nwea Research

Understanding the initial educational impacts of COVID-19 on communities of color

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Key findings

- Using math and reading test scores from 2.1 million Black, Indigenous, and people of color (BIPOC) students in grades 3 to 8, we found that math achievement was significantly impacted in fall 2020 but reading achievement was mostly parallel to prior years.
- BIPOC students' math achievement during the pandemic dropped relative to a pre-pandemic national sample of same-grade students, particularly for students who were in 4th, 5th, and 6th grade in fall 2020.
- All student groups exhibited average test score gains during the fall 2019 to fall 2020 period, indicating that students were learning during the pandemic, however the rate of learning was lower than during the pre-pandemic period.
- Black, American Indian and Alaska Native, and Latinx students made 55-68% of typical learning gains in math and 73-86% of typical gains in reading during the pandemic, whereas Asian American students made between 88-100% of their typical gains in the two subjects.
- Male BIPOC students and BIPOC students attending high-poverty schools were the least likely to achieve typical learning gains during the pandemic.

Introduction

The COVID-19 pandemic has severely disrupted educational systems across the U.S., prompting concerns about a "lost year" of schooling for many children. Initial evidence from NWEA assessments indicates that students' math test scores decreased substantively relative to students testing in the prior school year. Further, a smaller proportion of students made gains in math during COVID-19 than in the year prior for all grades. For example, 57% of students starting in 3rd grade made academic gains between winter 2020 and fall 2020 (during a period of school closures), relative to 79% of students between winter 2019 and fall 2019. While reading achievement and growth were fairly similar before and after the start of the COVID-19 pandemic in our own study of 3rd through 8th graders, other studies have found that students in earlier grades struggled more in reading since the onset of the pandemic. There is also a possibility that results to date understate the true negative impact of COVID-19 on achievement. A key finding from our research was that approximately one in four students who had tested last year were missing in the fall 2020 data, and that a higher percentage of missing test takers were Black or Latinx and attended schools serving a higher proportion of students living in poverty. Thus, our earlier study likely did not fully capture the outcomes of the very students that were hit hardest by the pandemic and the ongoing disruptions to learning it has wrought.

Framing

We acknowledge that enumerating the educational inequities faced by BIPOC students and the ways BIPOC communities have been more adversely affected by the pandemic may be seen as adopting a deficit-based perspective. This perspective often perpetuates a victim-blaming orientation. However, we do not believe that BIPOC students need "fixing;" focus should instead be on the dominant power systems that continue to provide inequitable supports for BIPOC students.

In this report, we address this incomplete understanding by looking more closely at data on the impact[1] of the pandemic on Black, Indigenous, and people of color (BIPOC)[2] students. BIPOC students have faced longstanding systematic educational inequalities that have been exacerbated during the pandemic. Recent data collected by the U.S. Department of Education indicate that BIPOC students were twice as likely to be learning remotely than White students in January 2021. Remote learning puts more of the teaching and learning burden on students and their guardians, making it even harder for them to access the academic content they need during the pandemic. Further complicating matters, Black and Latinx children were less likely than White children to have a parent who could work from home during the pandemic, meaning they had to manage their own learning to a greater extent than their peers. Emergent bilingual students also likely experienced additional barriers to learning as they tried to manage their learning in a language they are still learning.

While such barriers to learning for BIPOC students during the pandemic are immense, they at least assume that students can access on-line content. However, due to decades long patterns of discrimination in housing policy and differential access to technology infrastructure, many BIPOC students live in homes without computers/devices, internet, and/or dedicated learning spaces—all essential for effective online teaching and learning. For example, over one-third of American Indian and Alaska Native (AIAN) children live in households without broadband internet access (the highest of all groups), and 15% live in homes without a computer. In short, students' ability to even access online content was itself inequitable.

The unequal impacts of the pandemic on BIPOC communities extend far beyond education. For instance, the pandemic highlights systematic inequalities in access to high-quality medical care, participation in the workforce, and mortality among individuals in BIPOC communities. These inequalities manifest in higher rates of unemployment among Black households and higher COVID-19 infection and death rates in the Black community. In addition, Latinx and AIAN individuals have three times the risk of hospitalization and two times the risk of death from COVID-19 as White individuals. In the workforce, Latinx workers are among those most affected by the pandemic with nearly 50% being forced to take a pay cut and/or laid off. It seems likely that these differential health outcomes and economic impacts will only serve to further impact academic achievement.

Evidence is also emerging about the effect of the pandemic on mental health, particularly for BIPOC youth. A recent CRPE report based on the YouthTruth survey found that nearly half of all students who responded reported elevated levels of depression, stress, and anxiety. Further, an analysis of youth visiting a pediatric emergency department found a stark increase in the prevalence of suicide risk among youth aged 11-21 during the pandemic compared to the year prior. Mental health issues may be taking an even greater toll on BIPOC students. For example, according to a Common Sense media poll, Black children are particularly vulnerable to mental health challenges during the COVID-19 pandemic, with 74% of Black respondents concerned about the effect that COVID-19 may have on their family's finances and 71% worried that they or a family member will contract the virus. Stressors related to COVID-19 may be compounded by societal unrest in the face of race-related traumas, including those involving police brutality towards Black people and a rise in overt acts of discrimination against Asian Americans. Sixty percent of Asian Americans witnessed someone blame Asian people for the pandemic, and over 80% of Chinese American teenagers reported that they experienced or witnessed COVID-19-related discrimination in person or online. Trauma and stress from police shootings,

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[1] This study provides descriptive evidence on contrasts in pre- and post-pandemic achievement trends. We use words such as impact and effect for simplicity, not to suggest causal warrant.

[2] BIPOC are anyone who identifies as Black, American Indian and Alaska Native (AIAN), Native Hawaiian, Asian American, Latinx, and Pacific Islander.

violence, and discrimination could exacerbate the educational impact of COVID-19, especially students and families of color.

BIPOC students and communities are severely affected by the COVID-19 virus and bear the brunt of its psychological and socioeconomic effects, compounding the impact of the educational inequities BIPOC students face. Student achievement and growth for BIPOC students during the pandemic will reflect the cumulative effect of these inequities. The purpose of this report is to document achievement trends for BIPOC students and provide policymakers with evidence to guide action to address these inequities. Specifically, we examine the academic trajectories of Black, Latinx, Native Hawaiian, Asian American, and AIAN students during the pandemic relative to a typical school year and seek to answer the following research questions:

1) How does the academic achievement of BIPOC students during the pandemic compare to national pre-pandemic patterns of achievement?

2) How do learning gains of BIPOC students from fall 2019 to fall 2020 compare to BIPOC student gains in prior years?

About MAP Growth

The NWEA MAP Growth assessment provides precise estimates of student achievement status (what students know and can do) as well as growth over time (the amount of learning gains made by students since they were last assessed). In addition, NWEA nationally representative norms (which were estimated before the COVID-19 pandemic) contextualize how a student's achievement and growth compares to academic peers. These features of the MAP Growth assessment make it possible to address research questions about student achievement status (RQ1) and growth over time (RQ2).

We analyzed data[3] from 2.1 million[4] BIPOC students in grades 3 to 8 who took the MAP Growth assessments in reading and math. We use a pre-pandemic sample of students as a benchmark to measure how the pandemic has changed students' learning. The benchmark statistic that we used was a student's percentile rank, which situates student performance relative to a pre-pandemic national norming sample. To address the first research question, we compared the achievement of BIPOC students in the fall of 2020 to their achievement in the fall of 2019 (see "About MAP Growth" text box, left). This analysis illustrates how BIPOC students' percentile rank in the fall of 2020 compares to their own prior pre-pandemic percentile rank (fall 2019) as well as to overall national pre-pandemic averages (calculated based on test scores from all student subgroups).

BIPOC students' math achievement was substantially lower in fall 2020 than it was in fall 2019, but reading performance showed only small declines during the same period.

Figure 1 shows fall-to-fall percentile rank changes in math by grade level for students in the five BIPOC groups. Students are followed across two grade levels between fall 2019 and fall 2020 (for instance, 3rd

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[3] Overall, the sample is 4% AIAN, 10% Asian American, 41% Black, 44% Latinx, and 1% Native Hawaiian. In line with Critical Race and Critical Whiteness Theorists, we explicitly chose to exclude White students from our analyses to avoid centering whiteness as the default academic standard. For more details on this decision, see the appendix section.

[4] To account for differential patterns of missing data in our study, we multiply imputed scores for students who tested in 2019-20 but were not observed in fall 2020. See the appendix for more detail on the multiple imputation strategy.

graders in the fall of 2019 were followed to the fall of 2020 as they entered 4th grade). Math performance dropped across nearly all grades and groups relative to pre-pandemic levels. For example, 4th grade Black and AIAN students were each at approximately the 40th percentile before the COVID-19 pandemic and dropped about 10 percentile points by fall 2020. This means that in fall 2019, 4th grade Black and AIAN students' scores were greater than 40% of a national pre-pandemic sample of students, but by fall 2020, their math achievement was greater than only 30% of the pre-pandemic sample.

Math achievement declines were particularly evident for students in 4th and 5th grades in fall 2020.

Overall, math achievement, when benchmarked against a national sample from before the pandemic, was lower in fall 2020 than in fall 2019 for nearly all grade levels examined in this report. However, the largest drops (ranging from 3 to 13 percentile points) were observed in the earliest grade levels we examined, corresponding to the late elementary school period. AIAN, Latinx, and Native Hawaiian student groups were most affected, followed by Black and Asian student groups. Put simply, BIPOC students appear to have lost significant ground in math during COVID-19 compared to national norms for achievement.

Figure 1. Math percentile rank change by cohort and grade level for BIPOC student groups
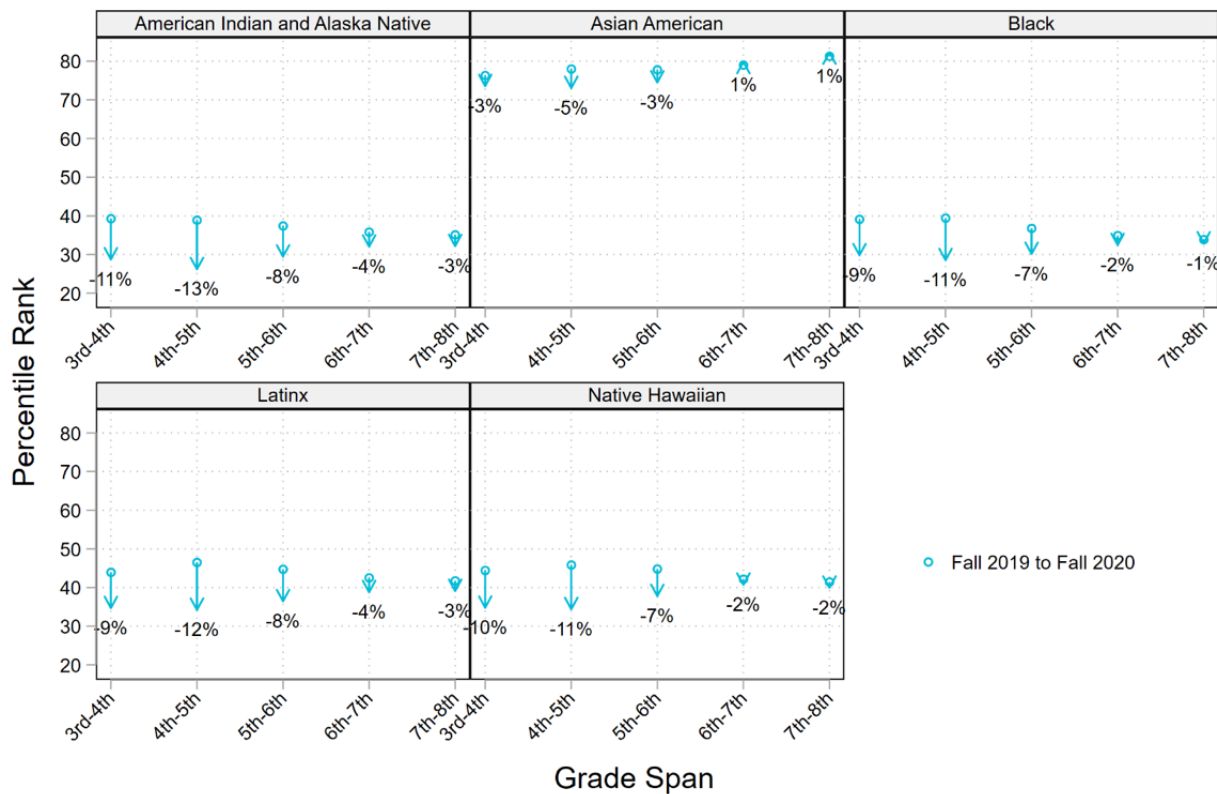
Note. The blue circle represents the pre-pandemic (fall 2019) median percentile rank for a given group, and the arrows represent change in student percentile rank for a given grade span during the pandemic.

The results for reading are shown in Figure 2. Drops in reading percentile rank during the pandemic are relatively small in magnitude overall, especially compared to math. However, we see a similar pattern of

larger drops for students in 5th and 6th grade in fall 2020, as well as larger declines for AIAN, Black, Latinx, and Native Hawaiian students.

Figure 2. Reading percentile rank change by cohort and grade level for BIPOC student groups
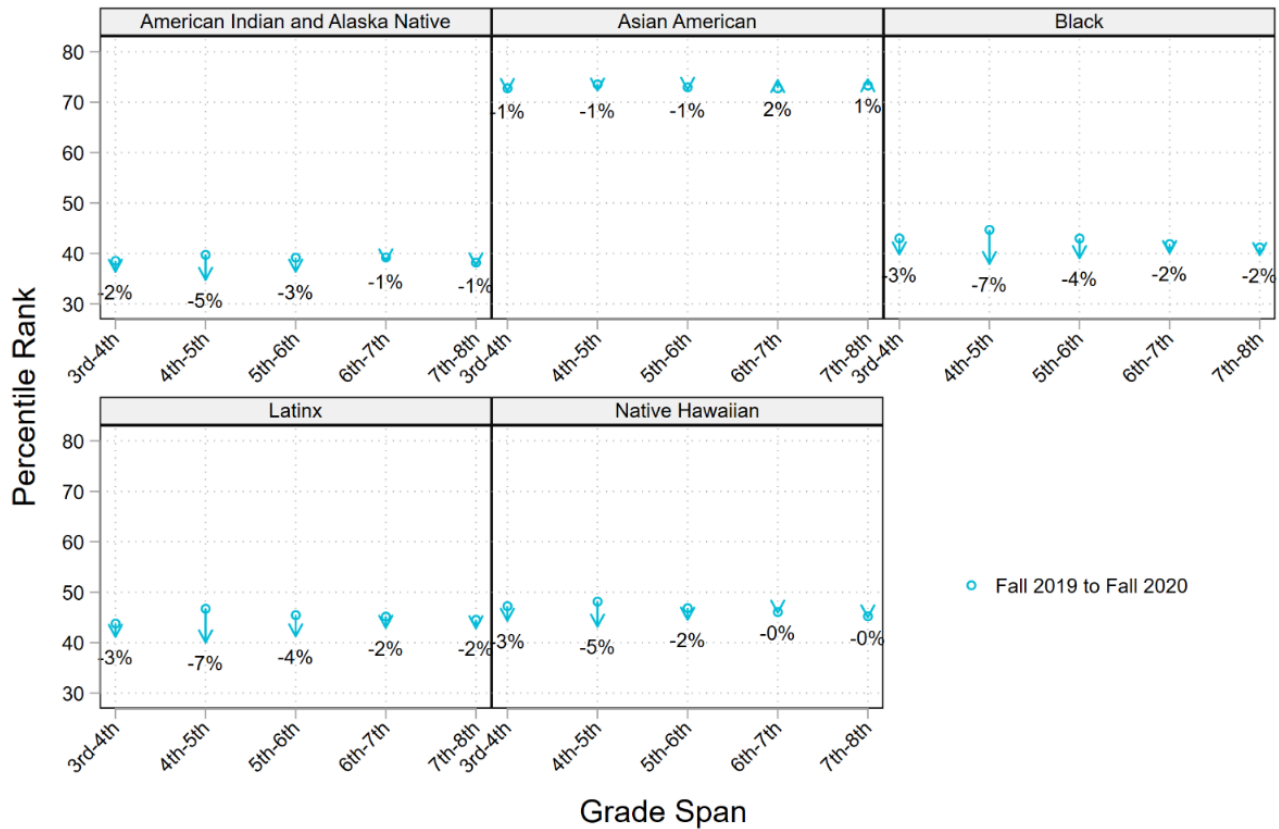

Note. The blue circle represents the pre-pandemic (fall 2019) median percentile rank for a given group, and the arrows represent change in student percentile rank for a given grade span during the pandemic.

All BIPOC student groups made learning gains during the pandemic, however Black, AIAN, and Latinx students only made 55-66% of the typical gains in math and 73-84% of the typical gains in reading during the start of the pandemic.

To address the second research question, we calculated the gains in BIPOC students' test scores (what we call learning gains) between fall of 2019 and fall of 2020 and compared these gains to those of a separate pre-pandemic cohort of BIPOC students (assessed in the fall of 2018 and the fall of 2019). Thus, we can ascertain whether BIPOC students made learning gains since the onset of the pandemic and also situate these gains relative to what we would expect for similar students in a more typical year. Figure 3 displays the results from this analysis. First, all BIPOC student groups made achievement gains from fall 2019 to fall 2020. Most students made between 60-70% of the pre-pandemic math gains for their group on average, and Asian American students made 88% of the pre-pandemic math gains. In reading, all groups made at least 70% of their historical gains; AIAN and Native Hawaiian students made 84-86% and Asian students gained equivalently to students in 2018-2019. Comparisons between each group's learning gains during the pandemic and the national NWEA MAP Growth norms for the same period are presented in the appendix.

Figure 3. Learning gains relative to typical pre-pandemic learning gains
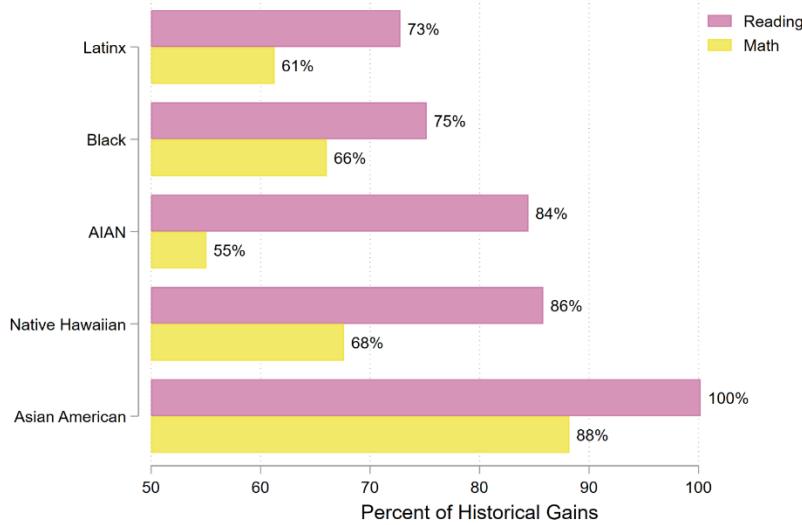
Note. Percentage of historical gains was calculated by dividing the average pandemic learning gains (fall 2019 – fall 2020) by historical gains (fall 2018 – fall 2019) calculated for students within the same race/ethnicity, grade, and subject. Weighted averages were calculated across grades. AIAN=American Indian and Alaska Native.

Learning gains during the pandemic were further disaggregated by student gender (Figure 4) and school poverty level (Figure 5). In both subjects, male BIPOC students made a lower percentage of pre-pandemic gains compared with female BIPOC students. Large differences by school poverty, particularly in reading, were also observed. BIPOC students in low poverty schools made over 90% of pre-pandemic reading gains between fall 2019 and fall 2020, whereas BIPOC students attending high poverty schools made only 65-81% of their historical reading gains.
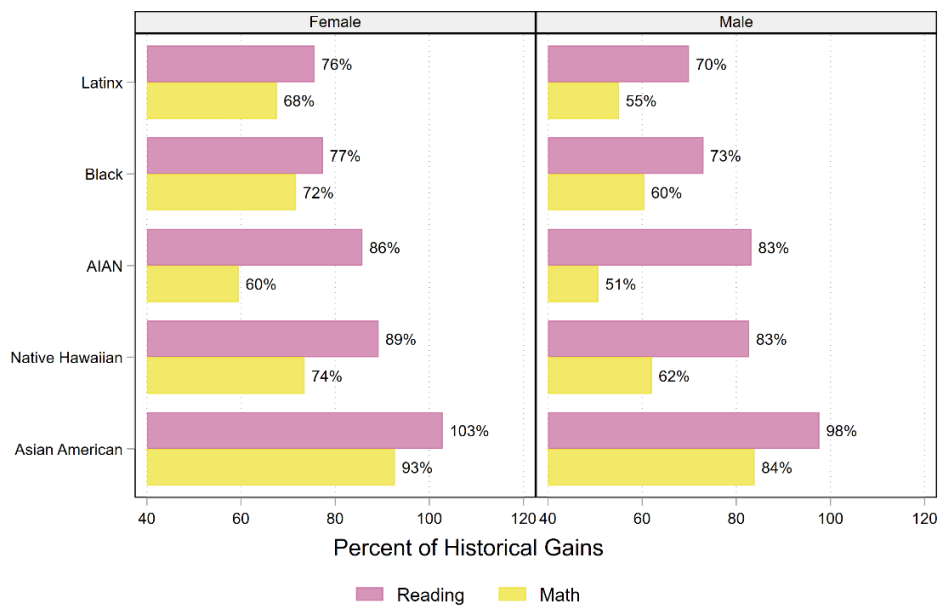
Figure 4. Learning gains relative to typical pre-pandemic learning gains by gender

Note. Percentage of historical gains was calculated by dividing the average pandemic learning gains (fall 2019 – fall 2020) by historical gains (fall 2018 – fall 2019) calculated for students within the same race/ethnicity, gender, grade, and subject. Weighted averages were calculated across grades.

Figure 5. Learning gains relative to typical pre-pandemic learning gains by school poverty level
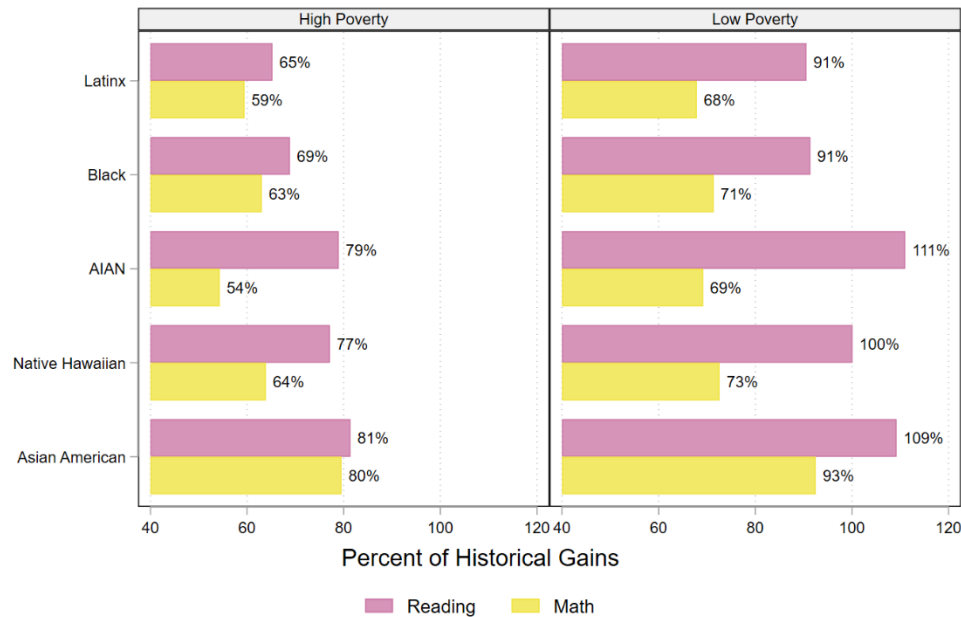
Note. Percentage of historical gains was calculated by dividing the average pandemic learning gains (fall 2019 – fall 2020) by historical gains (fall 2018 – fall 2019) calculated for students within the same race/ethnicity, school poverty level, grade, and subject. Low poverty schools had <25% of students eligible for free or reduced priced lunch (FRPL) in 2018-19, whereas high poverty schools served >75% FRPL-eligible students. Weighted averages were calculated across grades.

Summary of findings

The COVID-19 pandemic has exacerbated longstanding educational inequities for BIPOC communities in the United States. BIPOC students were less likely to be learning in person and more likely to run into obstacles in accessing instruction than White students during the 2020-21 school year. Further, differences in health outcomes, food insecurity, and mental health due to systemic racism faced by BIPOC students may well have contributed to diminished academic gains during the pandemic. Our initial achievement results confirm these challenges. For example, Black, AIAN, and Latinx students only made 60-70% of their typical gains in math and 75-90% of typical gains in reading. Our data cannot speak to why academic gains were lower during the pandemic, but it is likely that the myriad barriers that BIPOC students have faced during the pandemic have impeded their opportunities to learn, and as a result they are not progressing at the same rate they were before the pandemic. Therefore, a holistic approach to recovery is warranted and below we offer policy recommendations meant to encompass a wide range of ways to better support BIPOC students in this moment.

A "return to normal"? Setting recovery goals for BIPOC students

We use pre-pandemic patterns of achievement and growth to contextualize BIPOC students' achievement and growth during the pandemic. We do not, however, use a typical school year as an aspirational goal for students exposed to the pandemic as pre-pandemic educational opportunities were highly inequitable for BIPOC students. School systems should use this period to fundamentally rethink how programs, policies, and opportunities are allocated to BIPOC students.

Policy recommendations for supporting COVID-19 recovery for BIPOC students

- **Improve remote learning for BIPOC students:**
  - Ensure that *every* student has access to broadband, devices, and the technical support necessary to access remote learning opportunities; this continues to be important as it is possible that some BIPOC students may remain remote in the 2021-2022 school year.
  - Engage parents and families through regular, well-timed communication that also allows families to communicate what they are seeing at home.
  - Provide professional development for teachers and school leaders to support students and families in engaging with remote instruction effectively.

- **Extend learning time for BIPOC students:**
  - Offer engaging summer school or enrichment opportunities during the summer.
  - Provide additional instructional time by starting the 2021-22 school year early or extending the school day.
  - Launch high-quality tutoring programs for BIPOC students tied to school curriculum and instruction.

- **Target federal resources to BIPOC students**
  - Distribute resources *equitably* across schools within and across districts; districts with higher concentrations of BIPOC students and low-income students should receive a higher per-pupil allocation than Whiter and wealthier districts; same is true for schools within a district.
  - Engage community-based organizations with a proven track record of serving BIPOC communities to help with identifying needs and deploying resources.

- **Address BIPOC students' academic, social, and emotional needs**
  - Evaluate academic achievement and growth regularly using valid, reliable, and comparable assessments to identify unfinished learning and learning acceleration.
  - Ensure we use multiple data points to help tell the whole picture. In some places, data has been used to underinvest when it should be used to target more resources into certain places. We have to use this information to restructure our investments so the communities that need more resources get them.
  - Celebrate BIPOC students' and communities' strengths and successes, especially those that do not show up in traditional measures of student or school performance.
  - Replicate best practices and successful interventions across schools and districts where BIPOC students are experiencing greater-than-average gains.

- Deploy tools (like surveys) that measure students' social and emotional well-being.
- Screen regularly for physical and mental health conditions; provide school medical staff (nurses) and counselors with training to identify and treat trauma, stress, and anxiety effectively.
- Use federal funds to provide additional mental health and counseling resources to BIPOC students and families that have been disproportionately affected by COVID-19.
- Continue to expand school meal programs by reducing barriers for qualification, extending the hours and locations, and providing meals during non-traditional periods (e.g. summer).

Appendix

Terminology & considerations

NWEA student-level racial and ethnic identifiers are collected annually through class rosters. Such identifiers include "Hispanic," which generally refers to persons who speak Spanish natively and/or have Spanish-speaking ancestry. For this report, we adopted the contemporary gender-neutral term Latinx for individuals whose origin or ancestry is in Latin America.

We argue that many structural inequalities (e.g., access to technology infrastructure and/or digital devices) disproportionately impacted BIPOC communities, and we also chose to compare how students are performing academically relative to same race/ethnic students before and after the pandemic for this report's analyses. In line with Critical Race and Critical Whiteness Theorists, we did not want to position whiteness as the default or as centric in our comparisons. Therefore, we have chosen not to include White students as a comparison point in these analyses presented in this report.

Finally, we want to acknowledge how this study is among a large body of research pointing to educational inequalities, sometimes referred to as the racial achievement gap. Instead, we hope it is used to advance Gloria Ladson-Billings' nearly 15-year-old challenge for "education research to reconceptualize this notion of the achievement gap and to begin to think about the incredible debt that we as a nation have accumulated. So rather than focusing on telling people to catch up, we have to think about how we, all of us, will begin to pay down this mountain of debt that we have amassed at the expense of entire groups of people and their subsequent generations." Ladson-Billings' collective call to action is more pressing today than ever.

Sample

The data for the proposed study are from the NWEA anonymized longitudinal student achievement database. School districts use the NWEA MAP Growth assessments to monitor elementary and secondary students' reading and math growth, with assessments typically administered in the fall (usually between August and November), winter (usually December to March), and spring (late March through June). In total, our sample consists of approximately 2.7 million 3rd-8th grade students in 17,000 public schools who took MAP Growth reading and math assessments across the 2018-19, 2019-20, and 2020-21 school years. K-2 students were excluded from this sample as prior research has raised concerns that remotely administered tests are not comparable to in-person test in the early grades. Our analyses in this study are restricted to BIPOC students from the following groups: AIAN, Asian American, Black, Latinx, and Native Hawaiian.

In this study, we follow longitudinal cohorts of students across the two school years impacted by the pandemic (fall 2019-fall 2020) and compare them to students who went through the same grades in the prior school years (fall 2018-fall 2019). This design allows for us to understand growth during the pandemic in reference to a "typical" (pre-pandemic) period for students of the same racial/ethnic group. Table 1 illustrates the cohort design used in this study.

In a prior analysis of these data, we found that BIPOC students and historically lower-achieving students who had tested in previous years were less likely to have taken the MAP Growth assessments in fall 2020. Therefore, focusing only on students who had complete data before and after the pandemic may underestimate the impact of the COVID-19 disruptions on learning. In the analyses presented in this report, we retained students that tested at any point during the three school years (2018-19, 2019-20, and 2020-21), even if they did not test during the pandemic period. To address the issue of missing test scores, we used students' past test scores, student characteristics (racial/ethnic group identification

and biological sex), and school characteristics (percent of students below poverty line, percent of students receiving free-and-reduced price lunch, percent White, percent Black, total enrollment, total number of students with an Individualized Education Program, geographical location – city, rural, or suburban, and percent of schools closed in the larger district) to impute missing scores and to control for differences between students tested in fall 2020 and those tested in prior years. We used the mice package in R, which imputes incomplete multivariate data using chained equations. The mice package appropriately handles and imputes values depending on the variable type, employing a fully conditional specification. For each data file, we imputed student MAP Growth scores separately by grade cohort and by region of the U.S. to account for regional similarities in schooling and responses to COVID-19. Five sets of plausible (imputed) values were created for each data file (for example, five datasets corresponding to math scores from 7th graders in Fall 2020).

Counts of the number of students testing per time point within each cohort and racial/ethnic group, as well as the final sample size per group, are presented in Table 2. Overall, the sample is 4% AIAN, 10% Asian American, 41% Black, 44% Latinx, and 1% Native Hawaiian. Table 3 presents descriptive information on the sample of schools. Public schools that administered MAP Growth were included in the sample if least five BIPOC students tested in grade 3-8 during one of the three school years (2018-19, 2019-20, and 2020-21).

Measure of achievement

Student test scores from the NWEA MAP Growth reading and math assessments 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. The 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.

In this study, we used both students' RIT scores and their achievement percentile scores. Achievement percentile scores were calculated using the NWEA 2020 MAP Growth norms, which were calculated based on a pre-pandemic sample of students from the 2015-16, 2016-17, and 2017-18 school years. This national norming sample was used as the reference point for all timepoints examined in this study (e.g., fall 2018, fall 2019, and fall 2020).

Students' percentile rank is calculated conditional on each student's grade, subject, and instructional week of testing (i.e., the week in the school calendar in which a student tested). Instructional weeks were calculated for each student based on their school start date and the individual student's testing dates (for more details on the calculation of instructional weeks, see the norms study). On average, students' fall test occurred within the 3rd -4th instructional week of the school year. There were not substantial differences observed in average instructional week across school years.

Within each grade and subject, let Y_{it} be a student i's RIT score at instructional week t. The predicted mean $(\hat{Y}_t)$ and standard deviation $(SD(Y_t))$ for a given grade/subject/instructional week combination were pre-calculated based on the NWEA norms model (see Chapter 4 of the norms report). Based on these values, we calculated a standardized estimate of the student's RIT score:

$$z(Y_{it}) = \frac{(Y_{it} - \hat{Y}_t)}{SD(Y_t)}.$$

From the standardized score, we calculated the score percentile (e.g., the proportion of the distribution that the student scored as well as, or higher than):

$$p_s(Y_{it}) = Pr(Y_{it} \leq y_t) = \int_{-\infty}^{y_t} \phi(z)dz,$$

where $\phi(z)$ represents the probability density function. The student normative percentile used in this study was scaled to range from 1 to 99:

$$Perc = 100 \times p_s(Y_{it}).$$

A 4th grade student who achieved a percentile rank of 10 in math in fall 2019 scored at or above 10% of the 4th grade students in the norming sample who had tested in the same instructional week.

Methods

RQ1: How does the academic achievement of BIPOC students during the pandemic compare to national pre-pandemic patterns of achievement?

To address the first research question, we calculated the mean and standard deviation of students' RIT scores and median percentile rank across two falls (fall 2018 – fall 2019 for the pre-pandemic cohort, fall 2019 – fall 2020 for the pandemic cohort) each subject and student race/ethnicity group. The RIT estimates are reported in Tables 4 and 5. The changes in median percentile rank between fall 2019 and fall 2020 are shown in Figures 1 and 2.

RQ2: How do learning gains of BIPOC students from fall 2019 to fall 2020 compare to BIPOC student gains in prior years?

To address this research question, we calculated the average fall-fall gain for each cohort, subject, and student race/ethnicity group. For students in the first (pre-pandemic) cohort, these gains were estimated from fall 2018-fall 2019. For the pandemic cohort, gains were calculated from fall 2019-fall 2020. The grade-specific math plots are presented in Figure A1 and reading results are in Figure A2. In all grades and race/ethnicity groups, students made smaller gains in math during the COVID-19 pandemic than students had made in the prior cohort. Overall reading gains for the fall 2019-fall 2020 cohort were only slightly reduced as compared to gains for the prior cohort of students.

In addition, to quantify the percentage of historical gains made by students during the COVID-19 pandemic, we divided the fall-fall gains during the pandemic by the gains of their same-grade same-race/ethnicity peers from the prior year. For instance, if the average gain made by the pandemic cohort was 9 RIT points but the pre-pandemic cohort gained 10 RIT points on average, the pandemic cohort made 90% of the typical gains exhibited by the pre-pandemic cohort. We took a weighted average across grades and reported an overall percentage of historical gains by subject and race/ethnicity in Figure 3.

Additionally, these results were further disaggregated by gender (male vs. female students) and school poverty level (low poverty determined as <25% of students were eligible for free or reduced priced lunch [FRPL] in 2018-19, high poverty as >75% of students were FRPL-eligible). These results are

presented in Figures 4 and 5. Substantial differences were observed across groups favoring female students and students attending low poverty schools.

Finally, we also calculated the percentage of historical gains made by students during the COVID-19 pandemic using NWEA national norms for fall-fall gains as the baseline (e.g., Table B.1 and B.3 from the 2020 NWEA MAP Growth norms). These results are presented in Figure A3. Overall, similar patterns were observed, though Asian students' gains were observed to be over 100% of the national expected growth for students in a given grade span.

Limitations

This study is not without limitations. First, we have a combination of in-person and remote testers in our sample. While we have preliminary evidence that MAP Growth grade 3-8 tests administered remotely are comparable to in-person administration, it is possible that we are not getting a full picture of student performance that we would have if all students tested in-person this year. Second, the NWEA sample draws from approximately 18,000 schools across the country but is not nationally representative. Third, we utilize multiple imputation to recover missing test score data for students that did not test during one or more of the school terms. This approach is valid in the case that these scores are missing at random, which means that the reason that a test score is missing is not due to the score the student would have received had they took the test. Instead, the score is missing at random after we adjust for the observed covariates we included in the imputation procedure. Fourth, our sample size for Native Hawaiian students is relatively small, which limits the generalizability of the findings for this group.

Table 1. Cohort design used in the study

Grade	Fall 2018	Fall 2019	Fall 2020
3	C1	C2	
4		C1	C2
4	C1	C2	
5		C1	C2
5	C1	C2	
6		C1	C2
6	C1	C2	
7		C1	C2
7	C1	C2	
8		C1	C2

Note. C1=pre-pandemic cohort followed in a grade pair from Fall 2018-Fall 2019, C2=pandemic cohort followed from Fall 2019-Fall 2020). Note that the C2 cohort of students followed across grades 7-8 during the pandemic are the same students who are in the C1 pre-pandemic cohort in grades 6-7 between Fall 2018-Fall 2019.

Table 2. Overall sample size per race/ethnicity and cohort as well as sample size per term

Race/ethnicity	Grade (18-19)	Grade (19-20)	Grade (20-21)	Prior Cohort (fall 18-fall 19)	Pandemic Cohort (fall 19-fall 20)	Total N	Sample size per term					
							F18	W19	F19	W20	F20	W21
Asian American	2	3	4	—	3-4	43,107	30,435	29,370	29,981	28,618	18,790	13,949
Black	2	3	4	—	3-4	170,463	124,734	123,270	118,473	116,070	69,174	55,715
Native Hawaiian	2	3	4	—	3-4	2,786	1,804	1,720	1,980	1,961	1,285	1,093
Latinx	2	3	4	—	3-4	177,670	123,465	126,086	124,910	127,124	83,479	72,275
AIAN	2	3	4	—	3-4	15,087	10,560	10,093	10,703	10,378	5,057	3,988
Asian American	3	4	5	3-4	4-5	44,617	34,038	32,839	30,113	28,559	19,895	14,789
Black	3	4	5	3-4	4-5	173,279	129,295	129,404	117,410	114,247	70,431	56,746
Native Hawaiian	3	4	5	3-4	4-5	2,779	2,063	2,027	2,032	2,019	1,299	1,144
Latinx	3	4	5	3-4	4-5	185,854	136,548	137,519	126,666	128,596	88,296	76,148
AIAN	3	4	5	3-4	4-5	14,951	11,466	11,005	10,520	10,143	4,975	4,014
Asian American	4	5	6	4-5	5-6	46,710	33,392	32,205	30,973	28,810	18,187	13,152
Black	4	5	6	4-5	5-6	180,977	129,861	129,132	122,321	119,656	60,500	49,539
Native Hawaiian	4	5	6	4-5	5-6	2,765	1,892	1,836	2,052	1,974	915	762
Latinx	4	5	6	4-5	5-6	196,040	132,962	134,417	134,068	136,126	72,299	61,563
AIAN	4	5	6	5-6	5-6	15,770	11,819	11,351	11,033	10,489	4,859	3,520
Asian American	5	6	7	5-6	6-7	47,278	33,906	32,387	31,204	25,838	17,611	11,468
Black	5	6	7	5-6	6-7	181,308	131,849	131,435	116,627	107,793	58,471	46,519
Native Hawaiian	5	6	7	5-6	6-7	2,628	1,866	1,851	1,681	1,527	894	773
Latinx	5	6	7	5-6	6-7	195,076	139,570	140,816	124,863	118,673	71,319	58,401
AIAN	5	6	7	5-6	6-7	16,493	12,133	11,651	11,076	9,988	4,689	3,426
Asian American	6	7	8	6-7	7-8	42,811	33,369	29,804	29,086	24,502	17,096	11,381
Black	6	7	8	6-7	7-8	168,039	125,123	120,764	113,049	104,309	58,489	47,319
Native Hawaiian	6	7	8	6-7	7-8	2,475	1,829	1,651	1,715	1,561	902	770
Latinx	6	7	8	6-7	7-8	186,080	139,398	131,567	125,341	118,030	71,909	59,262
AIAN	6	7	8	6-7	7-8	15,583	11,513	10,458	10,321	8,766	4,634	3,237

Note. Math sample sizes are reported in this table but the final sample sizes for reading were very similar.

Table 3. Characteristics of Our School Samples (By Subject) Relative to US Public Schools Serving Grades 3-8

	Mathematics	Reading	US Schools
Total School Enrollment	486.5 (259.20)	486.1 (258.50)	486.84 (326.57)
Percent Black	0.15 (0.24)	0.15 (0.24)	0.15 (0.24)
Percent Latinx/Hispanic	0.21 (0.25)	0.21 (0.24)	0.26 (0.29)
Percent Asian	0.04 (0.08)	0.04 (0.08)	0.04 (0.09)
Percent White	0.58 (0.33)	0.58 (0.33)	0.53 (0.34)
Percent FRPL	0.54 (0.29)	0.54 (0.28)	0.56 (0.28)
Percent ELL	0.08 (0.09)	0.08 (0.09)	0.09 (0.11)
Percent SPED	0.14 (0.03)	0.14 (0.03)	0.13 (0.04)
School Location*			
City	0.29 (0.45)	0.28 (0.45)	0.28 (0.45)
Rural	0.27 (0.44)	0.27 (0.44)	0.28 (0.45)
Suburb	0.33 (0.47)	0.33 (0.47)	0.33 (0.47)
Town	0.12 (0.32)	0.12 (0.32)	0.12 (0.32)
% of Districts with Over 50% of Schools Physically Closed	0.39 (0.30)	0.39 (0.30)	0.30(.33)
	N = 18,079	N = 18,152	N = 73,345

Note. FRPL=free or reduced-price lunch, ELL=English Language Learners, SPED=special education students. *Because of rounding, may add to greater than 100%. The racial composition, FRPL, and school urbanicity variables came from the NCES Common Core of Data (CCD), the percent ELL and SPED variables come from the Civil Rights Data Collection, and the school closure variable refers to school closures in Sept. 2020 and comes from the U.S. School Closure & Distance Learning Database (see documentation for more detail on how school closures are quantified).

Table 4. Means and standard deviations for math achievement by cohort and race/ethnicity

Race/ethnicity	Grade span	Cohort	N	First Fall Term		Second Fall Term		Difference	
				M	SD	M	SD	M	SE
AIAN	3rd-4th	2018-2019	4,402	182.7	13.6	194.2	13.8	11.5	0.3
AIAN	3rd-4th	2019-2020	3,974	183.1	12.5	192.3	13.0	9.2	0.3
AIAN	4th-5th	2018-2019	4,062	193.9	14.5	202.8	15.2	8.9	0.3
AIAN	4th-5th	2019-2020	4,402	194.2	13.8	200.8	15.0	6.7	0.3
AIAN	5th-6th	2018-2019	3,869	203.4	15.0	208.7	14.2	5.3	0.3
AIAN	5th-6th	2019-2020	4,052	202.8	15.2	206.1	14.2	3.3	0.3
AIAN	6th-7th	2018-2019	8,956	207.7	14.9	213.0	15.0	5.3	0.2
AIAN	6th-7th	2019-2020	9,161	207.2	13.8	212.7	23.5	5.5	0.3
AIAN	7th-8th	2018-2019	8,433	213.6	16.1	217.8	16.0	4.2	0.2
AIAN	7th-8th	2019-2020	8,956	213.0	15.0	217.8	25.1	4.9	0.3
Asian American	3rd-4th	2018-2019	15,692	196.8	13.7	209.6	14.0	12.9	0.2
Asian American	3rd-4th	2019-2020	14,209	196.7	13.0	208.9	14.2	12.1	0.2
Asian American	4th-5th	2018-2019	13,362	209.9	14.7	220.9	15.4	11.1	0.2
Asian American	4th-5th	2019-2020	15,685	209.6	14.0	219.9	15.4	10.3	0.2
Asian American	5th-6th	2018-2019	12,106	220.3	15.9	225.6	14.3	5.3	0.2
Asian American	5th-6th	2019-2020	13,350	220.9	15.4	225.5	14.5	4.6	0.2
Asian American	6th-7th	2018-2019	25,652	225.5	16.7	233.9	17.6	8.4	0.2
Asian American	6th-7th	2019-2020	24,394	226.0	15.0	233.0	22.2	7.0	0.2
Asian American	7th-8th	2018-2019	22,093	233.2	18.7	239.9	19.0	6.7	0.2
Asian American	7th-8th	2019-2020	25,652	233.9	17.6	238.8	27.5	4.9	0.2
Black	3rd-4th	2018-2019	58,768	183.5	12.6	194.7	12.9	11.2	0.1
Black	3rd-4th	2019-2020	56,644	183.5	12.0	192.5	12.9	9.0	0.1
Black	4th-5th	2018-2019	50,899	194.8	13.3	203.4	13.7	8.6	0.1
Black	4th-5th	2019-2020	58,679	194.8	12.9	201.1	13.5	6.3	0.1
Black	5th-6th	2018-2019	49,588	203.3	14.5	207.9	12.9	4.5	0.1
Black	5th-6th	2019-2020	50,812	203.4	13.7	206.3	12.9	2.9	0.1
Black	6th-7th	2018-2019	96,091	207.2	14.6	212.6	15.0	5.5	0.1
Black	6th-7th	2019-2020	91,988	207.1	12.8	212.2	19.1	5.1	0.1
Black	7th-8th	2018-2019	85,994	212.9	16.0	217.6	15.6	4.7	0.1
Black	7th-8th	2019-2020	96,091	212.6	15.0	217.1	21.8	4.4	0.1
Latinx	3rd-4th	2018-2019	75,843	185.1	12.7	196.9	13.2	11.8	0.1
Latinx	3rd-4th	2019-2020	71,868	184.9	12.2	193.9	12.7	9.0	0.1
Latinx	4th-5th	2018-2019	60,046	197.2	13.3	206.2	14.0	8.9	0.1
Latinx	4th-5th	2019-2020	75,810	196.9	13.2	203.2	13.6	6.3	0.1
Latinx	5th-6th	2018-2019	60,052	206.3	14.5	210.7	13.0	4.4	0.1
Latinx	5th-6th	2019-2020	60,019	206.2	14.0	208.3	12.9	2.2	0.1
Latinx	6th-7th	2018-2019	115,484	210.7	14.1	216.1	15.5	5.4	0.1
Latinx	6th-7th	2019-2020	107,541	210.2	13.2	214.7	19.3	4.4	0.1
Latinx	7th-8th	2018-2019	103,708	216.4	16.0	220.9	16.5	4.4	0.1

Latinx	7th-8th	2019-2020	115,484	216.1	15.5	219.7	22.1	3.6	0.1
Native Hawaiian	3rd-4th	2018-2019	1,016	185.8	13.7	196.8	13.6	11.1	0.6
Native Hawaiian	3rd-4th	2019-2020	984	185.3	12.2	193.9	12.5	8.6	0.6
Native Hawaiian	4th-5th	2018-2019	680	196.4	14.6	205.7	14.9	9.3	0.8
Native Hawaiian	4th-5th	2019-2020	1,015	196.8	13.5	203.1	13.9	6.2	0.6
Native Hawaiian	5th-6th	2018-2019	667	205.9	15.9	210.2	14.8	4.3	0.8
Native Hawaiian	5th-6th	2019-2020	679	205.7	14.9	207.6	13.4	1.9	0.8
Native Hawaiian	6th-7th	2018-2019	1,478	209.4	16.0	215.2	16.5	5.7	0.6
Native Hawaiian	6th-7th	2019-2020	1,387	209.8	14.4	215.0	21.7	5.2	0.7
Native Hawaiian	7th-8th	2018-2019	1,301	216.1	17.8	220.3	17.4	4.2	0.7
Native Hawaiian	7th-8th	2019-2020	1,478	215.2	16.5	219.6	25.4	4.4	0.8

Note. M=mean, SD=standard deviation, SE=standard error. For the 2018-2019 (pre-pandemic) cohort, the first fall is fall 2018 and the second fall is fall 2019. For the 2019-2020 (pandemic) cohort, the first fall is fall 2019 and the second fall is fall 2020.

Table 5. Means and standard deviations for reading achievement by cohort and race/ethnicity

Race/ethnicity	Grade span	Cohort	N	First Fall Term M	First Fall Term SD	Second Fall Term M	Second Fall Term SD	Difference M	Difference SE
AIAN	3rd-4th	2018-2019	4,361	180.8	16.3	190.4	16.1	9.7	0.3
AIAN	3rd-4th	2019-2020	3,897	181.1	15.0	191.5	15.4	10.4	0.3
AIAN	4th-5th	2018-2019	3,978	190.5	16.7	197.7	16.5	7.2	0.4
AIAN	4th-5th	2019-2020	4,359	190.5	16.1	198.2	16.4	7.7	0.3
AIAN	5th-6th	2018-2019	3,768	198.7	16.6	204.6	15.3	5.9	0.4
AIAN	5th-6th	2019-2020	3,972	197.7	16.5	204.9	15.5	7.2	0.4
AIAN	6th-7th	2018-2019	8,845	203.1	16.1	207.0	15.2	3.9	0.2
AIAN	6th-7th	2019-2020	9,173	203.0	14.9	209.4	24.2	6.4	0.3
AIAN	7th-8th	2018-2019	8,408	207.4	16.0	210.8	15.3	3.4	0.2
AIAN	7th-8th	2019-2020	8,845	207.0	15.2	213.1	23.9	6.1	0.3
Asian American	3rd-4th	2018-2019	15,680	195.3	15.7	205.0	14.6	9.6	0.2
Asian American	3rd-4th	2019-2020	14,051	194.6	14.6	205.4	13.6	10.8	0.2
Asian American	4th-5th	2018-2019	13,224	205.3	15.3	212.5	14.5	7.2	0.2
Asian American	4th-5th	2019-2020	15,671	205.0	14.6	212.8	13.7	7.9	0.2
Asian American	5th-6th	2018-2019	12,885	212.9	15.1	219.2	13.1	6.3	0.2
Asian American	5th-6th	2019-2020	13,216	212.5	14.5	219.1	12.8	6.6	0.2
Asian American	6th-7th	2018-2019	25,821	217.9	15.3	222.1	14.6	4.2	0.1
Asian American	6th-7th	2019-2020	24,175	217.9	13.8	223.9	18.0	6.0	0.1
Asian American	7th-8th	2018-2019	23,553	222.3	15.5	226.0	14.9	3.7	0.1
Asian American	7th-8th	2019-2020	25,821	222.1	14.6	228.0	19.3	5.8	0.2
Black	3rd-4th	2018-2019	58,529	182.9	15.6	192.6	15.0	9.7	0.1
Black	3rd-4th	2019-2020	56,262	182.7	14.6	192.2	14.9	9.5	0.1
Black	4th-5th	2018-2019	49,786	192.9	15.6	199.9	14.7	7.0	0.1
Black	4th-5th	2019-2020	58,422	192.6	15.0	199.0	14.8	6.3	0.1
Black	5th-6th	2018-2019	48,277	199.9	15.6	205.5	14.1	5.5	0.1
Black	5th-6th	2019-2020	49,703	199.9	14.7	205.0	14.5	5.1	0.1
Black	6th-7th	2018-2019	96,800	204.7	15.7	208.4	14.5	3.7	0.1
Black	6th-7th	2019-2020	95,252	204.7	14.1	209.0	20.6	4.3	0.1
Black	7th-8th	2018-2019	87,925	209.0	15.6	212.5	14.4	3.4	0.1
Black	7th-8th	2019-2020	96,800	208.4	14.5	212.7	21.2	4.2	0.1
Latinx	3rd-4th	2018-2019	71,198	183.0	15.8	193.3	15.5	10.2	0.1
Latinx	3rd-4th	2019-2020	65,322	182.7	14.8	192.0	14.9	9.3	0.1
Latinx	4th-5th	2018-2019	56,306	193.2	16.0	200.5	15.2	7.3	0.1
Latinx	4th-5th	2019-2020	71,161	193.3	15.5	199.3	15.0	6.1	0.1
Latinx	5th-6th	2018-2019	56,435	200.8	15.8	206.4	14.7	5.6	0.1
Latinx	5th-6th	2019-2020	56,282	200.5	15.2	205.3	14.4	4.8	0.1
Latinx	6th-7th	2018-2019	110,142	206.2	15.7	209.6	15.5	3.4	0.1

Latinx	6th-7th	2019-2020	102,459	205.8	14.8	209.5	20.1	3.7	0.1
Latinx	7th-8th	2018-2019	99,934	210.3	15.9	213.3	15.6	3.0	0.1
Latinx	7th-8th	2019-2020	110,142	209.6	15.5	213.5	21.0	3.9	0.1
Native Hawaiian	3rd-4th	2018-2019	1,009	184.6	16.0	193.9	15.2	9.3	0.7
Native Hawaiian	3rd-4th	2019-2020	979	183.6	15.4	193.0	15.0	9.3	0.7
Native Hawaiian	4th-5th	2018-2019	683	191.9	17.5	200.1	15.7	8.2	0.9
Native Hawaiian	4th-5th	2019-2020	1,009	193.9	15.2	200.6	14.5	6.7	0.7
Native Hawaiian	5th-6th	2018-2019	668	200.3	17.3	206.2	15.2	5.9	0.9
Native Hawaiian	5th-6th	2019-2020	682	200.0	15.7	205.2	14.9	5.2	0.8
Native Hawaiian	6th-7th	2018-2019	1,471	205.6	17.2	209.8	15.8	4.2	0.6
Native Hawaiian	6th-7th	2019-2020	1,366	205.6	15.1	211.2	20.5	5.6	0.7
Native Hawaiian	7th-8th	2018-2019	1,385	209.4	16.9	213.0	15.4	3.7	0.6
Native Hawaiian	7th-8th	2019-2020	1,471	209.8	15.8	214.0	22.8	4.3	0.7

Note. M=mean, SD=standard deviation, SE=standard error. For the 2018-2019 (pre-pandemic) cohort, the first fall is fall 2018 and the second fall is fall 2019. For the 2019-2020 (pandemic) cohort, the first fall is fall 2019 and the second fall is fall 2020.

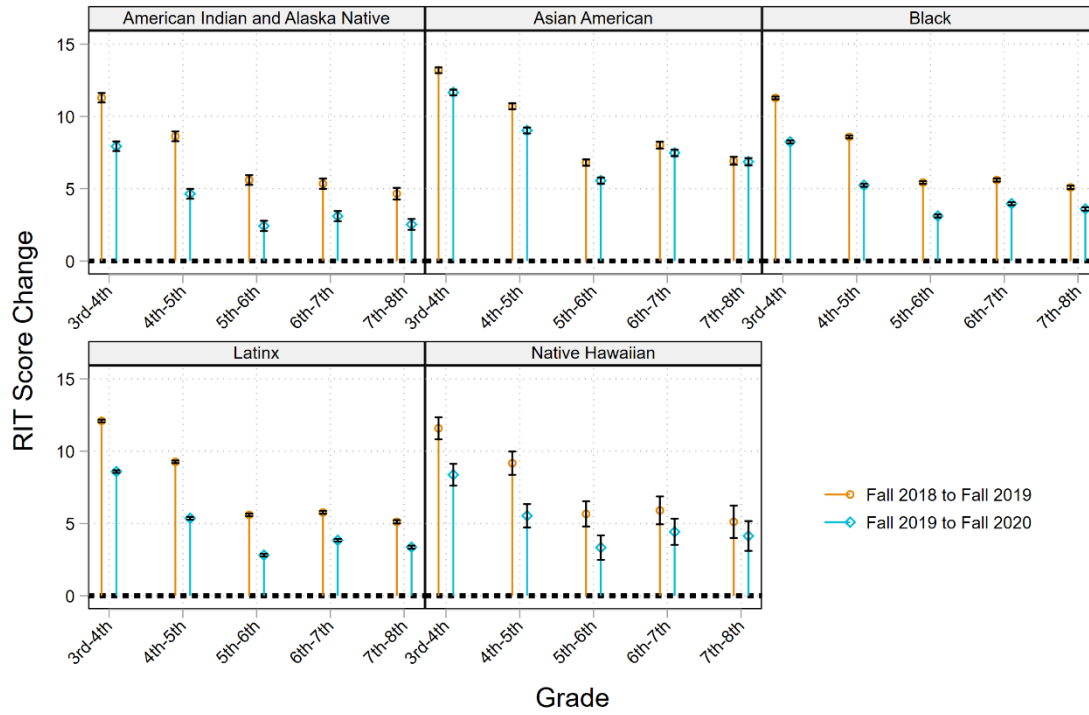**Figure A1.** Math test score gains by cohort and grade level for BIPOC student groups

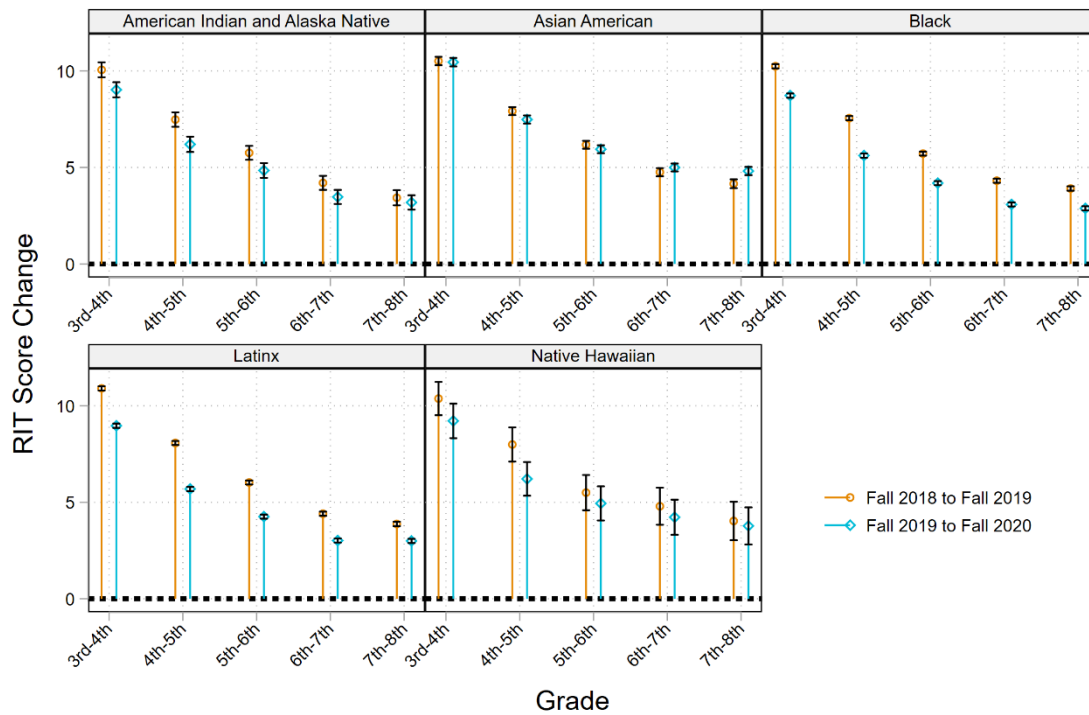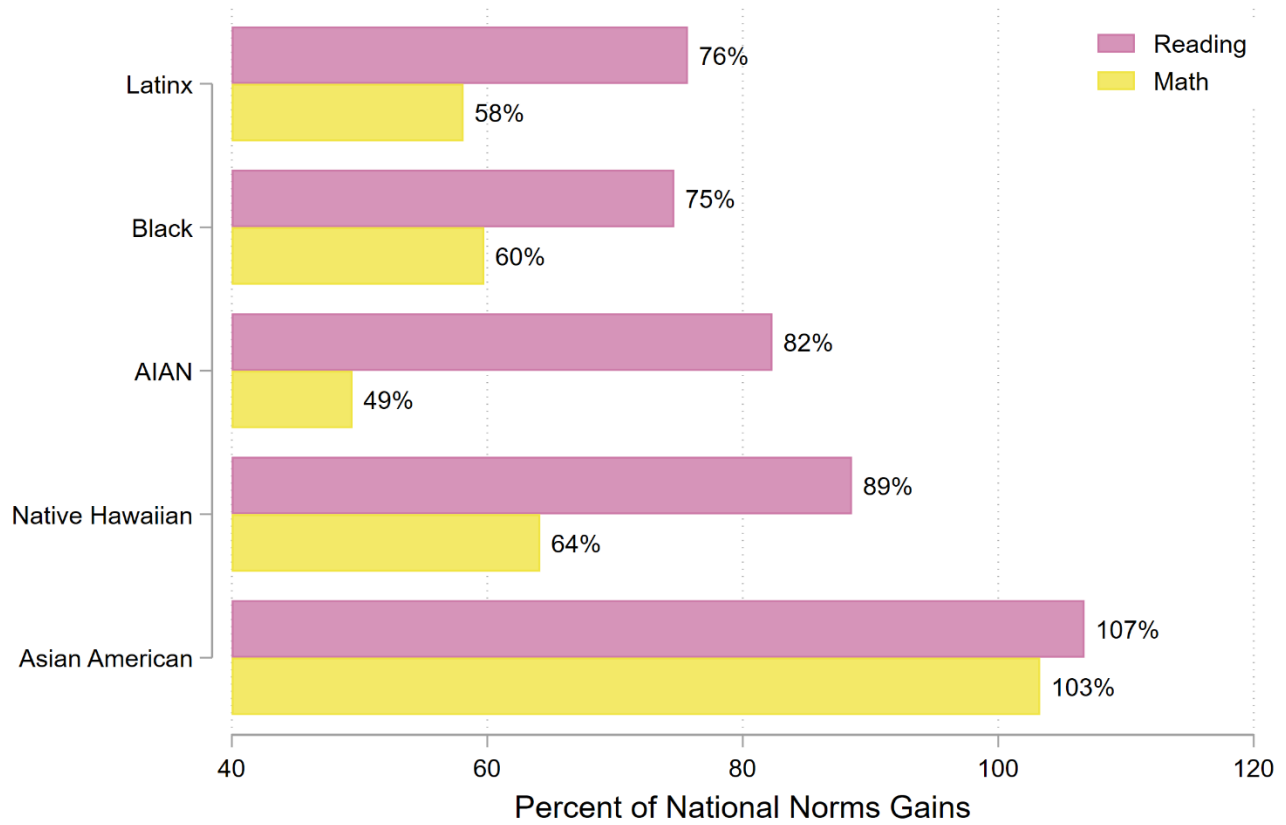**Figure A2.** Reading test score gains by cohort and grade level for BIPOC student groups

Figure A3. **Fall-fall gains during the COVID-19 pandemic relative to NWEA national norms for growth**

Note. Percentage of national norms gains was calculated by dividing the average pandemic (Fall 2019 – Fall 2020) learning gains for a given group by the national average for fall-fall gains based on a national pre-pandemic sample of students in a grade span and subject (e.g., Table B.1 and B.3 from the 2020 NWEA MAP Growth norms). Weighted averages were calculated across grades. AIAN=American Indian and Alaska Native.

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