# A Case Study: ACT Section Retest Scores and Superscores are Predictive of First-Term Grades

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## Abstract

This study conducted in collaboration with a postsecondary institution highlights results from a concurrent validity study of administering ACT® section tests to their entering freshmen who previously took the ACT test in high school. Students' ACT scores obtained from section retesting were found to be as predictive of first-term grade point average (GPA) as scores obtained via traditional ACT testing. Additionally, ACT Superscores that were computed across test administrations that included single-subject section test events were found to be predictive of first-term GPA, alone and in combination with high school GPA. Moreover, the strength of this relationship did not significantly differ from that based on students' most recent ACT Composite scores.

## Introduction

ACT test scores are designed to measure students' level of college readiness in key core academic content areas (ACT, 2019). Postsecondary institutions use ACT scores in combination with other measures such as high school GPA to help inform their admission and placement decisions and to identify students most likely to struggle academically, be at risk of dropping out, and benefit from institutional services and supports (ACT, 2019; Clinedinst, 2019; University of California Academic Senate, 2020). Numerous studies have been conducted that provide validity evidence supporting the use of ACT scores for these purposes (ACT, 2019; Mattern & Allen, 2016; Radunzel, 2017).

Beginning in September 2020, three new testing options will be available on national ACT test dates: online testing, section retesting, and superscoring. Section retesting (also referred to as modular testing or single-subject retesting) gives students the option to retake one or more sections of the ACT test instead of having to take the full ACT test again. Section retesting will initially only be available to students retesting online. The new option of superscoring will allow students who have tested more than once to send their ACT Superscore—the average of students' highest scores in each subject from all of their test attempts (including from section retests)—to postsecondary institutions of their choice. The option of superscoring is in alignment with current admissions practices and policies at many postsecondary institutions and allows students to demonstrate their academic achievement most favorably for college applications and scholarships.[1]

Over the last several years, ACT has been conducting research to examine the validity and fairness of different scoring practices and options to help provide insights on how postsecondary institutions might best make use of multiple ACT scores when students retest. Results from the studies conducted to date support offering the new options of section retesting and superscoring. First, in a large multi-institutional study (Mattern, Radunzel, Bertling, & Ho, 2018), superscoring was found to be as predictive—if not more predictive—of first-year GPA than the other ACT Composite scoring methods examined, which included computing the average Composite score across test administrations or using students' most recent Composite score or their highest Composite score; correlations ranged from 0.39 for the average to 0.41 for superscoring. The study also found that first-year GPA for students who tested more often was underpredicted, but that when examining the prediction accuracy by the number of times tested, superscoring resulted in the least amount of prediction error across the four scoring methods. These results suggest that ACT subject scores do not have to come from a single test attempt to be a valid indicator of students' college readiness, supporting both superscoring and section retesting.

The Mattern et al. (2018) study also explored the diversity implications for an admitted class of using superscores as compared to the other three scoring methods to admit students. Despite the fact that underserved students are less likely to retest (Harmston & Crouse, 2016), the authors found that superscoring did not result in a less diverse admitted class as compared to the other three scoring methods. In a subsequent study (Mattern & Radunzel, 2019), the researchers found that superscoring did not exacerbate subgroup differences for the national ACT-tested population over those reported based on students' most recent ACT scores.

Second, results from a randomized study of 4,000 students conducted in 2016 indicated that the order in which the subject tests were administered did not impact student performance (Andrews, 2019). More specifically, the study found that students earned subject scores that were similar regardless of the order in which the subject tests were taken. Given that ACT scores were similar when taken first as compared to the standard position in the full ACT test, the findings from this study support the option of offering section retesting where students will not have to retake the entire ACT test but can focus their learning efforts on specific subject areas of their choice. Despite concerns being raised that section retesting may lead to artificially inflated scores, two recent studies (Mattern, Radunzel, & Andrews, 2019; Radunzel & Mattern, 2020) provide empirical evidence suggesting that this is actually not the case. In particular, the results from these two studies demonstrate that students' performance when retesting in a single ACT subject area tends to be consistent with what would be expected based on typical test-retest score gains from taking the entire ACT test.

While decades of research provide evidence that each individual ACT test is a valid and reliable measure of students' college readiness and related to college outcomes (ACT, 2019; see chapters 10 and 11), there is a need to examine the predictive validity of section retest scores. Moreover, given that the prior study on superscoring (Mattern et al., 2018) was based only on full administrations of the ACT, it is of interest to investigate the relationship between first-year college outcomes and ACT Superscores that combine scores not only across full test administrations but also across section retests. To address these topics, we conducted a concurrent validity study in collaboration with a single four-year public university involving students from their fall 2019 freshman cohort. In particular, the following two research questions were examined in this case study:

1. Are section retest scores as predictive of first-term grades as subject scores obtained from taking the full ACT test?

2. Are ACT Superscores that include section retest scores, alone and in combination with high school GPA, as predictive of first-term grades as students' most recent ACT Composite scores?

# Data and Methods

## Study Sample

The participating institution is located in the western region of the country and has a highly selective admissions policy. The incoming freshman class size for this institution is a little over 4,000 students. The institution accepts both ACT and SAT test scores; nearly 60% of students submit ACT scores to the institution as part of the admissions process (U.S. Department of Education, 2020).

The institution completed the following activities for the study: (a) assigned a study coordinator to serve as the point of contact, (b) recruited first-year, first-time entering domestic college students who had previously taken the full ACT test in high school to take a single subject ACT test during the first three weeks of the fall 2019 term, (c) administered and proctored single-subject ACT tests in paper format in a secure manner and under standard testing conditions, (d) returned the completed answer documents to ACT, and (e) submitted a data file of students' first-term grades in January 2020. We aimed to recruit 50 students per ACT subject area (English, math, reading, science) for a total of 200 students. Approximately a month before classes began, the institution began inviting students to participate via email.[2] It became apparent early on that it would be difficult to achieve this recruitment goal within the narrow study recruitment and testing window. For this reason, students were allowed to test in multiple subject areas and to choose the subject(s) they wanted to test in. Students who tested in multiple subject areas took each subject test on different days to simulate a single-subject test experience.

Both the institution and study participants were compensated for participating in the study. The institution received a monetary incentive for completing the study activities. Students received a $50 gift card for each single-section test taken. To increase students' motivation for testing, students were informed that they would receive an additional $50 gift card if they met or exceeded their most recent ACT subject score taken during their junior or senior year in high school.

Complete data was available for a total number of 118 students who had prior ACT scores.[3] The resulting sample size by subject area was 39 in English and math, 50 in reading, and 46 in science. The institution provided outcomes data on their entire 2019 freshman cohort. There were 2,729 non-study participants who had taken the ACT test in high school. This sample of ACT-tested nonparticipants was used for comparison purposes.

## Measures

**Outcome**. The primary outcome was the fall-term college GPA, on a scale from 0.00 to 4.00. The average first-term GPA for the participant sample was 3.36 with a standard deviation of 0.52.

**Predictors**. The following academic achievement measures were included as predictors of first-term GPA: ACT section scores in English, math, reading, and science; the ACT Composite score; and high school GPA. ACT section scores and the Composite score range from 1 to 36. ACT subject scores were either the scores earned on the section tests that were administered during the first three weeks of college (labeled as section test) or the scores earned on students' most recent traditional ACT testing event from their junior or senior year in high school (labeled as full test-most recent).

Two different Composite scores were used; these included the most recent ACT Composite score earned in high school and the ACT Superscore that was computed by combining the highest subject scores across test administrations from a students' sophomore, junior, and senior year in high school, and their section test taken during the first three weeks of college. High school GPA was self-reported by students during the ACT registration process and is based on their coursework taken in up to 23 specific courses in English, mathematics, social studies, and science, and the grades earned in those courses. Prior studies have shown that students report high school coursework and grades accurately relative to information provided in their high school transcripts (Sanchez & Buddin, 2016).

## Analysis

Means and percentages were used to describe the outcomes and student characteristics. Pearson correlation coefficients were computed between students' achievement measures and first-term GPA. The formulas presented by Steiger (1980) were used to test whether two correlations that involve a common outcome variable were significantly different from one another. Linear regression models were developed to predict first-term GPA from students' achievement measures. To address study objective 1, analyses were conducted separately for each subject sample using the corresponding ACT section score. To address study objective 2, analyses were conducted for the full participant sample using ACT Composite scores. A significance level of .05 was used in this study.

## Description of Samples

Table 1 provides descriptive information on ACT Composite score, high school GPA, and first-term GPA, by sample. On average, students who participated in the study had slightly higher ACT Composite scores from high school and earned slightly higher first-term GPAs than ACT-tested nonparticipants from the institution. The average high school GPA tended to be more comparable across the samples. The average time between when the ACT section test was taken as a part of this study and when the full ACT was last taken in high school ranged from 13.6 months for the English sample to 15.1 months for the science sample.

As shown in Table A1 in the Appendix, there was representation in the study samples across gender, race/ethnicity, socioeconomic status, and initial declared major category, though differences existed across samples. For example, the math sample had a higher percentage of males and STEM majors than the other samples did (76.9% vs. 43.6% to 56.0% for males and 79.5% vs. 54.1% to 67.4% for STEM majors). For each sample, the percentage of students returning for the second term was high (ranging from 97.4% to 100.0%).

**Table 1.** Average ACT Composite Score, High School GPA, and First-term GPA by Sample

| Variable | English sample | | Math sample | | Reading sample | | Science sample | | ACT-tested nonparticipants from institution | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | Mean (SD) | n | Mean (SD) | n | Mean (SD) | n | Mean (SD) | n | Mean (SD) |
| ACT Composite score – most recent | 39 | 29.6 (3.7) | 39 | 30.4 (4.2) | 50 | 31.2 (3.7) | 46 | 30.6 (4.0) | 2,729 | 27.7 (4.1) |
| Time between ACT testing (in months) | 39 | 13.6 (4.2) | 39 | 14.2 (4.0) | 50 | 14.8 (4.5) | 46 | 15.1 (4.8) | | |
| High school GPA | 38 | 3.80 (0.19) | 37 | 3.84 (0.16) | 49 | 3.79 (0.24) | 45 | 3.86 (0.15) | 2,573 | 3.80 (0.22) |
| First-term GPA | 39 | 3.37 (0.43) | 39 | 3.35 (0.55) | 50 | 3.45 (0.46) | 46 | 3.41 (0.52) | 2,729 | 3.16 (0.62) |

*Note*. GPA = grade point average. SD = standard deviation. Time between ACT testing is the difference in months between when the ACT section test was taken as a part of this study and when the full ACT test was last taken in high school (labeled as ACT Composite score – most recent).

# Results

## Section Scores

Table 2 provides average ACT scores for the two testing events by subject and sample, as well as the correlations between the two scores. First, looking at the results in the table that are labeled as full sample, we see that the average ACT scores on the section retest tended to be relatively high, ranging from 27.9 in science to 29.7 in math. However, students' scores on the section retest completed during the first three weeks of college tended to be lower than those earned previously in high school when taking the full ACT (by 1.1 score points in math to 2.6 score points in English). This was seen even after omitting an extreme outlier from the math, reading, and science samples.[4] For reference, a study by Harmston and Crouse (2016) found that students first testing as juniors demonstrated an average Composite score increase of 1.1 points by their final ACT test. The magnitude of the average decline in scores may suggest that, despite the incentives offered, students were not as motivated on the section retest as they had been when taking the full ACT in high school to earn a college-reportable score. In fact, compared to their latest test scores from high school, the percentages of students scoring lower by more than two standard errors of measurement (SEM) on their section retest ranged from 16% in reading to 31% in English, which is higher than expected. If students' true achievement remained constant between the two time points, we would have expected fewer than 8% of students to score lower by more than two SEM.

Because some students may not have been fully engaged on the section retest, we also present results for a reduced sample that excludes students who experienced large score declines (labeled as subsample in the table). Even though around 40% to 50% of students in the subsample increased their subject scores on the section retakes, scores tended to be slightly lower on the section retest than those earned previously in high school on the full ACT (by 0.2 point in math to 1.2 points in reading).[5] Compared to the full sample, the correlations between

the full test and section retest scores were higher for the subsample of students (ranging from .77 to .94 vs. .65 to .73 for the full sample).[6] Given that students' level of motivation could significantly impact the results of the study, it is unfortunate that we were unable to quantify and therefore control for this factor in the analyses. This is a limitation of this study.

**Table 2.** Average ACT Scores and Correlations between ACT Scores by Subject and Sample

| Subject | n | Full test - most recent | | Section test | | Difference in ACT scores | | Correlations between ACT scores | | |
| | | Mean | SD | Mean | SD | Mean | SD | R | 95% Lower | 95% Upper |
|---|---|---|---|---|---|---|---|---|---|---|
| **English** | | | | | | | | | | |
| Full sample | 39 | 31.0 | 4.6 | 28.4 | 4.7 | -2.6 | 3.4 | .73 | .55 | .85 |
| Subsample | 27 | 30.3 | 5.1 | 29.6 | 4.8 | -0.7 | 1.7 | .94 | .88 | .97 |
| **Math** | | | | | | | | | | |
| Full sample | 38 | 30.8 | 3.7 | 29.7 | 3.3 | -1.1 | 2.9 | .65 | .42 | .80 |
| Subsample | 31 | 30.4 | 3.8 | 30.2 | 3.3 | -0.2 | 2.5 | .77 | .57 | .88 |
| **Reading** | | | | | | | | | | |
| Full sample | 49 | 31.9 | 4.4 | 29.5 | 5.2 | -2.4 | 3.9 | .67 | .49 | .80 |
| Subsample | 42 | 31.7 | 4.6 | 30.5 | 4.8 | -1.2 | 2.3 | .88 | .79 | .94 |
| **Science** | | | | | | | | | | |
| Full sample | 45 | 29.6 | 4.7 | 27.9 | 5.0 | -1.7 | 3.6 | .72 | .54 | .84 |
| Subsample | 36 | 28.8 | 4.8 | 28.5 | 5.1 | -0.4 | 2.4 | .89 | .79 | .94 |

*Note*. SD = standard deviation. The full sample includes all students' scores except the one outlier (see end note #4). The subsample excludes students whose scores on section retesting decreased by more than 2 SEM compared to their latest full test score from high school. All correlation coefficients were significantly different from 0 ($p < .0001$). Students completed the entire ACT test during their junior or senior year in high school, while students completed the section retest during the first three weeks of their freshman year in college.

Figure 1 provides the predicted first-term GPA as a function of ACT subject score by testing event for the subsamples. Figure A1 in the Appendix shows the corresponding figures for the full samples, and Table A2 in the Appendix provides the regression estimates by sample and testing event. As shown in Figure 1 and Table A2, ACT single-section test scores were predictive of first-term GPA among the subsamples of students who may have been more engaged. Moreover, in English and reading, the regression lines and parameter estimates associated with section retest scores were similar to those estimated using students' prior full ACT scores. In math and science, the slope appeared to be slightly steeper for the section retest scores than for the prior full ACT scores. However, the differences in the predicted values between the two scores were relatively small (at most 0.13 in math and at most 0.07 in science).[7] Moreover, as shown in Table A2, the 95% confidence intervals for the slopes associated with standardized test scores overlapped between the two testing events, suggesting that the two slopes did not significantly differ from one another. Similar conclusions were reached for the full sample (see Figure A1 and Table A2).
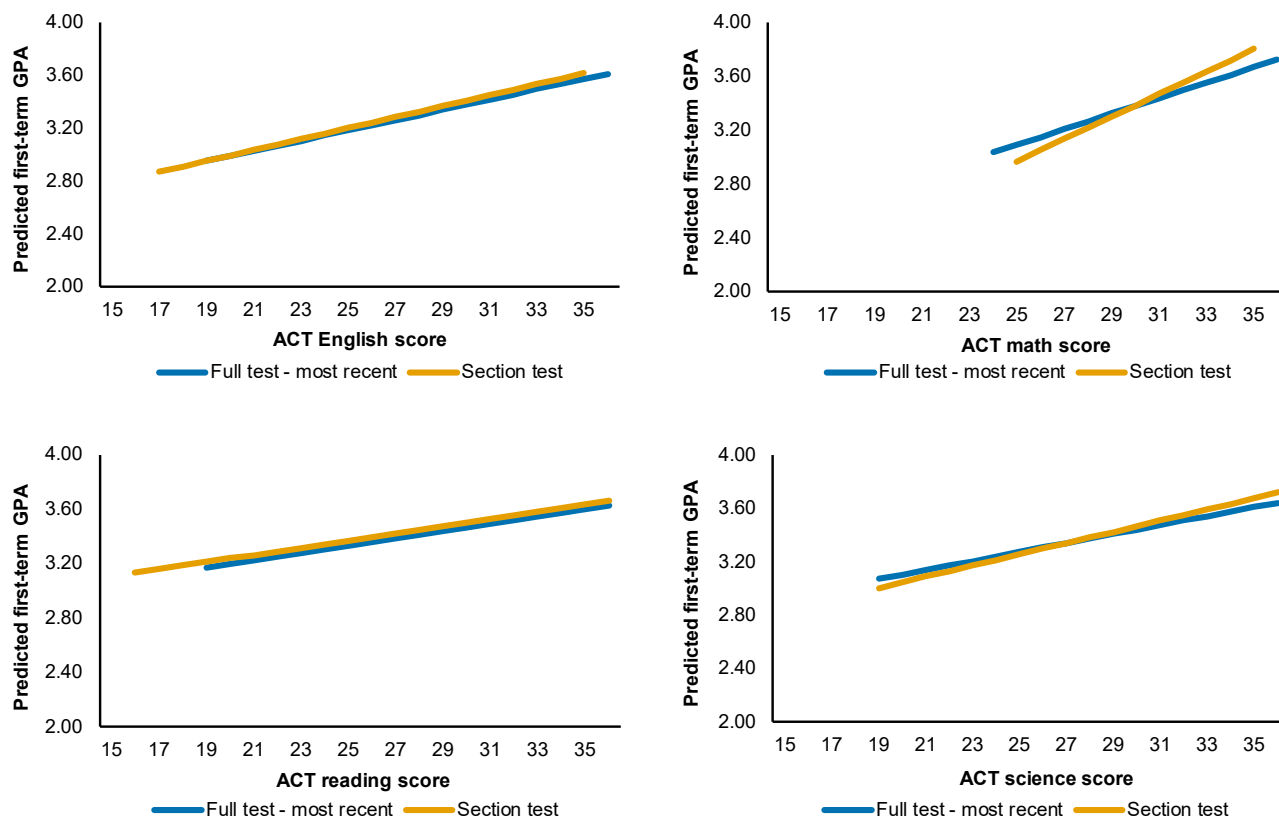
**Figure 1**. Predicted First-Term GPA by ACT Section Score and Testing Event for Subsamples



Table 3 provides the correlation coefficients between ACT subject scores and first-term college GPA by subject and sample. For the full sample, the correlation coefficient between the section retest score and first-term college GPA was significantly different from zero in each subject area (as evidenced by the 95% confidence intervals not including zero); the correlations ranged from .31 in reading to .53 in math. This result was also seen for the subsample except in reading where the correlation coefficient was nearly significantly different from zero (95% confidence interval = -.02 to .54); the correlations ranged from .29 in reading to .52 in math. The test-criterion correlations for the section retest scores did not significantly differ from those estimated using students' latest full ACT scores from high school (each *p*-value greater than .19). Moreover, the estimated section retest correlations with first-term GPA are in line with those reported in other studies between ACT Composite score and first-year college GPA (Mattern et al., 2018; Sawyer, 2010; Westrick, Le, Robbins, Radunzel, & Schmidt, 2015). A possible explanation for the correlation coefficient and estimated slope being higher in math than in the other subject areas is that there was a higher percentage of STEM majors among the sample of students taking the math section test than among the other samples (79.5% vs. 58.0% to 67.4%, Table A1 in Appendix).

These results indicate that ACT scores earned in a modular setting are predictive of first-term GPA and provide a valid indicator of college readiness. In the next section, we examine the validity of using ACT Superscores that include students' section retest scores in its computation to predict first-term GPA, alone and in combination with high school GPA.

**Table 3.** Correlations (*R*) between ACT Scores and First-Term College GPA by Subject and Sample

| Subject | n | Full test – most recent | | | Section test | | | p-value[1] |
|---|---|---|---|---|---|---|---|---|
| | | *R* | 95% lower | 95% upper | *R* | 95% lower | 95% upper | |
| **English** | | | | | | | | |
| Full sample | 39 | .34 | .03 | .59 | .42 | .12 | .65 | .486 |
| Subsample | 27 | .44 | .07 | .70 | .44 | .07 | .70 | .954 |
| **Math** | | | | | | | | |
| Full sample | 38 | .45 | .15 | .67 | .53 | .26 | .73 | .481 |
| Subsample | 31 | .42 | .07 | .67 | .52 | .20 | .74 | .346 |
| **Reading** | | | | | | | | |
| Full sample | 49 | .25 | -.03 | .50 | .31 | .04 | .55 | .576 |
| Subsample | 42 | .29 | -.02 | .54 | .29 | -.02 | .54 | .990 |
| **Science** | | | | | | | | |
| Full sample | 45 | .31 | .02 | .55 | .36 | .08 | .59 | .619 |
| Subsample | 36 | .30 | -.03 | .57 | .40 | .08 | .64 | .198 |

*Note*. GPA = grade point average. 95% lower and 95% upper corresponds to the lower and upper limits for the 95% confidence intervals. The full sample includes all students' scores except the one outlier (see endnote #4). The subsample excludes students whose scores on section retesting decreased by more than 2 SEM compared to their latest full test score from high school. Students completed the entire ACT during their junior or senior year in high school, while students completed the section retest during the first three weeks of their freshman year in college.

[1] *p*-value corresponds to testing whether the two correlations significantly differed from one another (Steiger, 1980).

## ACT Superscores

Nearly three-fourths of all students in the study sample (74.6%) took the ACT test more than once in high school; the average number of times tested with the full test was 2.3 times (not including the section retest taken during the first three weeks of college). ACT Superscores were computed by combining the highest section scores across test administrations from a students' sophomore, junior, and senior year in high school and their single-section retest. Superscores for nearly three-fourths of students were based solely on scores earned when completing the ACT during high school. For the remaining 26.3% of the students, the score earned on one of the section retakes was the highest section score across test administrations and was utilized in computing the ACT Superscore.[8] As shown in Table 4, the average ACT Superscore was slightly higher than the average of students' most recent ACT Composite scores from high school (by 0.7 point, 31.0 vs. 30.3, respectively). This difference in average scores between these two scoring methods is consistent with that reported in other studies (Mattern & Radunzel, 2019; Mattern et al., 2018). The two Composite scores were highly correlated (*R* = .97; 95% confidence interval = .95, .98).

**Table 4.** Summary of the Relationship with First-Term GPA by Predictor

| Statistic | ACT Composite score | | High school GPA |
| --- | --- | --- | --- |
| | Full test – most recent | ACT Superscore* | |
| n | 118 | 118 | 114 |
| Mean (SD) | 30.3 (3.9) | 31.0 (3.6) | 3.82 (0.21) |
| Relationship with first-term GPA | | | |
| Regression estimates | | | |
|    Intercept** | 3.36 (3.27, 3.45) | 3.36 (3.27, 3.45) | 3.35 (3.26, 3.44) |
|    Slope** | 0.18 (0.09, 0.27) | 0.16 (0.07, 0.25) | 0.15 (0.06, 0.24) |
|    Correlation** | .34 (.17, .49) | .32 (.14, .47) | .29 (.11, .45) |

*Note*. GPA = grade point average. SD = standard deviation. For the regression estimates, the predictors were standardized to have a mean of 0 and a standard deviation of 1. * ACT Superscore computed by combining the highest subject scores across test administrations. ** The values reported include the estimate and the 95% confidence interval of the estimate in parentheses.

As shown in Figure 2 and Table 4, ACT Superscores were found to be predictive of first-term GPA. The regression lines and parameter estimates for ACT Superscores were similar to those obtained from using students' most recent ACT Composite score. This is evident by the 95% confidence intervals for the slopes associated with the standardized scores overlapping for the two scoring methods. Additionally, there was not a significant difference in the correlation coefficients between the two scoring methods (Table 4; $R$ = .34 for most recent and .32 for Superscore; $p$-value = .205). These correlations are consistent with that computed for the institution's entire freshman cohort based on students' most recent ACT Composite score earned while in high school ($R$ = .30, 95% confidence interval = .26, .33).

**Figure 2.** Predicted First-Term GPA by ACT Composite Score and Scoring Method
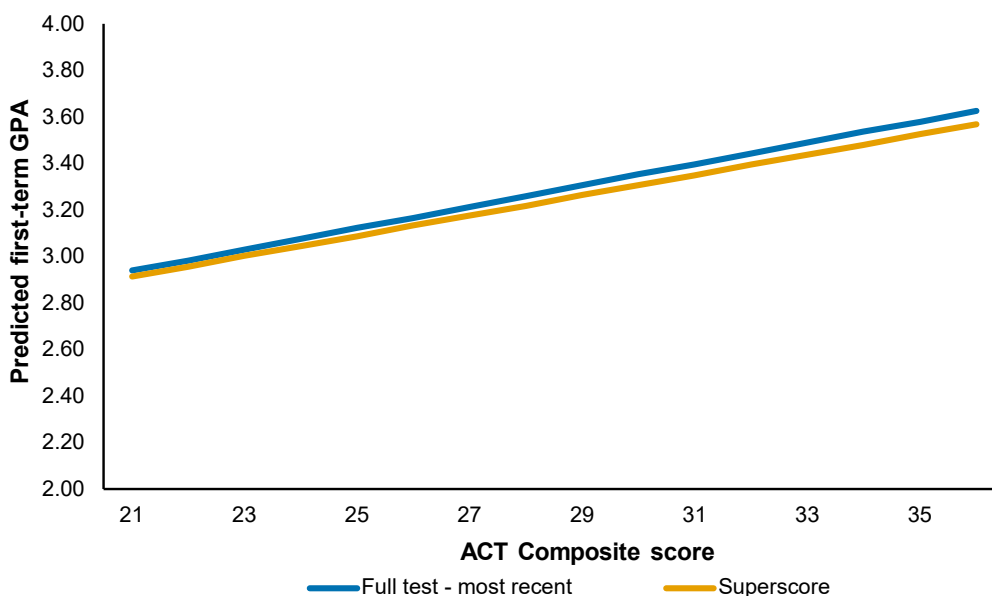
To further examine the predictive validity of using ACT Superscores, we developed regression models that included both ACT scores and high school GPA to estimate students' first-term GPA. According to the single-predictor model shown in Table 4, high school GPA was correlated with first-term GPA for the participant sample ($R$ = .29; 95% confidence interval = .11, .45). When including both ACT scores and high school GPA in the model (results shown in Table 5), ACT Superscore continued to contribute to the prediction of first-term GPA above and beyond high school GPA. Specifically, ACT Superscore was found to be significantly related to first-term GPA in the joint model that included high school GPA (standardized coefficient = 0.14; 95% confidence interval = 0.05, 0.23). Additionally, ACT Superscore improved the prediction; there was an increase in the validity coefficient associated with the joint model as compared to the model that only included high school GPA ($R$ = .40 vs. .29, respectively).  Moreover, when results for ACT Superscore were compared to those obtained when students' most recent ACT Composite scores were used instead, we found the parameter estimates, multiple correlation coefficient, and increase in multiple correlation over high school GPA alone to be similar for the two ACT Composite scoring methods (Table 5). The two multiple correlations reported in Table 5 for the study sample are consistent with that computed for the institution's entire freshman cohort using students' most recent ACT Composite score from high school in combination with high school GPA ($R$ = .42, 95% confidence interval = .39, .45).

**Table 5.** Summary of Joint Prediction Models for First-Term GPA by ACT Composite Scoring Method

| | ACT Composite score | |
|---|---|---|
| **Statistic** | **Full test – most recent** | **ACT Superscore*** |
| Regression estimates | | |
| Intercept** | 3.35 (3.27, 3.44) | 3.35 (3.27, 3.44) |
| ACT score slope** | 0.16 (0.07, 0.25) | 0.14 (0.05, 0.23) |
| High school GPA slope** | 0.12 (0.03, 0.21) | 0.13 (0.04, 0.22) |
| Multiple Correlation** | .42 (.26, .56) | .40 (.23, .54) |
| Increase in correlation over high school GPA alone | 0.13 | 0.11 |

*Note*. Model based on 114 participating students with a high school GPA available. For the regression estimates, the predictors were standardized to have a mean of 0 and a standard deviation of 1.  * ACT Superscore computed by combining the highest subject scores across test administrations. ** The values reported include the estimate and the 95% confidence interval of the estimate in parentheses.

# Conclusions

In conclusion, this study provides additional support for the use of section test scores and ACT Superscores for predicting students' first-year college grades. More specifically, findings from this study indicate that ACT scores earned from section retests are as predictive of first-term grades as scores earned from taking the full test. Additionally, results from the study suggest that ACT Superscores obtained from combining scores across test administrations including section retests are as predictive of first-term college grades as students' most recent full test scores.

Having said that, we acknowledge that this study has limitations. First, this study was conducted in collaboration with only one postsecondary institution. Second, the number of participating students was relatively small overall and by subject area. This resulted in wide confidence intervals for the correlation coefficients and the standardized ACT slope estimates. But, the regression results for the sample were found to be similar to those based on the institution's entire freshman cohort of ACT-tested students, suggesting that we would have found similar results if a larger number of students had participated from the institution. Moreover, the results from this study are consistent with those from an earlier multi-institutional study by Mattern et al. (2018) that found ACT Superscores obtained by combining the highest section scores across test administrations to be as predictive of first-year grades as other ACT Composite scoring methods. The earlier study involved nearly 278,000 students attending 221 four-year institutions.

Because the section retest occurred during the first three weeks of the fall term and was a low-stakes testing event, it was somewhat expected that some students may not have been as motivated or prepared for the section retest as they were when they took the full ACT test to receive a college-reportable score and used it to gain admissions to colleges. To try to increase participant motivation, we offered an extra monetary incentive to students who met or exceeded their prior scores from high school. Additionally, analyses were conducted not only on the full sample of participants but also on a subsample of students who did not experience a large score decline on their section retest as compared to their latest full ACT score from high school. The finding that section retest scores are as predictive of first-term grades as scores obtained via traditional full ACT testing was not dependent on the sample used in the analyses (full sample vs. subsample). Unfortunately, we were unable to quantify and control for students' level of motivation in this study which could have impacted some of the results. Additionally, the small sample size prevented examination of differential validity by test administration (section vs. full test) for demographic subgroups. Future studies will examine this topic.

Despite these limitations, the results based on this study suggest that section retest scores and ACT Superscores that combine scores across test administrations including section retest events are as predictive of first-term college grades as students' most recent full test scores. Once the section retesting and superscoring options become operational in September 2020, ACT will work with interested institutions to reexamine these issues. ACT is committed to continuing its efforts in conducting national validity studies to provide evidence supporting the use of ACT section retest scores and ACT Superscores, in combination with other measures, for college admission and course placement decisions and for identification of students who may benefit from additional academic services and supports once they matriculate to college.

# Notes

1. ACT Superscores are typically higher than an ACT Composite score earned from any single test attempt (Cruce & Mattern, 2020).

2. Initially, study eligibility required that a student be enrolled in a specific subject-relevant course to take the corresponding section test (e.g., English Composition I to take the ACT English section test). The reason for this requirement was so that we could examine section test scores in relation to the grades earned in typical first-year subject-relevant courses. However, this eligibility requirement was found to be too restrictive as too few students from the selected classes were interested in participating in the study. During the first week of classes, the decision was made to open participation in the study to any first-time entering student who had previously taken the ACT test in high school during the 2017–18 or 2018–19 academic year.

3. Two-thirds of the participants (or 67.0%) took only one single-subject section test; 33.0% took multiple section tests (22.9% in two subjects, 5.9% in three subjects, and 4.2% in all four subject areas).

4. For the math, reading, and science samples, there was one major outlier that scored 12 to 19 points lower on their section retest as compared to their latest score from high school. The corresponding student was omitted from the subject-specific analyses as the inclusion of their scores considerably elevated the correlation between ACT section scores and first-term GPA, especially in math. If the outlier was included in the subject sample, the correlations for the most recent scores and section retest scores were .47 and .62 in math, .27 and .38 in reading, and .30 and .38 in science, respectively.

5. The percentage of students scoring the same or higher on the section retest as compared to their ACT test score from high school was 37% (English), 48% (math), 38% (reading), and 53% (science).

6. For every subject except math, the correlations between the section retest scores and the full test-most recent test scores for the subsample were estimated to be higher than those obtained in an earlier study (Radunzel & Mattern, 2020; Table 2). We also found this to be the case when the correlations between the section retest scores and the full test-most recent test scores were compared to the test-retest Pearson correlation coefficients for the institution's entire freshman cohort who took the full ACT more than once in high school (54.2% of the institution's ACT-tested sample). For the test-retest correlations, a student's most recent score from high school was compared to their closest prior ACT test score; the typical time between these two testing events was 3.7 months. The test-retest correlation (and 95% confidence interval) was .74 (.72, .76) in English, .80 (.78, .82) in math, .67 (.64, .70) in reading, and .62 (.59, .65) in science. In English, reading, and science, the correlations between the section retest scores and full test-most recent scores were more similar to the high school test-retest correlations for the full sample than for the subsample. In math, the correlation between the section retest scores and full test-most recent scores was more similar to the high school test-retest correlation for the subsample than for the full sample.

7. In math and science, the slopes for the section test scores could be slightly higher than those for the full test scores from high school due to the scores being obtained more proximal to when the college courses were taken and earned. But, this could also be an artifact of the small sample size.

8. The corresponding percentages by subject area were 3.4% in English, 9.3% in math, 5.1% in reading, and 11.0% in science. These percentages do not sum to the total percentage because students could have increased their scores on the section retest in multiple subject areas.

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# Appendix

**Table A1.** Percentages of Students by Attribute and Sample

| Variable | English sample | Math sample | Reading sample | Science sample | ACT-tested nonparticipants from institution |
|---|---|---|---|---|---|
| Sample size | 39 | 39 | 50 | 46 | 2,729 |
| **Gender** | | | | | |
| Female | 56.4 | 23.1 | 44.0 | 47.8 | 51.8 |
| Male | 43.6 | 76.9 | 56.0 | 52.2 | 48.2 |
| **Race/ethnicity** | | | | | |
| Underserved minority | 30.8 | 15.4 | 10.0 | 19.6 | 17.9 |
| White | 48.7 | 46.2 | 64.0 | 50.0 | 59.1 |
| Asian | 12.8 | 28.2 | 14.0 | 17.4 | 13.5 |
| Multiple/unknown race | 7.7 | 10.3 | 12.0 | 13.0 | 9.5 |
| **Annual family income** | | | | | |
| Less than $36,000 | 12.8 | 12.8 | 4.0 | 8.7 | 4.7 |
| $36,000 to $80,000 | 18.0 | 15.4 | 14.0 | 19.6 | 11.1 |
| More than $80,000 | 43.6 | 38.5 | 42.0 | 37.0 | 49.4 |
| Missing | 25.6 | 33.3 | 40.0 | 34.8 | 34.8 |
| **Educational aspirations** | | | | | |
| Below bachelor's degree | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 |
| Bachelor's degree | 35.9 | 28.2 | 34.0 | 23.9 | 34.2 |
| Beyond bachelor's degree | 56.4 | 59.0 | 54.0 | 65.2 | 54.5 |
| Missing | 7.7 | 12.8 | 12.0 | 10.9 | 11.0 |
| **Declared major category** | | | | | |
| Non-STEM | 33.3 | 12.8 | 30.0 | 15.2 | 38.3 |
| STEM | 59.0 | 79.5 | 58.0 | 67.4 | 54.1 |
| Undecided/unknown | 7.7 | 7.7 | 12.0 | 17.4 | 7.7 |
| **Returned for second term** | | | | | |
| Yes | 100.0 | 97.4 | 100.0 | 100.0 | 99.4 |
| No | 0.0 | 2.6 | 0.0 | 0.0 | 0.6 |

*Note*. Student characteristics provided by institution or obtained from the ACT student record. Underserved minority students included African American, American Indian, Hispanic, and Native Hawaiian or other Pacific Islander. Science, technology, engineering, and mathematics (STEM) majors included science majors, computer science & mathematics majors, engineering & technology majors, and medical & health majors.

**Table A2.** Linear Regression Parameter Estimates for Predicting First-Term GPA by Subject, Sample, and Testing Event

| Subject | Predictor | Full test – most recent | | | | Section test | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Est. | SE | 95% Lower | 95% Upper | Est. | SE | 95% Lower | 95% Upper |
| **English** | | | | | | | | | |
| Full sample | Intercept | 3.37 | 0.07 | 3.24 | 3.51 | 3.37 | 0.06 | 3.24 | 3.50 |
| | ACT score | 0.15 | 0.07 | 0.01 | 0.28 | 0.18 | 0.06 | 0.05 | 0.31 |
| Subsample | Intercept | 3.39 | 0.08 | 3.23 | 3.55 | 3.39 | 0.08 | 3.23 | 3.56 |
| | ACT score | 0.20 | 0.08 | 0.03 | 0.37 | 0.20 | 0.08 | 0.03 | 0.37 |
| **Math** | | | | | | | | | |
| Full sample | Intercept | 3.39 | 0.08 | 3.24 | 3.54 | 3.39 | 0.07 | 3.24 | 3.53 |
| | ACT score | 0.23 | 0.08 | 0.08 | 0.39 | 0.28 | 0.07 | 0.13 | 0.43 |
| Subsample | Intercept | 3.40 | 0.09 | 3.22 | 3.58 | 3.40 | 0.08 | 3.23 | 3.57 |
| | ACT score | 0.22 | 0.09 | 0.04 | 0.40 | 0.28 | 0.08 | 0.10 | 0.45 |
| **Reading** | | | | | | | | | |
| Full sample | Intercept | 3.46 | 0.06 | 3.34 | 3.59 | 3.46 | 0.06 | 3.34 | 3.59 |
| | ACT score | 0.11 | 0.06 | -0.02 | 0.24 | 0.14 | 0.06 | 0.02 | 0.27 |
| Subsample | Intercept | 3.51 | 0.07 | 3.38 | 3.64 | 3.51 | 0.07 | 3.38 | 3.64 |
| | ACT score | 0.12 | 0.07 | -0.01 | 0.26 | 0.13 | 0.07 | -0.01 | 0.26 |
| **Science** | | | | | | | | | |
| Full sample | Intercept | 3.41 | 0.07 | 3.26 | 3.56 | 3.42 | 0.07 | 3.27 | 3.56 |
| | ACT score | 0.16 | 0.07 | 0.01 | 0.31 | 0.19 | 0.07 | 0.04 | 0.34 |
| Subsample | Intercept | 3.40 | 0.09 | 3.23 | 3.58 | 3.41 | 0.08 | 3.24 | 3.58 |
| | ACT score | 0.16 | 0.09 | -0.02 | 0.34 | 0.21 | 0.08 | 0.04 | 0.39 |

*Note*. GPA = grade point average. Est. = estimate. SE = standard error. 95% Lower and 95% Upper corresponds to the lower and upper limits for the 95% confidence intervals. ACT subject scores were standardized to have a mean of 0 and a standard deviation of 1. The full sample includes all students' scores except the one outlier (see endnote #4). The subsample excludes students whose scores on section retesting decreased by more than 2 SEM compared to their latest full test score from high school. Students completed the entire ACT test during their junior or senior year in high school, while students completed the section retest during the first three weeks of their freshman year in college.

**Figure A1.** Predicted First-Term GPA by ACT Section Score and Testing Event for Full Samples
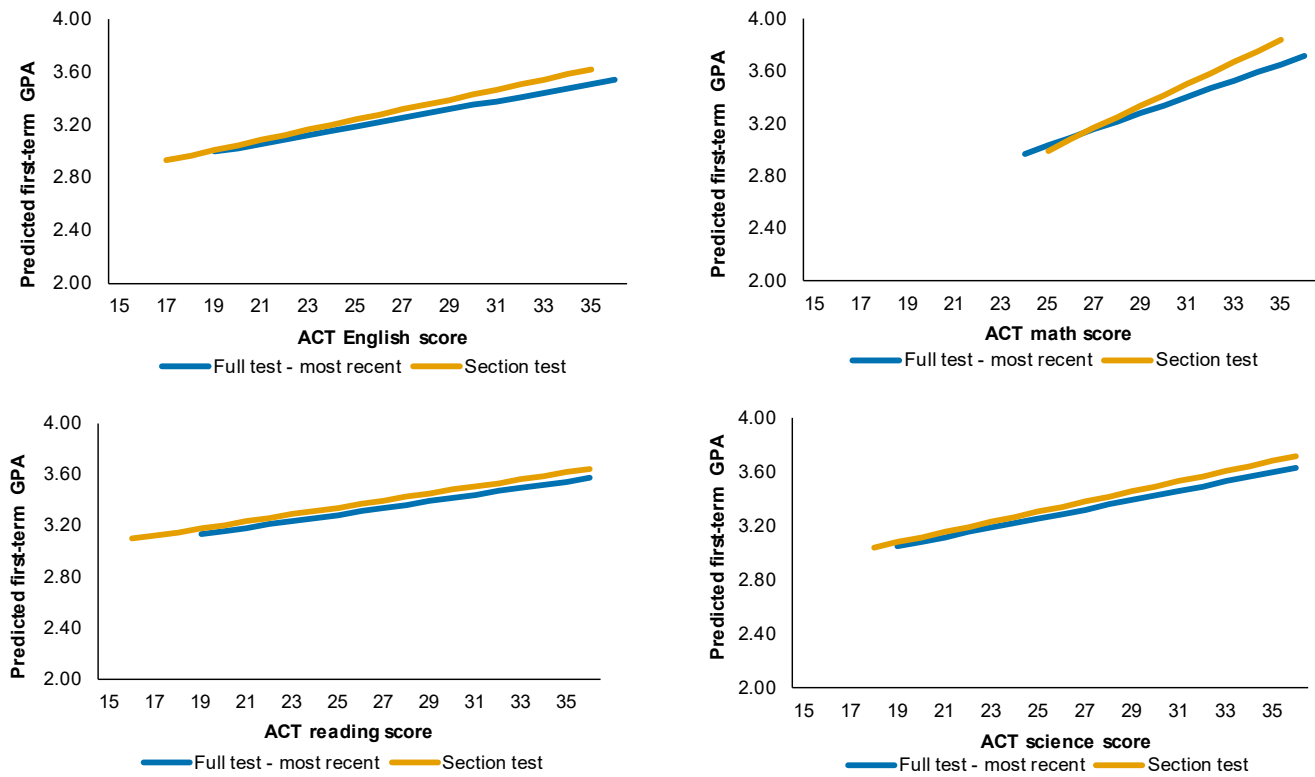


## Acknowledgements

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