

# A Synthesis of ACT Research Examining COVID's Impact on College Readiness, Career Plans, and Prediction of College Success

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## Introduction

The worldwide consequences of the COVID-19 pandemic affected virtually every domain of human life. The pandemic's impact on the education and development of children and adolescents was particularly severe given the closure of schools, shifts to online learning, and cancelation of college entrance exam administrations early in the pandemic. These drastic changes in education and learning assessment methods, as well as the social and emotional turmoil presented by the pandemic, led many to question how student learning outcomes might change. Many predicted that time spent out of school, combined with the compounding anxieties associated with the unprecedented circumstances, might lead to worse educational outcomes. Researchers at ACT invested a great deal of time and effort in examining the impact of the COVID-19 pandemic on student outcomes and experiences.

In this paper, we highlight and summarize this work. We describe these projects in order of student age and grade level, beginning with assessments of the pandemic's impact on ACT<sup>®</sup> Aspire<sup>®</sup> scores (test takers in Grades 3 through 10), followed by research on PreACT<sup>®</sup> outcomes (test takers primarily in Grade 10), research on outcomes/differential outcomes on the ACT<sup>®</sup> test by demographic, and research on students' career choices and the predictive validity of precollege achievement measures before and after the onset of the pandemic. By examining these findings in conjunction with each other, we can more clearly see the overarching effects of pandemic-related changes on educational outcomes. This synthesis includes findings from ten papers, some of which contain multiple studies. We have grouped these by their main outcome measures and will briefly review the methods and results for each paper, dividing the paper into relevant studies where needed. We begin by describing common features across all studies, then move to describing the papers themselves.

## Goal and Traits Across All Studies

Though each paper summarized in this paper has unique goals and methods, there is also important overlap between papers. The main objective of all the papers was to better understand how the pandemic affected students' learning outcomes and eventual career paths. An additional goal of all the papers, and a central goal of several of them, was determining whether the pandemic had differential impacts on educational outcomes for different student subgroups. Researchers examined whether greater declines in scores were related to variables such as gender and race/ethnicity. Many were concerned that the pandemic would exacerbate existing systemic issues that cause group differences (Allen 2022), so all the COVID research

included here works toward answering that question. These objectives represent the overarching goal of ACT's program of COVID-focused research. There are also some key overlapping methods. For example, for any measure intended to compare pre- and post-pandemic onset outcomes, only individuals or schools that reported scores or grades both before and after the start of the pandemic were included in analyses. Finally, all analyses described here include multilevel models that account for school-level differences in scores.

## ACT Aspire

Two of the COVID-focused ACT papers, both by author Jeff Allen (2021a, 2022c), use the ACT Aspire assessment. Both papers focus on how ACT Aspire scores changed with the onset of the pandemic and whether score changes differed by demographic category. The ACT Aspire tests assessed student mastery of English, math, reading, and science. These tests were available for students in Grades 3 through 10. Summative versions of the test were administered annually to test whether a student was on track for college readiness, and interim versions of the test could be given throughout the school year to assess student progress.

## Results

Allen (2021a) examines changes in student performance growth for ACT Aspire interim tests after the onset of the pandemic. This paper used two student cohorts, one that took the ACT Aspire interim test in 2019–2020 and another that took the test in 2020–2021. Students' growth before and after the onset of the pandemic was compared for each grade level and subject. The study used hierarchical linear regression models for each grade and subject group to account for nesting within schools. ACT Aspire interim scores were lower in the 2020–2021 cohort across all subjects (English, math, reading, and science), with the largest difference in math (-.17), followed by science (-.12), English (-.09), and reading (-.07). These decreases (effect sizes) represent average difference across the six grade levels (Grades 5–10) for each subject. Notably, the score decreases were worse for younger students. Score decreases were generally similar for male and female students. Students with disabilities showed less severe score declines across all subjects. For English and math, economically disadvantaged students and English learners showed small declines across several grade levels. Evidence also suggested that decreases were more severe for public school students and those in rural settings. Finally, in math and English, decreases were more severe for high-achieving students. So overall, while the pandemic does seem to have decreased student performance, it does not seem to have differentially affected the performance of historically disadvantaged groups and may instead have had less impact on these individuals.

Allen (2022c), which focused on a population of Arkansas students, showed similar results, though with some distinct differences. Scores declined for all sections and grade levels from 2019 to 2021. When examined in comparison to average annual gains, score declines were smaller for lower grade levels than for higher grade levels. This is opposite the direction of the previous study's findings. However, when examined in effect size (standard deviation) units, score declines were larger for lower grade levels; Grades 3–6 had declines of 0.2 or higher, compared to higher grade levels, whose declines ranged from about 0.18 in the growth sample

to 0.05 in the status sample. As in the prior study, score declines were most severe for math. Score declines were less severe for African American and Hispanic students relative to White students across Grades 5 through 10. Also, as in the prior paper, students with disabilities and English learners both showed less severe score declines relative to other students in models accounting for prior scores.

Allen (2022c) includes a second study on the same population of Arkansas students that examined the impact of virtual learning on ACT Aspire test scores. Score declines were largest for students who learned virtually during the 2020–2021 school year relative to students who attended onsite or hybrid classes, and score declines were the smallest for onsite learners. Virtual learning had the most severe impact on math scores and the least severe impact on reading scores. Score differences by mode of learning were smaller for African American students and students with disabilities.

Across both ACT Aspire studies, though there is evidence that the pandemic adversely impacted student scores, there is little evidence of disproportionate impact on historically disadvantaged students. In fact, score changes were generally more favorable for these groups. The potential for the pandemic to have differential impacts on educational outcomes by demographic is further explored in other sections.

## PreACT

In addition to the two ACT Aspire papers, Allen also examined the impact of the COVID-19 pandemic on PreACT scores (Allen, 2021b). PreACT is a multiple-choice college readiness exam comprising English, math, reading and science sections. It is typically administered to 10th grade students in preparation for the ACT test in 11th grade. This paper, like the ACT Aspire studies, compares scores for the 2019–2020 cohort to scores for the 2020–2021 cohort in a hierarchical linear regression model.

## Results

PreACT scores for the 2020–2021 national cohorts were lower for English (-1.02 points, 0.17 standard deviations), math (-.59, 0.13 standard deviations), and reading (-.32, 0.05 standard deviations), but higher for science (.34). While cohort differences in scores were generally similar across ethnic groups, English score declines were slightly more severe for Hispanic students (a 1.18-point decrease versus a .99 decrease for White students). Math scores, however, decreased more severely for White students than either African American or Hispanic students (-.66 compared to -.35 and -.50, respectively). Female students also had larger decreases in English (-1.12) and reading (-.68) for the 2020–2021 cohort as compared to male students (-.93 for English and .03 for reading). Finally, students enrolled in public schools showed slightly weaker score declines for math and reading than students enrolled in nonpublic schools but larger declines in English.

This study finds evidence that some of the changes in student scores can likely be attributed to the pandemic's onset. Further, as in the prior section on ACT Aspire score changes, there is limited evidence that the pandemic differentially impacted the scores of historically

disadvantaged groups. Though there are some isolated examples of this, it is far from a clear pattern; in fact, in several instances, these groups show weaker score declines.

## Predictions for ACT Test Score Changes in 2020

Early in the pandemic, before actual changes in ACT test outcomes could be measured, Allen, Mattern, & Camara (2020) developed models to predict changes. The authors used models of learning loss based on summer vacation outcomes to make predictions about academic performance declines. School closures associated with the pandemic were expected to cause score declines similar to, if not worse than, those caused by normal out-of-school periods. This paper concludes that over a normal three-month summer break, students are expected to lose the equivalent of two months of instructional time, with the greatest losses expected in math and the least in reading. Using estimates from prior-year summer-break effects, researchers modeled the expected impact of COVID school shutdowns based on several factors, including the date of the shutdown, the date schools reopened the following year, and the availability of supplemental online learning. Allen and colleagues estimated that ACT Composite scores would decrease by between .31 and .71 points, depending on the scenario.

These models helped to provide insight into expected changes to learning outcomes despite the unprecedented nature of the situation. The following section examines how well score changes aligned with these predictions.

## Observed Differences in ACT Test Scores During the Pandemic

In this section we describe four papers that compare ACT test scores pre- and post-pandemic onset. Two papers (Allen 2021c and Allen 2022a) examine changes in ACT scores after the start of the pandemic across multiple U.S. states. A third paper (Allen et al., 2022) focuses solely on ACT score changes in Nebraska. The final paper (Allen 2022b) focuses on ACT score changes for Native American students after the onset of the pandemic. Each study examined possible demographic group differences in score impacts to probe possible differential impacts of pandemic-related education changes for historically disadvantaged groups. Each of these papers uses hierarchical linear regression models to estimate the average difference in ACT scores between years. The collective results of these studies provide a clearer picture of the continuing impacts of the pandemic.

### Results

Allen (2021c) includes approximately 50,000 students for each of the two cohorts who took the ACT test in the fall as part of state and district testing programs. This paper finds that scores were substantially lower for the fall 2020 cohort than the fall 2019 cohort. English scores decreased by .88 (0.12 standard deviations), math scores by .49 (0.09 standard deviations), reading scores by .44 (0.06 standard deviations), and science scores by .26 (0.04 standard deviations). This means there was a .63 decrease in ACT Composite scores. With a few exceptions (e.g., African American students had slightly greater reading score declines than

White students,  $-.63$  vs.  $-.38$ ), score decreases were relatively similar between White, African American, and Hispanic students. Asian students, however, experienced substantially less severe decreases in scores across all subjects than did White students. For example, Asian students had a  $.35$  English score increase, while White students saw a  $.89$ -point decrease. Finally, score decreases in English and math were more severe for public school than nonpublic school students (a  $.93$  decrease compared to a  $.45$  decrease in English, and a  $.53$  decrease versus a  $.11$  decrease in math).

Allen (2022a) expands on some of the findings from the previous study by comparing the spring 2021 and 2022 school-day tested cohorts to three comparable pre-pandemic cohorts (2018, 2019, early 2020). The 2022 cohort had a  $.59$ -point ACT Composite score decrease ( $-0.11$  standard deviations) relative to the pre-pandemic cohorts. This is only slightly smaller than the  $.66$  decrease observed for the 2021 cohort. Much like in the 2021 cohort, Asian American students had the least severe score decreases. Comparing 2021 to 2022, score declines in 2022 were less severe for African American students, students identifying as two or more races, and White students. Score declines were more severe in 2022 than 2021 for Asian American, Hispanic, Native American, and Native Hawaiian/other Pacific Islander students. Only math scores showed a more severe decline in 2022 than 2021. This study also found some differences in which students were likely to still be receiving virtual rather than in-person schooling. For the 2020–2021 school year, African American and Asian American students were more likely than White students to have virtual instruction. Female students and students from urban schools were slightly more likely to learn virtually compared to other groups. Finally, though most students were able to go back to school in person for the 2021–2022 school year, students of color, except for Hispanic students, were more likely to continue online schooling.

Allen and colleagues (2022) examined differences in pre- and post-pandemic ACT scores within Nebraska's 11th-grade cohorts from 2017 through 2021. As in the other samples, ACT scores declined after the pandemic, with similar decreases for 2020 ( $-.65$  points,  $-0.12$  standard deviations) and 2021 ( $-.64$ ,  $-0.12$  standard deviations). All subjects showed decreased scores. The largest score declines were in English, with the 2020 score decline being slightly larger. For math, reading, and science, however, the score declines were slightly larger in 2021. Reading scores showed the smallest decline. There were slight variations by student demographic group in Composite score declines in this study as well. In 2020, Asian students showed a score increase and Native American/Hawaiian students showed the greatest decline (though notably this group was small,  $N < 200$ , and did not significantly differ from White students). However, in 2021, Native American/Hawaiian students showed the smallest score decline, while African American students showed the greatest. For both 2020 and 2021, score declines for English learners were less severe than those of the total group. Score changes were similar across other demographic groups (e.g., gender, special education status, and free/reduced lunch eligibility status).

Finally, Allen (2022b) focused on the pandemic's impact on school-day-tested Native American students compared with other groups. First, during the 2020–2021 school year, Native American students were more likely to attend school virtually than White students but less likely than students belonging to other student groups (e.g., African American and Asian students). In the

2021–2022 school year, however, while most students returned to school in person, Native American students were the most likely to continue virtual learning. Turning to score outcomes, Native American students showed score declines for both the 2021 cohort (-.45 points, -.08 standard deviations) and the 2022 cohort (-.58 points, -.22 standard deviations). This is particularly notable, as other racial/ethnic groups showed some improvements between 2021 and 2022. Native American students also showed some differences from other groups in post-high school, college, and career planning. Native American students were somewhat less likely than students of other races/ethnicities to send their ACT scores to potential colleges in conjunction with their school-day testing. On the ACT Interest Inventory, Native American students showed slightly more interest in community service and careers in the arts (visual art and performance art), repair, production, and construction than students of other racial/ethnic groups. Native American students showed slightly less interest than students of other races/ethnicities in careers in health science, business, or education.

Across all these studies, a few consistent themes emerge. First, the pandemic seems to have adversely affected virtually all students' performance on the ACT test. Scores were consistently lower on average for the pandemic years as compared to pre-pandemic performance. While there was reasonable concern among researchers and educators that the pandemic might worsen existing achievement gaps between demographic groups, these four studies do not find consistent evidence of this phenomenon. Interestingly, across multiple studies, Asian students seemed to show the weakest score decline, at least early in the pandemic. Some sporadic evidence showed worse score declines across traditionally underrepresented groups, but there was no consistent pattern across all historically underrepresented groups. Native American students showed the most consistent pattern of score declines associated with pandemic years, with scores rebounding substantially less in 2022 than those of other student groups. Because other studies focused largely on short-term effects of the pandemic on scores (looking at scores from the 2020–2021 school year), there may be delayed impacts for historically disadvantaged groups that have yet to be identified and might be explored in further research. These studies offer valuable insight into the immediate effects of the pandemic.

## Occupational Preference Trends

A study from Allen and Wai (2023) examined students' career preferences using occupation preference data from over 16 million ACT-tested students who completed high school between 2012 and 2023. Researchers used logistic regression to assess the likelihood of students planning any given career path and how that might have changed over the years, with particular focus on post-pandemic changes.

### Results

Allen and Wai (2023) find several interesting occupational patterns. Students were increasingly undecided in their majors over the 11 years included in the study; numbers of students undecided about their future career jumped from 15.1% in 2012 to 24.4% in 2023. Interest in careers in finance showed the largest increase among students (more than doubling from 1.0% of students to 2.2%). Students also increasingly selected careers in computer science and



math. Across this time span, students less frequently showed interest in careers in the arts, pharmacy, communication, and education. After the onset of the pandemic, more students were undecided about their career paths. While this trend was already apparent before the pandemic, it increased significantly after the start of the pandemic. Biology, business administration and management, and law all showed increases in student interest after the onset of the pandemic, while agriculture, nursing, skilled trades, and the arts all showed decreasing student interest.

This article (Allen & Wai, 2023) suggests that in addition to impacting students' test scores and school performance, the pandemic may also have shaped students' goals and career prospects. By understanding the ways in which the pandemic influenced students' values and interests, we can better understand the long-term implications of the pandemic for the future workforce.

## Implications for ACT Test Validity

One final paper essential for understanding the pandemic's implications for test scores comes from Sanchez (2024). This study explores the validity, before and after the onset of the pandemic, of pre-college achievement indicators such as high school GPA (HSGPA) and ACT scores in predicting student performance in college. Given the pandemic's effects on pre-college academic performance, which have already been noted in this paper, it is essential to examine whether these metrics are performing as well as they previously have in predicting college success. Given the major disruption in schooling and assessment, it cannot be taken for granted that a given measure offers the same predictive validity post pandemic. Sanchez (2024) compares the ability of HSGPA and ACT to predict first-year college GPA (FYGPA) pre and post pandemic onset using hierarchical linear modeling.

## Results

Sanchez (2024) finds evidence that HSGPA shifted somewhat as a predictor of college performance after the start of the pandemic. While the slope of HSGPA's relationship with FYGPA remained very similar for the years 2017, 2018, and 2019, for the years 2020 and 2021, the same HSGPA predicted a lower FYGPA (e.g., a 2019 student with a 2.5 HSGPA was expected to earn a 1.87 FYGPA, while a 2020 student with a 2.5 HSGPA was expected to earn a 1.54 FYGPA). ACT scores, however, remained consistent across all years as a predictor. This occurred in the context of observed grade inflation during that period. While ACT scores decreased during the pandemic years, only HSGPA showed a slope change for the predictor's relationship with FYGPA. Of note, the model using ACT and HSGPA together made the best predictions, and ACT scores interact with HSGPA such that ACT scores are a better predictor of FYGPA for students with higher HSGPAs.

Overall, these findings highlight the importance of examining a measure's predictive validity under changing circumstances, as during the pandemic. These findings also demonstrate that using multiple predictors for college success can protect predictions against inconsistencies in any given measure. Using both ACT scores and HSGPA during pandemic years helped to maintain high-quality predictions about student performance.

## Conclusions

Taken together, the studies discussed in this review make several key points about the impact of the pandemic. First, researchers consistently found that student performance declined after the start of the pandemic. While there were isolated pockets of students who did not show declines (e.g., Asian students in some cohorts, as in Allen 2021c), this was atypical. There was some evidence of student achievement scores bouncing back once schools reopened, but this should be further explored as time passes. Second, English and math scores frequently showed the greatest decline, with reading performance being somewhat protected. Third, the pandemic did not seem to exacerbate existing demographic performance gaps. In fact, in several cases, traditionally advantaged students showed larger declines than other groups—e.g., PreACT math scores decreased more severely for White students than they did for either African American or Hispanic students. Additionally, there is some evidence that Native American student performance recovered less in 2022 than that of other students, highlighting the importance of continued assessment. Some differential group effects could have a delayed onset and are worth continuing to look out for. Fourth, students showed changes in career preferences post COVID, with many more being undecided about their majors. Finally, while high school GPA shifted somewhat in its strength as a predictor of early college performance post COVID, ACT score remained consistent.

Researchers at ACT demonstrate the importance of assessment in understanding external influences on student learning across a student's academic career. For example, students from different cohorts experienced different gaps in educational instruction due to the COVID disruption. While one cohort may have a skills gap in lower-level mathematical concepts, others may have a skills gap in more advanced mathematical concepts. By consistently measuring student performance, we can understand how severely the pandemic disrupted learning. Furthermore, with consistent assessment, researchers were able to carefully examine the potential risk that the pandemic would widen achievement gaps for historically underserved populations. Researchers should continue to monitor student performance, tracking whether scores recover from early pandemic numbers and continuing to monitor the predictive validity of success metrics. Overall, research on the pandemic and student performance enables educators and researchers to better understand and plan for the consequences of the pandemic on student learning.



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