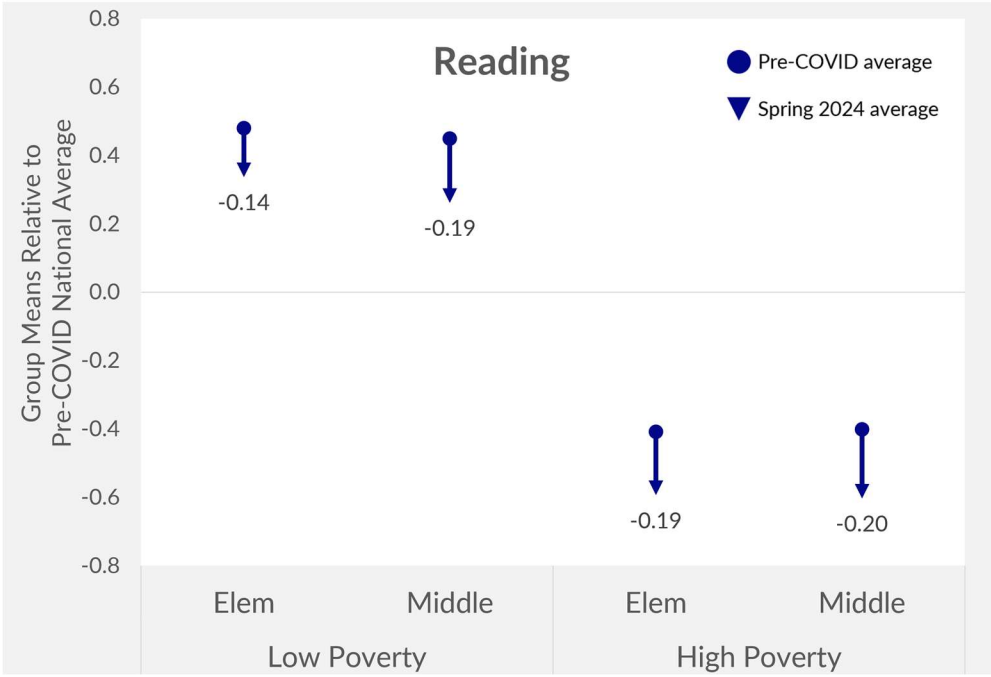


Figure A4. Average spring achievement levels pre-COVID and in 2023–24 relative to national pre-COVID averages by school poverty level



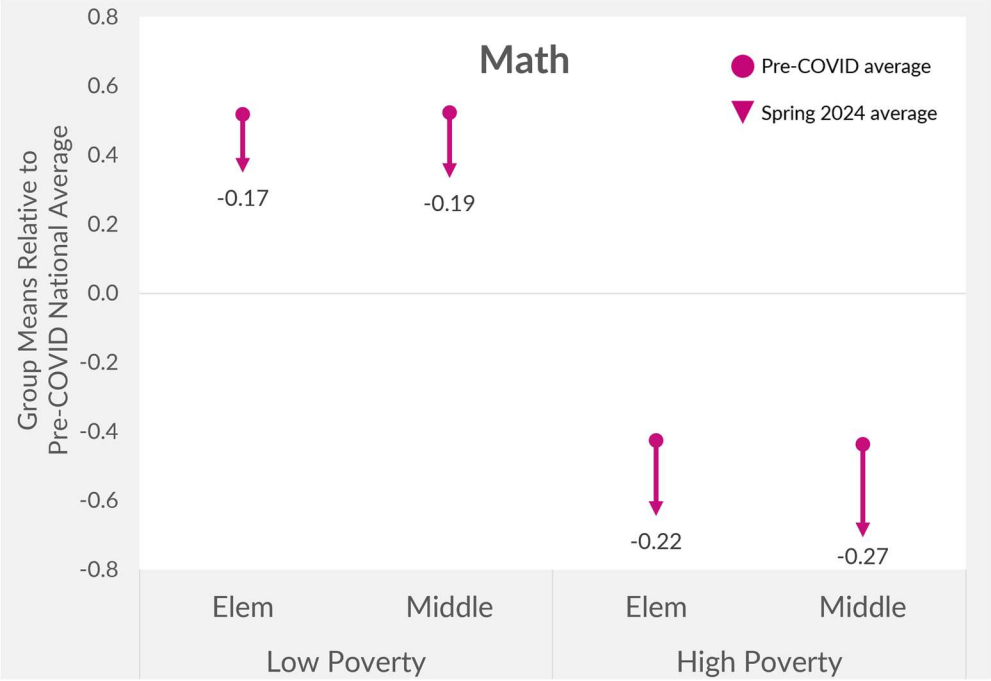


Figure A5. Months of schooling required to catch up to pre-COVID achievement by school poverty level