



In School, Engaged, On-track? The Effect of the Pandemic on Student Attendance, Course Grades, and Grade Retention in North Carolina

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In School, Engaged, On-track? The Effect of the Pandemic on Student Attendance, Course Grades, and Grade Retention in North Carolina

ABSTRACT

The effects of the COVID-19 pandemic on students' experiences in school were widespread. Early research show reductions in test scores across grade levels and student groups. This study extends research evidence to additional student outcomes – absences, course grades, and grad retention – and to examine how pandemic effects are distributed across students. Using a combination of descriptive and regression analyses, we find negative average impacts on all outcomes. These effects are largest at the high end of the absence distribution and the low end of the grade distribution. Effects are also largest in middle school for most outcomes and are typically larger among historically marginalized groups of students. These findings reflect widening achievement gaps and the need for targeted supports.

INTRODUCTION

In March 2020, schools across the US closed their doors and pivoted to remote learning in response to the COVID-19 pandemic. Students have since experienced economic upheaval, isolation, a public health crisis, and a mixture of remote, hybrid, and in-person instruction. Research has begun to provide a clearer picture of the impact of the pandemic on students' learning. Several studies have documented lower test scores and reduced growth in scores across tested-grades and subjects, with larger impacts for vulnerable groups (Goldhaber et al., 2022; Irwin et al., 2022; Kuhfield et al., 2022; Kwakye & Kibort-Crocker, 2021; Lipscomb et al., 2023; Miller & Schueler, 2022; NCDPI, 2022).

Test scores are an important measure of academic progress, but they also have limitations. Test scores are available for a limited range of grades and subjects – often primary grades reading and math and selected subjects in high school. They also provide only a snapshot of students' learning and can be affected by test preparation, test anxiety, and student well-being on the day of the test (Figlio & Winicki, 2005; Heissel et al., 2021). In addition, other outcomes are often equally important. For example, course grades are used in college admissions and are better predictors than test scores of postsecondary success (Allensworth & Clark, 2020; Bowers et al., 2013; Easton et al., 2017; Galla et al., 2019).

A comprehensive understanding of the impact of the pandemic requires examining a range of education outcomes. In this study, we focus on three sets of outcomes that offer insight into students' engagement with school and opportunity to learn over the course of the school year – attendance, course grades, and grade retention. We examine changes in these outcomes using data on all students attending traditional public schools in North Carolina from 2015-16 to 2020-21. We focus on identifying variation in impacts on these outcomes across subgroups and across the distribution of each outcome (e.g., changes at the 10th and 90th percentiles). We compare descriptive statistics and generate regression estimates with controls for pre-existing trends and compositional changes in the student population.

We find a large and statistically significant average effect of the pandemic on all measured outcomes. Furthermore, there is considerable variation in effects across the distribution of outcomes and across school levels and student subgroups. Outcome distributions widened, especially at the high end of the absence distribution and low end of the course grade distribution. Impacts on absences and grades were largest for middle school students, while grade retention impacts were largest in high school. In addition, students of historically marginalized subgroups, including students of color, economically disadvantaged students, and English learners, experienced more severe impacts across most outcomes.

BACKGROUND

The scale of the pandemic is beyond anything in the experience of modern educational systems, but prior research on natural disasters provides evidence that lost schooling time can directly impact learning (e.g. Pane et al., 2008; Ward & Shelley, 2008) while the psychological effects of such an event contribute to additional negative impacts on school outcomes (e.g., La Greca et al., 2013; La Greca & Silverman, 2009; Hansel, 2013). The effects of the COVID-19 pandemic bear similarities to these previous disasters. Children and adolescents suffered increased mental health concerns (USED, 2022; Viner et al., 2022) and had fewer hours of schooling (Esposito et al., 2020; Kwakye & Kibort-Crocker, 2021; USED, 2022). Based on these impacts and others, researchers have predicted substantial negative effects on achievement since the beginning of the pandemic (Kuhfield et al., 2020; Fuchs-Schundeln et al., 2020; Azevedo et al., 2020; Agostinelli et al., 2020).

Several studies have begun an exploration of the effects of the pandemic on student test scores. Two studies using NWEA MAP scores from districts across the country found reductions in student growth in math and reading for grades 3 to 8. These studies also found that test score losses were larger for high poverty schools and students of color (Kuhfield et al., 2022; Goldhaber et al., 2022). Similarly, studies in specific states, including Washington, Virginia, Pennsylvania, and Georgia, found lower test scores with larger reductions among vulnerable groups (Kwakye & Kibort-Crocker, 2021; Irwin et al., 2022; Lipscomb et al., 2023; Miller & Schueler, 2022). In North Carolina (the focus of this study), a report looking at student test score growth found reductions in growth compared to predicted growth. These effects were larger in math, particularly for middle schoolers, and for many historically marginalized groups (NCDPI, 2022). Additionally, some studies show that the bottom end of the test score distribution dropped more significantly than the upper end – for example, the 10th percentile decreased more than the 90th percentile (Kuhfield et al., 2022).

While test scores are an important measure of academic progress, they have limitations as well. A more complete understanding of pandemic impacts requires also assessing other educational measures. However, few studies have examined absences, grades, and grade retention. One study in Chicago Public Schools found a significantly increased number of course failures during the pandemic among students in grades 4-8, but among high schoolers, course failure rates remained stable. In addition, students in hybrid or remote learning received more ‘A’ grades (Gwynne et al., 2022). In Washington state, high school students were more likely to receive non-credit grades (Fs or incompletes) in 2020-21 (Kwakye & Kibort-Crocker, 2021). In terms of attendance, a federal survey of schools found that many schools reported an increase in chronic absenteeism during the pandemic (USED, 2022). However, this does not provide insight into which students experienced a greater loss of school time. More research is needed to understand how outcomes vary across populations and implications for student recovery programs.

About This Study

This study adds to the literature by looking at a set of related outcomes – attendance, grades, and grade retention – which provide new insight into students’ experiences, opportunities to learn, and their performance in school during the pandemic. Exploring variation within and between these outcomes helps us understand the diverse experiences of students during the pandemic and lasting effects on their education.

North Carolina is an ideal setting for this study. It is a large state with a diverse population by race/ethnicity, urbanicity, and economic status (see Appendix Table 1 for summary statistics). The state also mirrored much of the country in pandemic response policies. For example, all students were eligible to receive free school meals in 2020-21, and schools began the year in remote or hybrid instruction, with more in-person instruction occurring as the year progressed. As in other states, districts within North Carolina took different approaches to instruction and to spending relief dollars.

The outcomes we study may have been affected by the pandemic in several ways. Attendance was likely affected directly by illness and indirectly by remote learning situations. The latter could include factors decreasing attendance, such as poor Internet connectivity and disengagement, as well as factors increasing attendance, such as an ability to attend school while sick and reduced travel.

Lower attendance has implications for students’ opportunities to engage with and absorb new material. As such, attendance contributes to student grades. However, grades are also influenced by students’ engagement with the material, participation and behavior in class, and learning (Galla et al., 2019; Gwynne

et al., 2022). Prior research finds that grades are more reliable and more predictive of future success than test scores (Allensworth & Clark, 2020; Bowers et al., 2013; Easton et al., 2017; Galla et al., 2019). Many of the disruptions caused by the pandemic, including remote learning, social isolation, loss of family financial stability, and exposure to illness and deaths in the family, would be expected to decrease students' focus on their courses. However, there were also some changes that may have helped some students' grades, such as slower instructional pacing, access to free meals, and less exposure to peer conflicts (Bacher-Hicks, et al., 2022; Fuller et al., 2021).

Finally, the impact on grades may have led students to fail one or more courses. Failing grades impede students' ability to make progress and be promoted. An increase in failures and grade retention means that a set of students may no longer be on track to complete school as previously expected and may need additional resources to finish school on time.

In combination, our outcomes provide a clearer picture of students' engagement and learning experiences in 2020-21 and their needs in upcoming school years. With these outcomes, we answer the following research questions:

1. How did pandemic-related disruptions affect student attendance and rates of chronic absenteeism in 2020-21?
2. How did pandemic-related disruptions affect course grades and the rate of course failures in 2020-21?
3. How did pandemic-related disruptions affect grade retention in 2020-21?

The average change in outcomes will not adequately represent the unique and varied impacts of the pandemic on students. For example, different groups of students had different levels of exposure to remote or hybrid learning (Goldhaber et al., 2022; Esposito et al., 2020). Some students were directly impacted by job loss or a death in the family; others were not. Some students struggled with lack of access to online instruction or school meals, while others may have benefitted from a different style or slower pace of instruction. Therefore, to add to our understanding the variation in effects of the pandemic across students, we examine impacts across the distribution of outcomes and across subgroups of students defined by school level, race/ethnicity, income, gender, and program participation. These findings will lead to a richer understanding of student experiences and supports needed moving forward.

DATA

Our data come from a longitudinal database of student-level administrative data provided by the North Carolina Department of Public Instruction (NCDPI). The data include information on student demographics, enrollments, attendance, test scores, course grades, and program participation as well as school characteristics. We focus on students enrolled in North Carolina traditional public schools (NC TPS) between 2015-16 and 2020-21.¹ This includes more than 1.5 million students annually, or more than 7.5 million student-year observations across the five years of interest. We drop less than 1% of students who are missing data on an outcome or covariate of interest.

We compare outcomes in the 2020-21 school year to the pre-pandemic years of 2015-16 through 2018-19. We omit 2019-20 because emergency response measures in the spring of 2020 (e.g., pass/fail grading)

¹ This study does not include data on charter schools.

resulted in outcomes that were not measured comparably to other years. Appendix Table 1 shows descriptive statistics for students in our sample during the pre-pandemic period (2015-16 to 2018-19) and 2020-21. We see a small reduction in the percent of students in grades K-5 and White students between the pre-pandemic period and 2020-21, but other characteristics remain relatively stable.²

Our outcomes of interest are attendance, course grades, and grade retention. We measure attendance in two ways: (1) the percent of days the student was absent out of the total days enrolled and (2) an indicator of whether the student was chronically absent – missing 10 percent or more of the total number of days enrolled. We examine absence outcomes for students at all grade levels with at least 80 days enrolled (97.5% of all students). We use two measures of course grades: (1) the *average* quality points the student earned across all courses taken, where a student earns 4 quality points for an ‘A’, 3 for a ‘B’, 2 for a ‘C’, 1 for a ‘D’, and 0 for an ‘F’; and (2) an indicator of whether the student failed one or more courses during the school year. Course failures and quality points are available for middle and high school students only (grades 6 and above).³ Finally, we use a single measure of grade retention defined as an indicator for whether a student in a particular grade appeared in the same grade the subsequent Fall. Appendix Table 1 displays average outcomes pre-pandemic and in 2020-21.

METHODS

We employ descriptive and regression analyses to assess pandemic related impacts on attendance, course grades, and grade retention. First, we examine changes in the distributions of our two continuous outcomes – percent days absent and average quality points. To do so, we generated quantile plots of each outcome in 2018-19 and 2020-21 to compare the distributions of each outcome prior to and during the pandemic. We specifically examine the 10th, 25th, 50th, 75th, and 90th percentile for each outcome in each year.

While these descriptives provide a straightforward estimate of changes across the distribution for each outcome, our prior work (and Appendix Table 1) shows that there were modest shifts in the composition of students who chose to enroll in the public school system in 2020-21 (Fuller & Bastian, 2021). To ensure that compositional changes and pre-existing trends are not driving changes, we estimated quantile regressions for each outcome at the 10th, 25th, 50th, 75th, and 90th percentiles across the 2015-16 to 2020-21 school years. We controlled for student-level variables including sex, race/ethnicity, economic disadvantage status interacted with school Community Eligibility Provision status, disability status, English Learner status, and grade level; school-level urbanicity and percent non-white; and a linear time trend.⁴ Introducing controls has little impact on the estimates (see Appendix Table 2).

To further explore how changes in outcomes were distributed across students, we used OLS regressions to examine changes in means across student subgroups defined by race/ethnicity, economic disadvantage, gender, English Learner status, disability status, and school level (see appendix for pre-pandemic and 2020-21 outcome means by subgroup). Models use the same controls listed above and include an interaction term

² Descriptives statistics in Appendix Table 1 also suggest a reduction in economically disadvantaged students, but this is likely due to a change in measurement resulting from universal free school meals being provided during the pandemic.

³ We note that we do not find a meaningful difference in the number of courses taken for a letter/numeric grade between pre-pandemic (mean = 7.86, SD = 1.94) and 2020-21 (mean = 7.62, SD = 1.88).

⁴ Due to a change in the structure of our absences data beginning in 2017-18, we also include an indicator for being in 2017-18 or later for all results related to absences. This absorbs about a 1 percentage point increase in percent of days absent that occurs due to this data change.

between the subgroup indicator and pandemic cohort indicator for each set of subgroups. These models identify whether differences between subgroups are statistically significant, though due to high power almost all differences achieve conventional levels of significance.⁵

RESULTS

Attendance

Figure 1 plots every fifth quantile from the 5th through 95th percentile of percent of days absent in 2018-19 and 2020-21, marking the 10th, 25th, 50th (the median), 75th, and 90th percentiles. The change between years at the 10th, 25th, and 50th percentile was small and negative – i.e., fewer days missed in 2020-21 – ranging from 0.6 to 1.2 percentage points lower than pre-pandemic. However, at the 75th percentile, the percent of days absent increased 1.8 percentage points from 7.1 to 8.9 percent, while at the 90th percentile the percent of days absent nearly doubled from 11.6 to 22.8 percent, the equivalent of about 40 days of a 185-day school year. Thus, while many students attended school as many days as usual during the 2020-21 school year, a subset of students missed much more school.

[Figure 1 about here]

To further understand variation in pandemic impacts on attendance, Figure 2 shows estimated impacts on percent of days absent (left) and chronic absenteeism (right) for selected student subgroups as estimated using OLS regression models. On average, the percent of days absent increased by 2.5 percentage points from a pre-pandemic baseline of 6.6 days absent and the rate of chronic absenteeism increased by 8.3 percentage points from a pre-pandemic rate of 13.4 percent of students chronically absent. This is a substantial increase for both measures. Additionally, the magnitude of the impact varies considerably across groups.

The effect on both absence measures was largest for middle schoolers, with increases of 4.0 percentage points in percent of days absent and 13 percentage points in chronic absenteeism. Elementary schoolers saw smaller increases in the percent of days absent (1.8 percentage points) but larger increases in chronic absenteeism (8 percentage points) compared to high schoolers (2.3 and 5 percentage points, respectively). Pre-pandemic, high schoolers were the most frequently absent (see Appendix Table 3 for subgroup means). However, middle schoolers overtook high schoolers on both measures of absences during the pandemic. Overall, more than 1 in 4 middle schoolers was chronically absent in 2020-21, as were nearly 1 in 4 high schoolers and 1 in 5 elementary schoolers.

Turning to differences across racial/ethnic subgroups, the increases in percent of days absent and chronic absenteeism for white students were just 2 and 1 percentage points, respectively. However, the percent of days missed increased 5.5 percentage points for Black students and 4.6 percentage points for Hispanic students. Rates of chronic absenteeism increased 16 percentage points for both Black and Hispanic students.

⁵ We focus on characterizing differences in mean impacts between subgroups as a measure of the variation in impacts across students. Appendix Figure 1 plots the full 2018-19 and 2020-21 distributions of each continuous outcome for White, Black, and Hispanic students separately. This example shows that outcomes were generally worse for Black and Hispanic students at all key quantiles of the distribution. Appendix Table 4 shows the 10th, 25th, 50th, 75th, and 90th percentiles of each outcome pre-pandemic and in 2020-21 for all subgroups.

These large increases for Black and Hispanic relative to White peers substantially widened existing gaps in learning time.

English Language Learners (ELL) and economically disadvantaged students (EDS) also experienced much larger increases in absences and chronic absenteeism than their counterparts. ELL students experienced the largest increase in percent of days absent (5.8 percentage points) and chronic absenteeism (20 percentage points) of all subgroups. Differences by disability status and gender were less pronounced, but students with disabilities (SWD) and male students experienced greater increases in each absence outcome than their counterparts.

[Figure 2 about here]

Course grades

Figure 3 compares the distribution of average quality points in 2020-21 to 2018-19. Changes at the 75th and 90th percentiles – the highest course grades – were very small (0.1 and 0 quality points, respectively). However, at the median (50th percentile), average quality points fell 0.4 points, from 3.1 to 2.7, roughly the difference between a B and a B- average. At the 25th and 10th percentile, the change in average quality points was even larger – a reduction of 0.9 points and 1.0 points respectively, or the decrease of a whole letter grade on average. The reduction in grades resulted in average grades equivalent to a D+ for students at the 25th percentile and an F for students at the 10th percentile.

The pattern of changes across the distribution of course grades differs from the pattern for percent days absent. Median student attendance improved slightly in the 2020-21 school year, but for course grades, the median meaningfully decreased. This implies that attendance alone cannot be driving the reduction in grades in the 2020-21 school year, suggesting that students who regularly attended also experienced negative effects on their grades.

[Figure 3 about here]

Figure 4 displays the estimated effects of the pandemic on average quality points (left) and the percent of students who failed at least one course (right) across student subgroups. Pre-pandemic, average quality points were 2.9, about a B, and the percent of students failing at least one course was 18.6 percent. Across all students, average quality points decreased by an average of about half a point, while the probability of failing one or more classes increased 16.7 percentage points. This increase in students failing at least one course is very large, nearly double the pre-pandemic rate.

Turning to school levels, as with absences, middle schoolers experienced larger changes in grades (-0.66 points compared to -0.29 points) and failure rates (23 percentage points compared to 12 percentage points) than high schoolers. Across grade levels, these shifts resulted in greater than a third of students failing at least one course and average grades between a C+ and a B-.

Compared to Black and Hispanic students, White students saw smaller decreases in grades (-0.33 points) and smaller increases in failure rates (12 percentage points). However, in contrast to absences, these negative impacts represent a meaningful change in outcomes – compared to pre-pandemic, 1 in 10 *additional* White students failed a class in 2020-21. Black students fell the equivalent of half a letter grade (-0.52 points) on their average grades in 2020-21, and Hispanic students fell two-thirds of a letter grade (-0.67 points). Rates of course failures for Black and Hispanic students increased by 20 and 25 percentage

point, respectively. These changes represent an *additional* 1 in 5 Black students and 1 in 4 Hispanic students who failed a course in 2020-21. As a result, nearly half of Black and Hispanic students in middle and high school in North Carolina failed at least one class in 2020-21.

Most other patterns of subgroup effects on course grades were similar to those on absences. ELL and EDS students experienced much greater changes in grade outcomes than their peers, with ELL students again experiencing the largest declines in grade averages (0.7 points) and largest increases in course failures (27 percentage points). Differences by gender and disability status were small but differed notably from the patterns for absences with male students and students with disabilities seeing *smaller* impacts on grades and failure rates than their counterparts.

[Figure 4 about here]

Grade retention

Finally, Figure 5 displays regression coefficients for the 2020-21 school year on rates of grade retention from regression models. Grade retention increased an average of 1.6 percentage points across all students. However, this effect was concentrated primarily in high school where students saw an increase in retention rates of 4.4 percentage points (from a baseline of 3.1 percent). This differs from absences and course grades, where middle schoolers saw the largest impacts. This suggests that the high rates of course failures among middle schoolers did not translate into retention at those grade levels.

For racial/ethnic subgroups, White students had lower increases in grade retention (1.1 percentage points) compared to Black and Hispanic students (2.0 and 2.5 percentage point increases, respectively). Because the effects within each subgroup were concentrated among high schoolers, Black and Hispanic high schoolers were retained in grade at rates of 13.0 and 14.5 percent in 2020-21.

Mirroring other outcomes, ED students experienced larger increases in grade retention than non-ED students. However, in contrast to previous outcomes, rates of grade retention were not significantly different for ELL and non-ELL students. Rates for male and female students were also similar, though slightly larger for males. Finally, students with disabilities experienced smaller increases in grade retention than students without disabilities.

[Figure 5 about here]

DISCUSSION

In this study, we examined the effect of the pandemic on three related sets of educational outcomes – absences, course grades, and grade retention. We use descriptive and regression analyses to understand the size of the impacts on these outcomes and how these impacts are distributed across students. We find that the pandemic worsened all outcomes examined and that the variation in effects was considerable. The higher end of the absence distribution saw much greater increases in absences compared to the median and lower end. The median and low end of the grade distribution saw substantial decreases in average grades, while the high end of the grade distribution was largely unchanged. These results highlight that education outcomes became substantially more unequal in 2020-21, with many students experiencing little change in these outcomes, but a substantial subset experiencing much worse outcomes.

Further, most subgroups were negatively affected across all outcomes, but historically marginalized groups, including Black and Hispanic students, EDS students, and ELL students generally experienced more severe

impacts. These groups also had worse outcomes pre-pandemic, matching the findings of greater impacts at the high end of the absence and low end of the course grade distributions. Indeed, within each subgroup, the higher end of the absence distribution and the lower end of the grade distribution were more affected by the pandemic (see Appendix Table 4 and Appendix Figure 1). These marginalized students were also more likely to be exposed to COVID-19, to job loss or death in the family, and to lack access to reliable Internet for remote learning (Gemelas et al., 2022; Mackey et al., 2021; Stelitano et al., 2020). Recovery will depend on reaching the students most severely impacted by the pandemic, many of whom are students of historically marginalized backgrounds.

There are also some notable places where subgroup patterns differ across outcomes. For all absence and grade measures, middle schoolers experienced larger negative changes in outcomes than elementary or high schoolers. However, high schoolers experienced substantially higher retention in grade. This means that even though many middle schoolers missed substantial amounts of school and failed at least one course, they were not retained and continued to the next grade. These students may need more support to fill the gaps in their knowledge and to succeed in subsequent courses.

SWD and ELL students also experienced divergent patterns across outcomes. SWD students were absent more and more likely to be chronically absent than their peers, with this gap increasing during the pandemic. However, SWD students saw smaller decreases in grades, smaller increases in course failures, and smaller changes in grade retention than peers. ELL students, on the other hand, experienced the largest negative effects on attendance and grades but did not see correspondingly large increases in grade retention. Other research finds that during the pandemic SWD and ELL students fared better than their peers on measures of test score growth in North Carolina (NCDPI, 2022). These divergent patterns of outcomes likely highlight the impact of specific policies and programs intended to protect SWD and ELL students from course failures and grade retention as well as specific efforts districts made to serve these students during the pandemic. These patterns also raise questions about how these students are faring as they progress through school.

There are several limitations to this study that are important to note. First, although we document effects across a diverse set of students and a range of outcomes, we are not able to distinguish mechanisms driving the effects. In addition, the pandemic directly affected some key measures, including economic disadvantage, which has historically been measured by qualifying for free or reduced-priced meals and was measured less consistently in 2020-21 due to a universal free lunch policy. The presence of these measures among regression controls could potentially create bias. However, regression results are very similar to descriptive differences across time (shown in Appendix Tables 1 and 3).

In addition, outcomes that rely on specific measurement practices, such as grades and attendance, may not have the same meaning in 2020-21 as pre-pandemic. For example, teachers may have employed more lenient grading practices, while “logging on” to online learning may have been a different kind of attendance than being in school in-person pre-pandemic. However, to the extent that these measures continue to be used by parents, teachers, administrators, and policymakers in interpreting individual- and population-level education outcomes, it is important to understand how they have changed over time.

The variation across the outcomes examined here highlights the inequality of the pandemic’s impacts. While many students attended school at similar rates and earned similar grades to pre-pandemic cohorts, our results suggest that around 20 to 25 percent of students experienced substantial increases in absences

and saw their grade averages drop by one letter grade or more. Many students failed courses or became chronically absent for the first time. These impacts were disproportionately felt among students of historically marginalized backgrounds. However, most still progressed to the next grade level in 2021-22.

These results have several implications. First, administrators and policymakers will need to implement tiered, targeted interventions to provide appropriate supports for students with different needs. The most severely impacted 20 to 25 percent of students likely need sustained, intensive intervention and may continue to need supports for several years. Students who experienced such disruptions at the end of their secondary school careers may require targeted outreach to ensure they remain connected to school, work, and future educational opportunities.

Second, with evidence of substantial absences and learning loss but low rates of grade retention in elementary and middle school, it is likely that teachers and administrators will be working with students of increasingly heterogeneous skill sets within the same grade level. Educators will need new supports and resources to strengthen their abilities to differentiate instruction. Meanwhile, the consequences of falling behind may be most acute in high school when students must pass certain courses to be promoted. Retention in grade is associated with reduced motivation and increased likelihood of dropping out (Kretschmann et al., 2019; Cockx et al., 2019). Additional resources for remediation and acceleration may be especially important to keep students on track in high school, particularly as they reach legal dropout ages.

Finally, administrators, policymakers, and researchers must pay attention to the *full* distribution of student outcomes. For example, in terms of absences, changes in the mean and changes in the median provide different conclusions about the impacts of the pandemic in 2020-21. A rebound in outcomes in the future could mask growing inequality in distributions, as new support systems could help some students recover and accelerate learning while others remain far behind. Attention to the full distribution of student outcomes will be critical to ensuring that recovery reaches all students. In addition, the uniqueness of the pandemic experience makes it difficult to predict how individual students or groups of students will progress in the future. Students who performed well in 2020-21 may experience later mental health impacts, while other students may rapidly catch up. An important next step for us and for other researchers is to continue to track the progress of groups of students and individual students into the 2021-22 and 2022-23 school years. As these results become available, policymakers will need to continue to adjust and adapt responses based on new evidence about how students are faring in school.

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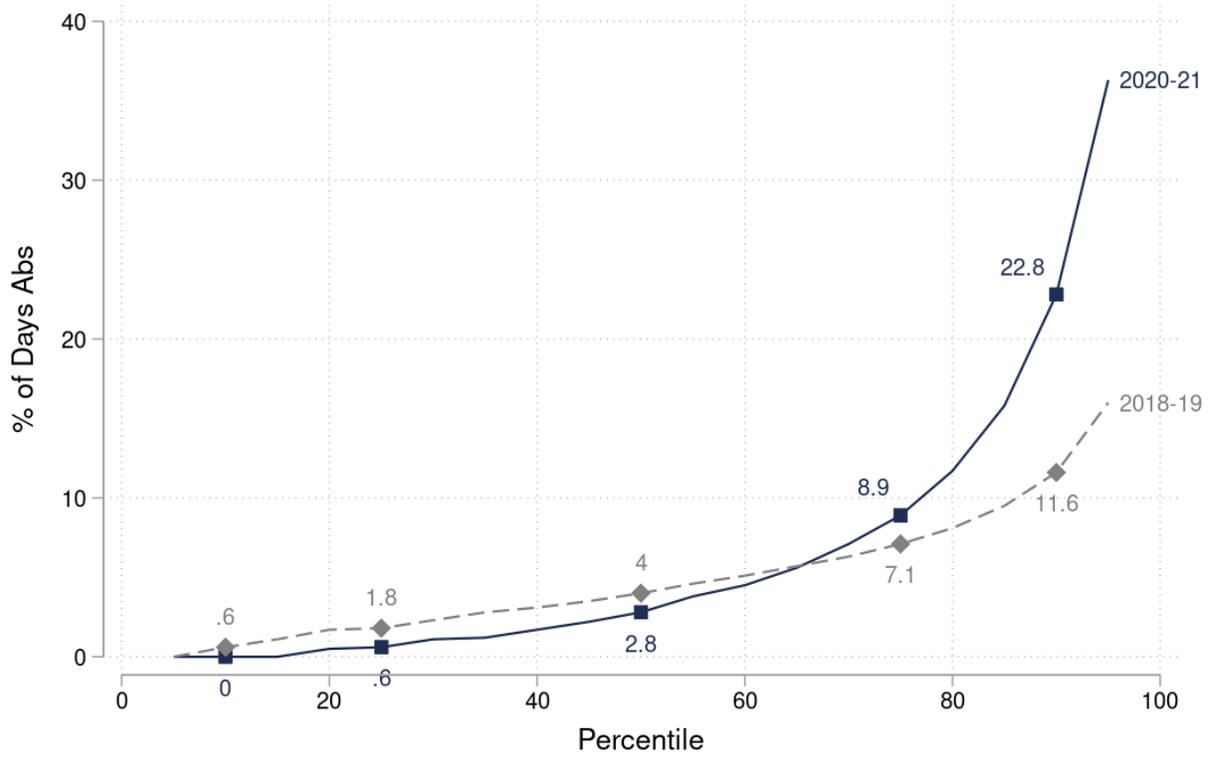
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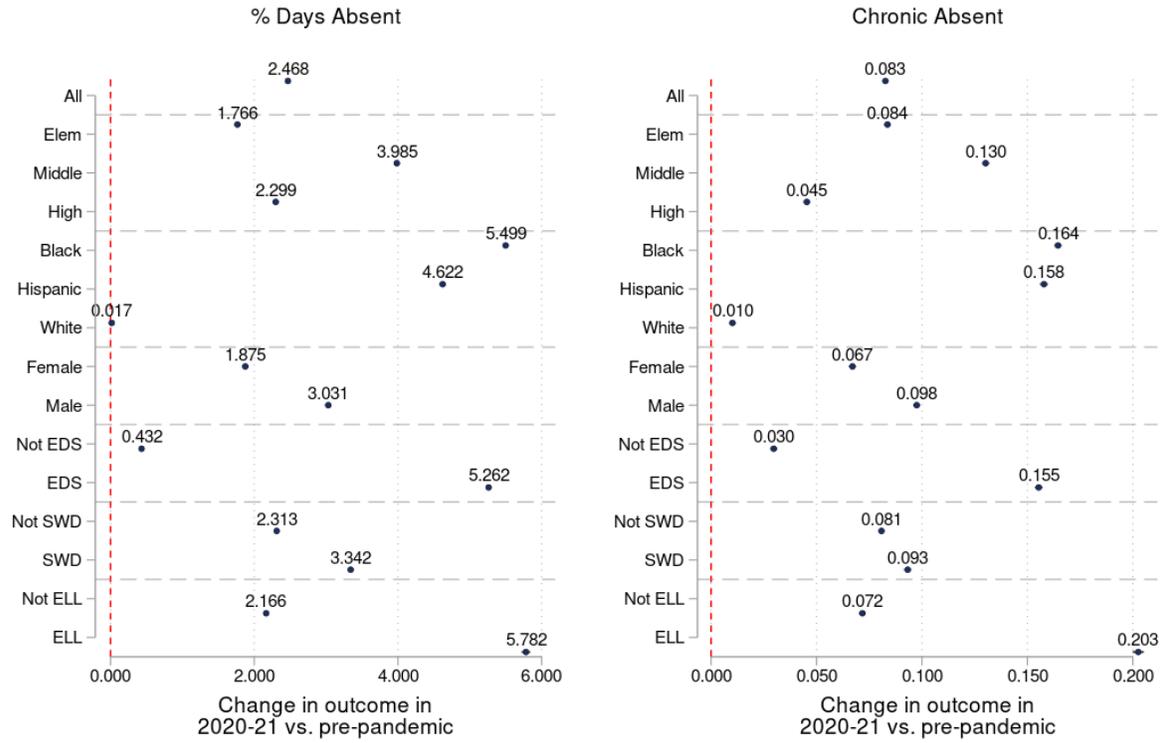
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Figure 1. Descriptive Quantiles of Percent of Days Absent, 2018-19 vs 2020-21



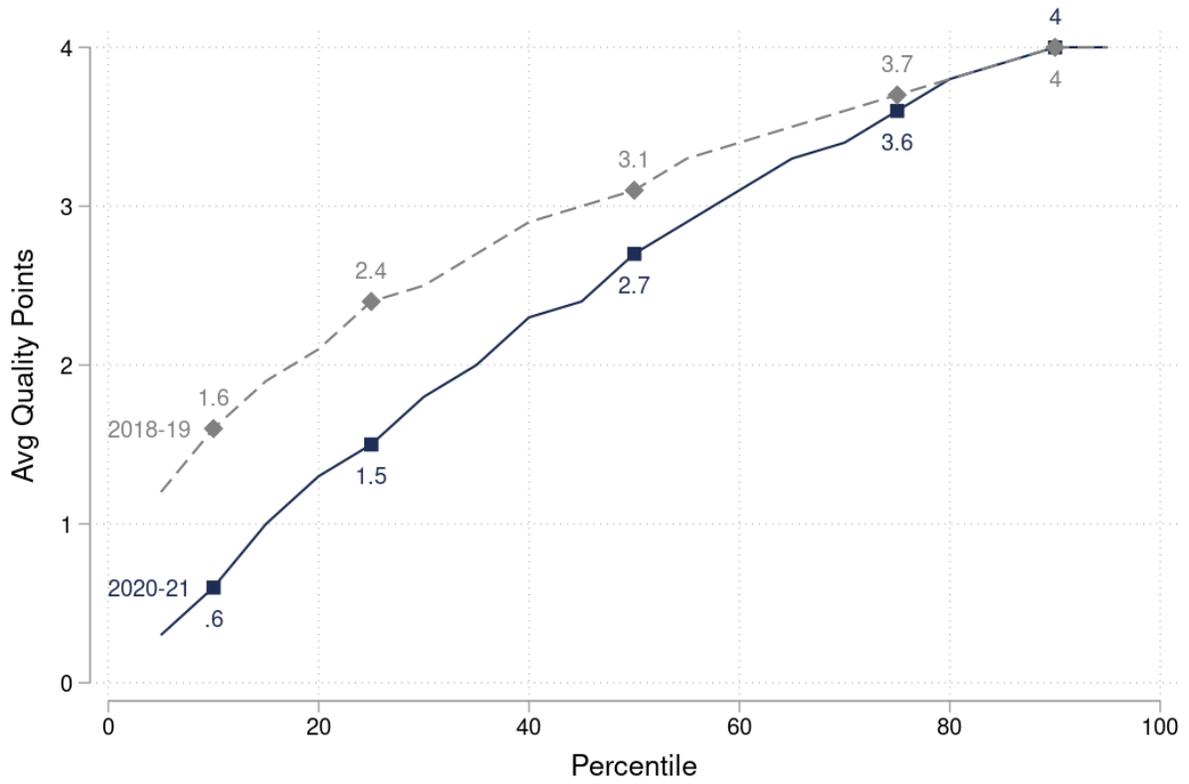
Note. This chart plots every 5th percentile from 5 to 95 for percent of days absent in 2020-21 (solid) and 2018-19 (dashed gray). Labeled points indicate the values at the 10th, 25th, 50th, 75th, and 90th percentiles.

Figure 2. Subgroup Coefficients for the 2020-21 Cohort in Regression Models of Absence Outcomes



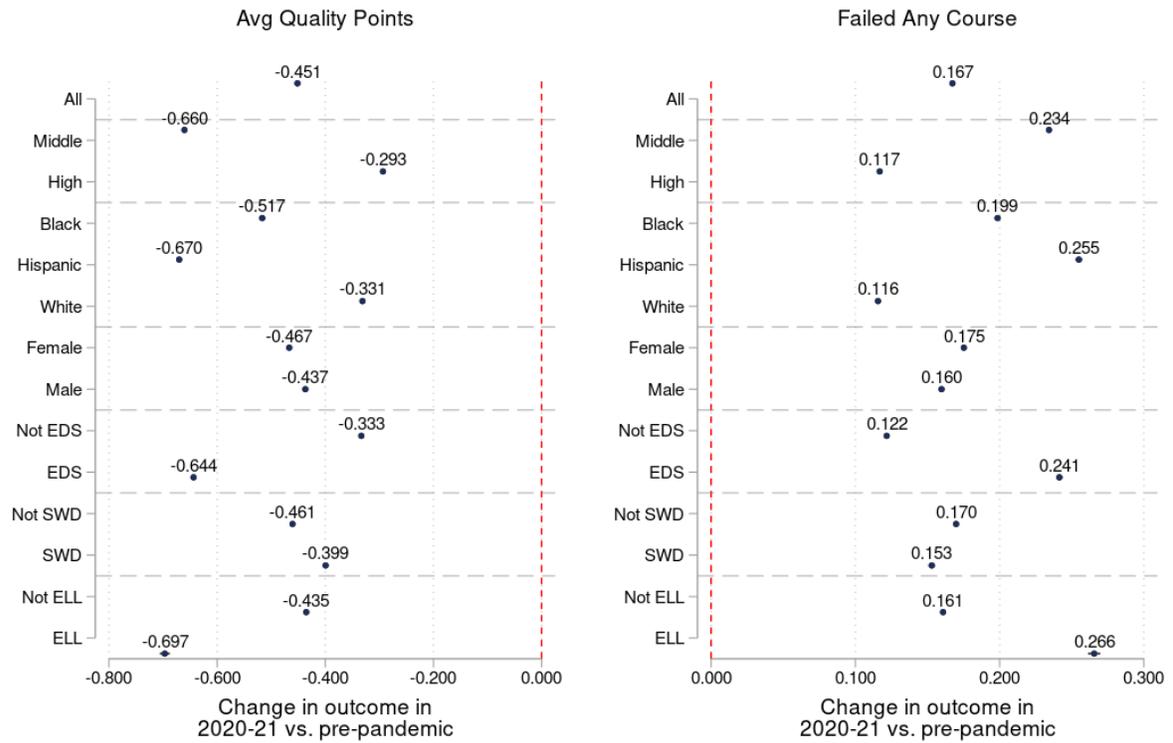
Note: This coefficient plot shows the estimated effect of being in 2020-21 vs. pre-pandemic on outcomes by subgroup from regressions of outcomes on all covariates and an interaction between the pandemic cohort and a subgroup indicator. All coefficients are statistically significant at $\alpha < .05$ level.

Figure 3. Descriptive Quantiles of Average Quality Points, 2018-19 vs 2020-21



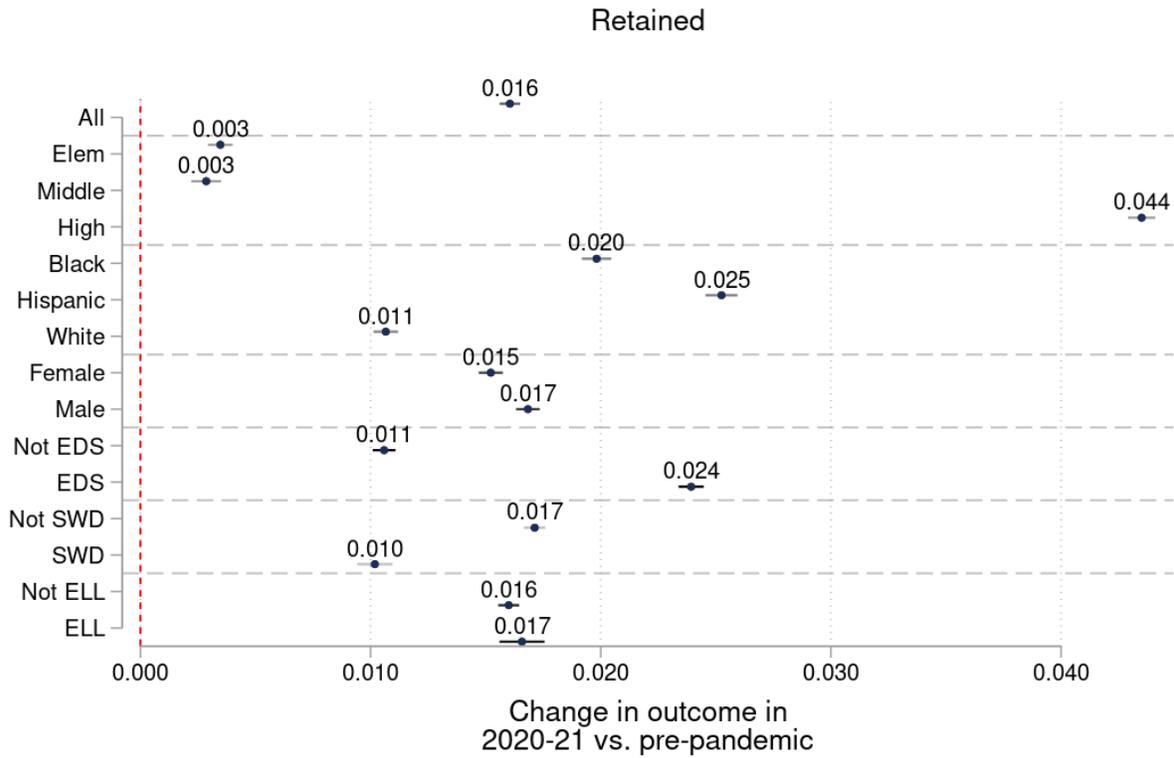
Note. This chart plots every 5th percentile from 5 to 95 for average quality points earned in 2020-21 (solid) and 2018-19 (dashed gray). Labeled points indicate the values of the 10th, 25th, 50th, 75th, and 90th percentiles. Sample includes only middle and high school students.

Figure 4. Subgroup Coefficients for the 2020-21 Cohort in Regression Models of Course Grade Outcomes



Note: This coefficient plot shows the estimated effect of being in 2020-21 vs. pre-pandemic on outcomes by subgroup from regressions of outcomes on all covariates and an interaction between the pandemic cohort and a subgroup indicator. All coefficients are statistically significant at $\alpha < .05$ level.

Figure 5. Subgroup Coefficients for the 2020-21 Cohort in Regression Models of Grade Retention Outcome



Note: This coefficient plot shows the estimated effect of being in 2020-21 vs. pre-pandemic on outcomes by subgroup from regressions of outcomes on all covariates and an interaction between the pandemic cohort and a subgroup indicator. All coefficients are statistically significant at $\alpha < .05$ level.

Supplementary Appendix

Appendix Table 1. Summary statistics for all variables, by year

	Pre-Pandemic			2020-21		
	Mean	SD	N	Mean	SD	N
Gr K-5	0.464		5,804,993	0.439		1,399,406
Gr 6-8	0.226		5,804,993	0.241		1,399,406
Gr 9-12	0.310		5,804,993	0.319		1,399,406
White	0.480		5,804,993	0.451		1,399,406
Black	0.254		5,804,993	0.250		1,399,406
Hispanic	0.177		5,804,993	0.200		1,399,406
Asian	0.034		5,804,993	0.039		1,399,406
Am Ind	0.012		5,804,993	0.011		1,399,406
Multi	0.042		5,804,993	0.049		1,399,406
Male	0.514		5,804,993	0.513		1,399,406
Female	0.486		5,804,993	0.487		1,399,406
EDS	0.484		5,804,993	0.400		1,399,406
In CEP school	0.255		5,804,993	0.297		1,399,406
SWD	0.145		5,804,993	0.152		1,399,406
ELL	0.072		5,804,993	0.085		1,399,406
School: Urban	0.406		5,804,993	0.410		1,399,406
School: Suburban	0.144		5,804,993	0.142		1,399,406
School % non-white	52.186	(25.231)	5,804,993	55.054	(24.666)	1,399,406
% of days abs	5.595	(6.310)	2,849,871	8.316	(13.313)	1,381,427
Chronically absent	0.134		2,849,871	0.237		1,381,427
Quality Point Avg	2.923	(0.896)	3,083,293	2.456	(1.224)	776,028
Failed any course	0.186		3,090,012	0.378		778,050
Retained	0.019		5,804,993	0.032		1,399,406

Note. Data include all students in North Carolina traditional public schools between 2015-16 and 2020-21. % of days abs and chronically absent measured only for 2018 to 2021. Quality points and failed any course measured only for middle and high school students; quality point averages not available for students who only received non-numeric/non-letter grades (e.g., “Pass”).

Appendix Table 2. Quantile regression estimates, no controls and controls + time trend

	Elem			Middle			High		
	1	2	3	1	2	3	1	2	3
% Days Absent									
Q10	-0.588*** (0.0013)	-0.114*** (0.0078)	-0.595*** (0.0025)	-0.041*** (0.0031)	-0.318*** (0.0100)	0.172*** (0.0104)	-0.015*** (0.0025)	-0.318*** (0.0079)	-0.571*** (0.0029)
Q25	-0.753*** (0.0033)	-0.851*** (0.0099)	-0.655*** (0.0029)	-0.690*** (0.0053)	-0.648*** (0.0149)	-0.637*** (0.0052)	-1.175*** (0.0037)	-1.168*** (0.0141)	-1.184*** (0.0042)
Q50	-0.681*** (0.0059)	-0.920*** (0.0146)	-0.636*** (0.0050)	-0.067*** (0.0131)	-0.273*** (0.0236)	-0.067*** (0.0102)	-1.823*** (0.0088)	-1.622*** (0.0207)	-1.776*** (0.0073)
Q75	1.694*** (0.0204)	0.776*** (0.0258)	1.920*** (0.0186)	4.631*** (0.0451)	3.584*** (0.0504)	4.835*** (0.0454)	1.659*** (0.0435)	1.131*** (0.0490)	1.749*** (0.0427)
Q90	8.072*** (0.0525)	6.187*** (0.0581)	8.364*** (0.0526)	16.820*** (0.1010)	14.337*** (0.1127)	16.949*** (0.1029)	14.454*** (0.1101)	11.521*** (0.1239)	14.685*** (0.1152)
N	3,111,843	3,111,843	3,111,843	1,569,389	1,569,389	1,569,389	2,150,319	2,150,319	2,150,319
Avg Quality Points									
Q10				-1.375*** (0.0031)	-1.196*** (0.0056)	-1.375*** (0.0035)	-0.804*** (0.0035)	-0.691*** (0.0056)	-0.804*** (0.0033)
Q25				-1.225*** (0.0037)	-1.031*** (0.0045)	-1.200*** (0.0037)	-0.667*** (0.0029)	-0.600*** (0.0046)	-0.700*** (0.0026)
Q50				-0.730*** (0.0042)	-0.600*** (0.0037)	-0.694*** (0.0046)	-0.333*** (0.0037)	-0.259*** (0.0036)	-0.333*** (0.0051)
Q75				-0.206*** (0.0029)	-0.163*** (0.0023)	-0.179*** (0.0028)	0.125*** (0.0016)	-0.024*** (0.0024)	0.054*** (0.0015)
Q90				0.000 (0.0003)	-0.007*** (0.0006)	0.000 (0.0005)	0.125*** (0.0005)	0.009*** (0.0010)	0.125*** (0.0006)
N				1,632,921	1,632,921	1,632,921	2,226,400	2,226,400	2,226,400

Note. Results show quantile coefficients and std errors for Year = 2020-21 (referent: 2015-16 to 2018-19). Model 1 = no controls. Model 2 = full controls + time trends. Model 3 = PS weighted, no controls.

*** p<.001, ** p<.01, * p<.05

Appendix Table 3: Subgroup outcome means, pre-pandemic and 2020-21

Elem	Mean	% Abs		Chronically Abs		Mean QP		Failed Any		Retained	
		Pre	20-21	Pre	20-21	Pre	20-21	Pre	20-21	Pre	20-21
	SD	(4.50)	(10.16)								
	N	1,424,710	670,788	1,424,710	670,788					2,903,608	681,218
Middle	Mean	5.42	9.36	0.131	0.272	3.12	2.45	0.141	0.396	0.005	0.007
	SD	(5.73)	(14.06)			(0.78)	(1.22)				
	N	708,618	367,770	708,618	367,770	1,376,338	359,828	1,377,521	360,347	1,413,947	371,858
High	Mean	6.57	8.92	0.179	0.240	2.79	2.50	0.213	0.349	0.031	0.072
	SD	(8.44)	(15.56)			(0.94)	(1.22)				
	N	925,291	466,057	925,291	466,057	1,855,680	466,031	1,861,652	467,785	1,875,427	471,327
White	Mean	5.22	5.56	0.113	0.149	3.16	2.82	0.124	0.262	0.013	0.021
	SD	(5.49)	(9.80)			(0.81)	(1.13)				
	N	1,465,272	686,763	1,465,272	686,763	1,620,982	385,575	1,624,679	386,725	2,999,231	693,880
Black	Mean	6.08	11.36	0.163	0.333	2.56	2.06	0.274	0.487	0.028	0.044
	SD	(7.26)	(15.97)			(0.90)	(1.18)				
	N	768,629	377,130	768,629	377,130	819,973	205,693	821,932	206,231	1,573,329	382,387
Hispanic	Mean	5.66	10.05	0.136	0.296	2.73	2.10	0.237	0.500	0.023	0.045
	SD	(6.58)	(14.54)			(0.90)	(1.20)				
	N	543,414	290,248	543,414	290,248	520,476	157,624	521,453	158,004	1,067,296	295,210
Asian	Mean	3.62	3.45	0.059	0.087	3.41	3.20	0.067	0.170	0.008	0.012
	SD	(4.54)	(8.39)			(0.70)	(1.02)				
	N	109,482	58,625	109,482	58,625	103,436	29,545	103,633	29,617	212,944	59,226
AmInd	Mean	7.78	12.06	0.237	0.345	2.73	2.14	0.233	0.489	0.029	0.035
	SD	(8.05)	(16.75)			(0.89)	(1.22)				
	N	35,557	16,411	35,557	16,411	39,710	8,962	39,751	8,976	75,073	16,567
Multi	Mean	5.98	8.70	0.157	0.255	2.89	2.38	0.195	0.402	0.019	0.034
	SD	(6.57)	(13.42)			(0.89)	(1.22)				
	N	135,365	74,584	135,365	74,584	128,416	38,311	128,714	38,436	260,406	75,885
Female	Mean	5.43	7.42	0.127	0.211	3.10	2.63	0.135	0.330	0.014	0.027
	SD	(6.05)	(12.34)			(0.82)	(1.20)				
	N	1,490,731	734,876	1,490,731	734,876	1,580,920	404,444	1,583,592	405,293	3,015,278	743,938
Male	Mean	5.62	8.62	0.136	0.245	2.77	2.33	0.229	0.407	0.023	0.037
	SD	(6.45)	(13.70)			(0.93)	(1.22)				

		% Abs		Chronically Abs		Mean QP		Failed Any		Retained	
N		Pre	20-21	Pre	20-21	Pre	20-21	Pre	20-21	Pre	20-21
		1,569,144	770,021	1,569,144	770,021	1,653,880	421,712	1,658,381	423,142	3,177,437	780,359
Not EDS	Mean	4.54	5.43	0.082	0.143	3.17	2.78	0.113	0.272	0.011	0.021
	SD	(5.14)	(10.15)			(0.80)	(1.14)				
	N	1,669,073	918,316	1,669,073	918,316	1,796,870	529,425	1,800,299	530,841	3,274,205	932,191
EDS	Mean	6.70	12.11	0.192	0.363	2.63	1.94	0.270	0.543	0.028	0.050
	SD	(7.20)	(15.80)			(0.91)	(1.18)				
	N	1,390,933	586,686	1,390,933	586,686	1,438,019	296,773	1,441,763	297,636	2,918,777	592,212
Not ELL	Mean	5.53	7.77	0.132	0.220	2.96	2.52	0.176	0.355	0.017	0.031
	SD	(6.24)	(12.86)			(0.89)	(1.21)				
	N	2,836,552	1,383,617	2,836,552	1,383,617	3,097,630	775,846	3,104,427	777,952	5,767,027	1,399,957
ELL	Mean	5.48	10.98	0.127	0.330	2.37	1.77	0.341	0.598	0.035	0.045
	SD	(6.45)	(14.95)			(0.90)	(1.11)				
	N	223,454	121,385	223,454	121,385	137,259	50,352	137,635	50,525	425,955	124,446
Not SWD	Mean	5.31	7.69	0.121	0.217	3.00	2.54	0.165	0.354	0.015	0.030
	SD	(5.96)	(12.75)			(0.87)	(1.22)				
	N	2,588,615	1,277,445	2,588,615	1,277,445	2,783,642	706,392	2,785,812	707,058	5,299,080	1,294,693
SWD	Mean	6.72	9.96	0.190	0.292	2.51	2.13	0.293	0.461	0.039	0.046
	SD	(7.60)	(14.57)			(0.92)	(1.18)				
	N	471,391	227,557	471,391	227,557	451,247	119,806	456,250	121,419	893,902	229,710

Appendix Table 4. Subgroup percentiles, Pre and 2020-21

% Abs	10th pctl		25th pctl		50th pctl		75th pctl		90th pctl	
	Pre	20-21								
Elem	0.6	0.0	1.8	1.1	4.0	2.9	6.4	7.8	10.0	17.5
Middle	0.6	0.0	1.8	1.1	4.0	3.8	7.0	11.0	11.4	27.1
High	0.6	0.0	1.7	0.0	4.0	2.2	8.0	9.4	14.5	28.6
White	0.6	0.0	1.8	0.6	4.0	2.2	6.8	6.0	10.6	14.2
Black	0.6	0.0	1.7	1.1	4.0	4.6	7.6	14.7	13.1	33.1
Hisp.	0.6	0.0	1.8	1.1	4.0	4.4	7.0	12.2	11.6	28.1
Asian	0.0	0.0	1.1	0.0	2.3	0.6	4.7	2.8	8.0	8.5
AmInd	1.2	0.0	3.0	1.1	5.7	5.0	9.8	15.6	16.0	36.7
Multi	0.6	0.0	2.2	0.6	4.3	3.4	7.6	10.3	12.5	24.7
Female	0.6	0.0	1.7	0.6	4.0	2.8	6.9	8.2	11.2	20.9
Male	0.6	0.0	1.8	0.6	4.0	3.3	7.0	9.7	11.6	24.7
Not EDS	0.6	0.0	1.7	0.5	3.4	1.7	5.8	5.6	9.1	13.9
EDS	1.1	0.0	2.3	1.7	4.8	6.0	8.6	15.8	14.0	33.5
Not ELL	0.6	0.0	1.8	0.6	4.0	2.8	6.9	8.5	11.4	22.1
ELL	0.6	0.0	1.7	1.7	4.0	5.1	6.9	13.8	11.3	29.8
Not SWD	0.6	0.0	1.7	0.6	4.0	2.8	6.8	8.4	10.9	21.8
SWD	0.6	0.0	2.3	1.1	4.6	4.3	8.5	12.1	14.2	28.1
Avg QP										
Middle	2.0	0.7	2.6	1.4	3.3	2.6	3.8	3.6	4.0	4.0
High	1.4	0.6	2.2	1.5	3.0	2.8	3.6	3.6	3.9	4.0
White	2.0	1.0	2.8	2.0	3.4	3.1	3.8	3.8	4.0	4.0
Black	1.3	0.4	2.0	1.1	2.6	2.0	3.3	3.0	3.7	3.7
Hispanic	1.5	0.4	2.1	1.1	2.9	2.1	3.4	3.1	3.8	3.8
Asian	2.4	1.5	3.1	2.7	3.6	3.7	4.0	4.0	4.0	4.0
AmInd	1.5	0.5	2.1	1.1	2.9	2.1	3.4	3.3	3.8	3.9
Multi	1.6	0.6	2.3	1.4	3.0	2.5	3.6	3.5	4.0	4.0
Female	1.9	0.8	2.6	1.7	3.3	2.9	3.8	3.8	4.0	4.0
Male	1.5	0.6	2.1	1.3	2.9	2.4	3.5	3.4	3.9	3.9
Not EDS	2.0	1.0	2.8	2.0	3.4	3.1	3.9	3.8	4.0	4.0
EDS	1.4	0.4	2.0	1.0	2.8	1.9	3.3	2.9	3.8	3.6
Not ELL	1.7	0.7	2.4	1.6	3.1	2.8	3.7	3.6	4.0	4.0
ELL	1.1	0.3	1.8	0.9	2.4	1.7	3.0	2.6	3.5	3.4
Not SWD	1.8	0.7	2.5	1.6	3.2	2.8	3.7	3.7	4.0	4.0
SWD	1.3	0.5	1.9	1.1	2.6	2.1	3.3	3.1	3.7	3.8

Appendix Table 5

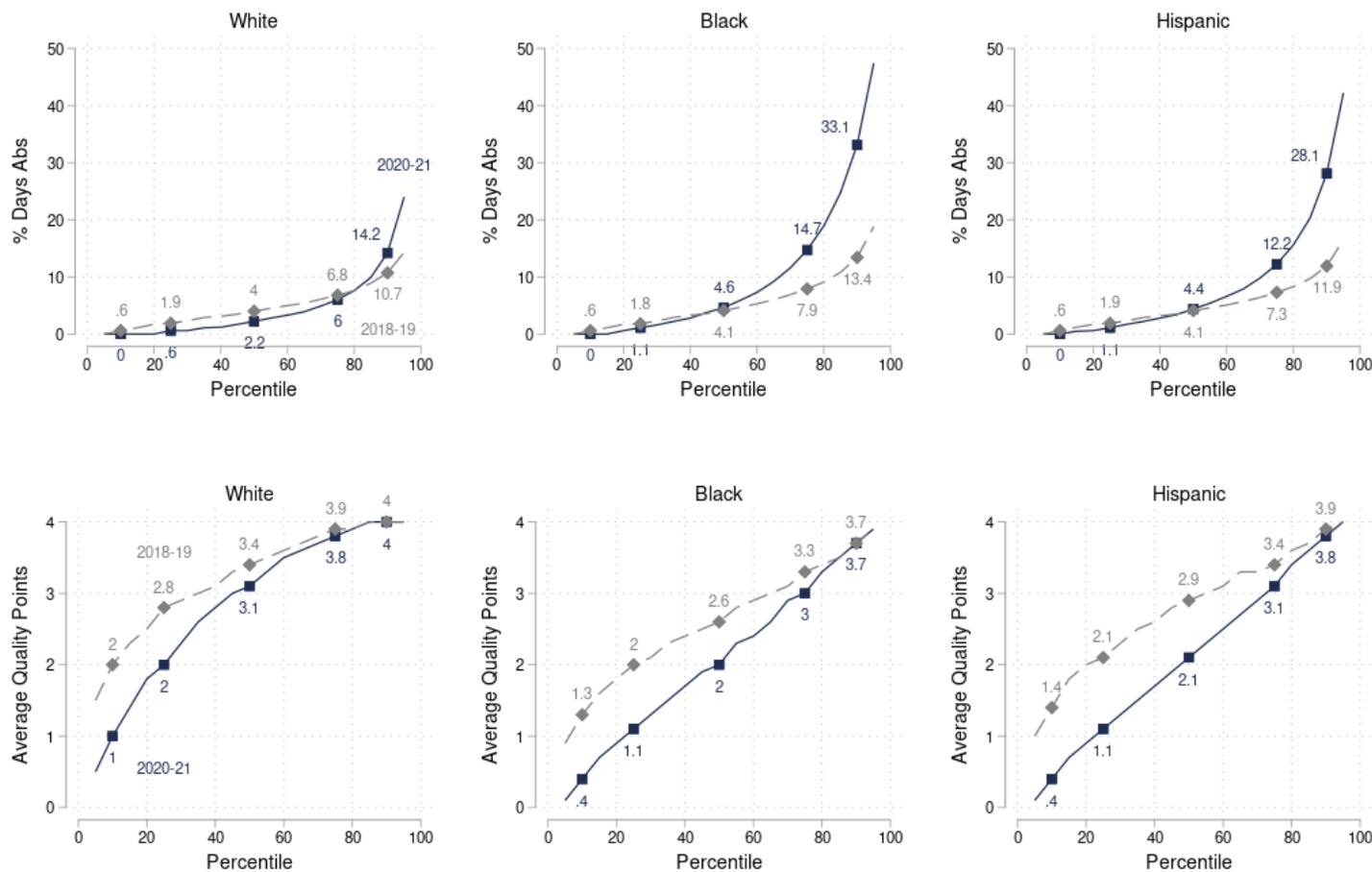
	% Days Absent	Chronically Absent	Mean Quality Points	Failed Any Course	Retained in Grade
All					
2020-21 (base: Pre-Pandemic)	2.47*** (0.018)	0.083*** (0.0008)	-0.45*** (0.002)	0.167*** (0.0009)	0.016*** (0.0002)
Grade Level					
2020-21	1.77*** (0.020)	0.084*** (0.0009)	-0.66*** (0.002)	0.234*** (0.0010)	0.003*** (0.0003)
2020-21 x Middle	2.22*** (0.019)	0.047*** (0.0008)			-0.001 (0.0003)
2020-21 x High	0.53*** (0.017)	-0.038*** (0.0007)	0.37*** (0.002)	-0.117*** (0.0010)	0.040*** (0.0003)
Race/ethnicity					
2020-21	4.44*** (0.069)	0.101*** (0.0031)	-0.60*** (0.010)	0.238*** (0.0047)	0.009*** (0.0013)
2020-21 x Asian	-4.80*** (0.077)	-0.096*** (0.0034)	0.36*** (0.012)	-0.147*** (0.0053)	-0.001 (0.0014)
2020-21 x Black	1.06*** (0.069)	0.064*** (0.0030)	0.08*** (0.010)	-0.039*** (0.0047)	0.011*** (0.0013)
2020-21 x Hispanic	0.18** (0.069)	0.057*** (0.0030)	-0.07*** (0.010)	0.017*** (0.0048)	0.017*** (0.0013)
2020-21 x Multi	-1.70*** (0.075)	-0.013*** (0.0033)	0.08*** (0.011)	-0.048*** (0.0052)	0.009*** (0.0014)
2020-21 x White	-4.42*** (0.068)	-0.091*** (0.0030)	0.27*** (0.010)	-0.122*** (0.0047)	0.002 (0.0013)
Gender					
2020-21	1.88*** (0.020)	0.067*** (0.0009)	-0.47*** (0.002)	0.175*** (0.0010)	0.015*** (0.0003)
2020-21 x Male	1.16*** (0.015)	0.030*** (0.0006)	0.03*** (0.002)	-0.015*** (0.0010)	0.002*** (0.0003)
EDS					
2020-21	0.43*** (0.019)	0.030*** (0.0008)	-0.33*** (0.002)	0.122*** (0.0009)	0.011*** (0.0003)
2020-21 x EDS	4.83*** (0.015)	0.126*** (0.0006)	-0.31*** (0.002)	0.120*** (0.0010)	0.013*** (0.0003)
SWD					
2020-21	2.31*** (0.019)	0.081*** (0.0008)	-0.46*** (0.002)	0.170*** (0.0009)	0.017*** (0.0002)

2020-21 x SWD	1.03*** (0.020)	0.012*** (0.0009)	0.06*** (0.003)	-0.017*** (0.0014)	-0.007*** (0.0004)
ELL					
2020-21	2.17*** (0.018)	0.072*** (0.0008)	-0.44*** (0.002)	0.161*** (0.0009)	0.016*** (0.0002)
2020-21 x ELL	3.62*** (0.027)	0.131*** (0.0012)	-0.26*** (0.005)	0.105*** (0.0021)	0.001 (0.0005)
N	6,831,551	6,831,551	3,859,321	3,868,062	7,204,399

Note. Table displays OLS coefficients on estimate of pandemic cohort variable (2020-21) and interaction of this variable with subgroup indicators, run separately for each subgroup by grade level, race/ethnicity, gender, EDS, SWD, and ELL. N is same for all regressions within each outcome. All models controls for full controls + time trends.

*** p<.001, ** p<.01, * p<.05

Appendix Figure 1. Quantiles of average quality points and percent of days absent by race/ethnicity



Note. These charts plot every 5th percentile from 5 to 95 for percent of days absent (top) and average quality points earned (bottom) in 2020-21 (solid navy) and 2018-19 (dashed gray), by racial/ethnic subgroup. Labeled points indicate the values of the 10th, 25th, 50th, 75th, and 90th percentiles. Quality points sample includes only middle and high school students.