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Growing efforts to ensure that students graduate high school both college- and career-ready raise a need for better understanding and measures of “career readiness.” We leverage data from one state (North Carolina) where nearly half of students take a college entrance exam (the ACT) in 11th grade and a career readiness exam (the WorkKeys) in 12th grade to examine how these different measures of students’ skills relate to each other and to postsecondary outcomes. We find, first, that student performance on the ACT and WorkKeys is highly correlated, with most students either earning both a college-ready ACT score and a career-ready WorkKeys score, or neither a college- nor career-ready score. Second, student performance on math exam domains associates more strongly with postsecondary outcomes than performance on other domains, with ACT Math being more predictive of college completion and WorkKeys Applied Math more predictive of early-career earnings. Third, net of test scores, students’ GPAs are strong predictors of both college and early-career outcomes. Results provide suggestive evidence about skills that may be key to success across college and career pathways and highlight that more work remains needed to develop better understandings of career readiness as distinct from college readiness.

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Career ready or not? The relationship of WorkKeys scores, ACT scores, and high school GPAs with college and early-career outcomes

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Abstract

Growing efforts to ensure that students graduate high school both college- and career-ready raise a need for better understanding and measures of “career readiness.” We leverage data from one state (North Carolina) where nearly half of students take a college entrance exam (the ACT) in 11th grade and a career readiness exam (the WorkKeys) in 12th grade to examine how these different measures of students’ skills relate to each other and to postsecondary outcomes. We find, first, that student performance on the ACT and WorkKeys is highly correlated, with most students either earning both a college-ready ACT score and a career-ready WorkKeys score, or neither a college- nor career-ready score. Second, student performance on math exam domains associates more strongly with postsecondary outcomes than performance on other domains, with ACT Math being more predictive of college completion and WorkKeys Applied Math more predictive of early-career earnings. Third, net of test scores, students’ GPAs are strong predictors of both college and early-career outcomes. Results provide suggestive evidence about skills that may be key to success across college and career pathways and highlight that more work remains needed to develop better understandings of career readiness as distinct from college readiness.

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I. Introduction

Although most states aim to ensure that students exit high school both college- and career-ready, the assessments typically used to measure students' skills towards the end of high school – such as their ACT or SAT test scores – are primarily designed to measure (four-year) college readiness. If the skills needed to succeed in entry-level jobs differ from those needed to succeed in college coursework, these measures may provide only limited insight into students' career readiness. This can limit students' abilities to make optimal decisions about their postsecondary pathway and educators' abilities to improve school curricula in ways that would strengthen students' career skills.

To enhance their ability to assess and improve students' career skills, states need to know which skills are key to early-career success as well as how they can reliably measure those skills. One possibility being considered by many states is to require students to complete a career readiness assessment in high school, with the WorkKeys (designed by ACT) emerging as a key option (Petrilli, 2025; Zinth & Woods, 2018). The WorkKeys aims to measure foundational skills needed across a wide range of jobs, with sections on Applied Math, Graphic Literacy, and Workplace Document Comprehension (ACT, 2026). Based on their scores, exam takers can also earn a career readiness certificate at levels of Bronze, Silver, Gold, or Platinum (or none). While college readiness assessments like the ACT and SAT have a long history of use in education (Karavel, 2005), including use as a statewide high school assessment in over half of states (Swiderski, 2025), use of the WorkKeys as a high school exam is a more recent development. As such, research on the use of the WorkKeys in this way is limited, with one prior study showing that students' ACT and WorkKeys scores are highly correlated (Allen, 2025) and one showing

that the introduction of a WorkKeys requirement may have decreased college enrollments by low-income students in Wisconsin (Smith & Hirschl, 2022).

In this study, we focus on one state (North Carolina) in which all Career and Technical Education (CTE) concentrators are required to take both a college readiness exam (the ACT) in 11th grade and a career readiness exam (the WorkKeys) in 12th grade. Within this setting, we leverage data on students' ACT scores, WorkKeys scores, and GPAs to learn more about the skills that may be most associated with success across college and career pathways as well as the role the WorkKeys may play in helping states to measure important college- and/or career-relevant skills as compared to more traditional measures. Specifically, we draw on linked K-12, postsecondary education, and workforce data on about 80,000 students from the high school graduating classes of 2018 and 2019, followed through 2024, who took both the ACT and the WorkKeys as a required state assessment. We first examine how similarly CTE students perform across these two exams to assess the extent to which the exams may measure distinct skill sets. We then examine the association of students' performance on each domain of each exam with their college and early-career outcomes, net of their scores on all other domains as well as other demographic, contextual, and academic controls, including their GPAs, to better understand how different skills measured by these assessments relate to students' later outcomes.

To preview, we highlight three main sets of findings. First, we find that students' ACT and WorkKeys scores are highly correlated. Overall, 56% of the CTE students in our sample earned a college-ready ACT score (of 17+ in our setting) while 66% earned a career-ready WorkKeys certification (Silver or higher). Among those with a college-ready ACT score, the career readiness rate was 88%; among those who did not earn a college-ready ACT score, the career readiness rate was 37%. Students' GPAs are also highly correlated with both their ACT

and WorkKeys scores, though less than the exams are correlated with each other. Among students with a final unweighted GPA of 3.5 or above (the top quartile in our sample), 94% were college-ready and 95% were career-ready. Among students with GPAs of 2.0 or less (the bottom decile), only 10% were college-ready while 24% were career-ready.

These descriptive findings contribute new evidence as to how students' career readiness, as measured by the WorkKeys, relates to other measures of their academic performance. Like Allen (2025), we find that students who are college-ready are typically also career-ready, at least as these terms are defined by these exams in this setting, which suggests that the skills needed to perform well on these exams (or, the skills needed to be considered college- and career-ready) may be similar or complementary. However, college- and career-readiness rates are more distinct among students with weaker overall school performance, with students with the lowest GPAs being almost 2.5 times more likely to score as career-ready than college-ready in this setting.

Although students' performance across these measures is highly correlated, valuable information may still exist in the differences between them (Bruhn et al., 2025). To that end, our second main set of results focuses on associations between students' domain-specific scores across both exams and their college and career outcomes, net of other demographic, contextual, and academic controls, including their GPAs. In these models, we find that students' ACT Math scores, followed by their ACT English scores, are the strongest test-based predictors of their four-year college enrollment and completion likelihoods. Scores on other domains of the ACT are slightly positive predictors on net, while scores on all domains of the WorkKeys show no relationship or are slightly negative predictors. Patterns of results for any college completion (i.e., two-year or four-year) are similar, though less pronounced. By contrast, among students who were not enrolled in college, we find that the only test-based domain that shows a net

positive association with a student's early-career wages is their WorkKeys Applied Math score. Students' ACT English and Reading scores have negative net associations, while other tested domains show no association with early-career wages.

This second set of findings is consistent with a growing literature that leverages item-level, domain-level, and/or cross-subject exam data to identify skills and measures associated with later success. For example, like us, Bettinger et al. (2013) found that students' ACT Math and English scores were more predictive of four-year college success than their ACT Science and Reading scores. We extend this work by showing that this holds in a broader sample and is robust to inclusion of controls for career readiness exam scores, but does not hold for workforce outcomes. Meanwhile, several recent studies (Conrad et al., 2026; Moreno-Medina et al., 2026; Xu, 2026) show that a broad range of math skills tend to be positive predictors of college and career success, whereas only a more limited set of English or reading skills are strong predictors, with Conrad et al. (2026) likewise finding that English test scores tend to be negative predictors of early-career wages. The cause of the latter finding is unclear; we hypothesize that it may be due to the types of careers that students with relatively strong reading and writing skills choose to enter or have access to, though we continue to find negative results even when we control for an individual's industry of employment. However, more broadly, our overall set of findings suggests that students may benefit from developing a wide range of math skills regardless of their postsecondary pathway, whereas in English there may be benefits to placing greater emphasis on subskills captured by the ACT English exam, particularly for college-intending students.

Finally, our third key finding, which emerges from the same analyses as above, is that students' high school GPAs are strongly associated with both college and workforce outcomes

net of their test scores and other controls. This contributes to a large literature that has debated the extent to which test scores are better or worse predictors of college success than GPAs (Allensworth et al., 2020; Friedman et al., 2025; Galla et al., 2019; Joyce et al., 2026; Mattern et al., 2011). Our results suggest that, within a broad student sample, GPAs are highly predictive, though college entrance exam scores also add value. We also reinforce that GPAs are strongly positively predictive of early-career wages among students not enrolled in college, even after accounting for their scores on both a college and a career readiness exam (Borghans et al., 2016). These results suggest that, despite the lack of standardization in how grades are formulated (Brookhart et al., 2016), GPAs still provide meaningful information about students' college and career readiness. This might be due to the importance of soft skills that tend to be encompassed in a student's GPA more than their test scores (Borghans et al., 2016; Galla et al., 2019).

The remainder of this paper unfolds as follows. In the next section, we provide additional background on the WorkKeys and its role within state assessment systems. We follow this with a description of our data and methods before turning to our main results. Finally, we conclude with a brief synthesis of findings and discussion of implications for research, policy, and practice.

II. Background

In recent years, there has been a growing shift of emphasis in U.S. high school policy and practice from a focus on “college for all” to “college- and career-readiness” (Falcone et al., 2025). With this, there has also been a growing effort by states to better understand and measure what makes students “career ready,” and how this differs from “college ready.” One way in which this may be manifesting is growing adoption of “Portraits of a Graduate” that aim to recognize the importance of soft skills, such as grit and growth mindsets, that are not directly

assessed by traditional multiple-choice exams, but which are expected to be important for success in college, the workforce, and civic and social life more broadly (Stanford, 2023).

At the same time, as states remain federally required to administer a standardized assessment of high school students, states have a strong interest in identifying an exam that can be useful to students, educators, and policymakers. As of 2019, most states had chosen to use the SAT or ACT college entrance exams for this purpose (Swiderski, 2025) – exams which have a long history of use in education (Karabel, 2005) and which measure skills and knowledge in a range of academic areas. Researchers and practitioners have long debated whether these exams are stronger indicators of students’ likelihood of college success than other measures, especially GPAs, with results tending to show that both measures can add value and that their relative contribution may vary depending on the setting and population examined (e.g., Allensworth et al., 2020; Friedman et al., 2025; Galla et al., 2019; Joyce et al., 2026; Mattern et al., 2011). Notwithstanding the debate about whether colleges ought to use entrance exam scores in admissions processes, several studies show that when states require the ACT or SAT of all students in high school, college enrollments increase (Goodman, 2016; Hurwitz et al., 2015; Hyman, 2017; Klasik, 2013; Swiderski, 2025), likely because this removes a potential application barrier, because some students score better than they thought they would, which convinces them to apply to college, and/or because this provides some students a chance to re-test and improve their score before they submit their applications (Goodman et al., 2020).

However, with states’ growing interest in not only college but also career readiness, there is also interest in potentially replacing or supplementing these college entrance exams with a career-readiness assessment – particularly, the WorkKeys (Petrilli, 2025; Zinth & Woods, 2018). Also designed by ACT, the WorkKeys is designed to measure foundational math and reading

skills required across a broad range of occupations (ACT, 2026). The exam has been used with adult job-seeking populations and, increasingly, high school students. Following an update in 2018, the WorkKeys tests domains of Applied Math (e.g., calculating perimeters, areas, volumes, sales tax, and averages); Workplace Document Comprehension (e.g., understanding memos, policies, manuals, and contracts); and Graphic Literacy (e.g., reading and analyzing charts and figures). Based on their performance across domains, participants can also earn a National Career Readiness Certificate at a level of Bronze, Silver, Gold, or Platinum.

As use of the WorkKeys as a statewide high school exam is relatively new, there has been limited research on its use in this way. Most prior research on the WorkKeys includes validation and correlational studies, much of which is based on small samples rather than applications of the exam in broad high school settings (ACT, 2026). Most relevant to our work, a recent large-scale study by ACT Research (Allen, 2025) found that there were high correlations between students' performance on the ACT and the WorkKeys, but also that each exam provided unique information about students' post-secondary readiness, based on data from multiple states on students who took both exams. In addition, Smith & Hirschl (2022) examined the impact of the adoption of an ACT and WorkKeys requirement in Wisconsin in 2015. The authors found that, in districts where the ACT was already mandatory or nearly universally taken, the addition of the WorkKeys requirement led to slight decreases in college enrollments by low-income students.

The limited research base on the WorkKeys leaves open many questions about how this exam might contribute to education policy and practice and affect students' later outcomes, particularly relative to other traditional measures. In this study, we leverage data from a state setting (North Carolina) in which all students are required to take the ACT at the end of 11th grade and all Career and Technical Education (CTE) concentrators are additionally required to

take the WorkKeys at the end of 12th grade. Within this context, we aim to learn more about the use of the WorkKeys as a state assessment, its relationship to other measures of students' skills and knowledge, and its relationship to students' later college and career outcomes. Further, we draw on the multiple measures of students' skills and knowledge available in this setting to try to identify which specific measures appear to be most strongly associated with positive college and early-career outcomes, and whether this differs across college and career pathways.

III. Data

We use data from three main sources. Our base dataset is K-12 administrative data from the North Carolina Department of Public Instruction (NCDPI) on students in the high school graduating classes of 2018 and 2019. Data include student demographics, course-taking and grades, CTE concentration area (if applicable), and state-required test scores, including on the ACT and WorkKeys. There are about 200,000 students in these cohorts, 80,000 of whom took the WorkKeys as a required exam.

We connect these data to two additional sources to track students' early post-secondary outcomes. First, we link to data from the National Student Clearinghouse (NSC), which provides college enrollment and completion records of North Carolina high school graduates from 2018 through 2024. NSC data cover postsecondary outcomes occurring at almost any institution of higher education in the U.S.¹ Second, we link to state unemployment insurance (UI) wage earnings records from 2018 through 2024 from the North Carolina Department of Commerce (NCDOC). These data provide quarterly earnings records for individuals who work in jobs covered by North Carolina's UI law. A limitation of these data is that they do not capture the

¹ See: <https://nscresearchcenter.org/workingwithourdata/>

wages of those who move out of state or those in a small number of employment types that are not covered by North Carolina’s UI law (e.g., federal, self-employment).

Our key treatment variables include students’ WorkKeys and ACT scores, by domain, and their high school GPA. For GPA, we use students’ final unweighted high school GPA, reported on a scale of 0-4. For the ACT, scores on each domain (Math, Science, English, and Reading) are reported as integers ranging from 1 to 36, and students’ overall ACT score is the rounded average of their performance across all four domains. During the period of this analysis, students who earned an overall score of 17 or higher were considered college-ready by North Carolina.² On the WorkKeys, students’ scores on each domain (Applied Math, Graphic Literacy, and Workplace Documents) are reported as integers ranging from 3 to 7, with those who do not reach the threshold to earn a 3 being reported as “less than 3.” For this study, we recoded “less than 3” to be a score of 2. We summed students’ scores across all domains to create a total score. At times, we also refer to students’ National Career Readiness Certificate level, which is based on the minimum score that a student receives across all domains. Those who score at least a 3 on all domains earn a Bronze; those with a minimum score of 4, 5, or 6 earn Silver, Gold, or Platinum respectively. If an individual scores less than 3 on any domain, they receive no certification. Certifications of “Silver” and higher are considered career ready.

Key outcomes include: A) An indicator equal to 1 if an individual enrolled in college in the first year after high school graduation; B) An indicator equal to 1 if an individual completed a college degree within five years of high school graduation; and C) An individual’s logged annual wage earnings in their first and fifth year after high school graduation. Because high-achieving

² Students who earned scores of 17 or higher were eligible for admission to UNC System institutions. This is lower than what the ACT typically considers to indicate “college readiness” (see, e.g., Allen, 2025). Accordingly, the percentage of students that we identify as being “college ready” is much higher than the rate in Allen (2025).

students are likely to enroll in college, and attending college can reduce students' ability to be employed full-time, we measure outcomes A and B using all CTE concentrators in our sample but restrict estimation of outcome C to those who are not enrolled in college at the focal time point. Thus, Year 1 wages pertain to students who did not transition to college after high school, while Year 5 wages pertain to students who had either completed college within 4 years, attended college but dropped out before their fifth year, or never attended college.

We note that, in general, we observed that higher ACT scores, higher WorkKeys scores, and (in Year 1) higher GPAs were associated with net *decreases* in the likelihood of having any recorded wages among those who were not enrolled in college. We posit that this may be due to at least two confounding factors: 1) students with stronger skills may be more likely to work out of state (especially post-college), which we cannot observe; and 2) students with strong academic skills who do not enroll in college may largely do so due to barriers that might also prevent them from working (e.g., illness or caretaking responsibilities). For this reason, we focus on estimating wages conditional on employment only.³

As noted above, our main sample is restricted to CTE concentrators, who are required to take the WorkKeys.⁴ Table 1 provides more insight into how the characteristics of our CTE concentrator sample compare to the characteristics of students statewide (distributions of key measures are shown in Appendix Table A1). Compared to non-concentrators, CTE concentrators are more likely to be White and male, are more likely to be located in rural areas, and have lower

³ Results of models for having any wage earnings are available on request.

⁴ We refer to our sample as including all CTE concentrators for simplicity. However, although all CTE concentrators are required to take the WorkKeys, only 87% of students who took the WorkKeys had a record of having completed a CTE concentration, suggesting that some students who are not CTE concentrators took the WorkKeys. Some oversampling may occur because a student's CTE concentrator status is not finally determined until they complete high school, but the WorkKeys must be administered before this point. For example, a student could be enrolled in a course that would make them a concentrator but fail or withdraw from it.

ACT scores and measures of advanced academic course-taking in 12th grade.⁵ We do not see major differences in economic disadvantage (ED) status. In Appendix Figure A1, we depict how achievement and demographics interact to shape participation rates. In particular, we observe that CTE concentration gaps by race/ethnicity and urbanicity are driven by differences in concentration rates among low-achieving students, whereas gaps by gender are driven by differences in concentration rates among high-achieving students. These results may be of some interest on their own, but are also important in that they highlight that our study should be interpreted with differences in selection-into-CTE in mind. Though our sample is diverse, some caution is warranted in generalizing to non-CTE students.

IV. Methods

In the first part of our analysis, we examine how students' WorkKeys performance compares to their ACT performance through descriptive methods. We first produced correlations of students' performance across these measures. Given the policy relevance of earning a "career" and "college" ready status, we then also examined the percentage of students at each ACT integer score who earned a career-ready WorkKeys certification (Silver or higher), and the percentage of students at each WorkKeys certification level who earned a college-ready ACT score (of 17+ in our setting). Finally, we estimated regressions of students' WorkKeys aggregated score on their ACT score and select demographic characteristics (e.g., race/ethnicity) to examine whether some groups of students over- or under-perform on the WorkKeys relative to other measures of their academic skills and performance. That is, for example, we estimate:

$$(1) \text{WorkKeysOvr}_{it} = \beta_0 + \beta_1 \text{ACTOvr}_{it} + \beta_2 \text{RaceEthnicity}_{it} + \delta_t + \epsilon_{it},$$

⁵ Our measures of course-taking are modeled off of "pipeline" variables used by the U.S. Department of Education and Bureau of Labor Statistics, as in, e.g., Dalton et al. (2007) and Brown et al. (2018).

where $WorkKeysOvr_{it}$ represents the summed total WorkKeys score of student i from cohort t , $ACTOvr_{it}$ represents a student's overall ACT score, $RaceEthnicity_{it}$ is an indicator of a student's race/ethnicity, δ_t is a cohort year fixed effect, and ϵ_{it} is an error term. At times, characteristics other than race/ethnicity (e.g., ED status) are used in place of race/ethnicity.

In the second part of our analysis, we estimated regressions to examine the relationship of students' performance on each domain of each exam with their college and early-career wages, controlling for other demographic, contextual, and academic characteristics including their high school GPAs. Specifically, we estimate:

$$(2) Y_{it} = \beta_0 + \beta_1 WorkKeys_{it} + \beta_2 ACT_{it} + \beta_3 GPA_{it} + \beta_4 X_{it} + \delta_t + \epsilon_{it},$$

where Y_{it} represents the outcome of individual i at time t , $WorkKeys_{it}$ is a vector of students' scores on each domain of the WorkKeys, ACT_{it} is a vector of students' scores on each domain of the ACT, GPA_{it} is a student's final unweighted high school GPA, X_{it} is a vector of controls (shown in Table 1), δ_t is a cohort fixed effect, and ϵ_{it} is an error term. To increase comparability, we use within-cohort standardized versions of exam domain scores and GPAs in these models. For simplicity, we run all models as OLS (i.e., binary outcomes are modeled as linear probability models), and we cluster all standard errors by students' graduation school and year. To test for heterogeneity, we re-ran equation (2) restricted to members of subgroups defined by select demographic characteristics and CTE concentration areas, as described more in Section V.

Our results should be interpreted cautiously as our approach produces only associations between variables and outcomes of interest, not causal effects, and are based on imperfect and correlated measures of students' skills and knowledge. As such, from these associations, we aim to derive new hypotheses about the types of skills and knowledge that may be most impactful for students' college and career trajectories, as well as the role that these assessments may play in

measuring these skills, but these hypotheses should be tested further in future causal work. Nonetheless, the approach here is similar to that of many other studies that connect differences between students' test performance across items, domains, or subjects, or their test scores and GPAs, to college and career outcomes (e.g., Bettinger et al., 2013; Bruhn et al., 2025; Conrad et al., 2026; Friedman et al., 2025; Galla et al., 2019; Joyce et al., 2026; Moreno-Medina et al., 2026; Xu, 2026). Further, we include an extensive set of controls in our full models, such that significant coefficients on (for example) ACT Math scores show that there are differences in outcomes between students with the same demographics, high school course-taking patterns, CTE concentrations, GPAs, and test scores on all other domains of the ACT and the WorkKeys, who scored differently on the ACT Math domain, which we interpret as providing suggestive evidence of the potential importance of advanced academic math skills.

V. Results

a) Comparing ACT and WorkKeys scores

We begin by descriptively analyzing the relationship between students' performance on the WorkKeys and the ACT. We find that overall WorkKeys and ACT scores are highly correlated at $r = 0.77$. Correlations across conceptually-related domains (e.g., WorkKeys Applied Math and ACT Math) are also high, and always above $r = 0.6$. These high correlations suggest that a student's "college readiness" as measured by the ACT will be similar to their "career readiness" as measured by the WorkKeys. Indeed, in total, 66% of students in our sample earned a career-ready WorkKeys score and 56% earned a college-ready ACT score; 50% of students scored both college- and career-ready, 17% scored career-ready only, 6% scored college-ready only, and 28% scored neither college- nor career-ready. Thus, most students were either assessed as being *both* college- and career-ready or *neither* college- nor career-ready.

This relationship is further depicted in Figure 1. Panel A shows that students' likelihood of earning a career-ready WorkKeys score increases steadily with their ACT score. Just 15% of students with an ACT score of 12 or lower earned a career-ready WorkKeys score, but this increases to 73% of students with a (just college-ready) score of 17 and above 95% of students with scores of 22 or higher. Likewise, Panel B shows that the inverse is also true – only 11% of students who score too low to earn a career readiness certification via the WorkKeys had earned a college-ready ACT score, whereas 99% of students who earned a Platinum certification had earned a college-ready ACT score.

In Appendix Figure A2 we show a coefficient plot of results from regression models that explore how students of different demographic subgroups perform on the WorkKeys, controlling for their ACT scores. We find that Black students score about 0.5 points (or 15% of a standard deviation) lower on the WorkKeys than White peers with the same ACT scores, and students with disabilities score about 1.6 points (or 48% of a standard deviation) lower on the WorkKeys than peers without disabilities. Differences between other subgroups are smaller. Thus, in general, Black students and students with disabilities are less likely to be assessed as being career-ready than their ACT scores would predict. For example, as shown in Figure 2, while 75% of White students with an ACT score of 17 in our sample earn a career-ready WorkKeys score, this is true of only 69% of Black students with an ACT score of 17. And, while 75% of students without disabilities with an ACT score of 17 in our sample earn a career-ready WorkKeys score, this is true of only 51% of students with disabilities with an ACT score of 17.

Overall, these results show that students' performance on the WorkKeys can largely be predicted from their performance on the ACT, and vice versa. As defined by these exams, students who are college-ready are almost always also career-ready, those who are nearly

college-ready are generally career-ready, and those who are far from college-ready are also typically not career-ready. However, Black students and students with disabilities may experience more discrepancies across these measures than their peers, with their career readiness rates being lower than expected based on their ACT performance.

b) Comparing test scores and GPAs

For reference, we also briefly examine how students' high school GPAs relate to their ACT and WorkKeys test scores. Overall, we find that students' GPAs are highly correlated with both of these exams, though slightly less than the exams are correlated with each other ($r = 0.65$ for GPA with ACT and $r = 0.63$ for GPA with WorkKeys). As a result, students' GPAs are strong predictors of their likelihood of being college- and career-ready. In Figure 3, we depict the percentage of students who earned college-ready ACT scores and career-ready WorkKeys scores across 0.25-point GPA bins. Among students with GPAs of 3.5 and above, 94% are college-ready and 95% are career-ready according to these exams. Among students with GPAs below 2.0, just 10% score as college-ready, though 24% score as career-ready, highlighting that there are larger discrepancies in college- and career-readiness rates among low-GPA students.

c) Relationship of WorkKeys scores, ACT scores, and GPAs with 4-year college outcomes

We next turn to examining how students' ACT and WorkKeys scores, by domain, relate to their postsecondary outcomes, as well as how the inclusion of a control for their GPA affects these relationships. In Table 2, we show results of models estimating the relationship of our key measures with 4-year college enrollment in the first year after high school graduation and 4-year degree attainment within five years of high school graduation. All models control for student demographic characteristics. Besides this, Model 1 includes only students' WorkKeys scores, by domain; Model 2 includes only students' ACT scores, by domain; Model 3 includes students'

WorkKeys and ACT scores, by domain; and Model 4 includes students' WorkKeys scores, ACT scores, high school GPAs, and controls for their course-taking patterns and CTE concentration area to account for differences in the types and potential difficulty of coursework taken.

Models 1 and 2 show that, net of their performance on other measures of the same exam only, improvements in any domain are associated with increased likelihood of 4-year college enrollment and degree attainment, with the strongest relationships observed for math domain performance. For example, a 1 standard deviation (SD) increase in a student's WorkKeys Applied Math score is associated with a 7 percentage point higher likelihood of them earning a 4-year degree, net of controls for their performance on other domains of the WorkKeys and their demographics. Similarly, a 1-SD increase in a student's ACT Math score is associated with a 10 percentage point higher likelihood, net of controls for their performance on other domains of the ACT and their demographics. Other domain scores have smaller, but still significantly positive, associations with these outcomes. These results suggest that WorkKeys and ACT performance, in isolation from each other, are each associated with students' odds of experiencing four-year college success, with math scores on each exam being the most predictive domain.

In Model 3, we include all test score domains from both the ACT and the WorkKeys in the same model. When doing so, the relationship between WorkKeys scores and four-year outcomes attenuates much more significantly than the relationship between ACT scores and four-year outcomes. For example, in these models, a 1-SD improvement in WorkKeys Applied Math scores is associated with just a 1 percentage point increase in the likelihood of a student earning a 4-year degree; by contrast, ACT Math scores continue to be associated with a nearly 10 percentage point increase in likelihood of four-year degree attainment.

Finally, in Model 4 we add controls for students' high school GPA as well as measures of their course-taking and CTE area. This significantly attenuates most test score relationships. WorkKeys domain scores generally fall to being null or even slightly negative predictors of four-year college outcomes. For example, in these models, a 1-SD higher Applied Math score is associated with a 1 percentage point decrease in the likelihood that a student completes a four-year degree. ACT scores also attenuate but remain positive in sign. ACT Math scores remain the most positively predictive test-based measure, with a 1-SD increase in ACT Math scores being associated with a 4 percentage point increase in four-year degree attainment likelihood – a result that is substantively and statistically significant, but much weaker than in prior models. ACT English scores are also substantive predictors, with a 1-SD increase in ACT English scores being associated with a 2.3 percentage point increase in four-year degree attainment likelihood. By contrast, ACT Reading and Science scores are fairly weak or null predictors of four-year college outcomes on net. Finally, and importantly, these models reveal that students' GPAs are highly predictive of their four-year college success net of controls for their test scores and other characteristics – for example, a 1-SD increase in GPA is associated with a 14 percentage point increase in the likelihood of earning a four-year degree, net of controls for ACT domain scores, WorkKeys domain scores, demographics, CTE concentration, and course-taking patterns.

d) Relationship of WorkKeys scores, ACT scores, and GPAs with any college outcomes

In Table 3, we repeat this analysis but change our outcomes to be measures of whether a student enrolled in any college (2-year or 4-year) in the first year after high school graduation and whether a student completed any degree (2-year or 4-year) within five years.⁶ In general, key

⁶ We focus on “any” enrollment and attainment rather than 2-year enrollment and attainment specifically because relationships of academic performance with 2-year outcomes are likely to be non-linear in ways that can be difficult to interpret (i.e., improvements from low to mid-range scores may be associated with increases in 2-year outcomes, but further improvements might be associated with decreases as students shift into the 4-year sector instead).

patterns of results in Table 3 are similar to those in Table 2, though there are some differences. For one, math test scores generally continue to be the most predictive test-based measures of these outcomes, though this pattern is not observed as consistently as it was in Table 2. Further, with full controls (Model 4), test-based measures tend to be at best quite weakly associated with any college enrollment and attainment. For example, while a 1-SD increase in ACT Math scores was associated with a 4 percentage point (or 16%) increase in the likelihood of four-year degree attainment, a 1-SD increase in ACT Math scores is associated with just a 1.4 percentage point (or 4%) increase in the likelihood of any degree attainment – and all other test-based measures are either weaker, null, or slightly negative predictors. By contrast, GPAs remain highly predictive of students’ likelihood of earning any college degree. A 1-SD increase in GPA is associated with a 21 percentage point (or 57%) increase in the likelihood of earning any degree, net of all other controls. In relative terms, this is comparable to the estimated relationship observed in Table 2, where a 1-SD increase in GPA was associated with a 14 percentage point (or 58%) increase in the likelihood of four-year degree attainment.

e) The relationship of WorkKeys scores, ACT scores, and GPAs with early-career wages

Table 4 again repeats the above analyses but now with outcomes of logged wage earnings in Year 1 and Year 5 after high school graduation, restricted to individuals who were A) not enrolled in college at the focal time point and B) observed as having any wage earnings. Results in Table 4 show some similarities, but also many meaningful differences, from the results in Tables 2 and 3.⁷ Beginning with Year 1 wages, we find that the only test-based domain that ever shows a statistically significant positive association with early-career wages is a student’s

⁷ In addition to the main results shown here, in Appendix Tables A2 and A3, we also show associations between test scores and four-year college and early-career wage outcomes that do not control for demographics. Interestingly, demographic controls have limited impact on coefficient estimates of the relationship of test scores with college outcomes, but substantively change coefficient estimates of the relationship of test scores with wage outcomes.

WorkKeys Applied Math score, even in models that only include controls for demographics and same-exam domain scores (i.e., Models 1 and 2). In Model 1, with controls only for WorkKeys scores and demographics, Applied Math scores show a significant positive association with Year 1 wages while Graphic Literacy and Workplace Documents scores show significant negative associations. Similarly, in Model 2, with controls only for ACT scores and demographics, ACT Math scores are substantive but not significantly positive predictors of Year 1 wages, ACT Science scores are null and near-zero in magnitude, and ACT Reading and English scores are substantive and significantly negatively associated.

When all test score domains are included (i.e., Model 3), WorkKeys Applied Math scores remain significant positive predictors of Year 1 wages, ACT English and Reading scores remain significant negative predictors, and all other domains are null and relatively close to zero in magnitude. This pattern holds when adding controls for GPA and course-taking (i.e., Model 4). Specifically, in this model, a 1-SD increase in WorkKeys Applied Math scores is associated with about a 4.2% increase in Year 1 wages, while 1-SD increases in ACT Reading and English scores are associated with 8-11% decreases, with all other domains being null. Meanwhile, as in Tables 2 and 3, students' GPAs are strong positive predictors of their early-career earnings, with a 1-SD increase in GPA being associated with an 8.5% increase in Year 1 wages.

Results for Year 5 wages generally demonstrate similar patterns, with the key exception being that ACT Math and Science scores are significant positive predictors in Models 2 and 3, though each attenuates to null in Model 4 once GPAs and course-taking controls are included. In these final models, WorkKeys Applied Math scores remain statistically significantly associated with about a 2.3% increase in earnings in Year 5, while ACT English and Reading scores remain statistically negatively associated with about 4-7% decreases. GPAs once again show a very

strong positive relationship, with a 1-SD increase in GPA being associated with a 17% increase in earnings in Year 5 net of controls for test scores, demographics, and course-taking patterns.

f) Sensitivity checks

We conduct four sensitivity checks on our estimates. For the first three checks, we focus on results from models with the full set of test score, GPA, demographic, and course-taking controls (i.e., Model 4), results of which are shown in Appendix Tables A2 and A3. First, we test sensitivity to the fact that while Year 1 wage outcomes pertain distinctly to individuals who did not attend college after high school, Year 5 wage outcomes pertain to individuals who either completed college within four years, had enrolled but dropped out, or never attended. We consider potential effects on educational attainment to be a mediator of observed differences and thus do not control for it in our primary models, but in Appendix Table A3 we show results of models that do include a control for educational attainment by Year 5 (no college, some college, or Bachelor's degree). We find that these controls change coefficients very little. We continue to observe positive coefficients on WorkKeys Applied Math scores and negative coefficients on ACT Reading and English scores that are similar in magnitude to our main models. The coefficient on GPA attenuates slightly, but remains a strong and significant predictor, with a 1-SD increase being associated with a 14.5% increase in earnings in Year 5 net of controls for demographics, test scores, course-taking, and educational attainment by that year.

Second, we test sensitivity to including controls for an individual's industry of employment, as a test of a hypothesis that negative relationships between ACT English and Reading scores and wages might be due to the types of employment opportunities that students with relatively strong English skills choose to enter or have access to. Industry data are an imperfect proxy for the types of work that an individual does; however, unfortunately, more

precise data on individuals' *occupations* are not available in our data. With this limitation in mind, we find that the inclusion of industry controls only attenuates the negative coefficients on ACT English and Reading modestly, and these coefficients remain significantly negative.

Third, for one of our two graduation cohorts, we can observe outcomes through Year 6 after high school graduation. These results are less precise due to the loss of about half of our sample, but are important in that many students do not complete college until at least 5 to 6 years after high school completion, such that extending our analysis period allows us to capture more completers. In brief, although results are less precise, we find that key patterns of results are the same for Year 6 as they are for Year 5 across all outcomes.

Fourth, we test the extent to which over-control might be affecting our conclusions by producing models that omit course-taking controls. Broadly, we find that while results for key measures are slightly stronger in magnitude in these models, core patterns do not change.

g) Heterogeneity

Finally, we re-ran our primary models restricted to students of selected demographic subgroups and CTE concentration areas⁸ to examine potential heterogeneity. For simplicity, we focus on four-year degree attainment and Year 5 wages from models with full controls. In addition, while true throughout this work, we remind readers to recall that all students in our sample are CTE concentrators, and thus that observed patterns of heterogeneity – or lack thereof – might differ in analysis of a broader population of students.

⁸ For statistical power, we combine some low-enrollment and conceptually-similar CTE pathways together for analysis. The groupings we analyze include: the Agriculture, Food, and Natural Resources (AGNR) pathway; the Health Science (HLTH) pathway; the Hospitality & Tourism (HOSP) pathway; “Trade and Industrial” (TI), which includes the Architecture & Construction, Manufacturing, and Transportation, Distribution, & Logistics pathways; “Business,” which includes the Business Management & Administration, Finance, and Marketing, Sales, & Service pathways; and “STEM,” which includes the Science, Technology, Engineering, & Mathematics and Information Technology pathways. Remaining pathways with relatively lower enrollments are not included in this analysis.

Results are shown in Appendix Tables A4 and A5. In general, we find limited evidence of heterogeneity. In terms of four-year degree attainment, key patterns of relationships are consistent across demographic subgroups. For example, with limited exception, GPAs are the most highly predictive measure, followed by ACT Math and English scores. The magnitude of estimates varies, but much of the time this corresponds to differences in subgroups' baseline rates of attainment. For example, a 1-SD increase in GPA is associated with a 10 percentage point increase in the likelihood of four-year degree attainment for ED students, but an 18 percentage point increase for non-ED students; however, this translates to an 80% increase for ED students relative to their baseline attainment rate of 12.4%, as compared to a 56% increase for non-ED students relative to their much higher baseline attainment rate of 31.5 percent. Results are also similar across CTE areas. Again, within concentrations, the strongest associations with four-year degree attainment exist between students' GPAs, and then their ACT Math scores. Likewise, ACT English scores tend to be the next most predictive, though ACT English scores are null predictors for students in Business and STEM CTE pathways.

Turning to wages, we again find limited evidence of heterogeneity, in part because of imprecision of estimates given the smaller sample sizes. However, across all demographic and CTE subgroups, GPAs are highly positively associated with wages in Year 5, while ACT English and/or Reading scores are negatively associated. In these models, WorkKeys Applied Math scores are generally directionally positive but not significant due to greater imprecision. Therefore, while some differences in the magnitude of certain estimates can be identified, key patterns of results are broadly consistent across all subgroups examined.

VI. Discussion

This work examined the relationship among multiple measures of students' skills and knowledge at the end of high school, including their ACT scores, WorkKeys scores, and high school GPAs, as well as associations between their performance on these measures with their postsecondary education and early-career outcomes. Our results show, first, that there are strong correlations among these measures, such that students are most commonly assessed as being both college- *and* career-ready or neither college- *nor* career-ready. Students with high ACT scores nearly universally earn career-ready WorkKeys scores, while students with low ACT scores mostly fail to earn career-ready WorkKeys scores, and vice versa. Likewise, students with the highest GPAs almost always score both college- and career-ready, while the vast majority of students with low GPAs score as neither college- nor career-ready. However, there are some discrepancies. Students who are Black and – especially – students with disabilities appear to perform worse on the WorkKeys than would be expected based on their ACT scores, leading them to have lower career-readiness rates. Meanwhile, students with the lowest GPAs are about 2.5 times more likely to earn a career-ready WorkKeys score than a college-ready ACT score, at least according to the thresholds used to define “readiness” on these exams in this setting.

When examining relationships with post-secondary outcomes, we consistently observe students' GPAs to be very strong predictors of all outcomes, including overall college enrollment and completion, four-year college enrollment and completion, and early-career wages, net of controls for their ACT and WorkKeys scores as well as a range of other demographic and coursework controls. Beyond this, math test scores also tend to show positive relationships with all outcomes, though for college outcomes it is scores on the ACT Math domain that appear most positively associated, whereas for early-career wages it is scores on the WorkKeys Applied Math

domain that appear most positively associated. Meanwhile, scores on the ACT English domain are also positively associated with four-year college success, but ACT English and Reading scores are negatively predictive of early-career earnings.

Together, these findings offer new insights into the types of skills and knowledge that may most benefit students and the role that the WorkKeys may play in state assessment systems as a measure of career readiness, adding to a limited research base on this exam (ACT, 2026; Allen, 2025; Smith & Hirschl, 2022). In general, the high correlation between students' ACT scores, WorkKeys scores, and GPAs suggests that these measures all provide fairly similar assessments of students' post-secondary readiness, despite the different purposes that these measures may be designed for. This might be because what it takes to be “college-ready” is similar to what it takes to be “career-ready,” at least in terms of the types of math and reading skills that these measures primarily assess; or because the skills and knowledge needed to be college and career-ready are complementary, such that students who develop one set tend to also develop the other. As states increasingly consider incorporating career-readiness exams into their assessment systems and defining career-ready benchmarks for students and schools, our findings suggest that more work may remain needed to understand in what ways career-readiness is distinct from college-readiness, and in what ways these terms overlap, so that states can better identify appropriate assessments and minimize testing and other forms of accountability data collection that can be financially and politically costly to mandate.

However, we observe some discrepancies in student performance across these exams, particularly for Black students and students with disabilities, who appear to underperform on the WorkKeys relative to the ACT. There are several potential explanations of this result. For example, it may be that there are systematic differences in students' career readiness and

development opportunities that exist above and beyond any potential differences in their traditional academic opportunities; that there are differences in students' educational opportunities between the two exam administrations (i.e., during 12th grade); or that there are unobserved differential processes of selection into CTE among students with similar levels of college readiness in our setting that could influence these results. These several possibilities suggest that more research remains needed on this topic.

Further, although the exams are highly correlated in general, we do find that they relate to college and early-career outcomes differently, on net. In terms of exam domains, math scores consistently show the strongest associations with both college and career outcomes, consistent with a growing literature that has tended to find that a wide range of math skills support student success in both education and career pathways (e.g., Conrad et al., 2026; Moreno-Medina et al., 2026; Xu, 2026). The stronger association of ACT Math with college outcomes, and WorkKeys Applied Math with early-career earnings, is consistent with the aims of each exam, and provides some evidence that differences in the content of these two exams may be aligned with differences between the specific types of math skills that are most important to college vs. early-career success. However, it should be kept in mind that these results show only associations that could be subject to confounding from, for example, differences in student effort on the two exams that is related to their desired postsecondary pathway (e.g., if college-intending students exert more effort on the ACT and career-intending students exert more effort on the WorkKeys).

Results for English are less consistent. Like Bettinger et al. (2013), we find that ACT English scores are predictive of four-year college success at a magnitude that is less than that of the ACT Math domain but greater than the ACT Reading and Science domains. While Bettinger et al. (2013) discuss how college admissions officers might use this information to consider

students' ACT Math and English scores more heavily than their Reading and Science scores, we suggest that this also implies that K-12 systems may benefit from placing greater curricular emphasis on the types of English skills tested by the ACT English vs. ACT Reading (or WorkKeys Workplace Documents) domain. However, consistent with Conrad et al. (2026), we find that ACT English and Reading scores are negatively associated with early-career earnings, at least after controlling for students' scores on other domains of the ACT. We hypothesize that this may reflect that students with relatively strong English skills may opt away from or lack access to high-wage early-career pathways, but our partial test of this hypothesis in this study – controlling for individuals' industry of employment – only somewhat supports this theory.

Finally, our results add to a long debate in research and practice about the relative value of GPAs vs. test scores in college admissions and success (Allensworth et al., 2020; Friedman et al., 2025; Galla et al., 2019; Joyce et al., 2026; Mattern et al., 2011). Our findings suggest that, within a broad population that includes students attending non-elite institutions or no college at all, GPAs are strongly predictive of not only college success but also early-career wages, though test scores (especially in math) also add predictive value. Potential explanations of this result may be that students' GPAs better reflect their cumulative skills and knowledge than do one-day, multiple-choice exams; that, being based on their performance in both required and elective courses, GPAs provide better insight into students' skills and knowledge in the areas that are most relevant to their individual pathway (i.e., their major or career); and/or that GPAs at least partially measure key soft skills, such as grit and growth mindsets, that are highly relevant to success in both college and career but which are not captured well by test scores (Borghans et al., 2016; Galla et al., 2019). These findings suggest that, despite concerns about the lack of a consistent meaning to grades and rising grade inflation (Brookhart et al., 2016; Goldhaber &

Young, 2024; Sanchez & Moore, 2022; Swiderski & Fuller, 2023), GPAs still tend to encapsulate important information about students' post-secondary readiness; better understanding of what is captured, and how to capture it more reliably, may be an important avenue of future research.

We note that our results should be interpreted cautiously due to several limitations. For one, our sample includes only CTE concentrators. Although this sample is diverse in many ways, it is not clear the extent to which results may generalize to broader student populations. Second, our analysis is largely based on regressions which produce associations, not causal effects. Further, our key measures are correlated, imperfect measures of students' skills and knowledge. As such, there are multiple potential explanations for our results. We interpret our results as providing suggestive evidence as to the types of skills that may be most important to students' postsecondary trajectories, but these hypotheses should be further tested in future causal work.

Despite these limitations, the findings of this study can contribute to education policy and practice in an era of growing focus on not only college but also career readiness. Our work suggests the potential importance of a broad range of math skills as well as soft skills to student success across both college and career pathways. At the same time, it is also evident that more work remains needed to develop better understandings and measures of career readiness, as distinct from college readiness, to support states and schools in their efforts to better prepare all students, regardless of their pathway, for life after high school.

VII. References

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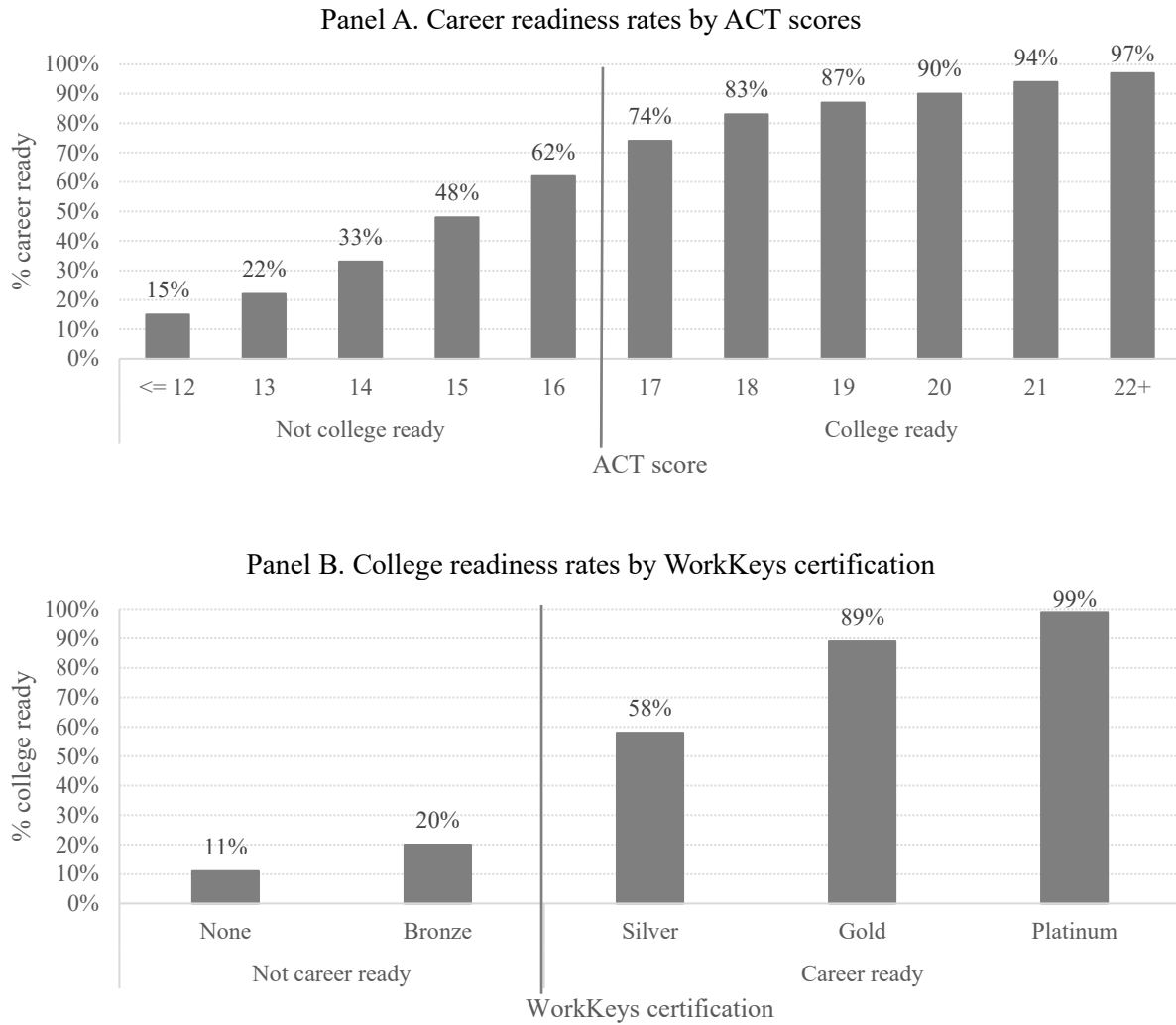
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VIII. Figures

Figure 1

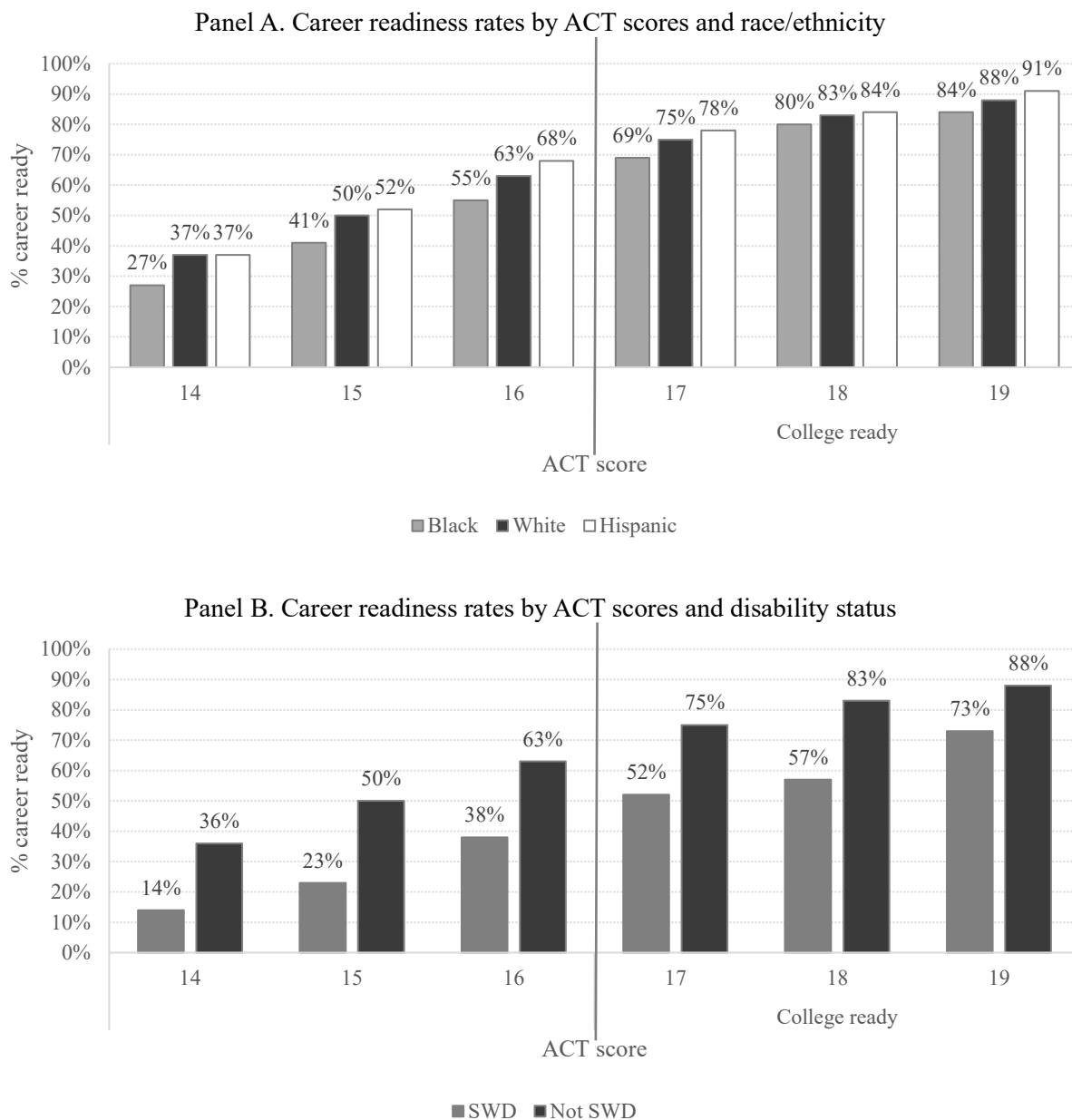
College and career readiness rates by ACT and WorkKeys scores



Note. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 who took both the ACT and the WorkKeys (N = 81,953). A student is defined as career-ready if they earned at least a Silver certification on the WorkKeys. A student is defined as college-ready if they earned at least a 17 on the ACT.

Figure 2

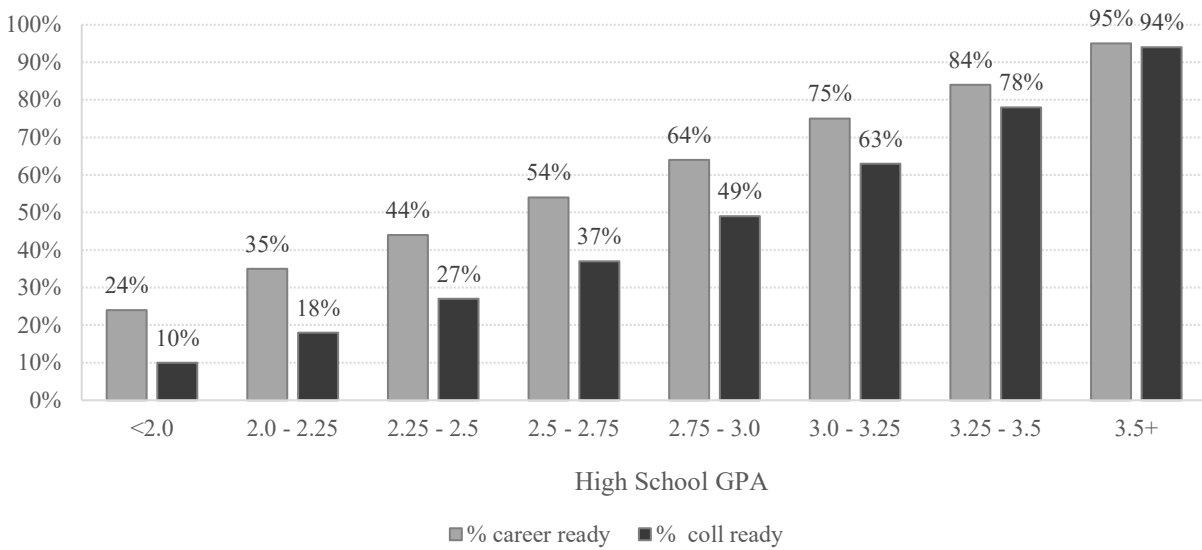
College and career readiness rates by ACT score and select demographic characteristics



Note. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 who took both the ACT and the WorkKeys (N = 81,953). A student is defined as career-ready if they earned at least a Silver certification on the WorkKeys. A student is defined as college-ready if they earned at least a 17 on the ACT. SWD = “student with disability.”

Figure 3

College and career readiness rates by high school GPA



Note. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 who took both the ACT and the WorkKeys (N = 81,953). A student is defined as career-ready if they earned at least a Silver certification on the WorkKeys. A student is defined as college-ready if they earned at least a 17 on the ACT.

IX. Tables

Table 1

Descriptive statistics of CTE Concentrators vs. all high school graduates

Variable	WorkKeys Takers	All Graduates
<u>Treatment variables</u>		
WorkKeys Certification Level		
None	8.6%	.
Bronze	25.0%	.
Silver	33.3%	.
Gold	19.7%	.
Platinum	13.3%	.
WorkKeys Aggregate score	14.0 (3.40)	
WorkKeys Applied Math score	4.6 (1.38)	.
WorkKeys Graphic Literacy score	4.9 (1.27)	.
WorkKeys Workplace Documents score	4.95 (1.21)	.
ACT Overall score	18.0 (4.59)	18.6 (5.19)
ACT Math score	18.5 (4.39)	19.0 (4.87)
ACT Science score	18.3 (4.83)	18.8 (5.26)
ACT Reading score	18.2 (5.77)	19.0 (6.33)
ACT English score	16.5 (5.37)	17.3 (6.13)
Unweighted overall high school GPA	2.9 (0.67)	2.9 (0.71)
<u>Demographic covariates</u>		
Race/ethnicity		
American Indian	1.5%	1.2%
Asian / Pacific Islander	2.5%	3.3%
Black	24.2%	24.6%
Hispanic	13.7%	14.3%
Multi-racial	3.5%	3.7%
White	54.7%	52.9%
Economically distressed (ED) student	36.6%	34.9%
Male	52.8%	49.1%
English Learner	1.5%	2.6%
Academically / intellectually gifted	16.9%	20.1%
Student with disability	6.2%	6.9%

School urbanicity		
Urban	30.8%	39.5%
Suburban	8.7%	7.7%
Town	8.1%	6.4%
Rural	52.4%	46.3%
Graduation Cohort Year		
2018	50.0%	49.8%
2019	50.0%	50.2%
<u>Course-Taking Covariates</u>		
Math course taken in graduation year		
None	19.7%	18.4%
Local elective	1.6%	1.8%
Math 3 or lower	3.0%	3.9%
Math 4 or equivalent	50.5%	46.4%
Precalculus	7.5%	7.0%
Calculus or AP or Dual Enrollment Math	17.6%	22.6%
Science course taken in graduation year		
None	61.8%	54.5%
Local elective	3.5%	3.9%
Basic required science	6.0%	7.2%
Other high school level science	18.2%	18.2%
AP or Dual Enrollment, non-physical sci.	7.2%	10.7%
AP or Dual Enrollment, physical sci.	3.3%	5.4%
Took non-math/non-sci AP/DE in graduation year	37.9%	42.3%
CTE Pathway		
Arts, AV Tech, & Communications	6.7%	3.1%
Agriculture, Food, & Natural Resources	21.1%	9.8%
Architecture & Construction	10.6%	4.9%
Business Management & Administration	8.5%	4.0%
Finance	1.3%	0.6%
Health Science	19.4%	9.0%
Hospitality & Tourism	15.3%	7.1%
Human Services	2.6%	1.2%
Information Technology	10.2%	4.7%
Law, Public Safety, Corrections, & Security	2.5%	1.2%
Manufacturing	4.1%	1.9%
Marketing, Sales, & Service	3.3%	1.6%
STEM	7.3%	3.4%
Transportation, Distribution, & Logistics	3.7%	1.8%
Other, None, or Missing	13.8%	59.7%
N	81,953	186,422

Note. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 with complete data on all variables in the associated column. CTE Pathway percentages sum to greater than 100% because students may complete a concentration in more than one pathway.

Table 2

Associations of students' WorkKeys scores, ACT scores, and GPAs with 4-Year College Outcomes

	4-Year Enrollment in Year 1				4-Year Degree by Year 5			
	M1	M2	M3	M4	M1	M2	M3	M4
WK A.M.	0.087*** (0.0028)		0.017*** (0.0027)	-0.003 (0.0025)	0.069*** (0.0027)		0.010*** (0.0026)	-0.010*** (0.0024)
WK G.L.	0.050*** (0.0025)		0.019*** (0.0025)	-0.001 (0.0023)	0.037*** (0.0023)		0.012*** (0.0022)	-0.007** (0.0021)
WK W.D.	0.041***		0.001 (0.0022)	-0.009*** (0.0020)	0.033*** (0.0022)		0.002 (0.0022)	-0.009*** (0.0021)
ACT MA		0.120*** (0.0033)	0.107*** (0.0035)	0.048*** (0.0034)		0.107*** (0.0032)	0.099*** (0.0034)	0.040*** (0.0034)
ACT SCI		0.052*** (0.0028)	0.046*** (0.0028)	0.015*** (0.0027)		0.037*** (0.0027)	0.033*** (0.0027)	0.005 (0.0026)
ACT ENG		0.062*** (0.0032)	0.056*** (0.0033)	0.034*** (0.0031)		0.049*** (0.0032)	0.045*** (0.0032)	0.023*** (0.0030)
ACT RD		0.037*** (0.0029)	0.035*** (0.0029)	0.018*** (0.0027)		0.024*** (0.0028)	0.022*** (0.0028)	0.006* (0.0026)
GPA				0.141*** (0.0031)				0.143*** (0.0031)
Demo covs?	Y	Y	Y	Y	Y	Y	Y	Y
Course covs?	N	N	N	Y	N	N	N	Y
N	81,953	81,953	81,953	81,953	81,953	81,953	81,953	81,953
Mean	0.346	0.346	0.346	0.346	0.245	0.245	0.245	0.245
Adj. R2	0.2230	0.2759	0.2779	0.3562	0.1936	0.2385	0.2394	0.3271

Note. Results obtained from OLS regression (linear probability) models. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 who took both the ACT and the WorkKeys. Standard errors, clustered by school-year, are shown in parentheses below coefficients. “WK A.M.” = WorkKeys Applied Math. “WK G. L.” = WorkKeys Graphic Literacy. “WK W.D.” = WorkKeys Workplace Documents. “ACT MA” = ACT Math. “ACT SCI” = ACT Science. “ACT ENG” = ACT English. “ACT RD” = ACT Reading. GPA refers to a student’s final unweighted high school GPA. “Demo covs” refers to the set of demographic covariates listed in Table 1. “Course covs” refers to the course-taking and CTE concentration covariates listed in Table 1.

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

Table 3

Associations of students' WorkKeys scores, ACT scores, and GPAs with Any (2-Year or 4-Year) College Outcomes

	Any College Enrollment in Year 1				Any College Degree by Year 5			
	M1	M2	M3	M4	M1	M2	M3	M4
WK A.M.	0.060*** (0.0028)		0.020*** (0.0028)	-0.002 (0.0027)	0.068*** (0.0029)		0.018*** (0.0030)	-0.009** (0.0028)
WK G.L.	0.052*** (0.0028)		0.033*** (0.0028)	0.007** (0.0026)	0.045*** (0.0026)		0.023*** (0.0025)	-0.004 (0.0024)
WK W. D.	0.031*** (0.0024)		0.006* (0.0024)	-0.006** (0.0022)	0.036*** (0.0024)		0.010*** (0.0025)	-0.005* (0.0022)
ACT MA		0.068*** (0.0031)	0.050*** (0.0033)	0.004 (0.0032)		0.094*** (0.0033)	0.078*** (0.0035)	0.014*** (0.0034)
ACT SCI		0.057*** (0.0031)	0.047*** (0.0032)	0.014*** (0.0030)		0.050*** (0.0031)	0.041*** (0.0032)	0.004 (0.0029)
ACT ENG		0.036*** (0.0036)	0.026*** (0.0036)	0.004 (0.0034)		0.043*** (0.0036)	0.033*** (0.0037)	0.008* (0.0035)
ACT RD		0.029*** (0.0033)	0.024*** (0.0033)	0.004 (0.0031)		0.022*** (0.0032)	0.017*** (0.0032)	-0.005 (0.0029)
GPA				0.164*** (0.0030)				0.211*** (0.0030)
Demo covs?	Y	Y	Y	Y	Y	Y	Y	Y
Course covs?	N	N	N	Y	N	N	N	Y
N	81,953	81,953	81,953	81,953	81,953	81,953	81,953	81,953
Mean	0.641	0.641	0.641	0.641	0.368	0.368	0.368	0.368
Adj. R2	0.1442	0.1597	0.1645	0.2504	0.1666	0.1897	0.1930	0.3004

Note. Results obtained from OLS regression (linear probability) models. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 who took both the ACT and the WorkKeys. Standard errors, clustered by school-year, are shown in parentheses below coefficients. “WK A.M.” = WorkKeys Applied Math. “WK G. L.” = WorkKeys Graphic Literacy. “WK W.D.” = WorkKeys Workplace Documents. “ACT MA” = ACT Math. “ACT SCI” = ACT Science. “ACT ENG” = ACT English. “ACT RD” = ACT Reading. GPA refers to a student’s final unweighted high school GPA. “Demo covs” refers to the set of demographic covariates listed in Table 1. “Course covs” refers to the course-taking and CTE concentration covariates listed in Table 1.

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

Table 4

Associations of students' WorkKeys scores, ACT scores, and GPAs with Early Wage Earnings Outcomes

	Logged Wages in Year 1				Logged Wages in Year 5			
	M1	M2	M3	M4	M1	M2	M3	M4
WK A.M.	0.030*		0.053***	0.042**	0.058***		0.048***	0.023*
	(0.0146)		(0.0157)	(0.0158)	(0.0090)		(0.0096)	(0.0097)
WK G.L.	-0.026*		-0.007	-0.013	0.005		0.007	-0.011
	(0.0128)		(0.0129)	(0.0128)	(0.0088)		(0.0091)	(0.0090)
WK W. D.	-0.059***		-0.019	-0.021	-0.002		0.011	-0.001
	(0.0131)		(0.0137)	(0.0137)	(0.0078)		(0.0082)	(0.0081)
ACT MA		0.040	0.016	0.030		0.080***	0.053***	0.008
		(0.0213)	(0.0230)	(0.0229)		(0.0111)	(0.0120)	(0.0121)
ACT SCI		0.009	0.006	-0.002		0.032**	0.022*	-0.006
		(0.0178)	(0.0180)	(0.0181)		(0.0109)	(0.0111)	(0.0110)
ACT ENG		-0.116***	-0.118***	-0.112***		-0.043***	-0.054***	-0.067***
		(0.0205)	(0.0207)	(0.0209)		(0.0128)	(0.0130)	(0.0130)
ACT RD		-0.087***	-0.083***	-0.078***		-0.030**	-0.035**	-0.043***
		(0.0181)	(0.0182)	(0.0183)		(0.0108)	(0.0111)	(0.0111)
GPA				0.085***				0.170***
				(0.0149)				(0.0092)
Demo covs?	Y	Y	Y	Y	Y	Y	Y	Y
Course covs?	N	N	N	Y	N	N	N	Y
N	18,688	18,688	18,688	18,688	38,200	38,200	38,200	38,200
Mean	9.09	9.09	9.09	9.09	10.08	10.08	10.08	10.08
Adj. R2	0.0295	0.0348	0.0353	0.0439	0.0504	0.0501	0.0518	0.0686

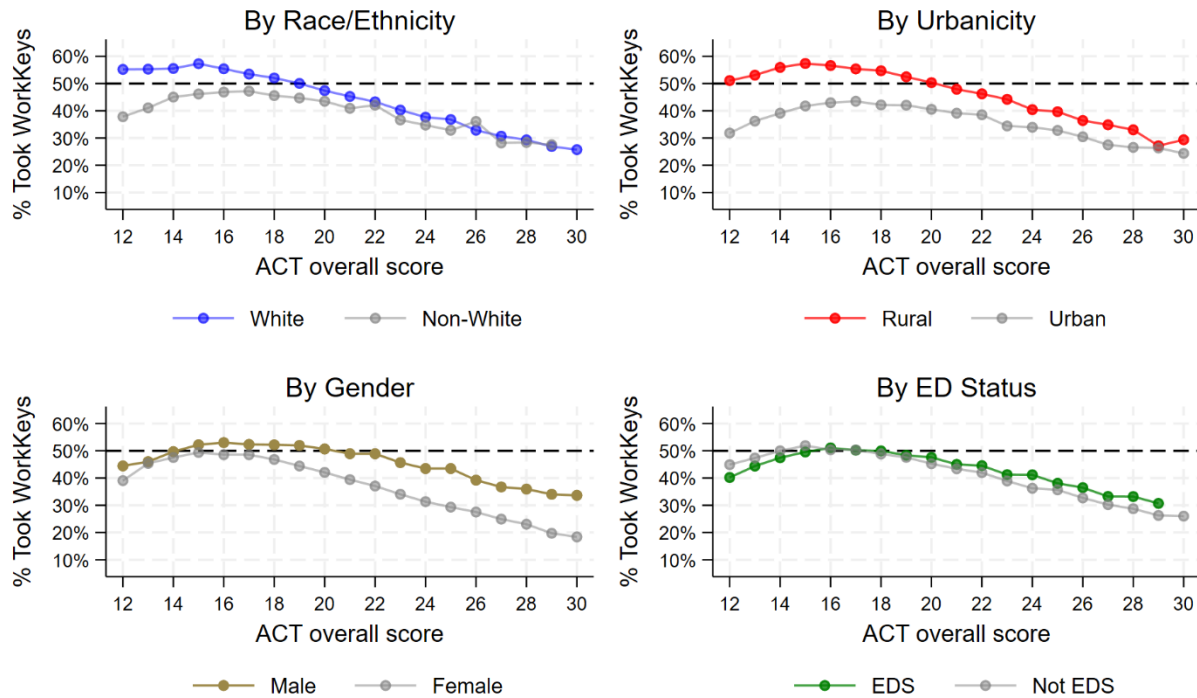
Note. Results obtained from OLS regression models. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 who took both the ACT and the WorkKeys. Standard errors, clustered by school-year, are shown in parentheses below coefficients. “WK A.M.” = WorkKeys Applied Math. “WK G. L.” = WorkKeys Graphic Literacy. “WK W.D.” = WorkKeys Workplace Documents. “ACT MA” = ACT Math. “ACT SCI” = ACT Science. “ACT ENG” = ACT English. “ACT RD” = ACT Reading. GPA refers to a student’s final unweighted high school GPA. “Demo covs” refers to the set of demographic covariates listed in Table 1. “Course covs” refers to the course-taking and CTE concentration covariates listed in Table 1.

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

X. Appendix A. Supplemental Figures and Tables

Appendix Figure A1

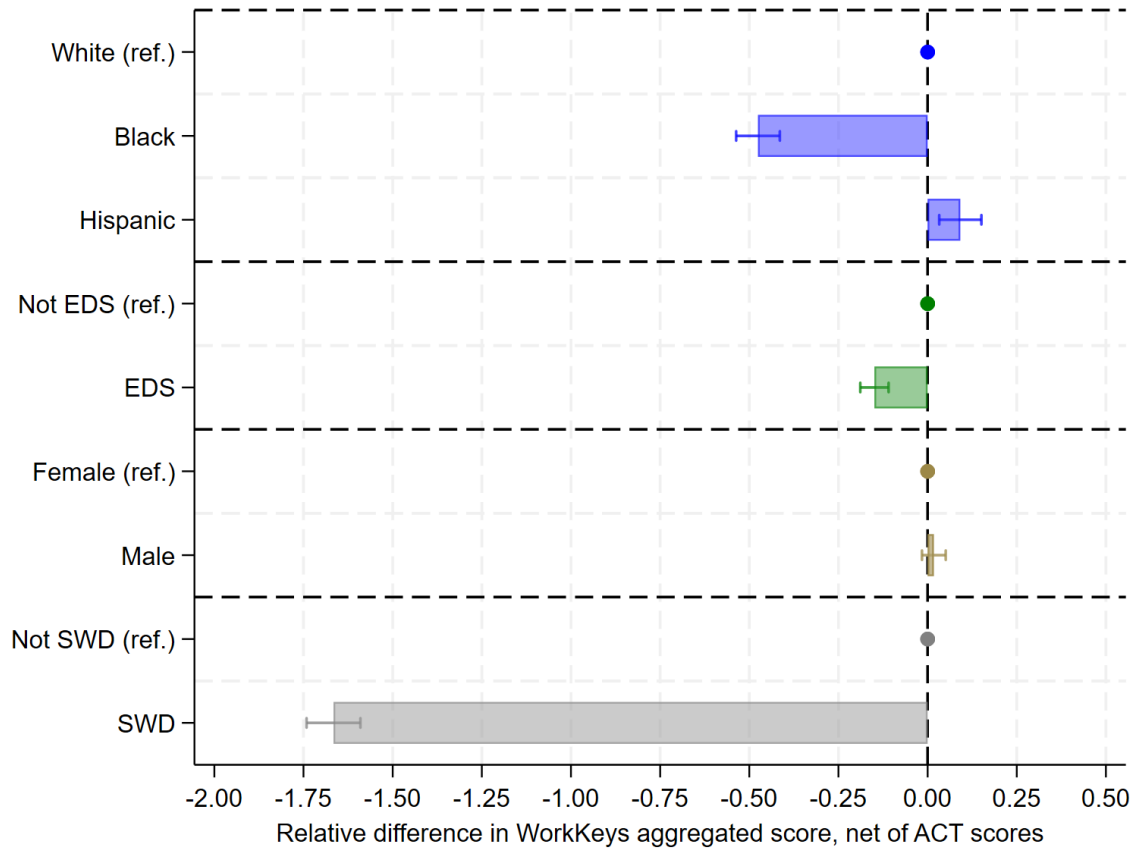
WorkKeys exam participation rates, by select demographic and academic characteristics



Note. Charts depict the percentage of students, by demographic subgroup and ACT score, who took the WorkKeys, among sample of students with complete data as shown in Table 1 (N = 186,422). Range is restricted to ACT scores between 12 and 30 because of small sample sizes outside of this range. Points are also omitted if the point would refer to <50 students to protect confidentiality and reduce noise. Sample includes all students who graduated from a North Carolina public high school in 2017-18 or 2018-19 with an ACT score. ED = Economically disadvantaged; Urban = student's school is in an urban/suburban school district; Rural = student's school is in a rural/town school district.

Appendix Figure A2

Coefficient plot of results of regressions of WorkKeys aggregate scores on ACT scores and select demographic characteristics



Note. Results obtained from OLS regressions of students' WorkKeys aggregated score (summed score across all 3 domains) on their ACT overall score and a demographic subgroup indicator, with separate models conducted for subgroups defined by race/ethnicity, Economically Disadvantaged Student (EDS) status, gender, and Student with Disability (SWD) status. Dots at zero are shown for the reference subgroup. Coefficients for comparison subgroups are shown as bars, while spikes depict 95% confidence intervals (clustered by school-year) around the estimate.

Table A1

Distributions of key treatment variables

	P10	P25	P50	P75	P90
WorkKeys Aggregate score	9	12	14	17	19
WorkKeys Applied Math score	3	4	5	6	7
WorkKeys Graphic Literacy score	3	4	5	6	6
WorkKeys Workplace Documents score	3	4	4	5	6
ACT Overall score	13	15	17	21	24
ACT Math score	14	15	17	21	25
ACT Science score	13	15	18	21	24
ACT Reading score	12	14	18	22	26
ACT English score	10	13	16	20	24
Unweighted overall high school GPA	2.00	2.45	3.00	3.47	3.78

Note. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 who took both the ACT and the WorkKeys (N = 81,953). P10 = 10th percentile, P25 = 25th percentile, etc.

Table A2

Sensitivity of 4-Year Degree Attainment Results

	M3, Main	M3, No Demos	M4, Main	M4, No Course Covs	M4, By Year 6
WK A.M.	0.010*** (0.0026)	-0.003 (0.0027)	-0.010*** (0.0024)	-0.007** (0.0025)	-0.015*** (0.0035)
WK G.L.	0.012*** (0.0022)	0.014*** (0.0023)	-0.007** (0.0021)	-0.008*** (0.0022)	-0.006 (0.0032)
WK W.D.	0.002 (0.0022)	0.011*** (0.0024)	-0.009*** (0.0021)	-0.008*** (0.0021)	-0.007* (0.0031)
ACT MA	0.099*** (0.0034)	0.104*** (0.0036)	0.040*** (0.0034)	0.071*** (0.0034)	0.037*** (0.0049)
ACT SCI	0.033*** (0.0027)	0.030*** (0.0029)	0.005 (0.0026)	0.011*** (0.0027)	0.008* (0.0036)
ACT ENG	0.045*** (0.0032)	0.059*** (0.0035)	0.023*** (0.0030)	0.033*** (0.0031)	0.022*** (0.0042)
ACT RD	0.022*** (0.0028)	0.029*** (0.0030)	0.006* (0.0026)	0.011*** (0.0027)	0.007 (0.0041)
GPA			0.143*** (0.0031)	0.158*** (0.0032)	0.156*** (0.0045)
Demo covs?	Y	N	Y	N	Y
Course covs?	N	N	Y	N	Y
N	81,953	81,953	81,953	81,953	41,056
Mean	0.245	0.245	0.245	0.245	0.274
Adj. R2	0.2394	0.2060	0.3271	0.2920	0.3425

Note. Results obtained from OLS regression (linear probability) models. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 who took both the ACT and the WorkKeys. Standard errors, clustered by school-year, are shown in parentheses below coefficients. “M3, Main” repeats results from Table 2, Model 3. “M4, Main” repeats results from Table 2, Model 4. “WK A.M.” = WorkKeys Applied Math. “WK G. L.” = WorkKeys Graphic Literacy. “WK W.D.” = WorkKeys Workplace Documents. “ACT MA” = ACT Math. “ACT SCI” = ACT Science. “ACT ENG” = ACT English. “ACT RD” = ACT Reading. GPA refers to a student’s final unweighted high school GPA. “Demo covs” refers to the set of demographic covariates listed in Table 1. “Course covs” refers to the course-taking and CTE concentration covariates listed in Table 1.

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

Table A3

Sensitivity of Logged Wages in Year 5 Results to Control Sets

	M3, Main	M3, No Demos	M4, Main	M4, +Ed. Covs	M4, +Ind. Covs	M4, No course Covs	M4, In Year 6
WK A.M.	0.048*** (0.0096)	0.111*** (0.0096)	0.023* (0.0097)	0.026** (0.0096)	0.023* (0.0093)	0.030** (0.0096)	0.027* (0.0126)
WK G.L.	0.007 (0.0091)	0.006 (0.0092)	-0.011 (0.0090)	-0.010 (0.0090)	-0.002 (0.0086)	-0.014 (0.0089)	0.011 (0.0124)
WK W.D.	0.011 (0.0082)	-0.015 (0.0083)	-0.001 (0.0081)	-0.000 (0.0081)	0.001 (0.0078)	-0.000 (0.0081)	-0.029** (0.0109)
ACT MA	0.053*** (0.0120)	0.077*** (0.0121)	0.008 (0.0121)	0.000 (0.0121)	-0.002 (0.0116)	0.018 (0.0119)	0.013 (0.0158)
ACT SCI	0.022* (0.0111)	0.040*** (0.0113)	-0.006 (0.0110)	-0.008 (0.0110)	-0.003 (0.0106)	-0.006 (0.0110)	0.003 (0.0138)
ACT ENG	-0.054*** (0.0130)	-0.030* (0.0127)	-0.067*** (0.0130)	-0.072*** (0.0129)	-0.049*** (0.0123)	-0.072*** (0.0129)	-0.069*** (0.0160)
ACT RD	-0.035** (0.0111)	-0.056*** (0.0111)	-0.043*** (0.0111)	-0.045*** (0.0111)	-0.033** (0.0108)	-0.048*** (0.0111)	-0.032* (0.0143)
GPA			0.170*** (0.0092)	0.145*** (0.0096)	0.132*** (0.0089)	0.185*** (0.0087)	0.211*** (0.0130)
Demo covs?	Y	N	Y	Y	Y	Y	Y
Course covs?	Y	N	Y	Y	N	Y	Y
N	38,200	38,200	38,200	38,200	38,200	38,200	20,802
Mean	10.08	10.08	10.08	10.08	10.08	10.08	10.21
Adj. R2	0.0518	0.0171	0.0686	0.0719	0.1376	0.0635	0.0786

Note. Results obtained from OLS regression models. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 who took both the ACT and the WorkKeys. Standard errors, clustered by school-year, are shown in parentheses below coefficients. “M3, Main” repeats results from Table 2, Model 3. “M4, Main” repeats results from Table 2, Model 4. “WK A.M.” = WorkKeys Applied Math. “WK G. L.” = WorkKeys Graphic Literacy. “WK W.D.” = WorkKeys Workplace Documents. “ACT MA” = ACT Math. “ACT SCI” = ACT Science. “ACT ENG” = ACT English. “ACT RD” = ACT Reading. GPA refers to a student’s final unweighted high school GPA. “Demo covs” refers to the set of demographic covariates listed in Table 1. “Course covs” refers to the course-taking and CTE concentration covariates listed in Table 1. “+Ed. Covs” refers to models that include a control for the highest level of education attained by Year 5 (i.e., no college, some college, or Bachelor’s degree). “+Ind. Covs” refers to models that include a control for an individual’s industry of employment.

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

Table A4

Heterogeneity of Results for 4-Year Degree Attainment

Panel A. 4-year degree attainment, by demographic subgroups							
	Male	Female	EDS	Not EDS	Black	Hispanic	White
WK MA	-0.016*** (0.0029)	-0.007 (0.0037)	-0.004 (0.0031)	-0.011*** (0.0032)	-0.004 (0.0044)	-0.011* (0.0053)	-0.009** (0.0033)
WK G.L.	-0.005* (0.0024)	-0.009** (0.0033)	-0.006* (0.0026)	-0.005 (0.0029)	-0.011** (0.0040)	-0.001 (0.0042)	-0.007* (0.0031)
WK W.D.	-0.012*** (0.0025)	-0.005 (0.0031)	0.000 (0.0027)	-0.012*** (0.0027)	-0.005 (0.0042)	0.005 (0.0048)	-0.012*** (0.0027)
ACT MA	0.037*** (0.0040)	0.052*** (0.0051)	0.019*** (0.0048)	0.041*** (0.0041)	0.029*** (0.0067)	0.034*** (0.0083)	0.037*** (0.0042)
ACT Sci	0.004 (0.0031)	0.012** (0.0038)	0.001 (0.0032)	0.005 (0.0035)	-0.001 (0.0050)	0.003 (0.0058)	0.004 (0.0036)
ACT Eng	0.018*** (0.0039)	0.023*** (0.0045)	0.011* (0.0043)	0.025*** (0.0038)	0.012* (0.0057)	0.029*** (0.0074)	0.024*** (0.0041)
ACT RD	0.005 (0.0032)	0.006 (0.0041)	0.005 (0.0037)	0.007* (0.0035)	0.013* (0.0056)	0.006 (0.0064)	0.004 (0.0037)
GPA	0.130*** (0.0036)	0.158*** (0.0039)	0.099*** (0.0035)	0.176*** (0.0038)	0.158*** (0.0051)	0.096*** (0.0053)	0.153*** (0.0039)
N	43,232	38,721	29,990	51,963	19,796	11,205	44,803
Mean	0.205	0.290	0.124	0.315	0.195	0.140	0.287
Adj R2	0.3231	0.3275	0.2057	0.3338	0.2524	0.2176	0.3472
Panel B. 4-year degree attainment, by CTE concentration							
	Health	T&I	Hospitality	AGNR	Business	STEM	
WK MA	-0.013* (0.0062)	-0.006 (0.0041)	-0.018** (0.0058)	-0.005 (0.0044)	-0.013 (0.0076)	-0.012* (0.0061)	
WK G.L.	-0.012* (0.0057)	-0.006 (0.0036)	0.000 (0.0049)	-0.004 (0.0037)	-0.004 (0.0070)	-0.003 (0.0055)	
WK W.D.	-0.003 (0.0055)	-0.012** (0.0040)	-0.010 (0.0051)	-0.004 (0.0037)	-0.012 (0.0068)	-0.012* (0.0050)	
ACT MA	0.043*** (0.0076)	0.032*** (0.0065)	0.049*** (0.0084)	0.024*** (0.0066)	0.036*** (0.0099)	0.040*** (0.0069)	
ACT Sci	0.016* (0.0065)	-0.009 (0.0049)	0.010 (0.0064)	0.004 (0.0048)	0.009 (0.0088)	-0.002 (0.0068)	
ACT Eng	0.035*** (0.0077)	0.026*** (0.0061)	0.022** (0.0074)	0.012* (0.0056)	0.012 (0.0096)	0.008 (0.0067)	
ACT RD	0.004 (0.0067)	0.006 (0.0054)	0.003 (0.0062)	0.011* (0.0049)	0.012 (0.0081)	0.004 (0.0061)	
GPA	0.189*** (0.0062)	0.086*** (0.0047)	0.134*** (0.0058)	0.104*** (0.0045)	0.181*** (0.0078)	0.186*** (0.0063)	
N	15,919	14,013	12,549	17,256	8,287	13,847	
Mean	0.334	0.131	0.209	0.154	0.332	0.331	
Adj. R2	0.2833	0.2950	0.3060	0.2745	0.3311	0.3331	

Note. Results obtained from OLS regression (linear probability) models. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 who took both the ACT and the WorkKeys. Standard errors, clustered by school-year, are shown in parentheses below coefficients. “M3, Main” repeats results from Table 2, Model 3. “M4, Main” repeats results from Table 2, Model 4. “WK A.M.” = WorkKeys Applied Math. “WK G. L.” = WorkKeys Graphic Literacy. “WK W.D.” = WorkKeys Workplace Documents. “ACT MA” = ACT Math. “ACT SCI” = ACT Science. “ACT ENG” = ACT English. “ACT RD” = ACT Reading. GPA refers to a student’s final unweighted high school GPA. “Demo covs” refers to the set of demographic covariates listed in Table 1. “Course covs” refers to the course-taking and CTE concentration covariates listed in Table 1. “EDS” = Economically disadvantaged student. For definitions of CTE concentration areas, see Footnote 8 in the main text.

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

Table A5

Heterogeneity of Results for Year 5 Wages

Panel A. Year 5 Logged Wages, by demographic subgroups							
	Male	Female	EDS	Not EDS	Black	Hispanic	White
WK MA	0.021 (0.0123)	0.013 (0.0153)	0.023 (0.0160)	0.023 (0.0121)	-0.007 (0.0241)	0.032 (0.0279)	0.028* (0.0117)
WK G.L.	0.001 (0.0111)	-0.022 (0.0135)	-0.014 (0.0144)	-0.009 (0.0112)	0.011 (0.0196)	-0.005 (0.0235)	-0.017 (0.0109)
WK W.D.	0.000 (0.0113)	-0.007 (0.0121)	-0.002 (0.0145)	-0.001 (0.0100)	-0.002 (0.0192)	0.011 (0.0261)	-0.006 (0.0099)
ACT MA	0.006 (0.0162)	0.032 (0.0193)	0.034 (0.0211)	-0.003 (0.0147)	0.011 (0.0298)	0.042 (0.0358)	0.006 (0.0139)
ACT Sci	-0.005 (0.0138)	0.005 (0.0168)	0.004 (0.0197)	-0.010 (0.0130)	-0.008 (0.0248)	-0.013 (0.0299)	0.001 (0.0138)
ACT Eng	-0.084*** (0.0170)	-0.052** (0.0183)	-0.069** (0.0228)	-0.064*** (0.0156)	-0.084** (0.0287)	-0.078* (0.0383)	-0.062*** (0.0155)
ACT RD	-0.054*** (0.0144)	-0.027 (0.0165)	-0.038* (0.0187)	-0.044*** (0.0133)	-0.032 (0.0265)	-0.052 (0.0295)	-0.048*** (0.0133)
GPA	0.148*** (0.0124)	0.197*** (0.0136)	0.150*** (0.0147)	0.179*** (0.0117)	0.187*** (0.0201)	0.090*** (0.0234)	0.167*** (0.0121)
N	20,788	17,412	14,498	23,702	9,280	4,383	21,944
Mean	10.184	9.952	9.915	10.179	9.763	10.130	10.217
Adj R2	0.0653	0.0591	0.0547	0.0562	0.0227	0.0297	0.0502
Panel B. Year 5 Logged Wages, by CTE concentration							
	Health	T&I	Hosp.	AGNR	Business	STEM	
WK MA	0.002 (0.0214)	0.031 (0.0185)	0.036 (0.0231)	0.028 (0.0180)	0.048 (0.0269)	0.019 (0.0251)	
WK G.L.	-0.024 (0.0188)	0.006 (0.0156)	-0.025 (0.0204)	-0.025 (0.0161)	-0.007 (0.0290)	0.020 (0.0234)	
WK W.D.	0.013 (0.0187)	-0.017 (0.0162)	-0.011 (0.0207)	0.014 (0.0149)	0.000 (0.0238)	-0.015 (0.0208)	
ACT MA	0.019 (0.0261)	-0.003 (0.0233)	0.008 (0.0297)	0.007 (0.0244)	0.054 (0.0377)	0.003 (0.0277)	
ACT Sci	-0.004 (0.0236)	-0.009 (0.0207)	0.007 (0.0273)	0.009 (0.0209)	-0.050 (0.0342)	0.025 (0.0260)	
ACT Eng	-0.099*** (0.0275)	-0.043 (0.0247)	-0.018 (0.0326)	-0.040 (0.0217)	-0.051 (0.0355)	-0.097** (0.0300)	
ACT RD	-0.010 (0.0229)	-0.058** (0.0219)	-0.072** (0.0267)	-0.073*** (0.0202)	-0.100** (0.0341)	-0.037 (0.0276)	
GPA	0.207*** (0.0218)	0.152*** (0.0179)	0.141*** (0.0213)	0.173*** (0.0164)	0.208*** (0.0275)	0.141*** (0.0223)	
N	7,732	8,748	7,045	10,292	4,216	6,638	
Mean	10.080	10.244	9.928	10.062	10.052	10.094	
Adj. R2	0.0505	0.0712	0.0515	0.0908	0.0755	0.0527	

Note. Results obtained from OLS regression models. Sample includes students from North Carolina who graduated in the class of 2018 or 2019 who took both the ACT and the WorkKeys. Standard errors, clustered by school-year, are shown in parentheses below coefficients. “M3, Main” repeats results from Table 2, Model 3. “M4, Main” repeats results from Table 2, Model 4. “WK A.M.” = WorkKeys Applied Math. “WK G. L.” = WorkKeys Graphic Literacy. “WK W.D.” = WorkKeys Workplace Documents. “ACT MA” = ACT Math. “ACT SCI” = ACT Science. “ACT ENG” = ACT English. “ACT RD” = ACT Reading. GPA refers to a student’s final unweighted high school GPA. “Demo covs” refers to the set of demographic covariates listed in Table 1. “Course covs” refers to the course-taking and CTE concentration covariates listed in Table 1. “EDS” = Economically disadvantaged student. For definitions of CTE concentration areas, see Footnote 8 in the main text.

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