ACT

2018 Higher Education
RESEARCH DIGEST

EXPLORE ACT DATA TO HELP INFORM RECRUITMENT, ENROLLMENT, AND SUCCESS STRATEGIES:

THREE NEW PUBLICLY-AVAILABLE ACT DATABASES

The inaugural *Higher Education Research Digest* was released in 2017 along with the *Enrollment Management Database*, a tool assisting enrollment managers, admissions personnel, and other college administrators with student recruitment, enrollment, and success strategies. For this second edition of the *Digest*, the *Enrollment Management Database* has been updated with the 2017 ACT-Tested Graduating Cohort. ACT is also pleased to announce the addition of two more databases: *Ten-Year Trends Database* and *College Completion Database*. The three databases—which are available in an interactive, Tableau environment—are described below in more detail, highlighting an example of the research insights you can capture from each tool. The three databases are available for access at: act.org/researchdigest.

Enrollment Management Database

The *Enrollment Management Database* includes data on multiple, recent ACT-tested high school graduating classes matched to college enrollment and second-year retention data obtained from the National Student Clearinghouse. It enables users to follow a graduating class from high school through the first two years of college. The database currently includes information on the 2014, 2015, 2016, and 2017 ACT-tested high school graduating classes and is structured into five topical areas: student background, college preferences, score sending behavior, enrollment, and retention and transfer behavior. The database allows users to answer questions of interest to them. For example, the degree to which students' college preferences align with actual behavior may help inform recruitment strategies at your institution. An *Enrollment Management Database User Guide* is also provided on the database landing page.

Example Scenario Use Case

Perhaps you work in the Office of Enrollment Management at a public university in Missouri and are interested in examining the relationship between students' college location preferences and actual enrollment behavior to help refine your student search criteria and recruitment strategies. Filtering by state and grad class year for students who directly enrolled in college, the tool provides the count and percentage of ACT-tested students in Missouri who indicated a preference to attend college out-of-state, in-state, and missing, as well as the breakdown in terms of actual enrollment. As shown in Figure 1, 22% of students indicated a preference to attend

Figure 1.
Screenshot from the Enrollment Management Database

out-of-state. Among those students, 50% actually enrolled in an out-of-state institution. On the other hand, 60% indicated a preference to attend a college in-state, of which 90% did. However, these results may vary by student characteristics such as academic preparation level. Therefore, the user can drill down further, filtering by ACT Composite score band (or by other student characteristics).

Ten-Year Trends Database

The *Ten-Year Trends Database* includes data on the ten most recent ACT-tested high school cohorts, helping users examine how the ACT-tested population has changed over time in terms of student characteristics and college preferences. The database currently includes information on the 2008–2017 ACT-tested high school graduating classes. Enrollment managers, admissions personnel, and other college administrators can use this information to help forecast and plan for changes in the student demographics and preferences of prospective applicants to help with recruitment strategies and resource planning. For example, trends in intended major may help colleges better anticipate future demand for specific programs of study and thus better plan for the allocation of resources and staffing. A *Ten-Year Trends Database User Guide* is also provided on the database landing page.

Example Scenario Use Case

Perhaps you work in the Office of Academic and Strategic Planning at a public university in Illinois and are interested in the demand for specific college majors among high school students in your state and nationally. By selecting up to two geographies (i.e., state, region, and national) and selecting majors of interest, this tool provides the count and percentage of the 2008–2017 ACT-tested students in Illinois and nationally who indicated that they intended to major in business, computer science and mathematics, engineering, and health sciences and technology. At the bottom of the display, the ACT participation rate is also provided by year to help contextualize the findings. As shown in Figure 2, the percentage of high school graduates interested in majoring in health sciences and technology and business tends to decrease over time whereas interest in engineering, and to a lesser extent computer science and mathematics, appears to rise in Illinois. A similar pattern is seen at the national level.

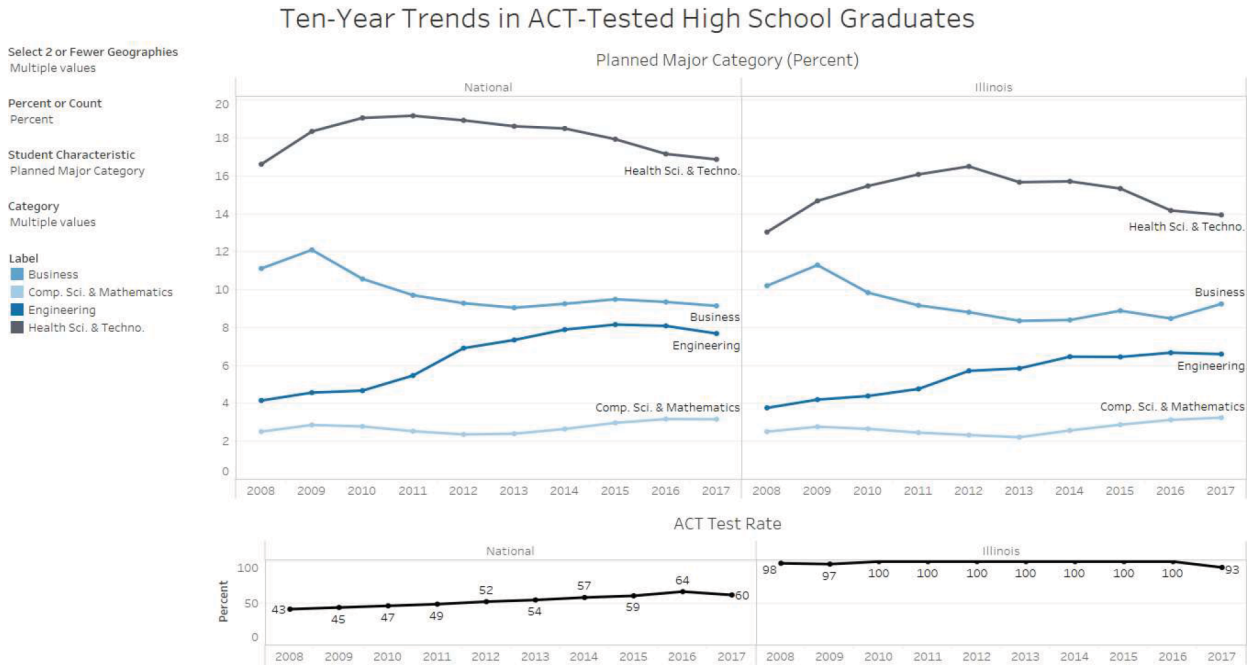

Figure 2.
Screenshot from the Ten-Year Trends Database

College Completion Database

The *College Completion Database* includes data on the 2010 ACT-tested high school graduating class matched to six years of college enrollment and graduation data obtained from the National Student Clearinghouse, letting users follow a graduating class from high school through the completion of college. Users can examine how student characteristics relate to degree completion within 100% and 150% of normal time to degree. For example, the extent to which students with higher academic preparation levels are more likely to earn a degree in a timely manner can be explored. A *College Completion Database User Guide* is also provided on the database landing page.

Example Scenario Use Case

Perhaps you work in the Office of Enrollment Management at a university in North Carolina. You are interested in examining the relationship between students' ACT Composite score and their probability of earning a degree within 150% of normal time to degree for four-year college students from your state and across all southern states. By selecting "South" and "North Carolina" from among the geographic entities that you want to compare, filtering your selection to "Four-year College Students" and selecting "ACT Composite Score Range" as your student characteristic of interest, you see the display in Figure 3. As the dashboard illustrates, in all ACT Composite score ranges except 33–36, ACT-tested students from North Carolina who began their college education at a four-year institution were more likely to earn a degree within a 150% of normal time to degree compared to their peers from across all southern states (including North Carolina). This gap between North Carolina and the South decreases as the ACT Composite score range increases.

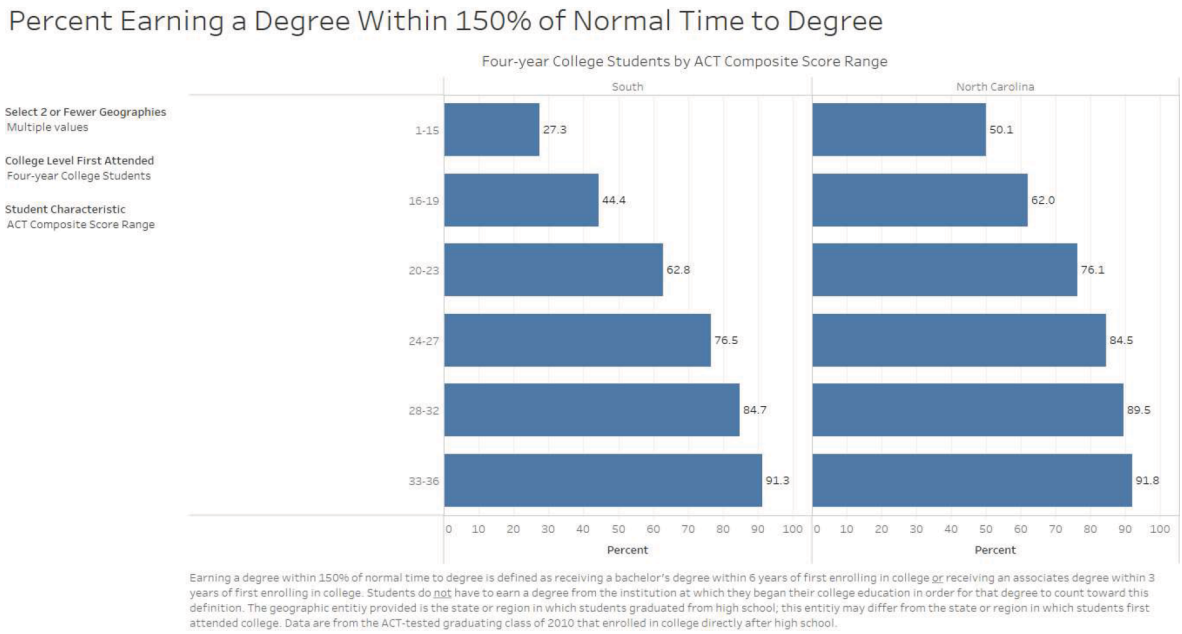

Figure 3.
Screenshot from the College Completion Database

BUILDING A DIVERSE AND COLLEGE-READY CLASS:

THE POWER OF SOCIAL AND EMOTIONAL LEARNING SKILLS

Jeff Allen, Krista Mattern, and Jeffrey Steedle

Changing demographics of the US population pose challenges for college admissions and enrollment managers who strive to admit a cohort of students that is both academically prepared for college and sufficiently diverse. Higher education serves as a powerful vehicle for upward social mobility, so it is important for minority and low-income students to have access to such opportunities. Unfortunately, the most common cognitive measures used in admission decisions (high school grades and test scores[1]) show large performance differences among subgroups. In particular, African American and Hispanic students and students from lower socioeconomic backgrounds tend to have lower high school grades and test scores compared to their White and more affluent peers. It is important to note that the existence of subgroup differences is not indicative of test bias; however, it can impact the diversity of admitted students. Specifically, enrollment managers who admit students based on these criteria may inadvertently be missing opportunities to maximize diversity in the incoming class. In response, many colleges and universities are exploring different solutions that can reliably identify underserved students possessing the potential to do well in college even though they may not have the strongest academic records.

1 Clinedinst, Melissa E. and Anna-Marie Koranteng. 2017. *2016 State of College Admissions*. Washington, D.C.: National Association for College Admission Counseling.

Findings from over a decade of ACT research on Social and Emotional Learning (SEL) offer new insights on ways to increase diversity without sacrificing readiness. **Results show that SEL skills—as measured by ACT Engage®—are predictive of college success while exhibiting small to no subgroup differences.** These findings support the ACT Holistic Framework™,[2] which underscores the importance of considering factors in addition to academic skills to better understand a student's likelihood of future success. Moreover, it's important to consider their *profile* of strengths and weaknesses across these domains. For example, a student with moderate academic skills but high SEL skills may be more likely to succeed than a student with high academic skills but low SEL skills. These findings clearly show the potential for using SEL in admissions; however, further exploration about how to effectively do this is necessary.

The Power of SEL Skills

Validity. ACT has a long line of research investigating the validity of SEL skills for predicting important educational outcomes. The results show that even after controlling for traditional measures, SEL skills—in particular, Academic Discipline, which reflects the degree to which one is hardworking and conscientious—add to the prediction of outcomes such as academic success, retention, and completion.[3] For example, the average first-year GPA for students with particular combinations of ACT Composite scores and Academic Discipline scores is displayed in Figure 4. The figure illustrates that within each ACT Composite score band, higher levels of Academic Discipline are related to higher college grades. Take, for example, students with ACT Composite scores in the top 25%. Those with high Academic Discipline scores are expected to earn a GPA nearly a whole point higher than students with low scores (3.57 vs. 2.74). The results also indicate that high levels of Academic Discipline can compensate for lower test scores. Students with ACT Composite scores in the middle 50% but high in Academic Discipline are expected to earn higher GPAs than students with ACT Composite scores in the top 25% but with low Academic Discipline (2.98 vs. 2.74).

2 Camara, Wayne, Ryan O'Connor, Krista Mattern, and Mary Ann Hanson. 2015. *Beyond Academics: A Holistic Framework for Enhancing Education and Workplace Success.* ACT Research Report 2015-4. Iowa City, IA: ACT.

3 Allen, Jeff and Steven Robbins. 2010. "Effects of interest–major congruence, motivation, and academic performance on timely degree attainment." *Journal of Counseling Psychology, 57*(1), 23–35. Robbins, Steven B., Jeff Allen, Alex Casillas, Christina Peterson, and Huy Le. 2006. "Unraveling the Differential Effects of Motivational and Skills, Social, and Self-Management Measures from Traditional Predictors of College Outcomes." *Journal of Educational Psychology, 98,* 598–616. Robbins, Steven B., Kristy Lauver, Huy Le, Daniel Davis, Ronelle Langley, and Aaron Carlstrom. 2004. "Do Psychosocial and Study Skill Factors Predict College Outcomes? A Meta-Analysis." *Psychological Bulletin, 130,* 261–288.

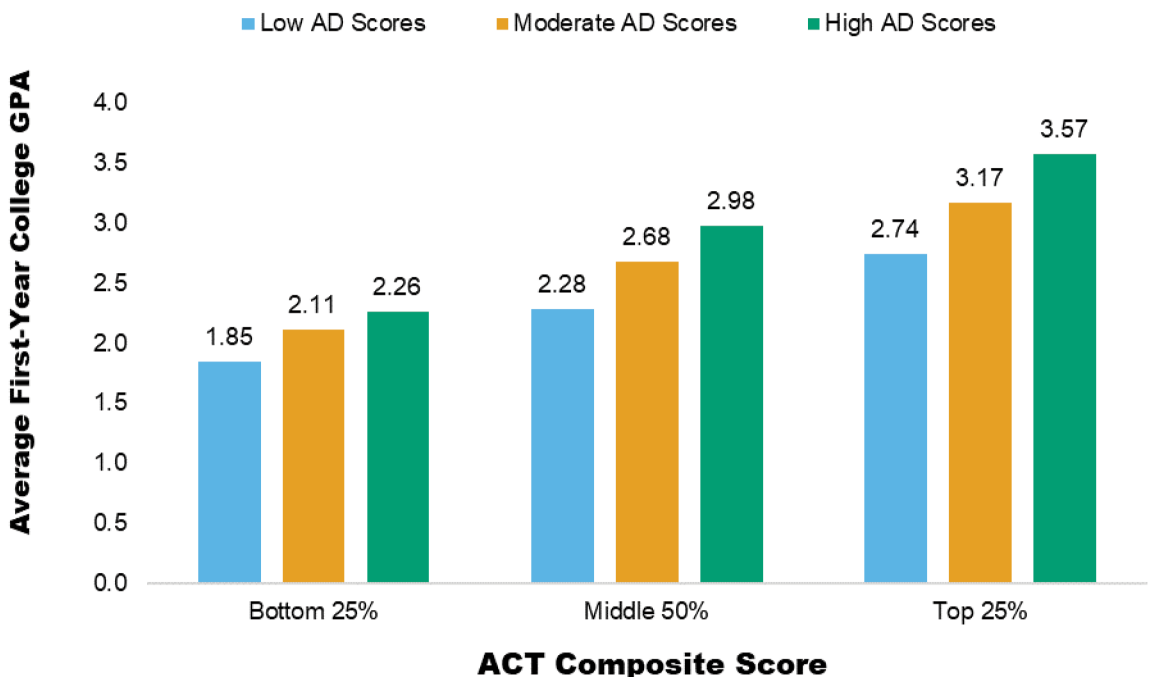

Figure 4.
Average First-Year GPA at 4-Year Institutions by ACT and ENGAGE Academic Discipline Score. Based on data from the ACT Engage field study (Robbins et al., 2006)

Subgroup Differences. Besides their predictive power, SEL skills are also useful for promoting diversity because they exhibit small to no subgroup differences. To illustrate this point, the means, standard deviations, and subgroup differences for ACT Composite score, HSGPA, and Academic Discipline by race/ethnicity and parental income are provided in Table 1. In contrast to academic measures, we see virtually no subgroup differences in Academic Discipline for Hispanic and African American students compared to White students (d = −0.06 and −0.08 standard deviations, respectively) and much smaller differences for low-income students (d = −0.23 for less than $36,000) compared to high-income students (greater than $100,000).

Table 1. Means, Standard Deviations, and Subgroup Difference on the ACT, HSGPA, and Engage Academic Discipline by Ethnicity and Income

Student Characteristics		ACT Composite			HSGPA			Academic Discipline		
		M	SD	*d*	M	SD	*d*	M	SD	*d*
Ethnicity	Asian	24.1	6.3	0.33	3.51	0.53	0.27	48.4	8.2	0.05
	African American	17.3	4.3	-0.88	2.94	0.62	-0.62	47.3	8.6	-0.08
	Hispanic	19.0	5.0	-0.57	3.11	0.63	-0.35	47.4	8.6	-0.06
	Other	20.5	5.5	-0.30	3.17	0.65	-0.26	46.6	8.6	-0.16
	White	22.3	5.4		3.33	0.61		47.9	8.5	
Income	< $36,000	18.0	4.5	-1.14	3.01	0.65	-0.75	46.7	8.6	-0.23
	$36,000 to $60,000	20.0	5.0	-0.77	3.17	0.63	-0.49	47.3	8.5	-0.16
	$60,000 to $100,000	21.9	5.2	-0.43	3.33	0.59	-0.24	48.1	8.4	-0.08
	>$100,000	24.4	5.5		3.48	0.54		48.7	8.2	

Note. Based on the 2017 ACT-tested graduating high school class with missing data imputed. M = mean, SD = standard deviation, d = standardized difference. White students and students reporting parental income greater than $100,000 are the referent groups for the ethnicity and income analyses, respectively.

Because of the smaller group differences, identifying and recruiting students based on both academic and SEL skills can have a positive impact on the diversity of your campus. To illustrate this point, we simulated the diversity of an admitted class using only HSGPA and ACT Composite score versus HSGPA, ACT Composite score, and Academic Discipline to admit students for three levels of admissions selectivity. As shown in Table 2, using all three measures slightly increases the percentage of minority and low-income students being admitted. For example, for a highly selective institution with a typical freshman class of 2,500 students, this translates to 28 more African American and Hispanic students and 30 more students from the two lowest income categories. To learn more about ACT Engage®, visit our website at www.act.org/engage.

Table 2. Diversity (%) of Admitted Class by Ethnicity and Income Using ACT Scores and HSGPA versus ACT Scores, HSGPA, and Academic Discipline

Admissions Selectivity	Student Characteristics		HSGPA & ACT	HSGPA, ACT, AD
Highly Selective (top 15%)	Ethnicity	Asian	11.0	10.6
		African American	2.8	3.3
		Hispanic	8.9	9.5
		Other	5.0	4.9
		White	72.3	71.8
	Income	< $36,000	8.6	9.4
		$36,000 to $60,000	12.6	13.0
		$60,000 to $100,000	24.8	24.9
		>$100,000	54.0	52.8
Moderately Selective (top 50%)	Ethnicity	Asian	7.3	7.2
		African American	6.0	6.6
		Hispanic	13.4	13.8
		Other	5.3	5.2
		White	68.1	67.2
	Income	< $36,000	17.2	17.8
		$36,000 to $60,000	17.8	17.9
		$60,000 to $100,000	25.8	25.6
		>$100,000	39.3	38.8
Less Selective (top 85%)	Ethnicity	Asian	5.7	5.6
		African American	11.2	11.5
		Hispanic	17.4	17.5
		Other	5.6	5.6
		White	60.1	59.8
	Income	< $36,000	26.6	26.8
		$36,000 to $60,000	20.1	20.1
		$60,000 to $100,000	23.5	23.4
		>$100,000	29.9	29.8

Note: Results are based on the 2017 ACT-tested graduating high school class with missing data imputed. Predicted FYGPAs were computed for each student based on two models: 1. ACT Composite score and HSGPA. 2. ACT Composite score, HSGPA, and Academic Discipline using data for the ACT Engage field study (Robbins et al., 2006). Students were ranked in order based on their predicted FYGPA; the top 15%, 50%, and 85% were selected for the three admission scenarios, and the demographic distributions were estimated.

NEW UNDERSTANDING OF HIGH SCHOOL RIGOR AND COLLEGE SUCCESS PREDICTIONS:

AN EMPIRICALLY-DERIVED INDEX OF HIGH SCHOOL ACADEMIC RIGOR

Jeff Allen, Edwin Ndum, and Krista Mattern

While high school grade point average (HSGPA) is a common and readily available measure of college readiness, the prevailing wisdom is that not all HSGPAs are created equal. Some courses are more difficult than others, and students can choose easy courses in hopes of raising their HSGPA. Even if all students take the same set of courses, course content and intensity vary among instructors and schools. This variability adds to the complexity of admission officers' efforts to make sense of applicants' HSGPA in relation to their coursework information. Though some may wish to give more weight to applicants who take advanced coursework, systematically applying this in practice presents significant barriers and introduces new risks.

To help admission officers and others quantify the rigor of a student's high school academic experience, ACT researchers developed and tested a new index of high school academic rigor, referred to as the *HSAR index*. **These findings reveal that prediction of first-year college grade point average can be improved when the rigor of high school coursework is considered alongside ACT test scores.**

Development and Validation of HSAR Index

The sample included 108,381 students who took the ACT Explore® test in 8th grade, took the ACT® test in 11th or 12th grade, graduated high school between 2006 and 2013, and enrolled in college. Coursework and grades data (including whether students took accelerated, honors, or advanced placement courses in each subject area) was collected when students registered for the ACT test in high school. While ACT Explore and ACT test scores were needed for the study, they are not needed to calculate the HSAR index. FYGPA was collected from 425 colleges and universities (322 4-year colleges, 103 2-year colleges) and coded on the usual 4-point scale.

HSAR Index

We sought an index of academic rigor that was a function of the high school coursework and grades data collected during ACT registration. We estimated the HSAR index by regressing FYGPA on the 30 high school course classification variables, as well as five

indicators for advanced coursework.[4] The resulting index assigns greater value to courses and grades that are positively related to FYGPA. Unlike HSGPA, the model does not place restrictions on how grades should be weighted. For example, the difference between earning an A and B in Algebra 2 may be larger than the difference between earning a B and C in Algebra 2, and the difference between earning an A and B in Chemistry may be larger than the difference between earning an A and B in American Government.

Students with higher pre-high school academic achievement are more likely to take challenging courses in high school and earn higher grades. To isolate the effect of high school coursework and grades on FYGPA, 8th-grade test scores were also included in the regression model used to develop the HSAR index. The index is therefore designed to predict FYGPA based on high school data, net of the effects of pre-high school academic achievement.

4 The course classification variables are based on whether students took the course and the grade they earned. There is one variable for each course, and 30 total courses. Indicators of advanced coursework in English, mathematics, social studies, science, and foreign languages were used.

Summary of Results

The HSAR index is driven by which courses (and grades) contribute most to FYGPA. Courses can influence FYGPA due to effects of simply taking the course, effects of earning higher grades in the course, or both reasons. Figure 5 lists 12 courses with the largest contributions to FYGPA. With the exception of Other Advanced Math, Spanish, Trigonometry, and Calculus, these courses were taken by the overwhelming majority of students in the sample. Therefore, the large contributions to FYGPA are due to the effects of earning higher grades in the course.

One of the surprising results of the study was that high school English courses, particularly English 10 and 11, provide the strongest contributions to predicting college FYGPA. The results did affirm the importance of performing well in upper-level mathematics courses: taking higher-level math courses (Trigonometry, Other Advanced Math, and Calculus) and earning good grades (A or B) was associated with higher FYGPAs. Performance in high school science courses—particularly Chemistry and Biology—also helped predict FYGPA. Across the core high school subject areas, the social studies courses contributed least to college FYGPA.

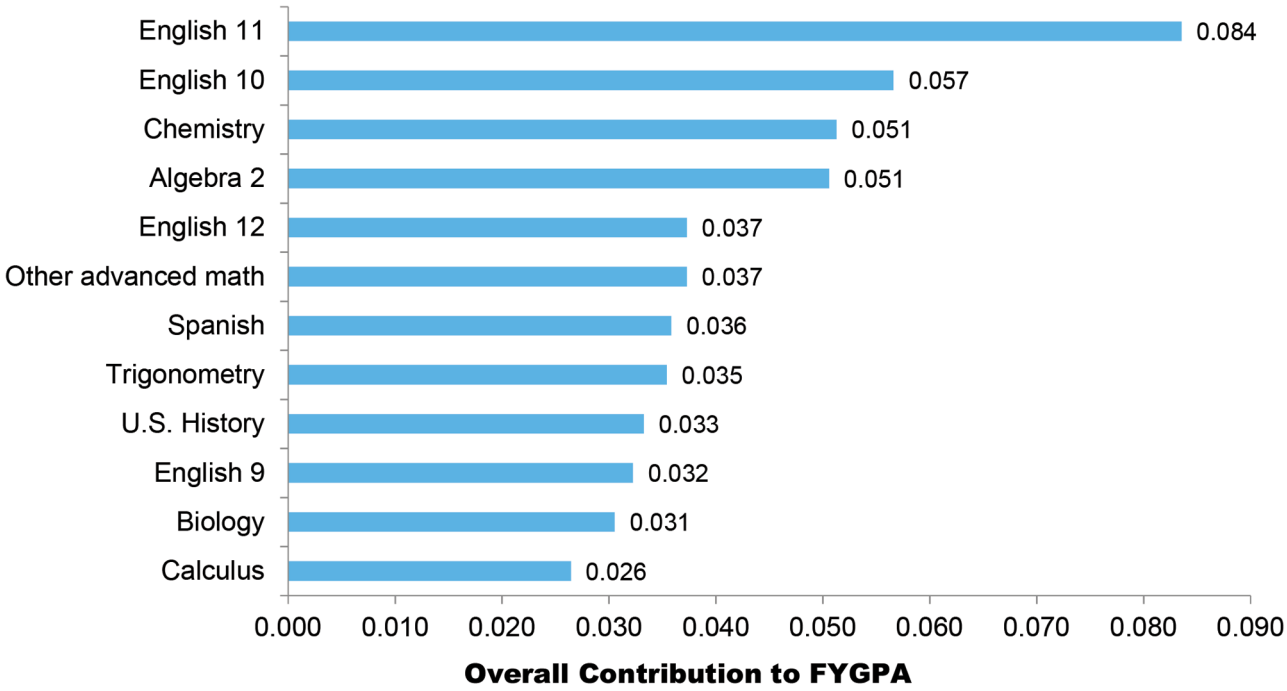

Figure 5:
High school courses with largest contributions to first-year college GPA

Because the HSAR index is driven by which courses and grades contribute most to FYGPA, we expected it to be correlated with FYGPA, and that was the case as shown in Figure 6. The HSAR index was a stronger predictor of FYGPA than HSGPA and ACT Composite score. In regression models for FYGPA, the HSAR index was the strongest predictor, followed by ACT Composite score. HSGPA was also a significant predictor of FYGPA. Using all three predictors, the correlation with FYGPA is maximized at 0.521. However, because the HSAR index is highly correlated with HSGPA, it only produces a small increase in the model's correlation over ACT Composite and HSGPA.

Recommendations for Practice and Study Limitations

This research validates what admission directors and enrollment professionals have known for years—that the rigor of high school coursework is crucial to gaining a full understanding of the academic promise of students they serve. This study offers new insights and empirical grounding which we hope guides campus-specific efforts that result in a more holistic and equitable consideration of all students in the admission process.

Results of the study can be used to identify high school courses with the strongest relationships with FYGPA, and this information can serve two purposes: (1) academic advising to college-bound students on which courses to take and perhaps where to prioritize efforts, and (2) guidance to college admission personnel, researchers, and survey developers on which high school courses are most important, given their relationship with future college success. **The HSAR index can be used for evaluation of the high school experience, or within a multiple measures college readiness model that includes HSGPA and ACT or SAT test scores.**

Additional research is needed to address the study's limitation of reliance on self-reported coursework and grades data. We did not attend to all aspects of rigor, such as course content and high school and classroom effects. More research is planned to test the performance of measures that account for differences across high schools in course difficulty. For more information, the full report is available at http://www.act.org/research/academicrigor/R1650.

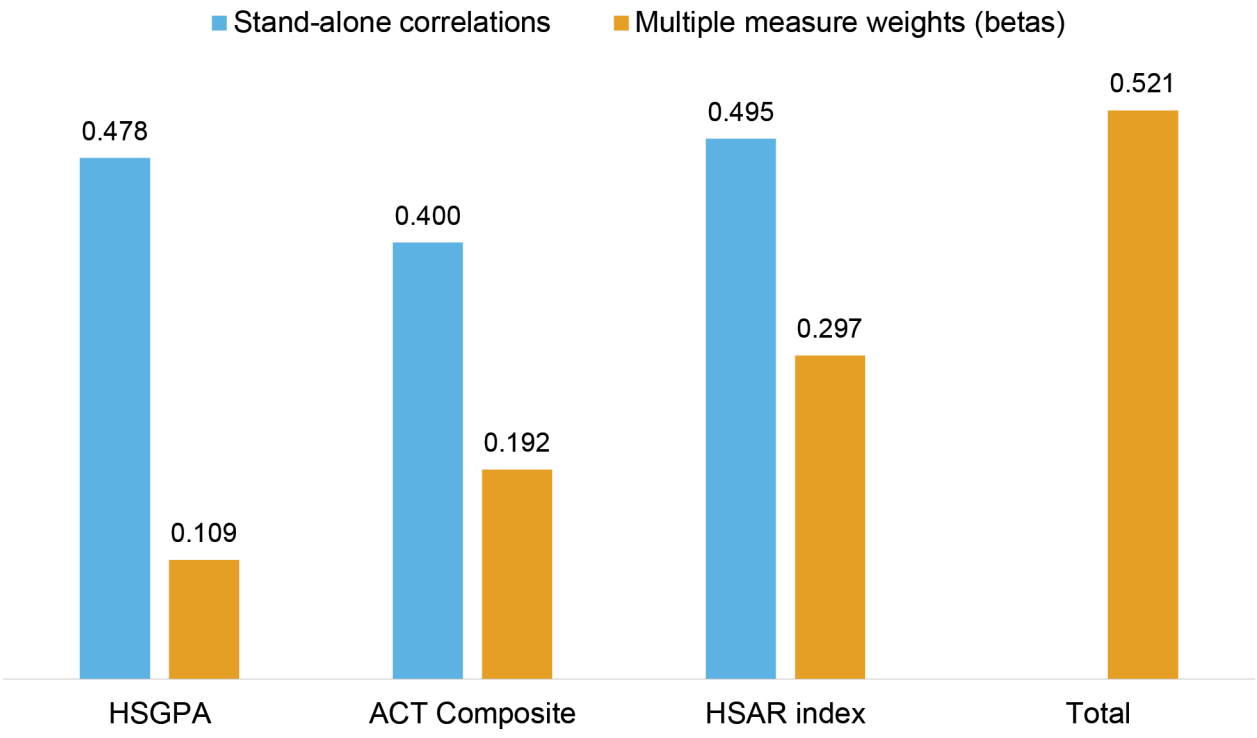

Figure 6:
Correlations and prediction weights of HSGPA, ACT Composite score, and the HSAR index for explaining first-year college GPA

STICKING TO THE PLAN:

WHO IS LIKELY TO DECLARE A MAJOR THAT IS CONSISTENT WITH THEIR INTENTIONS?

Ty Cruce and Krista Mattern

A student's intended major is one of the more important pieces of information that he or she provides when registering for the ACT. Colleges use this information to help search for and recruit prospective students, and high school students use this information to locate colleges that provide programs of study that align with their intentions. Although a student's intended major is used widely by both colleges and students to find the best match, we find that **only 55% of ACT-tested students declare a major in college that is consistent with the intended major area that they indicated at the time of ACT registration.**

This lack of consistency between declared major and intended major area could have negative implications for both colleges and students regarding student retention and timeliness to degree, so in a recent study we attempted to identify the factors that are related to a student following through on his or her choice of intended major area. Results of our research show that a student's intended major area is a more reliable indicator of his or her declared major when the student:

- Expresses greater certainty about his or her intended major
- Plans on majoring in an area that is well-aligned with his or her measured interests (i.e., interest-major fit)
- Plans on majoring in an area that is better aligned with his or her level of academic preparation (i.e., achievement-major fit)

With this in mind, college recruiters may want to implement more sophisticated methods of identifying prospective students by triangulating numerous pieces of ACT-provided information about the student, particularly major certainty, interest-major fit, and ACT performance. This same process can be used by academic advisors once students arrive on campus in order to guide students toward majors that are well aligned with their interests and academic strengths. Additionally, making use of information on the fit between students' interests and academic achievement with specific college majors could help colleges more precisely anticipate future demand for specific programs of study and thus better plan for the

allocation of space (e.g., classrooms, labs, etc.) on a campus and for anticipating changes in teaching loads and staffing. All three pieces of information—the student's intended college major, certainty of intended major choice, and interest-major fit score—are included in the ACT electronic score report that colleges receive.

Major Certainty

At the time that students register for the ACT, they can select their intended major, and indicate a level of certainty that they have in that choice. They can choose from "Very Sure," "Fairly sure," and "Not sure." Our findings show that, even after we account for other factors that are related to the consistency between students' intended major area and their declared major, the likelihood that they will declare a major in college that is consistent with their intentions increases with the level of certainty that they place in their choice of intended major. As seen in Figure 7, compared to students who are not sure of their intended major choice, the probability of declaring a major that is consistent with one's intended major area is 25 percentage points higher for students who are very sure of their intended major choice.

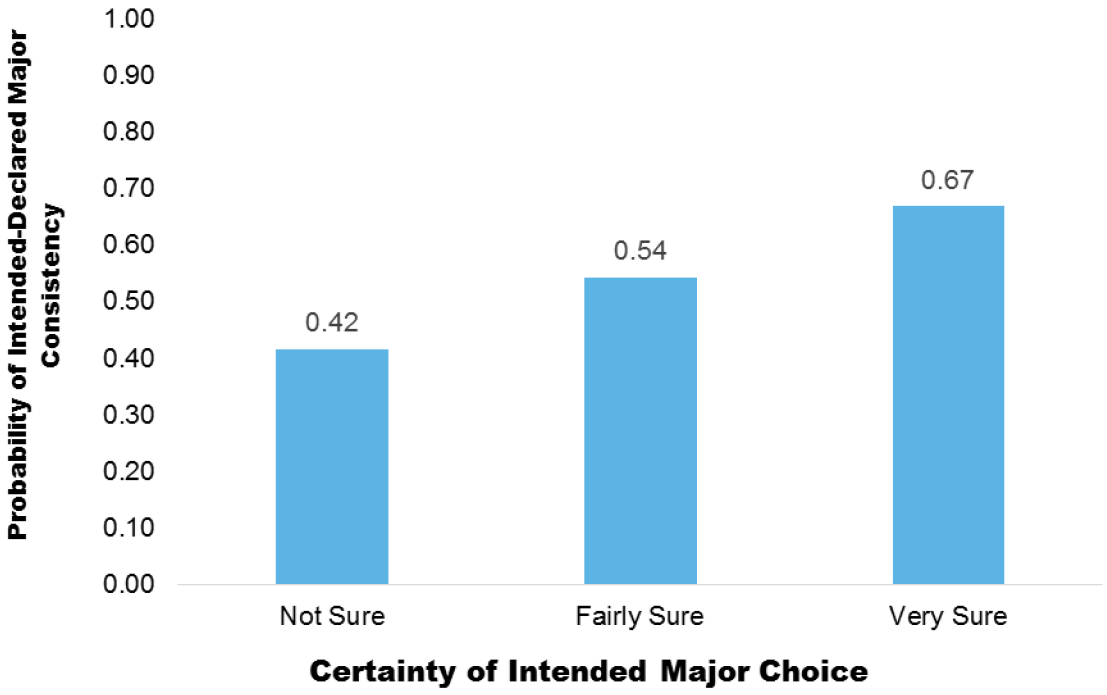

Figure 7.
Predicted probability of having Intended-Declared Major Consistency by Level of Intended Major Certainty

Interest-Major Fit

ACT's Interest-major fit score is derived from two data elements collected during ACT registration: (1) the student's ACT Interest Inventory scores and (2) the student's intended major, selected from a list of nearly 300 college majors. The ACT Interest Inventory provides six interest dimension scores *(i.e., Technical, Science & Technology, Arts, Social Service, Administration & Sales, and Business Operations)*, and from these scores, we determine a student's interest score profile. Interest-major fit scores measure the similarity between a student's interest score profile and the mean interest score profile of successful college students in that major.

ACT has conducted numerous studies on the relationship between interest-major fit and college outcomes. Collectively, the results show that if students' choose a major that is well-aligned with their interests as measured by the ACT Interest Inventory, they will be more likely to:

- remain in their major
- persist in college
- complete a college degree in a timely manner

Findings from our study show that even after we account for other factors that are related to the consistency between intended major area and declared major, the chances that students will declare a major in college that is consistent with their intentions increases as their interest-major fit score increases (Figure 8).

Achievement-Major Fit

In our study, the fit between achievement and intended major is computed as the standardized difference between the mean ACT score of successful students in that major and the student's corresponding ACT score.

- Negative values indicate that the student is less academically prepared than the typical successful student in that major;
- Positive values indicate that the student is more academically prepared than the typical successful student in that major; and
- A value of zero indicates that the student is similarly prepared as the typical successful student in that major.

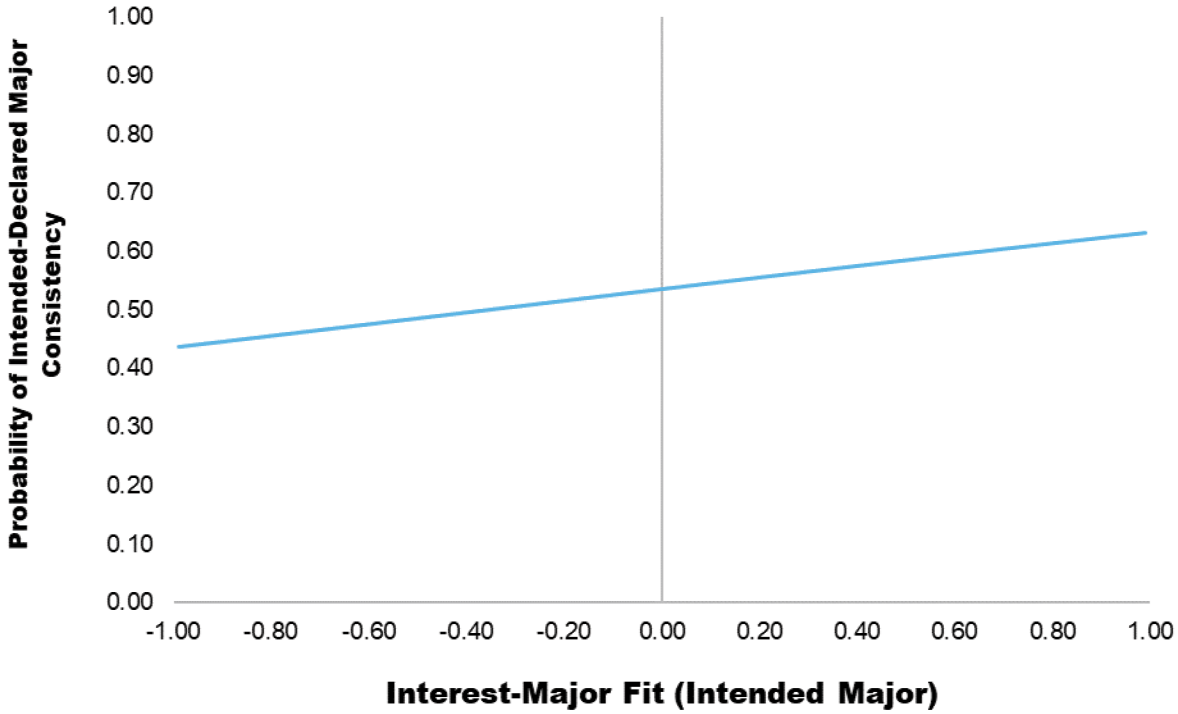

Figure 8.
Predicted probability of having Intended-Declared Major Consistency by Level of Interest-Major Fit

Results of our study indicate that students who are either underprepared or overprepared academically—relative to successful college students in their intended major—are less likely to declare a major in the same area as they had originally intended, as illustrated in Figure 9. After controlling for other study variables, including interest-major fit and certainty of intended major, the probability of declaring a major that is consistent with one's plans peaks when students' academic preparation is slightly higher (by about 0.7 standard deviations) than the corresponding academic preparation of successful students in that major.

Future research will examine the relationship between achievement-major fit and college success, such as major persistence and timely degree completion. For more information, the working paper is available at https://www.act.org/research/major-consistency/R1711.

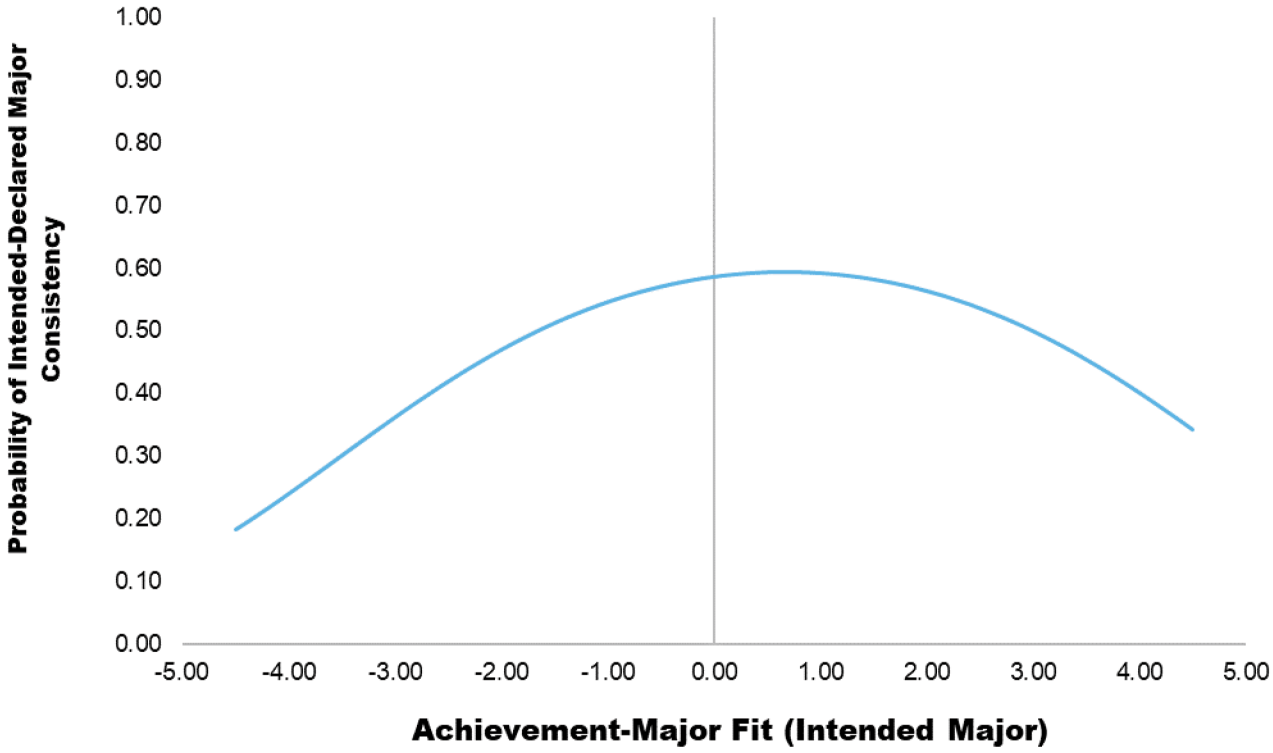

Figure 9.
Predicted probability of having Intended-Declared Major Consistency by Level of Achievement-Major Fit

COLLEGE AND CAREER READY:

HOW MUCH ACADEMIC PREPARATION IS NEEDED FOR MIDDLE-SKILLS JOBS?

Jeffrey Steedle, Justine Radunzel, and Krista Mattern

In today's economy, employers report that middle-skills jobs—those jobs offering middle-class salaries and opportunities for advancement—are difficult to fill. Further, the outlook for hiring managers of middle-skills jobs in growing fields such as healthcare and information technology is particularly bleak. While such jobs do not generally require a bachelor's degree, they increasingly demand some postsecondary training. But how much academic preparation is really required for middle-skills jobs?

It is most common for states to set education policies that define college and career readiness as a unified construct. This research considers whether that decision is prudent in light of possible differences in rigor between traditional bachelor's degree programs and middle-skills job training programs. Knowing whether college readiness and career readiness are equivalent has practical value for students, parents, educators, counselors, and admissions officers making decisions about postsecondary prospects and course placement.

By estimating separate readiness benchmarks based on ACT test scores[5] for students in different majors, this study evaluated the comparability of academic preparation levels needed for high-skills majors ("college readiness") and middle-skills majors ("career readiness") at two-year institutions.[6] **The bulk of evidence from this study points to a similarity between college readiness and career readiness for students at two-year institutions.** This finding partly reflects students taking the same first-year courses in specific content areas (e.g., college algebra), but first-year GPA (FYGPA) analyses including all courses also indicated that students in different majors needed similar levels of preparation to achieve first-year academic success. Moreover, most estimated benchmarks were within one point of the ACT College Readiness Benchmarks, which further supports the notion that all students—regardless of their college or career aspirations—should take rigorous courses in high school to be well prepared for postsecondary pursuits.

Such findings provide a useful signal to high school students and educators about the preparation levels

5 Readiness benchmarks—like the ACT College Readiness Benchmarks (Allen, 2013)—are ACT scores associated with a 50% chance of earning B or higher grades in first-year courses at typical postsecondary institutions. For more information, refer to: Allen, J. 2013. *Updating the ACT College Readiness Benchmarks.* (ACT Research Report Series 2013-6). Iowa City, IA: ACT.

6 Steedle, Jeffrey T., Justine Radunzel, and Krista Mattern. 2017. *Comparing College Readiness and Career Readiness: What Admissions Tests Tell Us.* (ACT Working Paper 2017-7). Iowa City, IA: ACT.

needed for college and career readiness. In particular, **the commonly-accepted notion that students enrolling in career and technical education (CTE) programs or pursuing middle-skills occupations need less academic preparation was not supported.** By setting realistic expectations, the goal is that more students will enter higher education ready to succeed.

Study Details

Data included declared majors and transcripts for ACT-tested students at 59 two-year institutions—the sorts of schools that commonly provide middle-skills job preparation. Students were grouped into majors associated with middle-skills or high-skills occupations using relationships among Classification of Instruction Program codes, Standard Occupational Classification codes, and O*NET job zones. Results for middle-skills and high-skills majors were considered reflective of career readiness and college readiness, respectively. Results for middle- and high-skills majors were compared to each other and to the ACT College Readiness Benchmarks to evaluate the generalizability of the findings to the general college-going population at both two-year and four-year institutions.

Figure 10 shows the estimated benchmarks for middle-skills majors, high-skills majors, and the national reference population of students at two-year and four-year institutions. With one exception, the estimated benchmarks were identical or within one point. This indicates, for example, that the ACT Math score associated with a 50% chance of earning a B or higher in college algebra was similar for middle-skills and high-skills majors at two-year colleges and the general college-going population. Likewise, the level of broad high school achievement (indicated by ACT Composite scores) associated with a 50% chance of earning an FYGPA of 3.0 or higher was similar for the three groups. The ACT English benchmark for middle-skills majors was significantly higher than the reference benchmark, which indicates that middle-skills majors at two-year institutions were less likely to earn a B or higher in English composition than students in the general college-going population with the same ACT English score.

Subsequent analyses estimated readiness benchmarks for 15 college major families at the two-year institutions. For each high-skills major family, the ACT Composite benchmark for predicting FYGPA was within one point of the reference benchmark

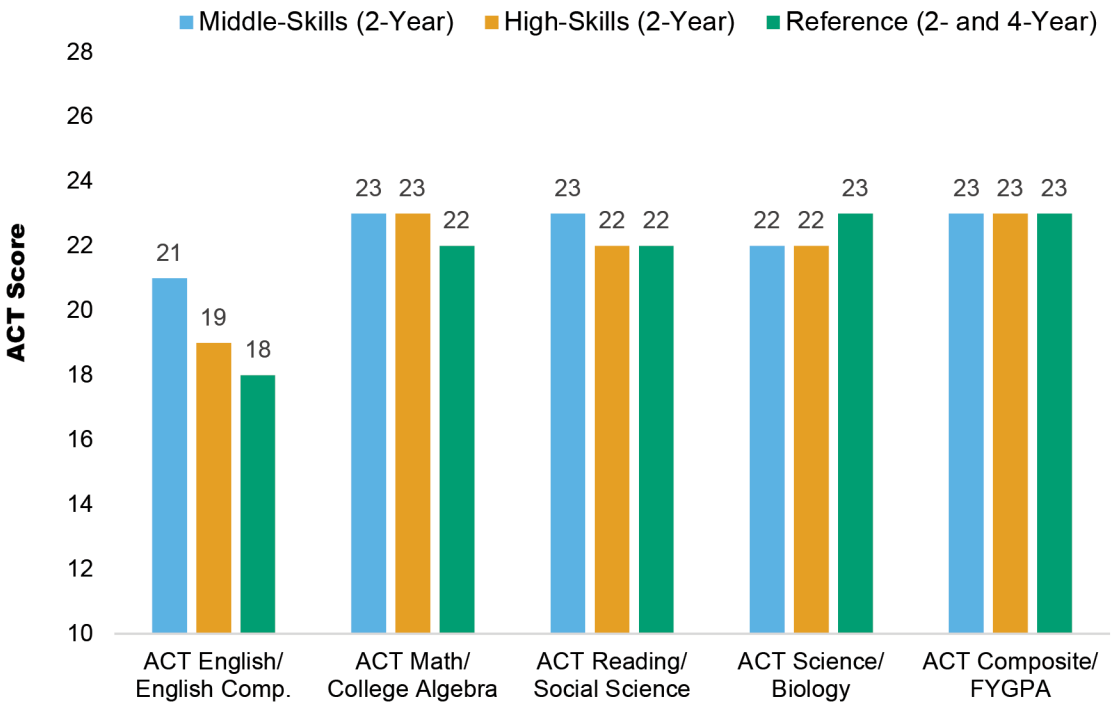

Figure 10:
Readiness Benchmark Scores

of 23 (Figure 11).[7] Most ACT Composite benchmarks for middle-skills major families were also within one point of the reference benchmark, but there were three college major families for which the estimated benchmark fell two points below: Computer and Information Sciences, and Family and Consumer Sciences, and Mechanic and Repair Technicians. Consistent with expectations, slightly higher benchmarks were observed for majors that might require higher levels of prior achievement to support postsecondary success (e.g., Physical Sciences, Education, Engineering, and Health Professions).

The third and final set of analyses estimated readiness benchmarks for Career and Technical Education (CTE) courses. The ACT Reading benchmark for business courses (22) and the ACT Math benchmark for computer courses (22) were both identical to the corresponding reference benchmarks. However, in comparison to the reference benchmarks, the ACT Science benchmark for dental and nursing courses was four points lower, the ACT Reading benchmark for criminal justice courses was three points lower, and the ACT Reading benchmark for teacher education courses was two points lower. These larger differences indicate that students with a given ACT score had greater chances of earning B or higher grades in certain CTE courses than in core academic courses.

For more information, refer to the full report: http://www.act.org/research/collegeandcareer/R1676.

7 Allen, Jeff, and Justine Radunzel. 2017. *Relating ACT Composite Score to Different Levels of First-Year College GPA*. Iowa City, IA: ACT.

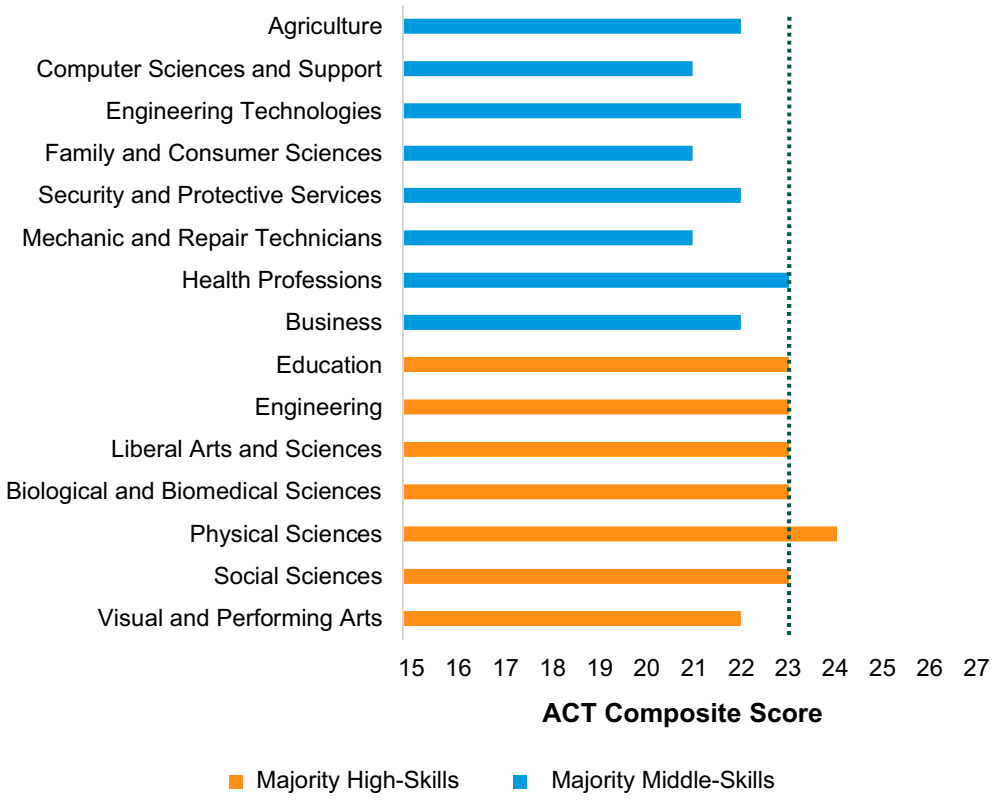

Figure 11:
FYGPA Readiness Benchmark Scores for Major Families

Note: When comparing one student to another, a difference of one point would not be deemed practically significant, considering that the standard error of measurement is approximately two for subject-area test scores and one for Composite scores.[8]

8 ACT. (2017). *The ACT Technical Manual: The ACT.* Iowa City, IA: ACT.

THEY MAY BE *FIRST* BUT WILL THEY *LAST*?

RETENTION AND TRANSFER BEHAVIOR OF FIRST-GENERATION STUDENTS

By Justine Radunzel

Are you struggling to retain first-generation (FG) students at your institution? Did you know you can use incoming student information that is available on students' ACT records to help identify early on FG students who are at greater risk of leaving and may benefit from institutional supports and services? ACT studied the extent to which academic and non-academic factors that are available at the time of admissions/enrollment explain differences in student retention, transfer, and dropout rates at year two between FG students and their peers. The study findings show that compared to their peers, FG students tended to be at greater risk of dropping out of college at year two even after considering their incoming academic achievement levels, educational goals, financial resources, intentions of living on campus, number of hours planned to work, and enrollment characteristics related to full-time status and distance from home. The findings support the need for institutional programs—such as early high school outreach programs, summer bridge programs, academic supports, faculty and peer mentoring, and intrusive advising—designed to help FG students succeed and persist in college.

The findings also illustrate how institutions might use student information available at the time of admissions/enrollment, including elements from the ACT record, to learn more about their incoming FG students and how to tailor their resources and supports to better meet the needs of these students. Institutions and state systems could also conduct local studies that utilize similar incoming student information to evaluate and inform transfer strategies and policies intended to help FG students achieve educational goals, including achieving a bachelor's degree. Transfer strategies might include strengthening partnerships between two- and four-year institutions, developing new articulation

agreements, and implementing guidance programs to help FG students successfully navigate the transfer process.

Study Details

Data for the study were available for approximately 150,000 ACT-tested first-time entering college students from the 2012, 2013, and 2014 freshman cohorts of two state higher education systems. Nearly 70 postsecondary institutions were included in the sample. Subsequent enrollment information was supplemented with data from the National Student Clearinghouse. The percentage of FG students was 15% among those beginning at a four-year institution and 27% among those beginning at a two-year institution.

Gaps in Retention and Dropout Rates by Parents' Education

In line with previous research, we found that gaps in second-year retention rates existed among students with parents from different education levels. This is primarily because FG students are more likely to drop out at year two. For example, as illustrated in Figure 12, there was an approximate 15 percentage point difference in dropout rates between FG students and students whose parents had earned at least a bachelor's degree (27% vs. 12%) for the four-year sample and a 9 percentage point difference for the two-year sample (38% vs. 29%).

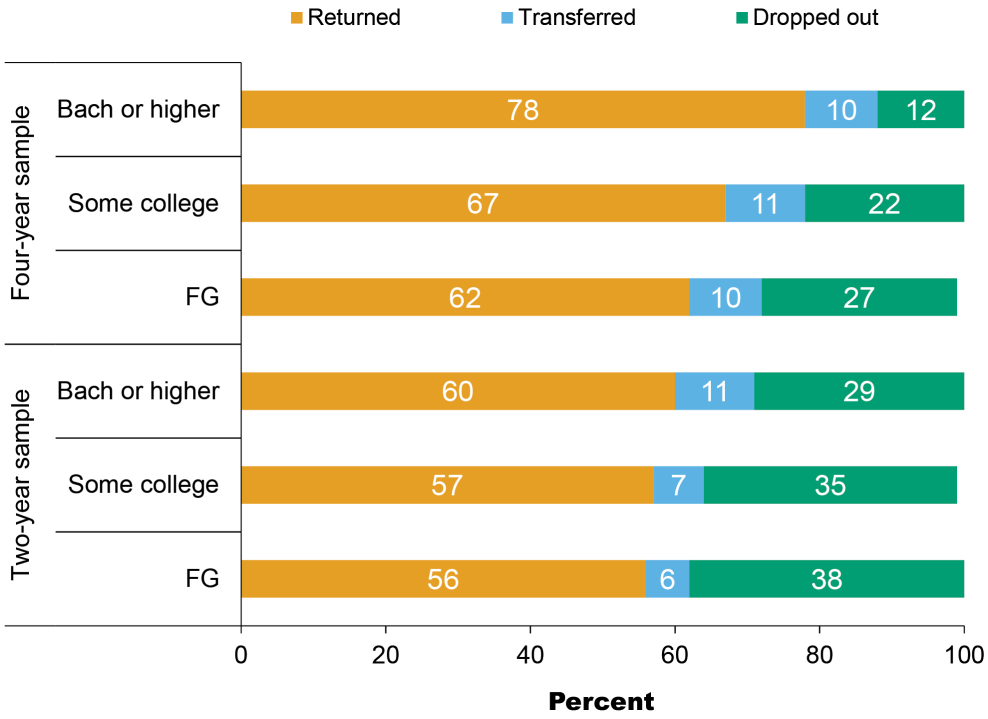

Figure 12.
Retention and attrition rates by parents' education level and institution type. Parents' education level = first-generation (labeled as FG); students whose parents had some college experience but had not completed a bachelor's degree (labeled as Some college); and students who had at least one parent who earned a bachelor's degree or higher (labeled as Bach or higher).

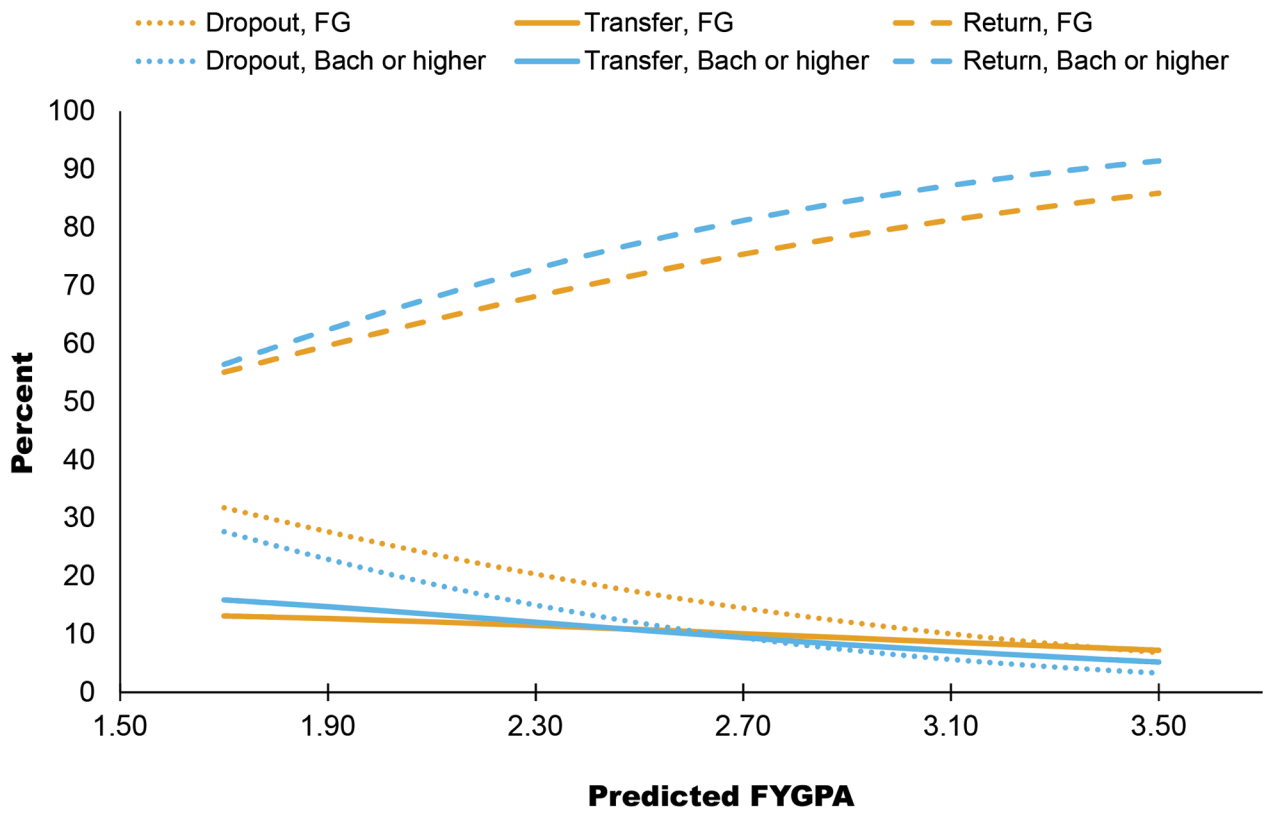

Figure 13.
Retention, transfer and dropout rates by parents' education level and predicted FYGPA for the four-year sample, holding all other predictors constant at sample means. Predicted FYGPA based on students' ACT Composite scores and high school grades. Results are shown for the middle 90% of predicted FYGPAs and for first-generation (labeled as FG) students compared to those who had at least one parent who earned a bachelor's degree or higher (labeled as Bach or higher).

After statistically controlling for other student characteristics and the institution attended, the gaps in retention and dropout rates by parents' education level were reduced but not completely eliminated. This is illustrated for the four-year sample in Figure 13, where we see smaller differences in retention rates by parents' education than those shown in Figure 12. Another observation from this example is that the gaps in retention rates were larger among students predicted to earn higher FYGPAs based on their ACT Composite score and high school grade point average, and smaller among those entering less academically prepared as indicated by a predicted FYGPA below 2.00. That is, there appear to be larger gaps in retention rates by parents' education level among students who are entering better prepared academically.

As for students attending two-year institutions, dropout rates were generally higher for FG students than for students whose parents had earned at least a bachelor's degree. In contrast, transfer rates were higher for non-FG students than for FG students, especially among those predicted to earn higher FYGPAs. Some students beginning at a two-year institution may go on and transfer to a four-year institution to work toward earning a bachelor's degree.

Where Are FG Transfer Students Going?

A majority of FG students in the sample indicated they had educational aspirations of obtaining a bachelor's degree or higher. Given this, we examined where FG transfer students were going. For the four-year sample, as illustrated in Figure 14, we found that FG students were more likely than their peers to reverse transfer to a two-year institution in year two (49% vs. 40% for students whose parents earned at least a bachelor's degree), after statistically controlling for other student characteristics. Moreover, for the two-year sample, there were fewer FG students than non-FG students going on to vertically transfer to a four-year institution (69% vs. 76%).

For more information, the full report is available at https://www.act.org/research/retention-firstgen.

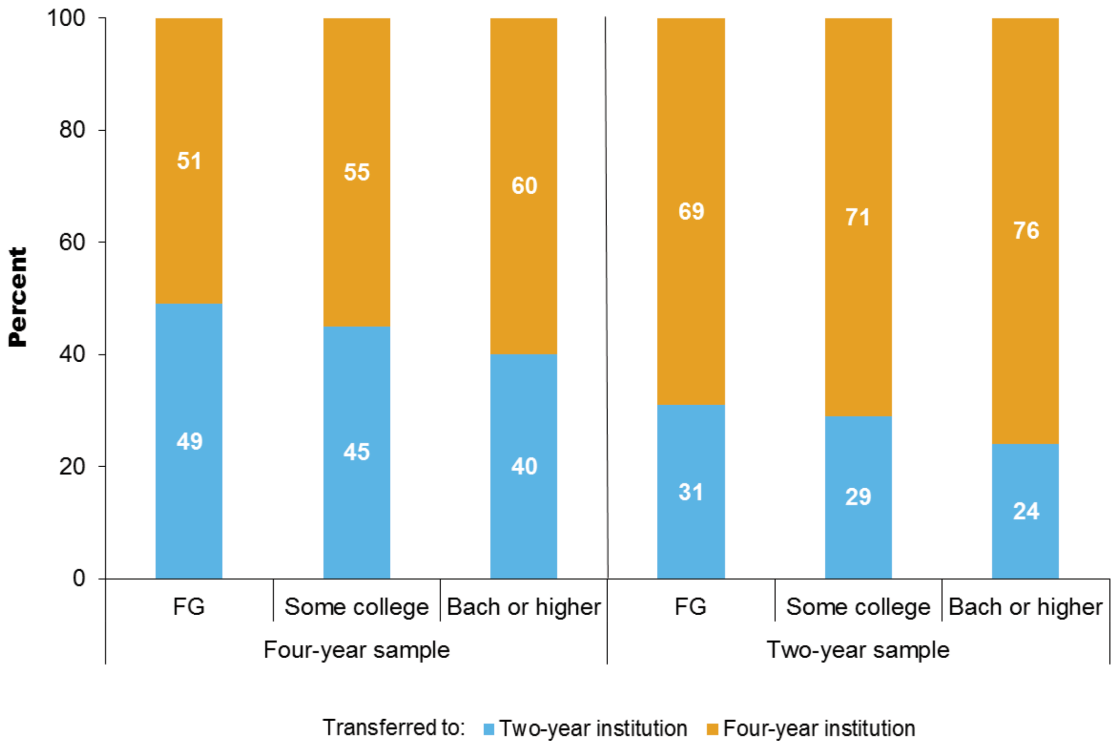

Figure 14.
Type of transfer by parents' education level among those transferring to another institution at year two, holding all other predictors constant at sample means. Parents' education level = first-generation (labeled as FG); students whose parents had some college experience but had not completed a bachelor's degree (labeled as Some college); and students who had at least one parent who earned a bachelor's degree or higher (labeled as Bach or higher).

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Examine relationships between ACT WorkKeys 2.0 scores and relevant performance outcomes (job performance ratings, productivity, grades, etc.).

TESSERA COLLEGE PILOT STUDY
Examine relationships between social and emotional skills and post-secondary academic achievement.

ACT®

ACADEMIC READINESS AND DISCIPLINE:

TWO FACTORS RELATED TO DEGREE COMPLETION

By Justine Radunzel, Krista Mattern, and Joann Moore

For students, the benefits of graduating high school ready for college are not limited to academic performance within their first-year of college coursework. In fact, achieving college readiness in high school is associated with positive and longer-term benefits.

To highlight this point, enrollment and degree completion rates were examined for the 2010 ACT-tested high school graduating class by the number of ACT College Readiness Benchmarks met.

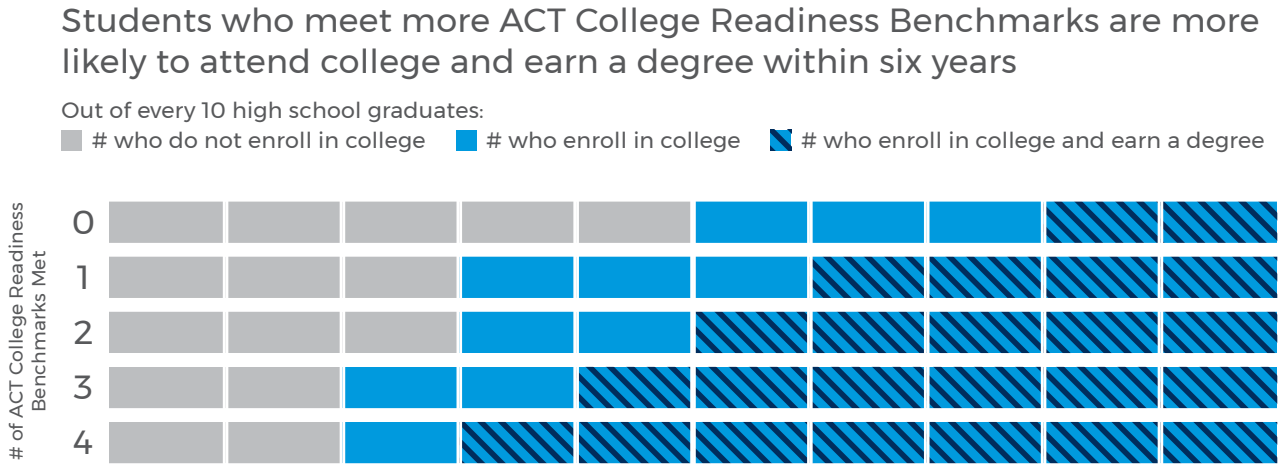

Figure 15.
2010 High School Graduates Who Immediately Enrolled in College and Completed a Degree within Six Years by Number of ACT College Readiness Benchmarks Met. Data based on matching ACT records to National Student Clearinghouse enrollment and degree information.

As illustrated in Figure 15, for the 2010 ACT-tested high school graduating class:

- 8 out of every 10 students meeting all four Benchmarks enrolled in a postsecondary institution in fall 2010 (or 83%), compared to only 5 out of every 10 students doing so among those meeting none of the Benchmarks (or 49%).
- 7 out of every 10 students meeting all four Benchmarks immediately enrolled in college and completed an associate's or bachelor's degree within six years (or 68%), compared to only 2 out of every 10 students doing so among those meeting none of the Benchmarks (or 18%).
- Approximate proportions for students meeting one, two, or three Benchmarks are also provided in the figure.

Figure 16 provides insights on the relationship between academic readiness and six-year degree completion status for 2010 high school graduates who began at a four-year institution. From the figure, we see that as the ACT Composite score increased:

- Students' chances of earning a bachelor's degree in a timely manner (i.e., within four years at a typical four-year institution) increased (from 21% for those with an ACT Composite score of 15 to 78% for those with an ACT Composite score of 36).
- Students' chances of being without a degree and not enrolled six years later decreased (from 37% for those with an ACT Composite score of 15 to 4% for those with an ACT Composite score of 36).

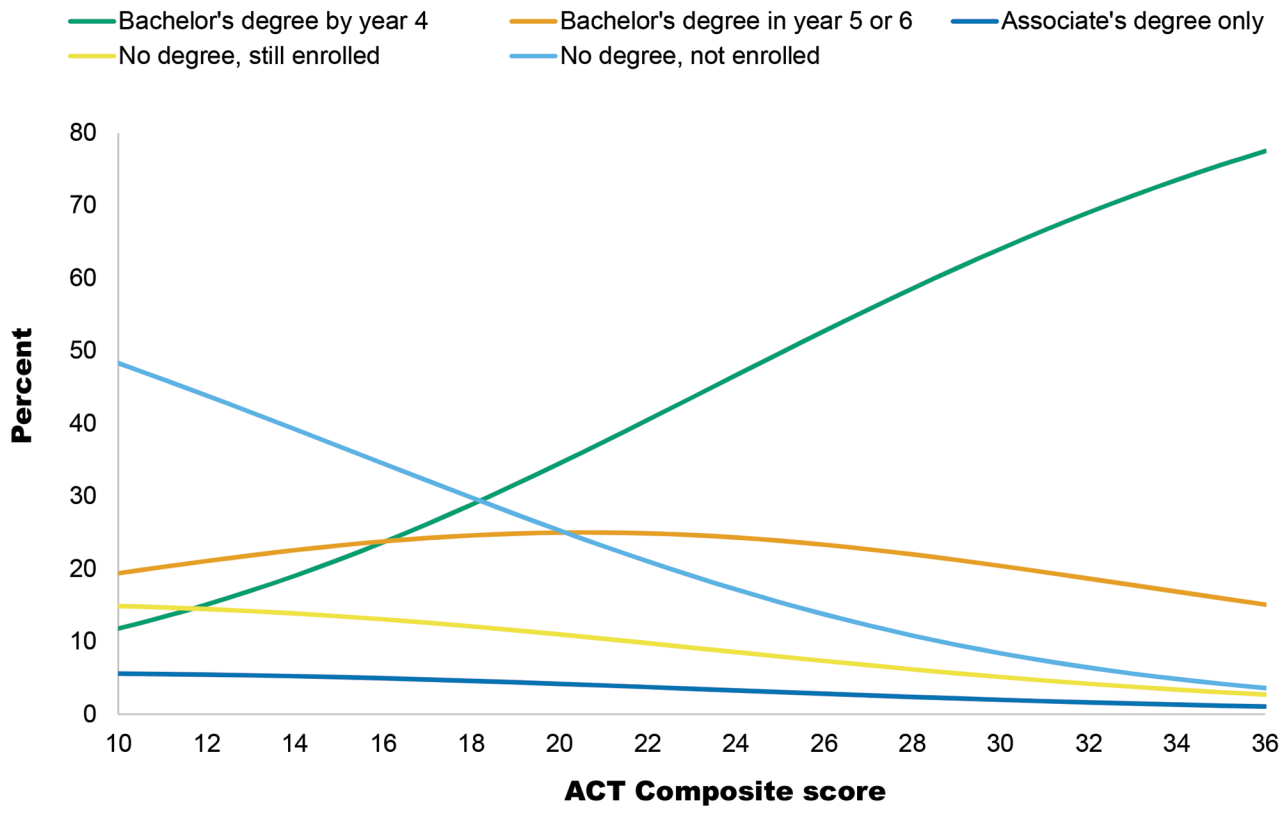

Figure 16.
Year 6 Degree Completion Status for 2010 High School Graduates Who Immediately Enrolled in a Four-Year Institution by ACT Composite Score, Statistically Controlling for Initial Institution Attended

Figure 17 illustrates the relationship between academic readiness and six-year degree completion status for 2010 high school graduates who began at a two-year institution. From the figure, we see that as the ACT Composite score increased:

- Students' chances of earning an associate's or bachelor's degree within six years increased (from 27% for those with an ACT Composite score of 15 to 80% for those with an ACT Composite score of 32).
- Students' chances of being without a degree and not enrolled six years later decreased (from 57% for those with an ACT Composite score of 15 to 13% for those with an ACT Composite score of 32).

For those interested in learning more about how ACT-collected data relate to college completion, check out the ACT College Completion Database: http://www.act.org/researchdigest. For example, users can examine degree completion rates within 100% and 150% of normal time for both four- and two-year students by student characteristics.

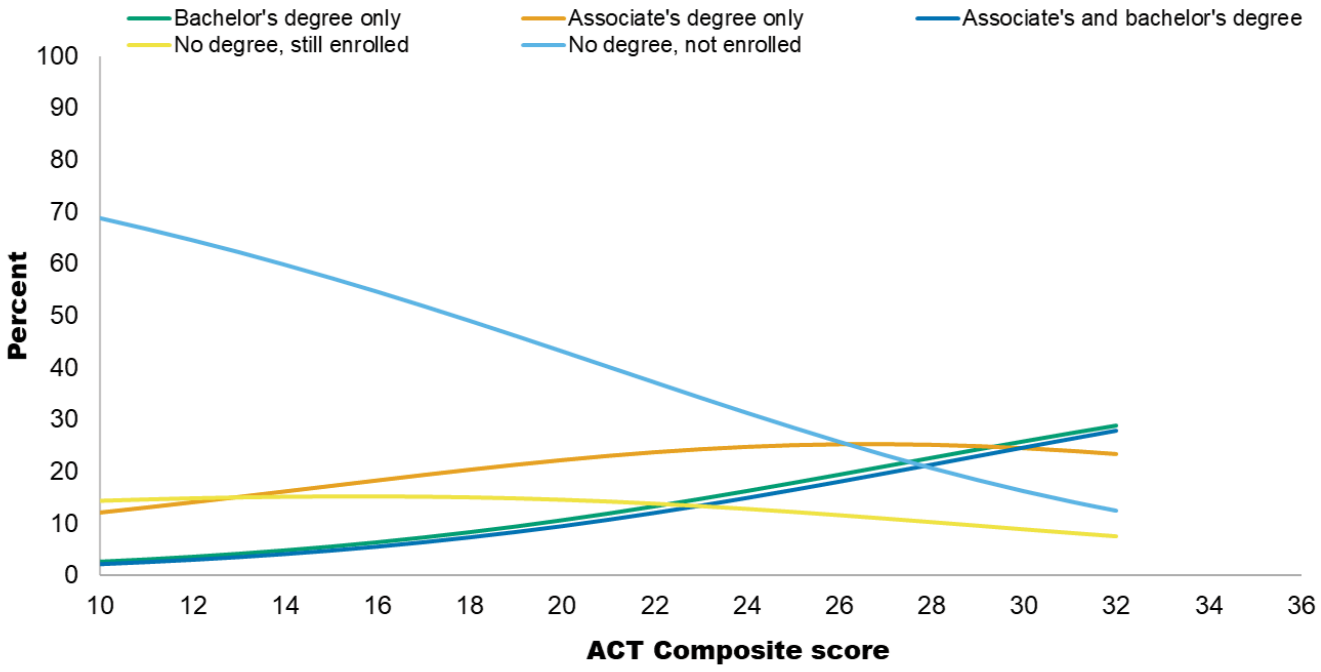

Figure 17.
Year 6 Degree Completion Status for 2010 High School Graduates Who Immediately Enrolled in a Two-Year Institution by ACT Composite Score Range, Statistically Controlling for Initial Institution Attended[9]

9 The lines in the figure stop at an ACT Composite score of 32 because there were fewer than 100 students at each score above 32.

Findings from these analyses highlight the positive effects that academic preparation has on persistence in college to timely degree completion for students attending two- or four-year postsecondary institutions. Given that a significant percentage of students with higher ACT Composite scores are without a degree six years later, there are clearly other student characteristics contributing to students' success in college.

Importance of Academic Discipline

Prior research has shown that social and emotional learning (SEL) skills (including motivation and academic discipline) provide information beyond measures of academic achievement that increases accurate identification of students who are at risk for dropping out of college and not completing a degree in a timely manner.[10]

Figure 18 illustrates this point for a sample of students from the 2010 ACT-tested high school graduating class who took ACT Engage® and enrolled in college in fall 2010. In the figure, we see that students with higher ACT Engage Academic Discipline scores were more likely to complete an associate's or bachelor's degree within six years than those with lower ACT Engage Academic Discipline scores. For example, for those with an ACT Composite

10 Allen, Jeff and Steven Robbins. 2010. "Effects of interest–major congruence, motivation, and academic performance on timely degree attainment." *Journal of Counseling Psychology, 57*(1), 23–35.

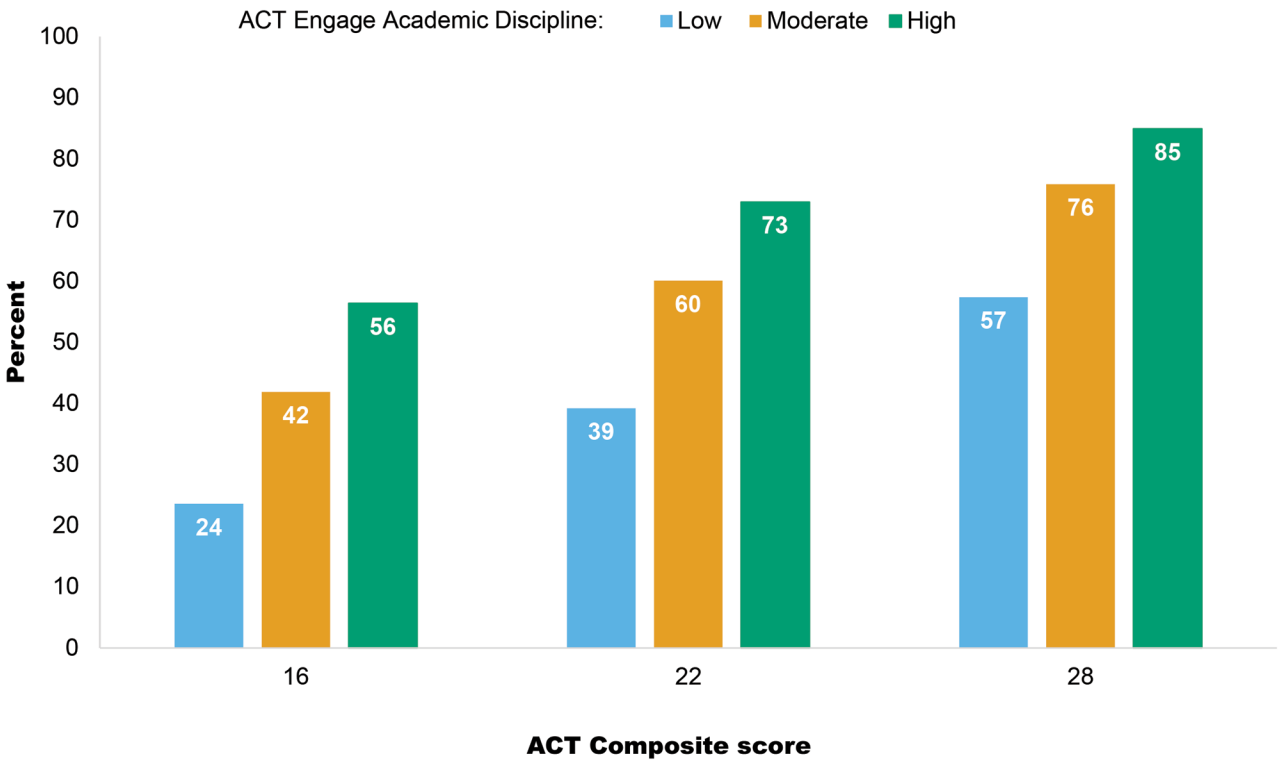

Figure 18.
Six-Year Degree Completion Rate for 2010 High School Graduates Who Immediately Enrolled in College by ACT Composite Score and ACT Engage Academic Discipline Score, Statistically Controlling for Initial Institution Attended[11]

11 Based on a sample of 3,800 ACT-tested 2010 high school graduates from 208 postsecondary institutions who took ACT Engage between 2009 and 2011. Ninety-one percent of the sample initially enrolled in a four-year institution. Students with a percentile score of less than 25 were classified as low (12% of sample), those with percentile scores between 25 and 75 were classified as moderate (45% of sample), and those with percentile scores greater than 75 were classified as high (43% of sample).

score of 22, a student's chances of completing a degree within six years increased from 39% for those with a low ACT Engage Academic Discipline score to 73% for those with a high ACT Engage Academic Discipline score.

In alignment with the ACT Holistic Framework, these findings highlight the benefits of using multiple measures for predicting students' chances of college success.[12] Examining students' SEL skills can also provide additional insights on ways institutions can make their student resources and supports more personalized to better meet students' needs.

12 Camara, Wayne, Ryan O'Connor, Krista Mattern, and Mary Ann Hanson. 2015. *Beyond Academics: A Holistic Framework for Enhancing Education and Workplace Success.* ACT Research Report 2015-4. Iowa City, IA: ACT.

FAIR TO COMPARE:

A GUIDE TO THE 2018 ACT/SAT CONCORDANCE

What is Concordance?

The term "concordance" refers to establishing a relationship between scores on assessments that measure similar (but not identical) constructs. A technically sound concordance allows students and professionals to compare scores from similar assessments to inform decisions. A concorded score is not a perfect prediction of how a student would perform on the other test.

How Were The ACT/SAT Concordance Tables Developed?

ACT and the College Board periodically produce ACT/SAT concordance tables to show how scores on each test compare. With the redesign of the SAT in 2016, researchers from the College Board and ACT, in collaboration with the NCAA Technical Advisory Board, developed updated technically sound concordance tables that will serve the needs of students and institutions going forward. The 2018 ACT/SAT concordance tables are now the only official concordance tables and should be the single source of reference moving forward when comparing SAT scores to ACT scores. These tables replace the concordance tables that were released in 2016.

The concordance tables show ACT and SAT scores with the same percentile rank for a group of students who took both tests. The sample of students used to develop the concordance tables took the ACT test and the new SAT test. For students who took the ACT and/or SAT more than once, their ACT and SAT scores with the closest test dates were used. The tables were produced using data from 589,753 students who were graduating seniors in 2017 and who took both the ACT and new SAT tests between February 2016 (for the ACT) or March 2016 (for the SAT) and June 2017. The sample was statistically weighted to reflect the demographics, school attributes, and high school grade point average (GPA) of all students who are likely to take the ACT, SAT, or both tests.

Which Concordance Tables are Provided?

The concordance tables are based on ACT and SAT tests that cover similar content and show a strong statistical relationship between scores. The table below lists the three sets of concordances.

ACT score	SAT score	Tables	
		SAT-to-ACT	ACT-to-SAT
ACT Composite	SAT Total	Table A1	Table A2
ACT Mathematics	SAT Math	Table B1	Table B2
ACT English + Reading	SAT ERW	Table C1	Table C2

Note: *Concordance tables for the ACT Composite were derived from concordances of the ACT sum score.*

Note: *ERW = Evidence-Based Reading and Writing*

Tables are provided in both directions (SAT-to-ACT and ACT-to-SAT). For this brief, Tables A1 and A2 are featured, showing the SAT Total to ACT Composite score and the ACT Composite score to SAT Total concordances.

What are the Potential Uses of Concordance Tables?

A variety of stakeholders use concordance tables to compare scores across the ACT and SAT to inform policies, processes, and decisions. College counselors, students, and their families use concordance tables to inform college searches and explorations. Policymakers, researchers, and K–12 educators use concordance tables to aggregate scores across tests to measure college readiness for groups of students. Colleges, universities, scholarship organizations, and athletic conferences also use concordances in a variety of ways including determining eligibility for a program or scholarship.

- **Comparing SAT and ACT scores across different students.** When scores from either test are accepted, concordance tables can help institutions or other stakeholders who need to compare scores.
- **Establishing a policy using comparable scores from both tests.** An institution, scholarship, or program may use a specific test score as one factor to establish eligibility.
- **Converting scores for use in a predictive model or index.** Many colleges and universities have built indices or models to predict the likelihood that individual students will apply, enroll, or succeed academically. These models typically include a variety of factors, including test scores, high school GPA, and course rigor. Institutions can apply the concordance tables in such prediction models.

What are the Key Considerations and Limitations when Using the Concordance Tables?

Using SAT and ACT scores in a consistent, psychometrically appropriate way as one component of a holistic admission process will help ensure all students are treated fairly in the admission process. While the concordance tables can be used for a variety of purposes, higher education professionals should keep the following considerations and limitations in mind:

- **The ACT and SAT are different tests.** The ACT and SAT measure similar, but not identical, content and skills. A concorded score is not a perfect prediction of how a student would perform on the other test. Concorded scores should be interpreted as the scores with the same rank within a group of students who take the tests at approximately the same time.
- **Concordances are used to compare individual scores, not aggregate scores.** Users should avoid converting aggregate scores (e.g., mean, median, ranges) using concordance tables, as this could introduce additional sources of error.
- **Users should avoid making decisions based solely on a concorded score.** Admission and enrollment professionals should use multiple reliable and valid measures when making decisions to account for the many factors that impact academic performance in college.
- **Note the prediction error (more details below).** Users should consider this when using the concordance tables to predict how a student would have performed on the ACT or the SAT.
- **Concordances are sample-dependent.** While concordance results can vary by sample, the ACT/SAT concordance sample was statistically weighted to more closely reflect the demographics, school attributes, and high school GPA of the population of students who take the ACT, SAT, or both tests.
- **Institutions should not superscore across the SAT and ACT tests.** Superscoring across two different tests is an imprecise way of understanding whether a student meets a certain academic threshold. Combining scores from the ACT and SAT in a single superscore is strongly discouraged.

Additional Notes and Technical Specifications

Like all concordance tables, the ACT/SAT concordance tables are somewhat dependent upon the sample of students who took both tests. The concordance tables reported here were produced using data from 589,753 students who were graduating seniors in 2017 and who took the ACT and new SAT test between February 2016 (for the ACT) or

March 2016 (for the SAT) and June 2017. International students, students with disabilities who tested with special accommodations, and students who took the ACT or SAT under state or district testing programs were included. For students who took the ACT and/or SAT more than once, their ACT and SAT scores from the closest test dates were used.

To produce the concordance, statistical weighting procedures were used to accomplish two goals. The first goal was to reflect the demographics, school attributes (size, locale, geographic region, public/private affiliation, and percent eligible for free or reduced lunch), and high school GPA of the students taking the ACT only, the SAT only, or both tests (i.e., the entire population of test takers). The second goal was to minimize the time between students' ACT and SAT testing and also ensure that the students who took the ACT before the SAT and the students who took the SAT before the ACT were counterbalanced. The ACT and SAT scores were linked using equipercentile methods on the weighted ACT and SAT score distributions. To the extent that the goals for the statistical weighting were accomplished, the concordance tables are representative of graduating seniors who took either test or both tests.

As mentioned above, concordance tables should not be expected to provide perfect predictions of a student's SAT score from their ACT score, or their ACT score from their SAT score. To convey the uncertainties associated with use of the table for predicting SAT or ACT scores that are close in time, we provide error intervals for the SAT and ACT scales. These error intervals reflect the variability of students' ACT scores from the SAT-to-ACT concordance, and the variability of students' SAT scores from the ACT-to-SAT concordance. The size of these error intervals depends on the correlation of the ACT and SAT scores and the reporting scale ranges of the ACT and the SAT.

- When using the SAT Total and ACT Composite concordance table to estimate a student's proximal ACT Composite score from their SAT Total score, the estimates in the table have a ± standard error of approximately ± 2.26 (2) ACT Composite score points on its 1–36 point scale. When using this table to estimate a student's proximal SAT Total score from their ACT Composite score, the estimates have a ± standard error of approximately ± 79.57 (80) SAT Total score points on its 400–1600 point scale.

- When using the SAT Math and ACT Mathematics concordance table to estimate a student's proximal ACT Mathematics score from their SAT Math score, the estimates in the table have a ± standard error of approximately ± 2.65 (3) ACT Mathematics score points on its 1–36 point scale. When using this table to estimate a student's proximal SAT Math score from their ACT Mathematics score, the estimates have a ± standard error of approximately ± 50.33 (50) SAT Math score points on its 200–800 point scale.

- When using the SAT ERW and ACT English+Reading concordance table to estimate a student's proximal ACT English+Reading score from their SAT ERW score, the estimates in the table have a ± standard error of approximately ± 5.93 (6) ACT English+Reading score points on its 2–72 point scale. When using this table to estimate a student's proximal SAT ERW score from their ACT English+Reading score, the estimates have a ± standard error of approximately ± 46.66 (50) SAT ERW score points on its 200–800 point scale.

2018 Concordance Tables

Table A1: SAT Total to ACT Composite.

SAT	ACT	SAT	ACT	SAT	ACT
1600	36	1250	26	910	16
*1590	36	*1240	26	900	16
1580	36	1230	26	*890	16
1570	36	1220	25	880	16
1560	35	*1210	25	870	15
1550	35	1200	25	860	15
*1540	35	1190	24	*850	15
1530	35	*1180	24	840	15
1520	34	1170	24	830	15
1510	34	1160	24	820	14
*1500	34	1150	23	810	14
1490	34	*1140	23	*800	14
1480	33	1130	23	790	14
1470	33	1120	22	780	14
*1460	33	*1110	22	770	13
1450	33	1100	22	*760	13
1440	32	1090	21	750	13
*1430	32	*1080	21	740	13
1420	32	1070	21	730	13
1410	31	1060	21	720	12
*1400	31	1050	20	*710	12
1390	31	*1040	20	700	12
1380	30	1030	20	690	12
*1370	30	1020	19	680	11
1360	30	*1010	19	*670	11
1350	29	1000	19	660	11
*1340	29	990	19	650	11
1330	29	980	18	640	10
1320	28	*970	18	*630	10
*1310	28	960	18	620	10
1300	28	950	17	610	9
1290	27	940	17	600	9
*1280	27	*930	17	*590	9
1270	27	920	17		
1260	27				

*Use this SAT score when a single score point comparison is needed.

Note: *Concordance tables for the ACT Composite were derived from concordances of the ACT sum score.*

Table A2 : ACT Composite to SAT Total.

ACT	SAT	SAT Range
36	1590	1570-1600
35	1540	1530-1560
34	1500	1490-1520
33	1460	1450-1480
32	1430	1420-1440
31	1400	1390-1410
30	1370	1360-1380
29	1340	1330-1350
28	1310	1300-1320
27	1280	1260-1290
26	1240	1230-1250
25	1210	1200-1220
24	1180	1160-1190
23	1140	1130-1150
22	1110	1100-1120
21	1080	1060-1090
20	1040	1030-1050
19	1010	990-1020
18	970	960-980
17	930	920-950
16	890	880-910
15	850	830-870
14	800	780-820
13	760	730-770
12	710	690-720
11	670	650-680
10	630	620-640
9	590	590-610

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