

Examining the COVID-19 Pandemic's Impacts on ACT Scores: Spring 2022 Update

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Executive Summary

The research summarized in this paper examines the effects of the COVID-19 pandemic on student performance on the ACT® test. We compare scores during the three years preceding the pandemic (2018, 2019, and early 2020) to scores in 2021 and 2022 while accounting for changes in the tested population across years. For students tested in 2022, we also examine differences in mode of learning across demographic groups. The study's major findings include the following:

- 1. Significant ACT score declines were observed for 2021, and scores only rebounded slightly in 2022.**
 - Relative to pre-pandemic cohorts, ACT Composite scores declined by 0.66 score points for students in the 2021 cohort and declined by 0.59 score points for those in the 2022 cohort.
 - The score declines for the 2022 cohort are smaller for reading and science but slightly larger for math.
 - The decline in Composite scores is comparable to losing 3 months of instruction. In math, the decline is comparable to having 3 fewer students (per 100) ready for college algebra.
 - Composite scores improved in 2022 for students who are African American, two or more races, or White. But scores continued to decline for students who are Hispanic, Native American, or Native Hawaiian/other Pacific Islander.
- 2. Female students of color from urban schools were more likely to learn online.**
 - During the 2020–2021 school year, 10th-grade students of color, particularly those who are Asian American or African American, were more likely to learn online compared to students who are White.
 - Students who are female and from urban schools were more likely to learn online during the 2020–2021 school year.



- During the 2021–2022 school year, most students returned to in-person learning. Non-Hispanic students of color were more likely to remain learning online.

Introduction

The COVID-19 pandemic caused widespread disruptions to the educational system in the United States and across the world. At the onset of the pandemic in March 2020, schools were forced to replace on-site instruction with virtual instruction. During the 2020–2021 academic year, many students learned online or under hybrid learning formats. While the 2021–2022 school year saw a return to traditional modes of classroom instruction with most students returning to on-site instruction, concerns about the pandemic’s negative effects on academic achievement persist.

Many states and districts across the United States administer the ACT test to their 11th-grade student body during the school day. Using ACT test scores and other data collected from administering the ACT test, we address the following research questions:

1. How was students’ college readiness, as measured by ACT test scores, impacted by the COVID-19 pandemic?
2. Did level of participation in online/virtual instruction vary across demographic groups?

Note. Our earlier report *Examining the COVID-19 Pandemic’s Impacts on Native American Students’ College and Career Readiness* included some of the same research presented in this report, but it focused on students who are Native American, used a different method for classifying students’ race/ethnicity, and addressed a different set of research questions. Furthermore, the findings presented in this report are based on updated data from spring 2022.

Methods

Sample

We used ACT data from spring school-day testing programs for 11th-grade cohorts of 2018 through 2022. For each cohort, schools were included in the sample if they tested at least 75% of their 11th-grade student body. This ensures that the ACT data are more likely to be representative of the school population. Only schools that met the 75% threshold for at least one pre-pandemic cohort (2018, 2019, or 2020) and one pandemic cohort (2021 or 2022) were included. For the 2020 cohort, the ACT school-day tests occurred in February and early March, prior to school closures.



Table 1 provides the number of students for each cohort included in the analysis of ACT Composite scores. Students are grouped by gender, race/ethnicity, school type (public or private), and school locale (rural, town, suburb, or urban).

Table 1. Sample Size, by Cohort Year and Student and School Group

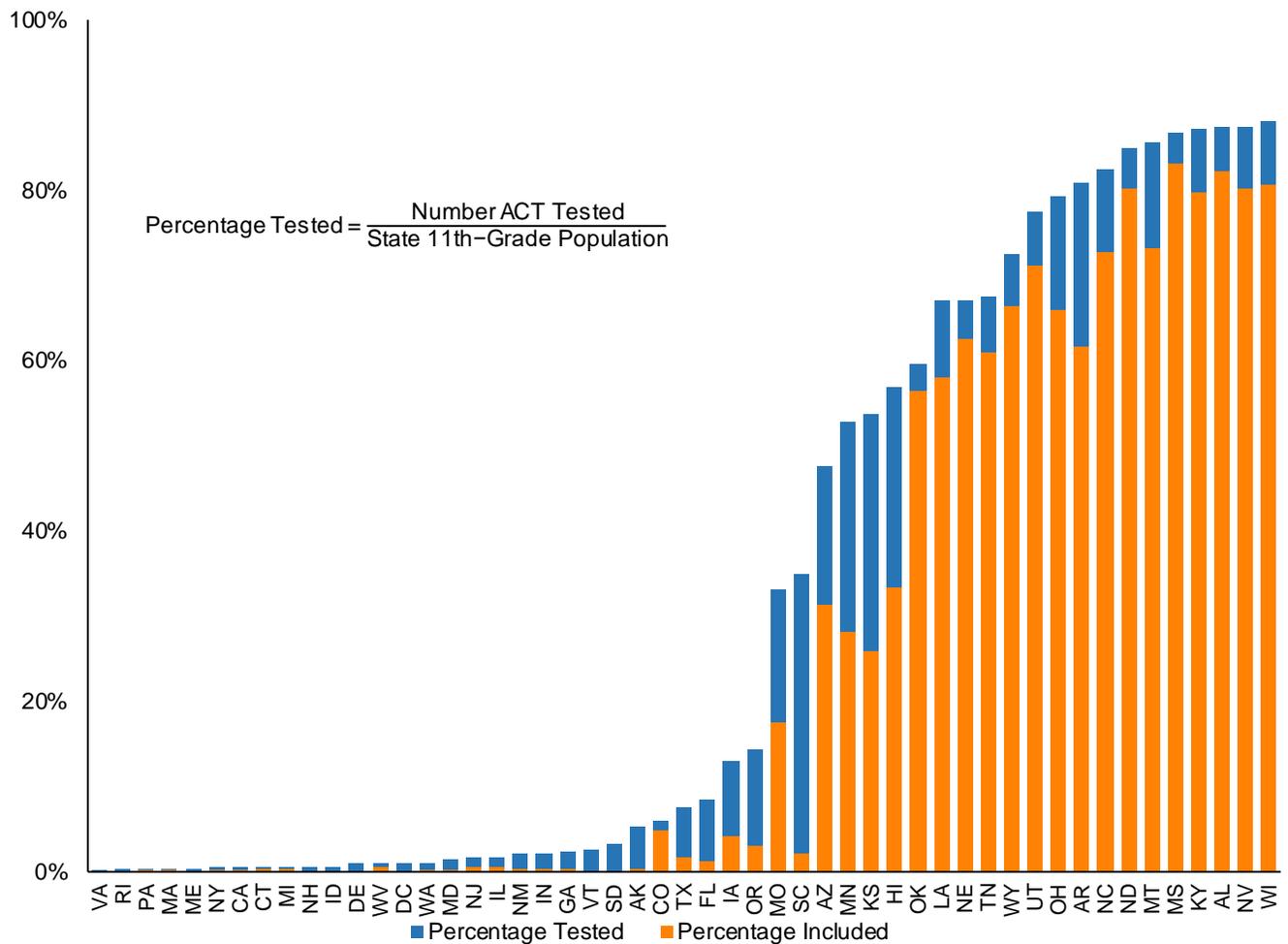
Group	11th-Grade Cohort Year				
	2018	2019	2020	2021	2022
Total	756,444	767,833	491,348	655,461	726,209
Gender					
Female	376,826	384,070	243,762	325,993	359,441
Male	379,618	383,763	247,586	329,468	366,768
Race/ethnicity					
African American	104,331	105,256	64,861	78,749	95,278
Asian American	22,757	23,818	16,459	18,861	24,171
Hispanic	108,609	114,755	69,299	93,934	115,781
Native American	9,168	9,119	4,112	7,111	8,706
Native Hawaiian/OPI	2,590	2,686	1,817	1,730	2,654
Two or more races	40,270	41,164	25,692	39,299	42,393
White	468,719	471,035	309,108	415,777	437,226
School type					
Public	726,136	736,943	471,395	625,028	696,596
Private	30,308	30,890	19,953	30,433	29,613
School locale					
Rural	180,901	183,113	123,110	167,327	168,432
Town	126,637	128,605	79,486	117,082	118,946
Suburb	238,162	238,181	160,577	206,660	231,643
Urban	210,744	217,934	128,175	164,392	207,188

Note. OPI = other Pacific Islander.

Overall, the sample was 50% female and 50% male; 13% African American, 3% Asian American, 15% Hispanic, 1% Native American, < 1% Native Hawaiian or other Pacific Islander, 6% two or more races, and 62% White. The sample was 96% from public and 4% from private schools; 24% from schools in rural areas, 17% from schools in town settings, 32% from schools in suburban settings, and 27% from schools in urban settings.

Across the five cohorts, over 4.4 million students took the ACT test, and nearly 3.4 million (76%) were enrolled at one of the 5,979 high schools that met the inclusion criteria. Figure 1 provides the percentage across the five cohorts of each state's 11th-grade population that took the ACT test, as well as the percentage that met the inclusion criteria. Schools from 42 states met the inclusion criteria.

Figure 1. Percentage Tested and Included, by State



Data

The ACT test includes four multiple-choice sections—English, math, reading, and science—as well as an optional writing test. Some states and districts administer the ACT during the school day through the ACT State and District testing programs. ACT scores are traditionally used for college entrance (e.g., admissions, scholarships, placement) and are also used for state and federal accountability and program evaluation. The ACT test is usually administered to students in 11th grade but may also be administered in 10th and 12th grades. More detailed information about the test is provided in the *ACT Technical Manual* (ACT, 2020).

Racial/Ethnic Categories

ACT collects student race/ethnicity data in two steps: (a) Students indicate if they are of Hispanic or Latino background; (b) Students select all racial groups to which they belong, with options of American Indian/Alaska Native, Asian, Black/African American, Native Hawaiian/other Pacific Islander, White, and prefer not to respond or none of these apply.



Following federal guidelines for reporting a single racial/ethnic category, ACT classifies students as Hispanic if they indicate they are of Hispanic ethnicity, regardless of which racial groups they identify with. Otherwise, we put students in the “two or more races” category if they are not Hispanic and selected two or more of the race options. If neither of the first two conditions were true, we put students who selected one of the race options in that racial group. Race/ethnicity data were available for 88% of the sample. For the remainder who chose “prefer not to respond” or who were missing data, race/ethnicity was imputed on the basis of a student’s school percentage in each racial/ethnic group.

School Characteristics

For each public school in the sample, data were obtained from the National Center for Education Statistics (2021; <https://nces.ed.gov/ccd/files.asp>) Common Core of Data, including 11th-grade class size, percentage of students eligible for free or reduced-price lunch, percentage of students who are Native American, percentage of students who are African American, and percentage of students who are Hispanic. For each private school in the sample, 11th-grade class size was estimated from the school’s total enrollment obtained from a MDR (2021; <https://mdrededucation.com/>) school-level data set. For both public and private schools, school locale (rural, town, suburb, or urban) was also obtained from the MDR data.

For each high school and each cohort year, percent tested was calculated as the number of 11th-grade students who took the ACT test divided by the 11th-grade class size. Percent tested was used to determine whether each school met the 75% threshold, and it was also used for sample weighting and as a covariate in the statistical analysis (described later in the Statistical Models and Sample Weighting sections) to account for differences across cohorts in school percent tested. Similarly, for each student, the number of days between September 1 and the ACT test date was also used for sample weighting and as a covariate in the statistical analysis to account for any differences in time spent in school prior to taking the ACT test.

Mode of Learning Data

For students in the 2022 cohort, additional data were collected from students on their mode of learning during the school years 2020–2021 (their 10th-grade year) and 2021–2022 (their 11th-grade year). On the ACT student questionnaire administered on the MyACT platform, students were asked two questions:

1. This school year, are you attending school online, in person (at school), or a mix of the two (hybrid)?
2. Last school year, did you attend school online, in person (at school), or a mix of the two (hybrid)?

Students were given the following response options: online only, mostly online, about the same online and in person, mostly in person, and in person only. Students were not required to respond to the questions, and in some states, the questions were not included on the ACT



student questionnaire. Therefore, the mode of learning data is not available for the entire sample. Of the students in the 2022 cohort who were enrolled at schools meeting the inclusion criteria, 44% provided responses to the mode of learning questions, 24% did not provide responses, and 32% were from states that did not include the questions on the ACT student questionnaire.

The mode of learning data is used to address Research Question 2: Did level of participation in online/virtual instruction vary across demographic groups?

Statistical Models

Comparison of ACT Test Scores

To address Research Question 1 (How was students' college readiness, as measured by ACT test scores, impacted by the COVID-19 pandemic?), analysis of ACT test scores was conducted for each section (English, mathematics, reading, and science) as well as for the Composite score.

We fit weighted hierarchical linear regression models to estimate the adjusted difference in average test scores across years for each section test and the Composite score. (In the Sample Weighting section, we describe how the data were weighted.) The models included a random intercept for the school effect and included student gender, race/ethnicity, number of days from September 1 to the ACT test date, and school percent tested as covariates. The general form of the regression model is test score = cohort group + covariates + school effect.

The model is a special case of an analysis of covariance (ANCOVA) model where cohort group (2018–2020, 2021, or 2022) is the categorical variable of interest. From the model, we estimated the COVID-19 pandemic impact for the 2021 cohort as $\mu_{2021} - \mu_{2018-2020}$ where μ_{Cohort} is the estimated adjusted mean ACT test score for the cohort. Similarly, we estimated the pandemic impact for the 2022 cohort as $\mu_{2022} - \mu_{2018-2020}$. Therefore, the pandemic impact is measured as the adjusted mean ACT score for each pandemic year relative to the average over the three most recent pre-pandemic years. We refer to the estimates of the pandemic impact as the **adjusted score difference**.

The hierarchical linear regression models were also used to estimate the adjusted score differences for different racial/ethnic groups, including African American, Asian American, Hispanic, Native American, Native Hawaiian/other Pacific Islander, White, and two or more races. Group-specific estimates were obtained by fitting the hierarchical linear regression model with interactions between the cohort (year) and the group indicator.

The adjusted score differences can be expressed using other metrics to help us understand the magnitude of the score declines:

- **Instructional months** expresses the score declines in terms of comparable number of months of schooling. A prior ACT research study (Allen et al., 2020) found that ACT test

scores increase when students are in school by 0.218 Composite score points per month, on average. The per-month increases for the section test scores are 0.310 (English), 0.193 (math), 0.182 (reading), and 0.186 (science). So, for example, an ACT Composite score decline of 0.60 points is comparable to 2.8 (0.60/0.218) fewer months of instruction.

- **College ready per 100** estimates how many fewer students (per 100) are ready for success in first year credit-bearing college courses. Prior research by ACT has established the probability of earning B or higher grades in first-year college courses for each possible ACT score (Allen et al., 2017). To estimate how many fewer students are ready for success in first-year college courses, we transformed each ACT score to the probability of success associated with that score, and then we fit the same hierarchical linear regression models described earlier. The estimates relate to the following college courses: English composition I (ACT English), college algebra (ACT math), social science courses (ACT reading), and biology (ACT science).
- ***d***, which equals the adjusted score difference divided by the standard deviation of the test score, represents the adjusted score difference. The *d* statistic is a common effect size measure used in many areas of research to describe the size of a difference with a standardized metric.
- **Percentile change** expresses the adjusted score differences on the percentile scale. For example, a percentile change of -4.0 suggests that average performance during the pandemic was 4 percentile score points below what it was before the pandemic.

Comparison of Mode of Learning Across Demographic Groups

To address Research Question 2 (Did level of participation in online/virtual instruction vary across demographic groups?), we first compared the relative frequency of the mode of learning survey responses across racial/ethnic groups.

Using the survey responses, we created a numeric measure of in-person schooling. Numeric values were assigned to the responses as follows: online only 0%, mostly online 25%, about the same amount online and in person 50%, mostly in person 75%, and in person only 100%.

We used hierarchical linear regression to examine predictors of the numeric measure for in-person schooling. The model included a random intercept for the school effect and used several student and school demographic variables, including gender, race/ethnicity, school 11th-grade enrollment, school percent eligible for free or reduced-price lunch, school percent of students of color (Black, Hispanic, Native American, or two or more races), and school locale (rural, town, suburban, or urban). Prior to fitting the models, the school-level numeric variables were centered to have a mean of 0.

The analyses were done separately for the mode of learning survey questions for 2020–2021 (when the 2022 cohort was in 10th grade) and 2021–2022 (when the 2022 cohort was in 11th grade).

Sample Weighting

To analyze ACT scores, we weighted the sample to ensure that the five cohorts were similar in terms of demographic characteristics, percent tested, and test date. We used propensity score weighting (Austin, 2011) to weight each cohort to be similar to the pooled data set, which combines the data across the five cohorts. The procedure used logistic regression to estimate each student's probability of being in each cohort based on gender, race/ethnicity, school percent tested, and number of days between September 1 and the ACT test date. Note that the variables used for weighting were also used as covariates in the hierarchical regression models. By weighting the sample and using covariates, we are more confident that differences in ACT scores across cohorts are not due to differences in the populations tested or when they tested (Jonsson Funk et al., 2011).

As described earlier, mode of learning data were collected for some students in the 2022 cohort but were not available for all students. To analyze the mode of learning differences across demographic groups, we applied weights to make the sample with mode of learning data available more comparable to the total 2022 cohort. We used propensity score weighting to weight the data for each racial/ethnic group. The procedure used logistic regression to estimate each student's probability of having mode of learning data given the student's gender, ACT Composite score, and school characteristics (percent in each racial/ethnic group, 11th-grade enrollment size, percent eligible for free or reduced-price lunch, and public/private status).

Results

Analysis of ACT Scores

Table 2 provides the estimated ACT Composite score declines for 2021 for each group. The table shows the average ACT Composite score for the pre-pandemic years (2018–2020), the average score for 2021, the raw difference, and the adjusted difference. The adjusted difference incorporates the sample weighting and hierarchical regression model and represents the estimate of the pandemic's effect on ACT test scores. Table 2 also includes the standard error of the adjusted score difference and the standardized effect size measure (d).

The decline in ACT Composite scores for 2021 was mostly consistent across the different groups, with all groups except Asian American students showing significant score declines. ACT Composite scores only declined by 0.03 points for students who are Asian American but declined by 0.45 score points for students who are Native American, 0.56 points for students who are Hispanic, 0.59 points for students who are Native Hawaiian/other Pacific Islander, 0.64 points for students who are two or more races, 0.65 points for students who are African American, and 0.72 points for students who are White. For the total group, ACT Composite



scores declined by 0.66 score points. The score declines for students who are female (–0.68) were similar to those for students who are male (–0.63). The score declines were also similar for students attending private schools (–0.72) and those attending public schools (–0.66). The score declines were also consistent across different school locales.

Table 2. Average ACT Composite Score Changes for the 2021 Cohort, by Group

Group	Average Composite score					
	2018–2020	2021	Diff.	Adj. diff.	SE adj. diff.	<i>d</i>
Total	19.17	18.71	–0.46	–0.66	0.01	–0.12
Gender						
Female	19.39	18.90	–0.49	–0.68	0.01	–0.13
Male	18.95	18.52	–0.43	–0.63	0.01	–0.12
Race/ethnicity						
African American	15.92	15.44	–0.49	–0.65	0.02	–0.12
Asian American	21.61	22.01	0.40	–0.03	0.04	–0.01
Hispanic	17.23	16.84	–0.39	–0.56	0.02	–0.11
Native American	16.28	15.84	–0.44	–0.45	0.06	–0.08
Native Hawaiian/OPI	16.48	16.11	–0.37	–0.59	0.11	–0.11
Two or more races	19.18	18.60	–0.58	–0.64	0.03	–0.12
White	20.28	19.67	–0.61	–0.72	0.01	–0.14
School Type						
Public School	19.04	18.56	–0.47	–0.66	0.01	–0.12
Private School	22.38	21.73	–0.64	–0.72	0.03	–0.14
School Locale						
Rural	18.41	17.90	–0.51	–0.63	0.01	–0.12
Town	18.61	18.00	–0.61	–0.68	0.02	–0.13
Suburb	19.90	19.54	–0.36	–0.64	0.01	–0.12
Urban	19.34	19.00	–0.34	–0.69	0.01	–0.13

Note. Diff. = difference; Adj. = adjusted; SE = standard error; *d* = adjusted difference in standard deviation units; OPI = other Pacific Islander.

Table 3 reports the same results for the 2022 cohort. The decline in ACT Composite scores was similar for 2022 (–0.59) and 2021 (–0.66), suggesting that academic performance has not rebounded much for the 2022 cohort. The 2022 cohort suffered the same interruptions as the 2021 cohort, so this result is not surprising.

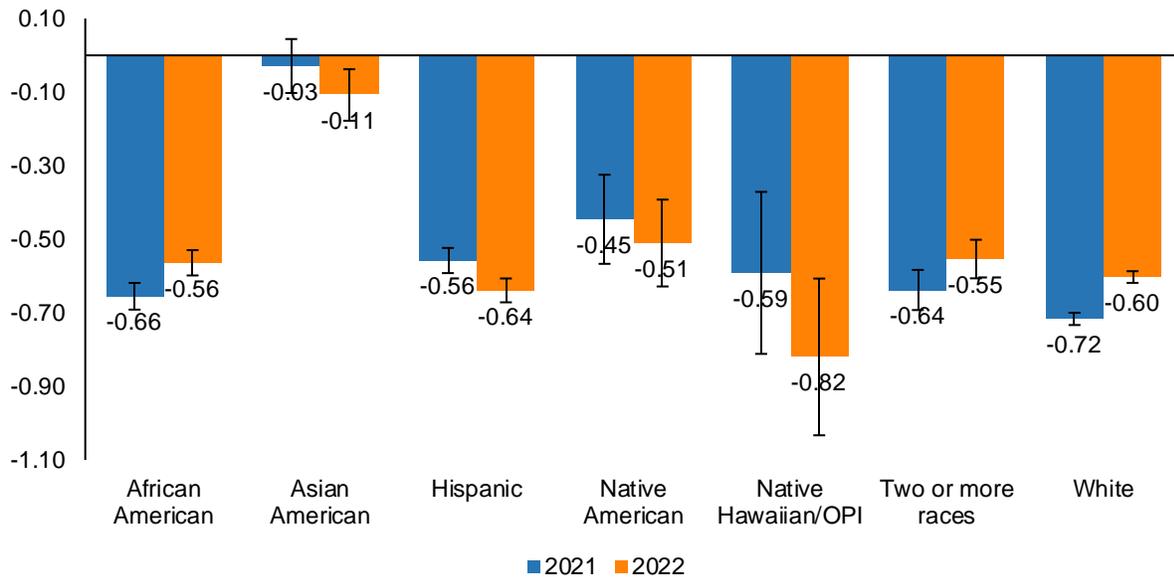
Table 3. Average ACT Composite Score Changes for the 2022 Cohort, by Group

Group	Average Composite Score					
	2018-2020	2022	Diff.	Adj. Diff.	SE Adj. Diff.	<i>d</i>
Total	19.17	18.60	-0.57	-0.59	0.01	-0.11
Gender						
Female	19.39	18.80	-0.59	-0.60	0.01	-0.11
Male	18.95	18.40	-0.55	-0.57	0.01	-0.11
Race/ethnicity						
African American	15.92	15.49	-0.43	-0.56	0.02	-0.11
Asian American	21.61	21.53	-0.08	-0.11	0.04	-0.02
Hispanic	17.23	16.55	-0.67	-0.64	0.02	-0.12
Native American	16.28	15.80	-0.48	-0.51	0.06	-0.10
Native Hawaiian/OPI	16.48	15.60	-0.88	-0.82	0.11	-0.16
Two or more races	19.18	18.62	-0.56	-0.55	0.03	-0.10
White	20.28	19.73	-0.55	-0.60	0.01	-0.11
School type						
Public School	19.04	18.48	-0.56	-0.58	0.01	-0.11
Private School	22.38	21.52	-0.85	-0.78	0.03	-0.15
School locale						
Rural	18.41	17.97	-0.44	-0.56	0.01	-0.11
Town	18.61	18.06	-0.55	-0.60	0.02	-0.11
Suburb	19.90	19.31	-0.59	-0.56	0.01	-0.11
Urban	19.34	18.64	-0.70	-0.62	0.01	-0.12

Note. Diff. = difference; Adj. = adjusted; SE = standard error; *d* = adjusted difference in standard deviation units; OPI = other Pacific Islander.

Relative to pre-pandemic scores, the score declines were least severe for students who are Asian American (-0.11). Similar to what was observed for the 2021 cohort, the ACT Composite score declines were mostly similar across the other racial/ethnic groups (Figure 2). Score declines were less severe for 2022 relative to 2021 for students who are African American, two or more races, or White. Score declines were more severe for 2022 relative to 2021 for students who are Asian American, Hispanic, Native American, and Native Hawaiian/other Pacific Islander.

Figure 2. Adjusted Difference in Average ACT Composite Score, by Race/Ethnicity and Year



Note. The vertical bars represent 95% confidence intervals for each estimate. OPI = other Pacific Islander.

A slight gender difference persisted for the 2022 cohort with scores dropping by 0.60 points for students who are female and by 0.57 points for students who are male. The public/private school difference was larger than for the 2022 cohort with scores dropping by 0.58 points for students from public schools and by 0.78 points for students from private schools. Similar to what was observed for the 2021 cohort, the score declines were very consistent across different school locales.

Table 4 and Figure 3 show the results for each ACT section test score in addition to the Composite score for the total group. For math, the score decline was a little more severe for the 2022 cohort (–0.74) as it was for the 2021 cohort (–0.70). For English, reading, and science, the score declines are less severe for the 2022 cohort.

Table 4 shows that the ACT score declines for 2022 are comparable to receiving at least 2 fewer months of instruction. For math, the score declines are comparable to 3.6 fewer months of instruction for the 2021 cohort and 3.8 fewer months of instruction for the 2022 cohort.

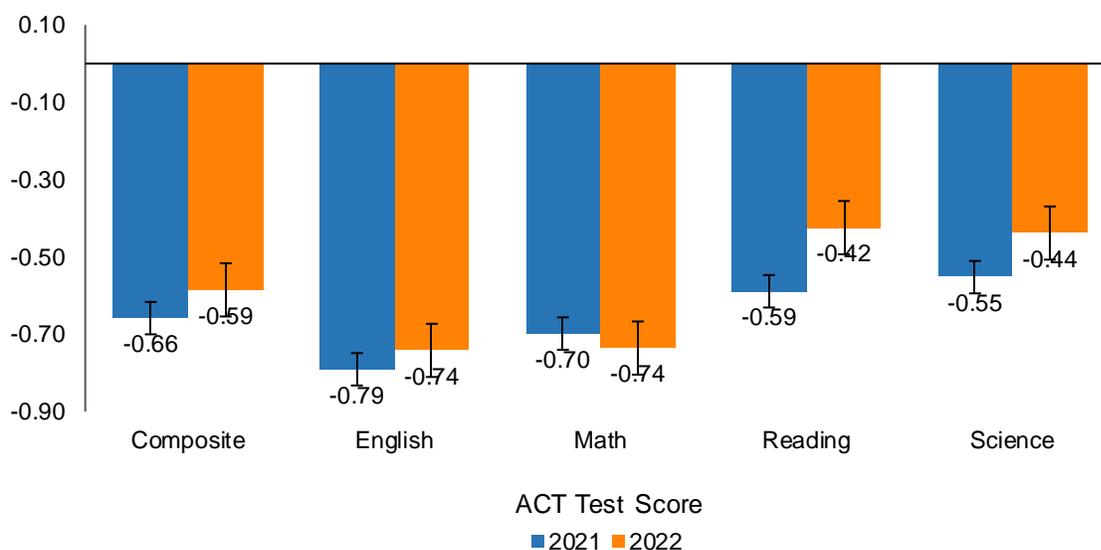
Translated to the number of students who are ready for first-year college courses, the score declines are comparable to between 1.2 (reading, 2022 cohort) and 2.9 (math, 2021 and 2022 cohorts) fewer students (per 100) who are college-ready. The score declines corresponded to *d* statistics ranging from –0.07 to –0.15 and percentile changes ranging from –2.7 to –5.8.

Table 4. ACT Score Changes, by Cohort and Score

Cohort	Score	Adjusted difference		Instructional months	College ready per 100	<i>d</i>	Percentile change
		EST	SE				
2021	Composite	-0.66	0.01	-3.0	—	-0.12	-5.0
	English	-0.79	0.01	-2.6	-2.3	-0.12	-4.9
	Math	-0.70	0.01	-3.6	-2.9	-0.14	-5.5
	Reading	-0.59	0.01	-3.2	-1.6	-0.09	-3.7
	Science	-0.55	0.01	-3.0	-2.1	-0.10	-4.1
2022	Composite	-0.59	0.01	-2.7	—	-0.11	-4.4
	English	-0.74	0.01	-2.4	-2.2	-0.12	-4.6
	Math	-0.74	0.01	-3.8	-2.9	-0.15	-5.8
	Reading	-0.42	0.01	-2.3	-1.2	-0.07	-2.7
	Science	-0.44	0.01	-2.4	-1.6	-0.08	-3.3

Note. EST = estimate; SE = standard error; *d* = adjusted difference in standard deviation units.

Figure 3. Adjusted Difference in Average ACT Scores, by Test Section and Year



Note. The vertical bars represent 95% confidence intervals for each estimate.

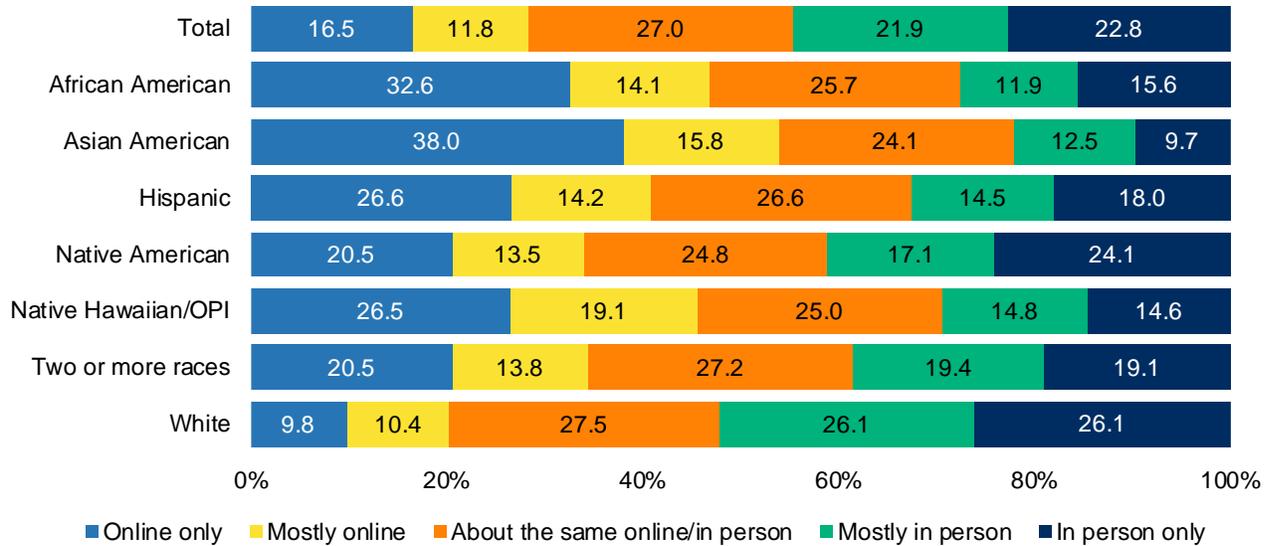
Mode of Learning

The relative frequencies of each mode of learning category are provided in Figure 4 for the 2020–2021 school year (when the students were in 10th grade) and Figure 5 for the 2021–2022 school year (when the students were in 11th grade).



For the 2020–2021 school year, 17% of the sample learned exclusively online, 12% learned mostly online, 27% learned about the same amount online and in person, 22% learned mostly in person, and 23% learned in person only. The percentage who learned exclusively online varied dramatically across racial/ethnic groups, from 38% for students who are Asian American, 33% for students who are African American, and 10% for students who are White.

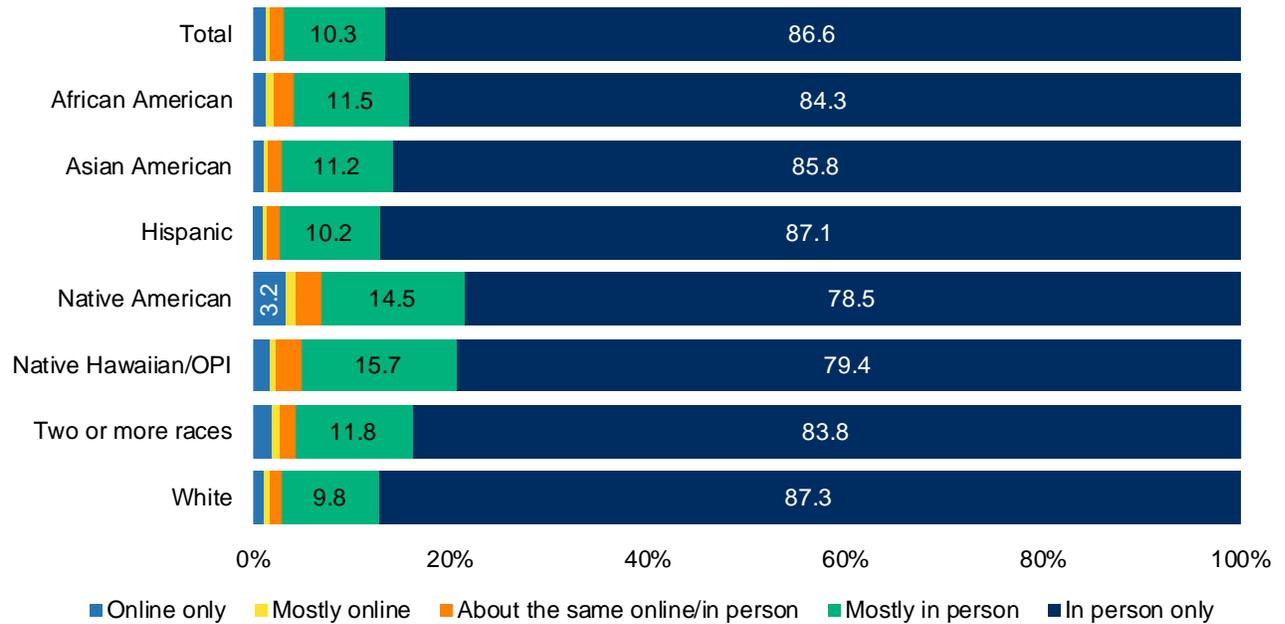
Figure 4. Percentage in Each Mode of Learning Category During 2020–2021 School Year for 2022 Cohort, by Race/Ethnicity



Note. OPI = other Pacific Islander.

For the 2021–2022 school year, the overwhelming majority of students returned to in-person learning: 1.2% of the sample learned exclusively online, 0.5% learned mostly online, 1.4% learned about the same amount online and in person, 10% learned mostly in person, and 87% learned in person only. Students who are Native American were less likely to return to in-person schooling: Only 79% learned in person only, compared to 84% African American, 86% Asian American, 87% Hispanic, and 87% White students. During the 2021–2022 school year, 3% of students who are Native American learned exclusively online, which was the highest percentage among the various racial/ethnic groups.

Figure 5. Percentage in Each Mode of Learning Category During 2021–2022 School Year for 2022 Cohort, by Race/Ethnicity



Note. Data labels are only shown for three categories: online only, mostly in person, and in person only (for Native American). OPI = other Pacific Islander.

Predictors of In-Person Schooling

Hierarchical linear regression was used to examine which student and school variables were associated with students' mode of learning. During the 2020–2021 (10th grade) school year, students attended school in person 56% of the time on average. All variables examined were significant predictors of percentage of time spent in person during the 2020–2021 (10th grade) school year (Table 5).

The regression coefficients (EST in Table 5) represent the change in percentage of time spent learning in person associated with each 1-unit increase in the predictor. For example, $EST = -2.38$ for female gender means that the percentage of time spent learning in person was 2.38 percentage points lower for female students relative to male students on average. Relative to students who are White, in-person schooling percentages were lower for students from other racial/ethnic groups, especially for students who are Asian American ($EST = -10.56$), African American ($EST = -8.42$), or Native Hawaiian/other Pacific Islander ($EST = -6.27$).

Table 5. Hierarchical Linear Regression Results for Predictors of In-Person Schooling During 2020–2021 School Year

Predictor	EST	SE	t	p-value
Intercept	51.46	0.67	—	—
Female gender	–2.38	0.10	–24.39	< .0001
Race/ethnicity (White reference group)				
African American	–8.42	0.19	–44.83	< .0001
Asian American	–10.56	0.27	–39.10	< .0001
Hispanic	–4.28	0.16	–26.18	< .0001
Native American	–5.00	0.49	–10.19	< .0001
Native Hawaiian/OPI	–6.27	0.94	–6.65	< .0001
Two or more races	–4.56	0.22	–20.65	< .0001
School Characteristics				
School grade 11 enrollment (in hundreds)	–1.34	0.19	–7.00	< .0001
School % FRL eligible	0.03	0.01	2.52	0.012
School % URM	–0.29	0.01	–22.04	< .0001
Private school	19.99	1.19	16.85	< .0001
School locale (Urban reference group)				
Rural	15.79	0.86	18.34	< .0001
Town	13.68	0.88	15.53	< .0001
Suburban	6.47	0.82	7.91	< .0001

Note. EST = estimate; SE = standard error; t = t statistic; OPI = other Pacific Islander; FRL = free and reduced-price lunch; URM = underrepresented racial/ethnic minority.

For each 1 unit increase in a school's percentage of underrepresented minority students, in-person schooling percentage declined by 0.29 percentage points. The in-person schooling percentage was also lower for students at larger schools and schools serving fewer students who are eligible for free or reduced-price lunch. Relative to public schools, the in-person schooling percentage was higher for students at private schools (EST = 19.99). Relative to schools in urban locales, the in-person schooling percentage was higher for students attending school in rural (EST = 15.79), town (EST = 13.68), and suburban (EST = 6.47) locales.

Collectively, the results for the 2020–2021 school year suggest that 10th-grade students who are male, White, and attend a small private school in a rural locale that has a low percentage of underrepresented minority students were most likely to attend school in person.

During the 2021–2022 (11th grade) school year, students attended school in person 95% of the time, on average. Generally, the associations between the predictor variables and percentage of time spent in person were weaker than what was observed for the 2020–2021 school year (Table 6).

Gender was not predictive of time spent in school in person during the 2021–2022 school year. Students who are Native Hawaiian/other Pacific Islander, Native American, African American, Asian American, or two or more races were less likely to attend school in person, relative to students who are White. But the differences were considerably smaller than what was observed for 2020–2021.

Students attending larger schools and students attending private schools were more likely to attend school in person during the 2021–2022 school year, whereas students from schools serving more students eligible for free or reduced-price lunch were less likely to attend school in person. Students attending schools in rural or town locales were more likely to attend school in person relative to students attending schools in urban locales, but the differences were much smaller than what was observed in the 2020–2021 school year.

Table 6. Hierarchical Linear Regression Results for Predictors of In-Person Schooling During 2021–2022 School Year

Predictor	EST	SE	t	p-value
Intercept	91.63	0.40	231.65	< .0001
Female gender	–0.03	0.05	–0.68	0.496
Race/ethnicity (White reference group)				
African American	–0.85	0.09	–9.48	< .0001
Asian	–0.76	0.13	–5.94	< .0001
Hispanic	–0.11	0.08	–1.44	0.151
Native American	–1.74	0.23	–7.46	< .0001
Native Hawaiian/OPI	–2.46	0.45	–5.49	< .0001
Two or more races	–0.70	0.11	–6.67	< .0001
School Characteristics				
School grade 11 enrollment (in hundreds)	1.09	0.11	9.64	< .0001
School % FRL eligible	–0.02	0.01	–2.20	0.028
School % URM	0.00	0.01	0.10	0.924
Private school	4.98	0.69	7.19	< .0001
School locale (Urban reference group)				
Rural	3.52	0.50	6.98	< .0001
Town	2.64	0.52	5.10	< .0001
Suburban	0.46	0.48	0.96	0.338

Note. EST = estimate; SE = standard error; t = t statistic; OPI = other Pacific Islander; FRL = free and reduced-price lunch; URM = underrepresented racial/ethnic minority.

Discussion

Revisiting the Research Questions

How was students' college readiness, as measured by ACT test scores, impacted by the COVID-19 pandemic?

ACT test scores from 11th-grade state and district testing programs declined during the pandemic years of 2021 and 2022. The analysis adjusted for changes in the tested population across years in race/ethnicity, gender, school percent tested, and number of days between September 1 and the ACT test date. **Because of the adjustments, the declines in average ACT scores are less likely to be due to changes in the tested population and more likely to be due to the pandemic.**

The decline in ACT Composite scores was slightly less severe for the 2022 cohort relative to the 2021 cohort with scores declining by 0.66 points for the 2021 cohort and by 0.59 points for the 2022 cohort. Relative to 2021, scores in 2022 improved most in reading and science and improved slightly for English. But math scores declined slightly from 2021 to 2022. This suggests that the negative effects of the pandemic on college and career readiness have persisted, especially in math. One negative consequence of the continued score decline in math is that fewer students will be ready for STEM-related coursework, which could lead to fewer students pursuing careers in STEM fields.

The ACT score declines are generally comparable to 2 to 4 months of lost instruction, with the effect most severe for math for the 2022 cohort (3.8 fewer months of instruction). The score declines translate to fewer students being ready for first-year college courses. For the 2022 cohort, 2.2 fewer students (per 100) are ready for English composition and 2.9 fewer students (per 100) are ready for college algebra.

Overall, the results show that the negative effects of the pandemic on college and career readiness are mostly similar across different racial/ethnic groups, but there is some evidence that the effects have worsened somewhat from 2021 to 2022 for students who are Hispanic, Native American, or Native Hawaiian/other Pacific Islander. It's possible that the lower rates of in-person learning among the Native American and Native Hawaiian/other Pacific Islander groups have contributed to their continued score declines.

Did level of participation in online/virtual instruction vary across demographic groups?

During the 2020–2021 school year (10th grade), students in the study sample were nearly as likely to participate in online/virtual mode as they were to participate in person: 17% of the sample learned exclusively online, 12% learned mostly online, 27% learned about the same amount online and in person, 22% learned mostly in person, and 23% learned in person only. Participation in online only or mostly online modes of instruction varied across racial/ethnic groups: 54% for students who are Asian American, 47% for students who are African American,



46% for students who are Native Hawaiian/other Pacific Islander, 41% for students who are Hispanic, 34% for both students who are Native American or are two or more races, and 20% for students who are White. In addition to their racial/ethnic group, other predictors of in-person participation included gender (males more likely to attend in person) and school characteristics (students from smaller, private, and rural schools more likely to attend in person). Although most students returned to in-person instruction during the 2021–2022 school year, 2% of the sample remained learning mostly or entirely online.

Conclusion

Because ACT scores have the same meaning across years and predict college and career success, these scores are useful indicators of academic progress. As states face the challenges of the pandemic and its aftermath, ACT scores can help us understand how much student learning and preparation for college and careers have been affected. Data from 2021 and 2022 State and District testing programs suggest that the Composite score declines are comparable to about 3 months of lost instruction and, depending on the subject area, 1 to 3 fewer students (per 100) ready for college coursework. By continuing to monitor ACT scores, we can better understand whether the loss in achievement will persist for future cohorts.

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