Education's long COVID: 2022–23 achievement data reveal stalled progress toward pandemic recovery

July 2023

Karyn Lewis and Megan Kuhfeld

KEY FINDINGS

- **In nearly all grades, achievement gains during 2022–23 fell short of prepandemic trends, which stalled progress toward pandemic recovery.**

- **Significant achievement gaps persist at the end of 2022–23, and the average student will need the equivalent of 4.1 additional months of schooling to catch up in reading and 4.5 months in math.**

- **Comparing across race/ethnicity groups, achievement gains for all students lagged prepandemic trends in 2022–23. Marginalized students remain the furthest from recovery.**

This brief continues ongoing research by NWEA® examining the impact of the COVID-19 pandemic on student achievement and progress toward academic recovery. To date, our research shows that the harmful effects of the pandemic on student achievement steadily accumulated over the course of the 2020–21 school year (Lewis, Kuhfeld, Ruzek, & McEachin, 2021). Sluggish achievement gains during that year resulted in a widening distance between test scores relative to prepandemic trends, reaching a low point in spring 2021 when the largest gaps between test scores during the pandemic relative to historical trends were observed. In the 2021–22 school year, achievement gains generally returned to mirror or slightly exceed prepandemic trends, and because of this rebounding, the gap between midpandemic achievement relative to a typical year started to narrow, albeit modestly (Kuhfeld & Lewis, 2022).[1] At the start of the 2022–23 school year, we observed further modest improvement, partly attributed to reduced summer learning loss in 2022 compared to previous summers (Lewis & Kuhfeld, 2022).

Here, we examine whether additional progress toward pandemic recovery occurred during the 2022–23 school year. To do this, we examine test scores from approximately 6.7 million students currently in grades 3–8 in approximately 20,000 public schools who have taken MAP® Growth™ reading and math assessments since the onset of the pandemic. Specifically, our "COVID sample" consists of six separate cohorts of students we followed longitudinally across the last three school years (for instance, current fifth-graders are part of the grade 3–5 cohort and were followed across third grade in 2020–21, fourth grade in 2021–22, and fifth grade in 2022–23).[2] We compared the COVID sample to a roughly comparable group of 11 million students who tested in grades 3–8 in the pre-COVID school years of 2016–17 through 2018–19.[3]

## Achievement gains during the 2022–23 school year fell short of prepandemic trends

We first examined student growth during 2022–23 relative to prepandemic trends. To do this, we calculated the change in test scores between fall 2022 and spring 2023 in each grade/subject compared to "typical" (average) growth rates in the pre-COVID sample. Figure 1 depicts 2022–23 gains as a percentage of pre-COVID trends separately for reading (blue bars) and math (magenta bars). For ease of interpretation, we centered our percentage gains relative to 100% so that positive values indicate gains that are above pre-COVID averages and negative values indicate gains that are below pre-COVID averages. Gains exceeding prepandemic trends (i.e., values above 0 in the graph) are necessary to reduce achievement gaps between the COVID and pre-COVID samples; conversely, when gains lag prepandemic trends (i.e., values below 0 in the graph), the achievement gaps widen.

---

1   We define **rebounding** as patterns of achievement gains that mirror or exceed prepandemic trends. "Rebounding" is not interchangeable with "recovery"; rather, the former describes progress toward the latter. We use the term **achievement gap** to indicate the difference between the COVID and pre-COVID samples in a grade level (reported here as standardized differences in average test scores). We use the term **achievement disparity** to indicate differences between demographic groups.

2   We did not require students to be present in all test seasons to be retained in the longitudinal COVID sample. See the technical appendix for more details.

3   Our published reports use the shifting samples of schools and students who take MAP Growth over time (depending on the number of schools and students testing across terms). Therefore, previous reports reflect slightly different testing populations, and comparisons across reports should be made with some caution.

Figure 1. Fall-to-spring achievement gains during 2022–23 relative to pre-COVID trends
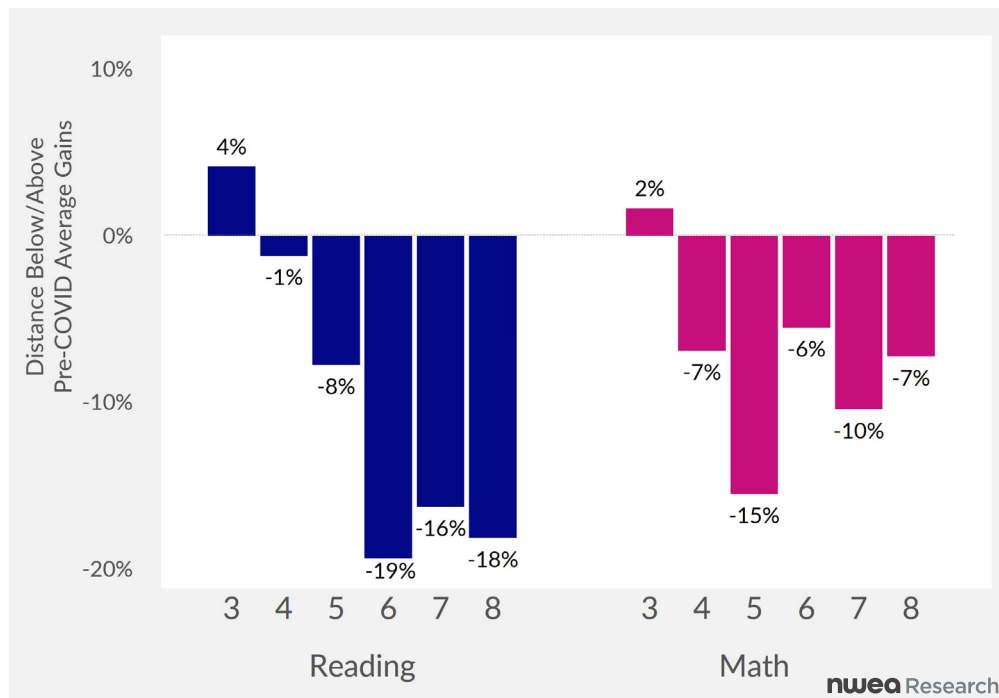
Note. The bars depict the percentage difference between 2022–23 fall-to-spring growth and pre-COVID growth trends. These relative gains ratios were calculated by taking the average fall-to-spring change in RIT score for the COVID sample and dividing by the average for the pre-COVID sample. The pre-COVID baseline was the aggregate fall-to-spring growth across the 2016–17, 2017–18, and 2018–19 school years.
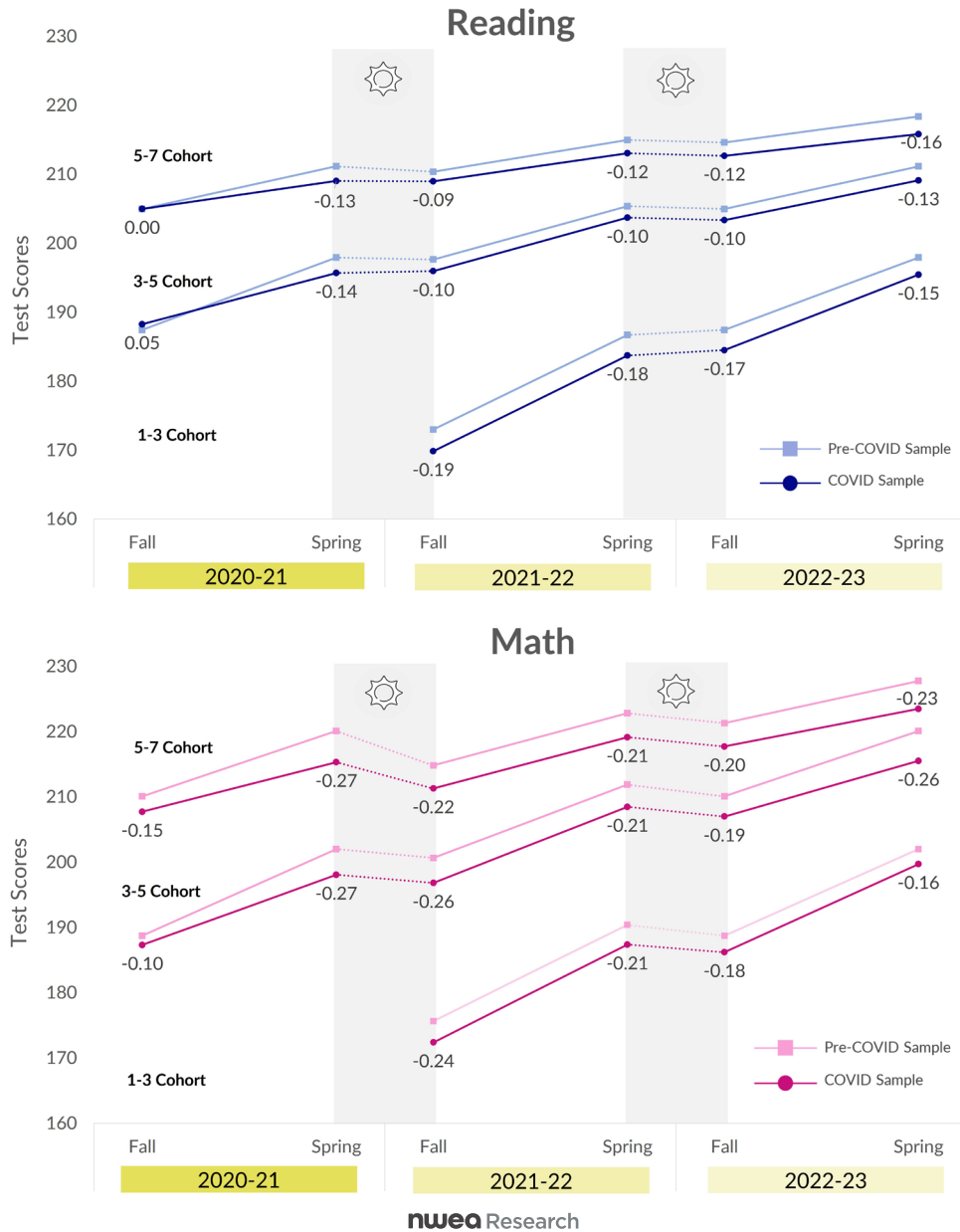
Overall, achievement gains in 2022–23 lagged prepandemic trends in all but the youngest cohort of students, falling short of prepandemic averages by 1–19% in reading and by 6–15% in math. This trend is worse than what was observed in 2021–22 where, in general, achievement gains were consistent with or even surpassed prepandemic trends. The most notable departure from prepandemic trends is evident in the upper grades in reading. Reading gains for these grades were also furthest below average in 2021–22.

Substantial achievement gaps remain at the end of the 2022–23 school year

To understand current achievement gaps and changes in the magnitude of these gaps over time, Figure 2 plots average fall and spring achievement (shown as points) as well as gains during each school year and summer (solid and dashed lines respectively that connect the points) over a three-year period for the COVID sample (darker shaded line) relative to the pre-COVID sample (lighter shaded line). The numbers below the points in Figure 2 reflect the achievement gap between the COVID sample and the pre-COVID sample calculated as standardized mean difference within a term (negative values indicate that achievement for the COVID sample was lower than for the pre-COVID sample). For simplicity, Figure 2 shows results for three of the six cohorts in the study.[4]

---

4   Figures for the non-depicted cohorts show similar patterns and can be found in the technical appendix that accompanies this brief.

Figure 2. Average MAP Growth achievement across three school years in reading (top panel) and math (bottom panel)

Reading

5-7 Cohort
-0.13   -0.09   -0.12   -0.12   -0.16
0.00

3-5 Cohort
-0.14   -0.10   -0.10   -0.10   -0.13
0.05

1-3 Cohort
-0.18   -0.17   -0.15
-0.19

Pre-COVID Sample
COVID Sample

Fall Spring   Fall Spring   Fall Spring
2020-21   2021-22   2022-23

Math

5-7 Cohort
-0.27   -0.22   -0.21   -0.20   -0.23
-0.15

3-5 Cohort
-0.27   -0.26   -0.21   -0.19   -0.26
-0.10

1-3 Cohort
-0.24   -0.21   -0.18   -0.16

Pre-COVID Sample
COVID Sample

Fall Spring   Fall Spring   Fall Spring
2020-21   2021-22   2022-23

nwea Research

Note. Test score means within each term for the COVID sample are plotted in the darker shade, while means for the pre-COVID sample are plotted in the lighter shade. The shaded vertical area denotes summer. Standardized mean differences between the groups are shown, with negative values indicating that achievement for the COVID sample was lower than the pre-COVID sample. Average test scores for the 2020–21 school year are not included for the grade 1-3 cohort given our previous research showed anomalies for the youngest students when remote testing was more prevalent (Kuhfeld et al., 2020). Results for the other cohorts as well as details on calculations are available in the technical appendix.

Substantial achievement gaps remain in reading and math at the end of 2022–23. Additionally, with the exception of the youngest cohort, we find that achievement gaps increased between fall 2022 and spring 2023, ranging between .01 to .06 standard deviations (SDs) larger depending on grade. It is important to consider the practical significance of these small changes. Recent guidelines on interpreting effect sizes from educational interventions suggest that an effect size of less than .05 SDs is small while an effect size between .05 and .20 SDs is considered medium sized (Kraft, 2020). Consistent with the findings in Figure 1 showing lower than typical fall-to-spring gains, we interpret these small increases in the achievement gaps between fall 2022 and spring 2023 as indicating that progress toward recovery generally stalled in 2022–23. Conversely, we interpret the small decreases in achievement gaps for the 1-3 cohort to indicate additional modest progress toward recovery for these students.

Catch-up will require months of additional schooling

To contextualize the achievement gaps that remain at the end of 2022–23, it is important to consider what amount of additional learning will be required to close those gaps and catch students up to pre-COVID achievement levels. To do this, we calculated the difference in test scores between the COVID and pre-COVID samples and divided it by the average monthly gains in the pre-COVID sample. This results in an estimate of the months of schooling required to catch students up to pre-COVID achievement levels.[5] These estimates are shown in Figure 3 (depicted as lines) alongside the size of achievement gaps in spring 2023 (depicted by bars).

Figure 3. Spring 2023 achievement gaps and months of schooling required to catch up to pre-COVID achievement levels
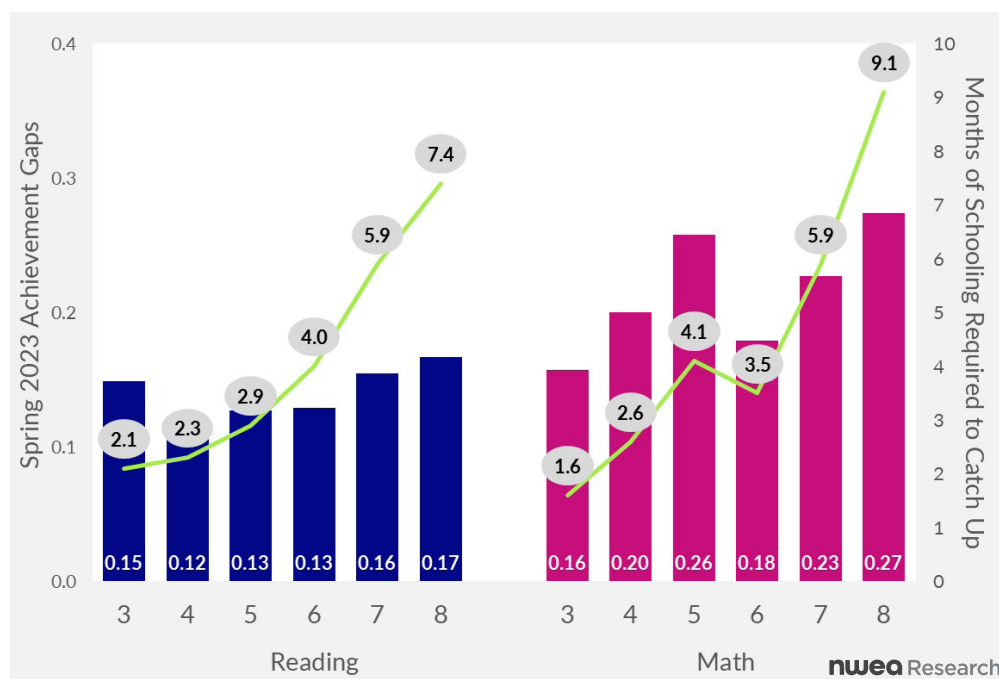
Note. The bars (scaled to the left axis) depict the absolute magnitude of spring 2023 achievement gaps for reading (in blue) and math (in magenta). The values at the bottom of each bar are the standardized mean differences between the COVID and pre-COVID sample for each cohort. The green line and accompanying values in gray ovals (scaled to the right axis) capture months of schooling required to close achievement gaps and catch up to pre-COVID achievement levels. Estimates were calculated by taking the mean score differences between the COVID and pre-COVID samples and dividing by the average pre-COVID fall-to-spring growth rates.

---

5   In previous reports, we estimated years required to close achievement gaps. Those estimates were based on extrapolating the cumulative rate of improvement observed up to that point (i.e., if students continued to close gaps at the rate observed at that time, how long would it take to reach full recovery?). We could not use that approach in these analyses given most cohorts did not show any improvements in the 2022-23 data, so we instead translated the achievement gaps in spring 2023 into the months of schooling required to catch up based on pre-COVID growth rates. A financial analogy is helpful to understand the difference in these two approaches: the **years to close gaps** approach asked, "At this rate of repayment, how long will it take to pay off this debt?" whereas the **months of additional schooling** approach asks, "How much do we owe?"

At the end of the 2022–23 school year, across all grade levels, the average student will require the equivalent of 4.1 months of additional schooling to catch up to pre-COVID levels in reading and 4.5 months in math. These estimates are based on prepandemic rates of learning that vary across grades and subjects. Within a year, younger students tend to make larger gains than older students, and math gains tend to be slightly larger than reading gains. These differential rates of gains are reflected in the estimates of months of schooling required to catch up to pre-COVID achievement levels. For instance, the size of achievement gaps in reading are of roughly similar magnitude across grades, but more months of schooling will be required to catch up middle school students given that older students tend to make smaller gains per year. Similarly, because math gains are typically larger in a year than reading gains, seventh-grade students will require 5.9 months of schooling to catch up in math and reading even though the math achievement gap (0.23 SD) is larger than the reading gap (0.16).

Achievement gains in 2022–23 lagged prepandemic trends across groups

Finally, we examined whether the overall trends we observed in 2022–23 differed across race and ethnicity categories. Figure 4 shows 2022–23 gains (darker shaded bar) separately by race/ethnicity as a percentage of overall average pre-COVID growth trends. To contextualize these group differences, Figure 4 also highlights the pre-existing disparities in gains across groups by showing how each group's average pre-COVID gains (lighter shaded bar) compared to national pre-COVID averages. For example, in reading, pre-COVID average gains for Asian middle school students were slightly above national pre-COVID averages, whereas 2022–23 gains were below national pre-COVID averages.

Overall, Figure 4 shows that 2022–23 gains for nearly all groups lagged pre-COVID national averages (i.e., the dark bars are generally below 0). Additionally, Figure 4 shows that across all groups, 2022–23 gains also lagged pre-COVID group averages (i.e., the darker bars are lower than the lighter bars), and this difference is especially notable for middle school students in reading. Math gains were more disparate across groups in the pre-COVID samples (i.e., there is an obvious stairstep pattern across groups in the lighter magenta bars) and this continues to be true in 2022–23, which reinforces the widened disparities across groups.

Figure 4. Achievement gains in 2022–23 and pre-COVID relative to overall pre-COVID national average by race/ethnicity
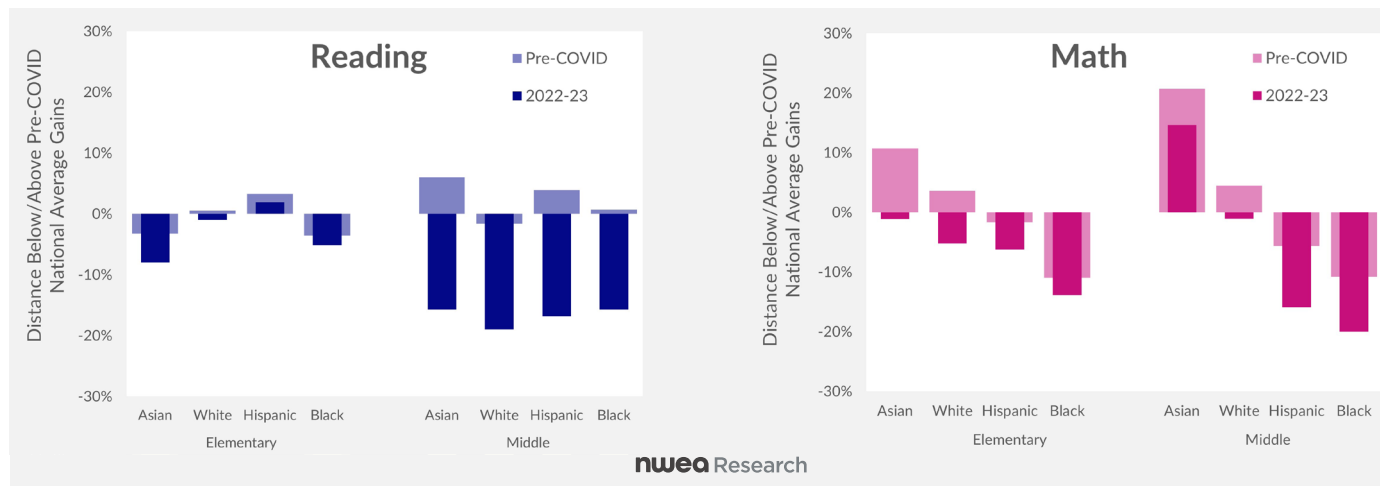
Note. The bars reflect average achievement gains for each group as a percentage below/above pre-COVID national growth trends. The darker shade represents 2022–23 gains relative to pre-COVID trends, and the lighter shade represents pre-COVID gains for each group relative to national pre-COVID averages. Percentages were calculated by taking the average fall-to-spring growth for each grade/group combination, dividing by average national achievement gains for the pre-COVID period (i.e., 2016–17 to 2018–19), and then averaging the racial/ethnic group estimates separately for grades three through five (elementary) and grades six through eight (middle) grades.

Framing

We recognize that focusing on differences across race and ethnicity groups can have negative implications, as it can perpetuate a deficit-oriented perspective that blames students and fails to recognize academic strengths, which may not be accurately reflected in standardized metrics. At the same time, it is crucial to disaggregate outcomes by race and ethnicity to shine light on the profound inequities existing within our education system. Those inequities were stark before the pandemic and have only widened dramatically over the last three years.

In this context, we share data on which students were disproportionately harmed during the pandemic, not to assign blame but to highlight the students to whom we owe, as Gloria Ladson-Billings coined, the greatest "educational debt" (Ladson-Billings, 2006). These data underscore the scope of the resources and supports schools must provide to address the cumulative impacts of the pandemic and rectify the harm these students have experienced.

Figure 5 plots the months of schooling required to return to each group's pre-COVID achievement levels. Consistent with overall averages, here too we see that more schooling will be required to catch up to pre-COVID achievement levels in math compared to reading and for middle schoolers compared to elementary students. Comparing across groups, estimates for Black and Hispanic students are generally larger than for other groups, typically by a month or more.[6]

Figure 5. Months of schooling required to catch up to pre-COVID achievement by race/ethnicity
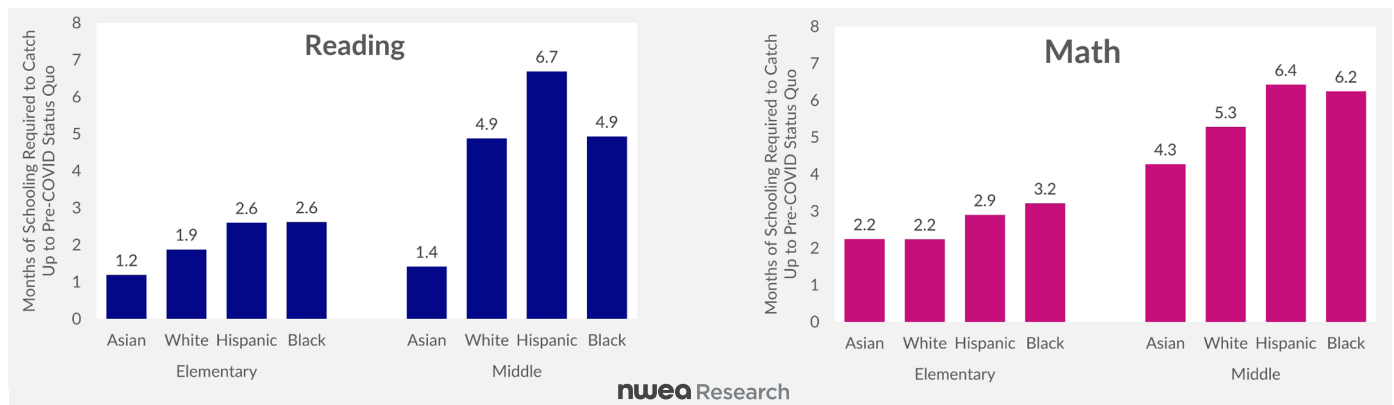

Note. The bars depict months of schooling required to catch up to pre-COVID achievement levels, broken down by subject, school level, and racial/ethnic group. Estimates were calculated by taking the mean score difference between the COVID and pre-COVID sample of each grade and group, dividing by the average rate of pre-COVID fall-to-spring growth for that group, and averaging across each grade band.

It's important to emphasize that the estimates in Figure 5 show the months of schooling required to return students to the prepandemic status quo. In other words, Figure 5 only tells us about restoring students to an already significantly inequitable state of academic achievement prior to the pandemic. To better understand the extent of these pre-existing disparities, Figure 6 shows the average achievement of each group in the prepandemic sample (base of the arrow) and their achievement in spring 2023 (tip of the arrow), along with the difference between the two (the number below the arrow). We centered the group averages around overall prepandemic averages to highlight the inequities that existed before the pandemic and how these disparities have widened over the last three years. For instance, Figure 6 allows us to situate prepandemic reading achievement for Hispanic middle school students (.30 SD below the prepandemic overall mean) relative to the reading achievement for Hispanic middle school students in spring 2023 (.47 SD below

---

6   These figures may underestimate group differences in months of schooling required to catch up given estimates are based on overall average rates of pre-COVID gains and do not reflect pre-COVID disparities across groups in average gains (as shown in Figure 4).

the prepandemic overall mean) and the difference between the two (a drop of .17 SD). This implies that providing an additional 6.7 months of schooling would return these students to achievement levels that were about a third of a SD below national average. To reach parity with national averages, an additional 11 months of schooling would be required.[7]

Figure 6. Average spring achievement levels pre-COVID and in 2022–23 relative to national pre-COVID averages by race/ethnicity
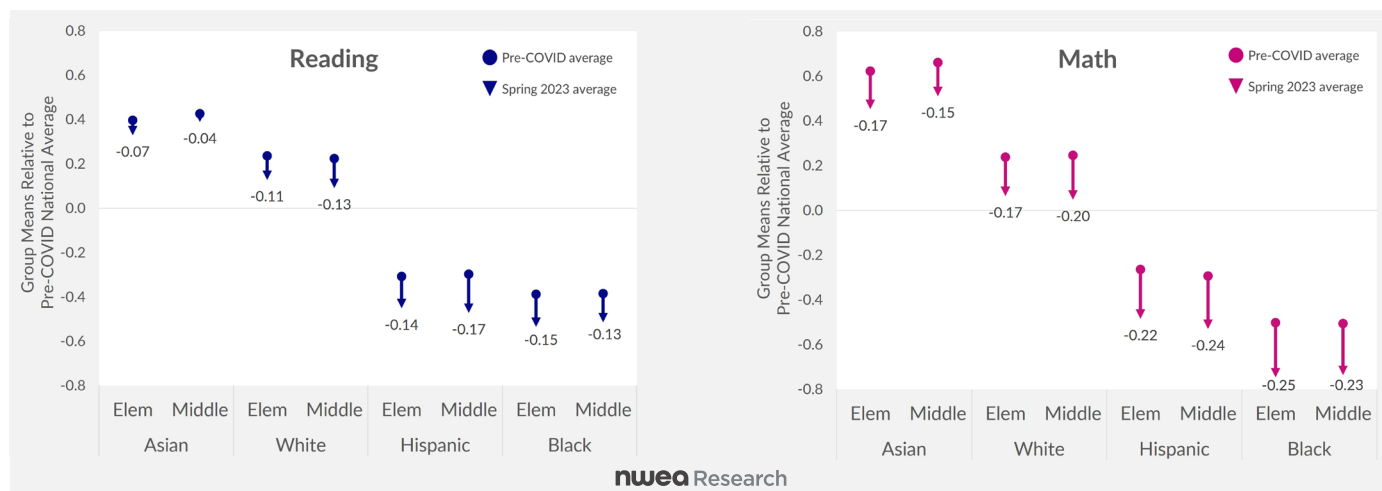
Note. This figure displays each racial/ethnic group's average achievement in the pre-COVID sample (base of the arrow) and in spring 2023 (tip of the arrow) standardized relative to the national pre-COVID averages (the solid line at zero). The number below the arrow is the difference between averages in the pre-COVID period compared to spring 2023 for each group.

Summary

The impacts of the COVID-19 pandemic continue to reverberate through the American school system three years after the COVID-19 virus closed the vast majority of public schools in spring 2020. By spring 2022, sizable declines in student achievement had been observed across grades, subjects, and a number of assessments (Cohodes et al., 2022; Kuhfeld & Lewis, 2022; Fahle et al., 2022). While the 2022–23 school year saw some semblance of normalcy, school districts were still confronting a range of behavioral, academic, and staffing challenges over the course of the year (Langreo, 2023; Bryant et al., 2023; Donnelly & Chakrabarti, 2023). Further, schools in many states were embroiled in lengthy political debates about what can and should be taught in schools (Alter, 2023). At the same time, states and districts also had access to ESSER funding intended to be used to target additional supports for the students who have fallen the furthest behind.

In the context of these challenges and supports, we examined whether US students made additional progress toward pandemic recovery during the 2022–23 school year. Echoing the way long COVID manifests as enduring health complications, our data show that the pandemic continues to impact students' academic progress three years after the onset of COVID-19. Our findings indicate that achievement gains in 2022–23 lagged prepandemic trends in all but the youngest cohort of students and significant achievement gaps remain at the end of this school year. Addressing these gaps will take sizable and sustained effort. The average student will require 4.1 months of additional schooling to catch up to pre-COVID levels in reading and 4.5 months in math. While many districts are offering academic programs this summer, these programs are typically offered to a small share of students and do not include enough additional instruction to catch up the average student, let alone the students who have been most affected by the pandemic. We must recognize that the amount of additional schooling required to catch students up cannot be compressed into a one-shot intervention or single school year. As such, it will be next to impossible for districts to build in the additional schooling time necessary to allow for student recovery before the expiration of ESSER funds next year. The significant gaps in achievement that remain necessitate a sustained and comprehensive effort spread over several years. This long-term perspective emphasizes the importance of continuity, consistent investment, and comprehensive strategies that extend beyond immediate recovery initiatives.

---

7   See table 9 in the technical appendix for estimates of months of schooling required to reach parity with overall national pre-COVID averages.

Comparing across groups, it is notable that 2022–23 gains trailed prepandemic trends for all students. This implies that marginalized students, who have been hardest hit by the pandemic, did not experience any additional catch-up, despite being the intended primary focus of academic recovery efforts. All students face a lengthy road to recovery, and our estimates indicate that road will be longer still for historically marginalized students. Furthermore, our estimates of the months of schooling required to return students to the prepandemic status quo would do nothing to address the achievement disparities that predate the pandemic. Addressing the mounting educational debt owed to marginalized students, who have been most deprived of educational opportunities, will require even more time, funding, and resources.

Amid the unprecedented challenges brought about by the COVID-19 pandemic, it is essential to acknowledge the commendable efforts made by schools in responding to the crisis. Academic recovery efforts have been vital in mitigating the educational impact of the pandemic. While we cannot know the state of academic recovery had schools *not* gone to these lengths or *absent* significant federal funding to facilitate recovery initiatives, it is likely that the current situation would be far more dire. However, the disappointing progress toward pandemic recovery that we see at the end of 2022–23 makes it increasingly clear that the scale of the crisis and its repercussions on students' academic progress surpass what can be fully addressed with the current response. While schools are taking steps in the right direction, the reality is that the depth and breadth of the crisis demands an even more comprehensive, intensive, and sustainable approach if we are to truly mitigate the long-lasting impacts of the pandemic on students.

References

Alter, A. (2023). Book bans rising rapidly in the U.S., Free speech groups find. *The New York Times*. https://www.nytimes.com/2023/04/20/books/book-bans-united-states-free-speech.html?smid=url-share

Bryant, J., Ram, S., Scott, D., & Williams, C. (2023). K–12 teachers are quitting. What would make them stay? *McKinsey & Company*. https://www.mckinsey.com/industries/education/our-insights/k-12-teachers-are-quitting-what-would-make-them-stay#/

Cohodes, S., Goldhaber, D., Hill, P., Ho, A., Kogan, V., Polikoff, M., ... & West, M. (2022). Student achievement gaps and the pandemic: A new review of evidence from 2021-2022. *Center on Reinventing Public Education*.

Donnelly, C., & Chakrabarti, M. (2023). *How to fix the growing discipline problem in U.S. classrooms*. WBUR. https://www.wbur.org/onpoint/2023/04/06/how-to-fix-the-growing-discipline-problem-in-u-s-classrooms

Fahle, E., Kane, T. J., Patterson, T., Reardon, S. F., & Staiger, D. O. (2022). Local achievement impacts of the pandemic. *Education Recovery Scorecard*. https://educationrecoveryscorecard.org/wp-content/uploads/2022/10/Education-Recovery-Scorecard_Key-Findings_102822.pdf

Kraft, M.A. (2020). Interpreting effect sizes of education interventions. *Educational Researcher, 49* (4) :241-253.

Kuhfeld, M., & Lewis, K. (2022). Student achievement in 2021-22: Cause for hope and continued urgency. NWEA. https://www.nwea.org/research/publication/student-achievement-in-2021-22-cause-for-hope-and-continued-urgency

Kuhfeld, M., Lewis, K., Meyer, P., & Tarasawa, B. (2020). Comparability analysis of remote and in-person MAP Growth testing in fall 2020. NWEA. https://www.nwea.org/research/publication/comparability-analysis-of-remote-and-in-person-map-growth-testing-in-fall-2020/

Ladson-Billings, G. (2006). From the achievement gap to the education debt: Understanding achievement in US schools. *Educational Researcher, 35*(7), 3-12.

Langreo, L. (2023). 5 Big challenges for schools in 2023. *Education Week*. https://www.edweek.org/leadership/5-big-challenges-for-schools-in-2023/2023/01

Lewis, K., & Kuhfeld, M. (2022). Progress toward pandemic recovery: Continued signs of rebounding achievement at the start of the 2022–23 school year. NWEA. https://www.nwea.org/research/publication/progress-toward-pandemic-recovery-continued-signs-of-rebounding-achievement-at-the-start-of-the-2022-23-school-year/

Lewis, K., Kuhfeld, M., Ruzek, E., McEachin, A. (2021). Learning during COVID-19: Reading and math achievement in the 2020-21 school year. NWEA. https://www.nwea.org/research/publication/learning-during-covid-19-reading-and-math-achievement-in-the-2020-2021-school-year/

Details on the methodology behind these analyses can be found in:

Isaacs, J., Kuhfeld, M. & Lewis, K. (2023). Technical appendix for: Education's long COVID: 2022–23 achievement data reveal stalled progress toward pandemic recovery.

Suggested citation:

Lewis, K. & Kuhfeld, M. (2023). Education's long COVID: 2022–23 achievement data reveal stalled progress toward pandemic recovery. NWEA.

ABOUT THE AUTHORS

Dr. Karyn Lewis is Director of the Center for School and Student Progress at NWEA, where she leads a team of researchers who operate at the intersection of K–12 education research, practice, and policy. Her research interests focus on the interplay between students' academic achievement and growth, their social-emotional development and well-being, and how they experience their school's climate. Prior to joining NWEA, she was a senior researcher at Education Northwest/REL Northwest, where she led a diverse portfolio of applied research, technical assistance, and evaluation projects centered around social-emotional learning. Dr. Lewis is a former data fellow with the Strategic Data Project at the Harvard Center for Education Policy Research. She completed a National Science Foundation funded postdoctoral fellowship at the University of Colorado Boulder and earned a PhD from the University of Oregon in social psychology.

Dr. Megan Kuhfeld is a Research Manager for the Collaborative for Student Growth at NWEA. Her research seeks to understand students' trajectories of academic and social-emotional learning (SEL) and the school and neighborhood influences that promote optimal growth. Dr. Kuhfeld completed a doctorate in quantitative methods in education and a master's degree in statistics from the University of California, Los Angeles (UCLA).

About MAP Growth

MAP Growth is a computer adaptive test that is vertically scaled across grades K–12 and measures student achievement on the RIT (Rasch unit) scale. Because the RIT scale is an equal-interval, cross-grade scale and the assessment adapts above or below grade level, RIT scores can be used to compare achievement across students and over time—within an academic year and across multiple years.

About NWEA

For more than 40 years, NWEA has been a pioneer in educational research and assessment methodology with a focus on improving learning outcomes for every student. NWEA continues this discovery through dedicated research that explores foundational issues in education, practical challenges in today's schools, and the evolving role of technology in the lives of students. As a mission-based educational research organization, NWEA's research agenda reflects our commitment to attacking big challenges in education and measurement and empowering education stakeholders with actionable insights.

About the Center for School and Student Progress

The Center for School and Student Progress (CSSP) engages directly with NWEA partner schools to influence education practices and policies that promote student success. The CSSP focuses on issues that impact the daily work of educators and the students they serve, such as achievement and growth patterns for traditionally underserved students, the integrity of testing systems, supporting college and career readiness, and school accountability. CSSP researchers also serve as consultative partners, offering advanced technical support, custom research projects, and analysis to school leadership, educators, and policymakers.

About the Collaborative for Student Growth

The Collaborative for Student Growth at NWEA is devoted to transforming education research through advancements in assessment, growth measurement, and the availability of longitudinal data. The work of our researchers spans a range of educational measurement and policy issues, including achievement gaps, assessment engagement, social-emotional learning, and innovations in how we measure student learning. Core to our mission is partnering with researchers from universities, think tanks, grant-funding agencies, and other stakeholders to expand the insights drawn from our student growth database—one of the most extensive in the world.

nwea