What's Happening

Developmental education and college readiness at the University of Alaska

Michelle Hodara
Monica Cox
Education Northwest

Key findings

- Developmental education placement rates among first-time students at the University of Alaska were higher in math than in English for students pursuing any type of degree. Developmental math placement rates increased as the time between students' exiting high school and entering college increased.

- Among bachelor's degree students, developmental placement rates were highest for Alaska Native students from rural areas of the state (in English) and Black students from urban areas (in math).

- Among bachelor's degree students who enrolled in developmental education, 47 percent eventually passed college English and 23 percent eventually passed college math.

- Among students who enrolled directly in college-level courses, high school grade point average was a stronger predictor of performance in college English and math than were SAT, ACT, or ACCUPLACER scores.

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Summary

The college readiness of high school students is a high priority across the U.S. education system. Many national and state policies, initiatives, and reforms at the high school and college levels are focused on better preparing students for college. College readiness is commonly defined as the ability of a student to enroll and succeed in college credit courses without the need for developmental education (that is, non-credit-bearing courses that prepare students for college English and math; Conley, 2007). The proportion of college freshmen placed in developmental education courses is an indicator of a student population's academic preparedness for college coursework.

Colleges typically place students in developmental education based on performance on the SAT or ACT, usually taken in high school, or the ACCUPLACER or ACT Compass, taken as needed during matriculation (Fields & Parsad, 2012). Recent research suggests that reliance on these test-based measures may direct some students to developmental coursework when they could have succeeded in college coursework or, less frequently, to college coursework when they could have benefited from developmental coursework (Scott-Clayton, Crosta, & Belfield, 2014).

To improve the placement process and assign students to the highest level of coursework in which they are likely to succeed, colleges are beginning to use high school grades or high school grade point average in addition to test scores (Bracco et al., 2014; Dadgar, Collins, & Schaefer, 2015; Scott-Clayton, 2014). High school grade point average may be useful because it is not just a measure of cognitive ability; instead, it is a cumulative measure of academic achievement in multiple subjects across a student's high school career and thus may signal a broader range of skills related to college readiness, such as a student's academic tenacity and motivation (Bowen, Chingos, & McPherson, 2009).

This study explores developmental education placement rates and how well high school grade point average and exam performance predicted performance in college-level courses among first-time students who enrolled in the University of Alaska system from fall 2008 to spring 2012. Like other colleges and universities, the University of Alaska, the state's public higher education system, is reexamining its course placement policies with the goal of lowering its developmental education placement rate (University of Alaska, 2013). The study draws on student data from the University of Alaska and a qualitative review of university placement policies from each of the three universities in the University of Alaska system for each year in the study.

The four key findings are:
- Developmental education placement rates were higher in math than in English for students pursuing any type of degree. Developmental math placement rates increased as the time between students' exiting high school and entering college increased.
- Among bachelor's degree students, developmental placement rates were highest for Alaska Native students from rural areas of the state (in English) and Black students from urban areas (in math) compared with students of other racial/ethnic groups and lowest for White students from rural or urban areas compared with other groups.
- Among bachelor's degree students who enrolled in developmental education, 47 percent eventually passed college English and 23 percent eventually passed

college math. In contrast, more than 60 percent of students who were placed in developmental English or math but who instead enrolled directly in college English or math passed these courses.

- Among students who enrolled directly in college-level courses, high school grade point average was a stronger predictor of performance in college English and math than were SAT, ACT, or ACCUPLACER scores.

This study informs high school and college stakeholders in Alaska about which student groups at the University of Alaska have the highest developmental education placement rates and suggests which students might benefit most from college readiness resources and programs at the high school or college level.

The study also shows that high school grades are better predictors of college academic performance than are standardized exams. Although this analysis is limited to students who enrolled directly in college-level courses, the findings may prompt conversations and further research among college stakeholders regarding the benefit of using additional measures to more accurately predict readiness for college coursework.

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Why this study?

Many national and state policies, initiatives, and reforms at the high school and college levels are focused on better preparing students for college (Glancy et al., 2014). For example, secondary school systems are implementing college and career readiness standards and assessments, increasing opportunities to earn college credit in high school, and enhancing a college-going culture in classrooms and schools (Glancy et al., 2014). Many of these initiatives are taking place in partnership with neighboring public and private colleges. Colleges are also addressing readiness concerns by enhancing the student intake process and improving developmental education classes, which prepare students for college courses (Hodara, 2013).

Assessing college readiness

College readiness is commonly defined as students enrolling and succeeding in college credit courses without the need for developmental education (Conley, 2007). The proportion of college freshmen placed in developmental education courses is a widely accepted indicator of how well that cohort of students is prepared for college coursework (Gianneschi & Fulton, 2014). Colleges and school districts use developmental education data to assess implementation of reforms, identify which student groups are least prepared for college to target efforts to improve their readiness, and track progress toward improving college readiness for all students. Currently, more than 30 states calculate the developmental education rate for their public two-year and four-year colleges (Gianneshchi & Fulton, 2014).

Reliance on standardized exam scores may result in the misdirection of students to developmental coursework

Colleges typically use a single measure to place students in developmental education courses: standardized exam scores on the SAT, ACT, ACCUPLACER, or ACT Compass (Fields & Parsad, 2012). (A description of the assessment and placement process is given in appendix A.) Recent research suggests that this reliance on standardized exam scores may result in the misdirection of students to developmental coursework when they could have succeeded in college coursework or, less frequently, to college coursework when they could have benefited from developmental coursework (Scott-Clayton et al., 2014). That research found that in two large community college systems nearly a quarter to a third of students may have been incorrectly placed into developmental coursework when they could have succeeded in college coursework.

To assign students to the highest level of coursework in which they are likely to succeed, colleges are beginning to use students' high school grades in specific subjects and their cumulative high school grade point average in addition to standardized exam scores (Bracco et al., 2014; Dadgar et al., 2015; Scott-Clayton, 2014). For example, several California community colleges are using high school grades in specific subjects and cumulative high school grade point average to assign students to coursework. Those colleges have found that students who earned higher grades in high school, even in non-English and nonmath subjects, do well in college English and math (although their grade in the highest-level math course was also extremely important for predicting college math grades; Willett & Karandjeff, 2014). Cumulative high school grade point average may be a useful predictor of college grades across any subject because it is not just a measure of cognitive ability; it is also a cumulative measure of academic achievement in multiple subjects across a student's high school career and thus may signal a broader range of skills related to college readiness, such as a student's academic tenacity and motivation (Bowen et al., 2009).

Box 1. Key terms

SAT and ACT. Exams taken by high school students preparing to attend college. Typically, colleges and universities have different cutscores for entrance requirements. At the University of Alaska these exams are used for course placement (see table B2 in appendix B for cutscores for University of Alaska campuses).

ACCUPLACER and ACT Compass. Exams taken by students entering a college or university to see which level of courses, including developmental education courses, they should be placed in. These exams are usually taken by students who did not take the SAT or ACT, who scored below the cutscores on the SAT and ACT for placement in college-level courses, or who are entering college several years after leaving high school. The ACT Compass exam suite is being phased out by the publisher by the end of 2016. It is not used at the University of Alaska.

Developmental education. Non-credit-bearing courses that prepare students for transfer-level, college English and math courses.

Nontraditional students. Students who have a gap between high school exit and college entry, enter college with a General Educational Development (GED) certificate rather than a high school diploma, or enter in the spring rather than the fall semester. In this study these students were less likely to have SAT or ACT scores and thus had to take the placement exam when they entered college.

Like other colleges and universities across the country, the University of Alaska is reexamining its course placement policies, with the goal of lowering its developmental education placement rate

Like other colleges and universities across the country, the University of Alaska, the state's public higher education system, is reexamining its course placement policies, with the goal of lowering its developmental education placement rate (University of Alaska, 2013).[1] In this study Regional Educational Laboratory (REL) Northwest worked with the University of Alaska on a descriptive analysis to inform the university's efforts to understand and improve the college readiness of its student population. Other colleges and universities considering similar courses of action may also benefit from these analyses.

How the University of Alaska assesses college readiness

The University of Alaska comprises three universities, each with its own set of campuses: the University of Alaska Anchorage, which has seven campuses; the University of Alaska Fairbanks, which also has seven campuses; and the University of Alaska Southeast (Juneau), which has three campuses. Each university offers less-than-two-year, two-year, four-year, and graduate degree programs. The campuses are located across the state to ensure that students in all regions have access to many degree programs. All of the less-than-two-year and two-year degree programs and most of the four-year degree programs are open-access and admit all students who meet minimum admissions standards—for example, having a high school diploma or General Educational Development (GED) certificate.

During the period of this study (2008/09–2011/12) each of University of Alaska's three universities established its own policies for determining incoming students' English and math course placement. Students could qualify for placement into college English and math courses based on their SAT or ACT scores, except at University of Alaska Southeast, which did not look at SAT and ACT scores to determine math placement. Students whose SAT reading or ACT English scores fell below the university's cutscores for placement in college English had to take the ACCUPLACER reading and sentence skills placement

exams to determine their English course placement. Similarly, students whose SAT or ACT math scores fell below the university's cutscores for placement in college math had to take the ACCUPLACER math placement exams to determine their math course placement. Students who did not have SAT or ACT scores had to take the ACCUPLACER placement exams to determine their course placement. These students were typically nontraditional students. The exam cutscores for placement in college-level English and math for each university and year are described in detail in table B2 in appendix B.

What the study examined

Student exam scores and high school grades were used to analyze the college readiness of first-time students who enrolled in the University of Alaska system from fall 2008 to spring 2012. First, the study team calculated the proportion of students considered academically underprepared for college coursework based on their scores on the SAT, ACT, or ACCUPLACER (that is, the developmental English and math placement rates; see box 1 for key terms) and how these rates varied across groups of students. Second, the study team examined the proportion of students who had been placed in developmental education and then eventually enrolled in and passed college English and math courses. Third, the study team explored whether high school grades are a better predictor of success in college courses than are exam scores.

Student exam scores and high school grades were used to analyze the college readiness of first-time students who enrolled in the University of Alaska system from fall 2008 to spring 2012

Research questions

Three main research questions guided this study:
- What percentage of incoming students pursuing an associate's degree or a certificate and what percentage pursuing a bachelor's degree were placed in developmental English and math at the University of Alaska?
  - How do developmental education placement rates vary for bachelor's degree students who immediately enroll in college after high school versus those who delay college enrollment?
  - How do developmental education placement rates vary for bachelor's degree students of different racial/ethnic groups and from rural and urban areas of the state?
- Among students placed in developmental education, what percentage later enrolled in and passed a college English and math course?
- Among students who enrolled directly in college-level courses, to what extent did their high school grade point average or SAT, ACT or ACCUPLACER scores predict their grades in college English and math courses?

Characteristics of the study sample

The study sample included University of Alaska data on first-time students who entered the university from fall 2008 to spring 2012 (see box 2 and appendix B for data sources and methodology; see table C1 in appendix C for characteristics of the entire sample). On entry 45 percent of students enrolled in an associate's degree or a certificate program and 55 percent in a bachelor's degree program. Sixty-three percent of students enrolled at one of the University of Alaska Anchorage campuses, 29 percent at one of the University of Alaska Fairbanks campuses, and 8 percent at one of the University of Alaska Southeast campuses. The sample is diverse: almost a quarter of the students are from rural areas of Alaska, 18 percent of the sample are Alaska Native students, 53 percent are White students, and the remaining 29 percent are other racial/ethnic groups.

Box 2. Data sources and methods

The University of Alaska system provided administrative data on all new students who entered the university from fall 2008 to spring 2012. The data elements provided are shown in table B1 in appendix B. The university's three main campuses in Anchorage, Fairbanks, and Juneau (Southeast) provided data on developmental education placement policies (table B2 in appendix B).

To answer research question 1, the study team calculated the developmental education placement rate at each university. The developmental education placement rate is the proportion of students who were considered academically underprepared for college English and math and thus were directed to take developmental education courses. First, information was gathered on each university's placement policies; then each student's highest score on the exams used for placement in English and math was determined. If a student's highest score was below the minimum cutscore to be placed in a college English or math course, that student was considered to have been placed in developmental English or math. The study team then disaggregated developmental placement rates by students' degree intent (those pursuing an associate's degree or a certificate and those pursuing a bachelor's degree) and within degree intent, for each university, by the time elapsed between high school exit and college entry, their race/ethnicity, and their geographic origin (rural versus urban).

To answer research question 2, the study team focused solely on fall 2008 entrants who were placed in developmental education (based on the calculations from research question 1) and examined the percentage that eventually enrolled in and passed a college English or math course over four years.

To answer research question 3, the study team estimated the relationship of grades in entry-level college English and math courses to student SAT, ACT, or ACCUPLACER scores and high school grade point averages for students who enrolled directly in college courses. The study team also estimated the relative contribution of high school grade point average and exam scores to students' grades in college English and math, holding constant student background characteristics. Such an analysis assessed the relationship of college grades to high school grades and exam scores for students with the same background.

The data sources and methodology are outlined in more detail in appendix B.

In the University of Alaska system developmental math placement rates were higher than developmental English placement rates for students pursuing any degree type

What the study found

In the University of Alaska system developmental math placement rates were higher than developmental English placement rates for students pursuing any degree type. The next three findings focus on students who pursued a bachelor's degree because less is known nationally about the developmental education placement rates of bachelor's degree students since research has focused on community college students. Findings for students pursuing an associate's degree or certificate are in appendix C. Students who had been out of high school longer before entering college were more likely than students who entered college immediately after high school to be placed in developmental math but no more likely to be placed in developmental English courses. Developmental placement rates were highest for Alaska Native students from rural areas (in English) and Black students from urban areas (in math).

Some 47 percent of fall 2008 entrants who were placed and enrolled in developmental English eventually passed a college English course, and 23 percent of fall 2008 entrants who were placed and enrolled in developmental math eventually passed a college math

course within four years. By contrast, more than 60 percent of students who were placed in developmental courses but who instead enrolled directly in college English or math passed those college-level courses.

For students who enrolled directly in college-level courses, high school grade point average was a stronger predictor of performance in college English and math than were SAT, ACT, or ACCUPLACER scores.

Developmental education placement rates were higher in math than in English for students pursuing any degree type

Across all three universities of the University of Alaska system developmental education placement rates were higher in math than in English for students pursuing any degree type (figure 1 and figure C1 in appendix C).

Because of a lack of national data on developmental education placement rates, it is not possible to compare these data with national averages. However, these findings are similar to those in a study of 57 community colleges in seven states, in which 59 percent of students were placed in developmental math and 33 percent in developmental English (Bailey, Jeong, & Cho, 2010).

Figure 1. More than half of first-time entrants in the University of Alaska system were placed in developmental math and nearly a third in developmental English, 2008/09–2011/12
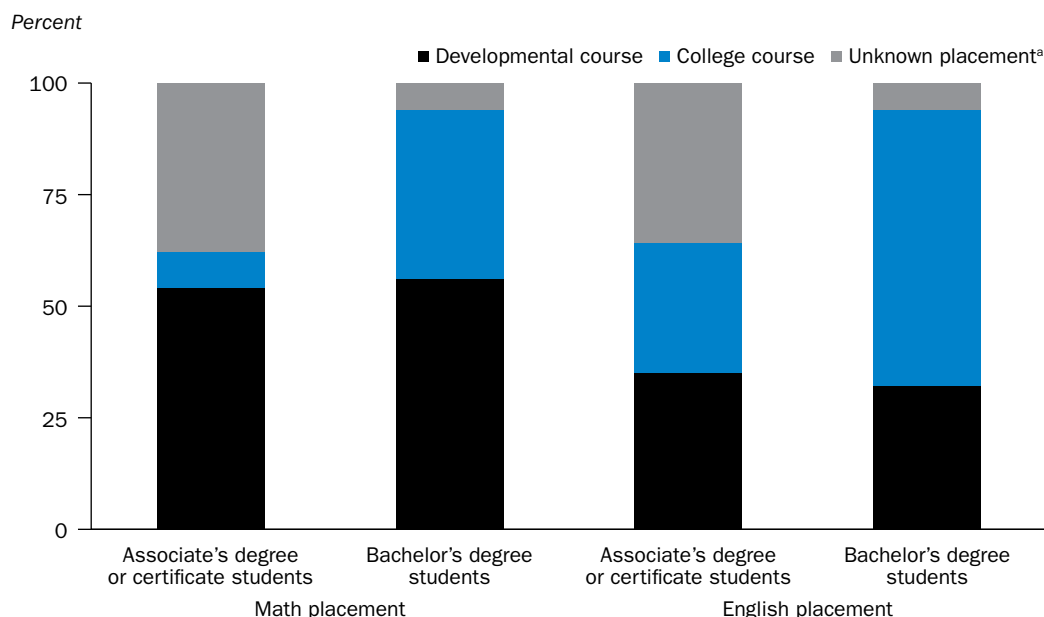
Percent

Note: Student entrants from fall 2008 to spring 2012 totaled 17,940. Course placement is based on authors' calculations using placement policies shown in table B2 in appendix B. Percentages may not sum to 100 percent because of rounding.

a. Students with no SAT, ACT, or ACCUPLACER score in the database (see appendix B).

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

Students who were out of high school longer before entering college and pursuing a bachelor's degree were more likely than students who entered college immediately after high school to be placed in developmental math but no more likely to be placed in developmental English courses (figure 2).

One explanation is that students tend to lose math skills over time. ACCUPLACER math scores were significantly lower for students who delayed college entry (that is, did not enroll in the fall immediately following high school graduation) than for students who enrolled in college the fall after high school. In contrast, ACCUPLACER English scores were statistically similar between students who delayed college entry and those who enrolled immediately (table C2 in appendix C). In other words, students who delay college entry perform worse on the ACCUPLACER math exam but not on the ACCUPLACER English exam compared with their counterparts who enroll in college immediately. This suggests a loss of math skills over the years but retention of English skills, as measured by ACCUPLACER scores.

Another pattern was the relationship between students entering college in the spring and higher developmental math placement rates, particularly among students who wait no longer than four years to enroll in college (see figure 2). Students who enrolled in

Students who were out of high school longer before entering college and pursuing a bachelor's degree were more likely than students who entered college immediately after high school to be placed in developmental math but no more likely to be placed in developmental English courses

Figure 2. Developmental math placement rates for bachelor's degree students in the University of Alaska system increased as the time between high school exit and college entry increased
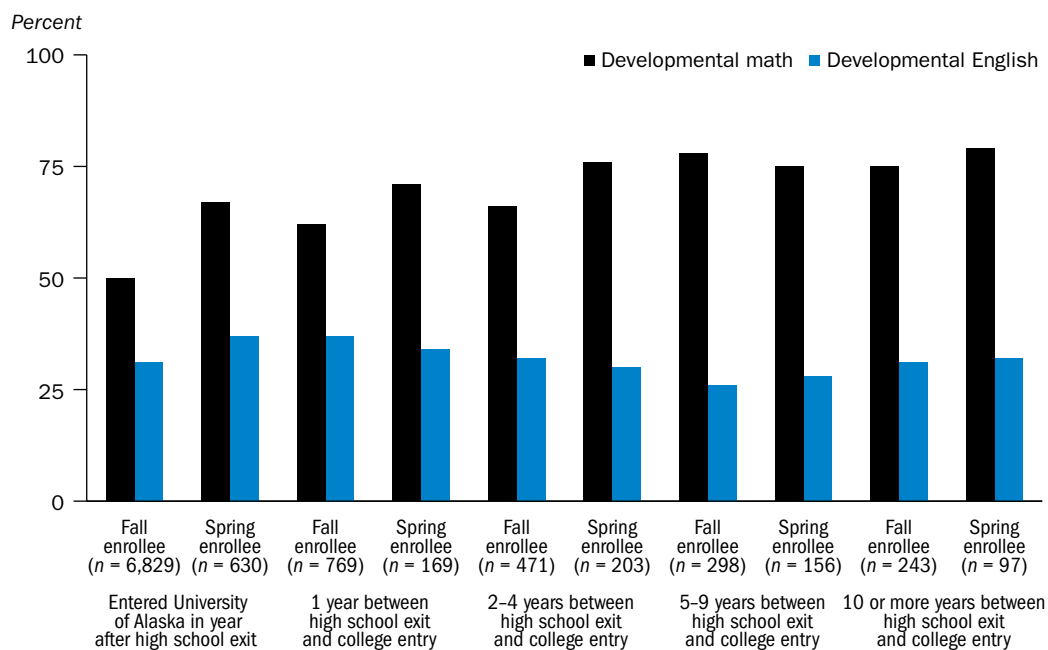
Note: Course placement is based on authors' calculations using placement policies given in table B2 in appendix B.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

the spring semester were much more likely to have a GED than a high school diploma: among students with less than a four-year gap between high school exit and college entry, 13 percent of spring entrants had a GED compared with only 3 percent of fall entrants. Perhaps related to their GED status, spring entrants were also less likely to have SAT or ACT scores and more likely to have taken the ACCUPLACER exam when they entered college.

ACCUPLACER scores in math were significantly lower among spring entrants, whereas ACCUPLACER scores in English were no different for spring and fall entrants. Overall, these results suggest that students who do not enroll directly in college after high school are more likely than recent high school graduates to take the ACCUPLACER placement exam and to be placed in developmental math.

Among students pursuing a bachelor's degree, developmental placement rates were highest for Alaska Native students from rural areas (in English) and Black students from urban areas (in math)

Developmental education placement rates in English and math vary for students of different racial/ethnic groups and from urban or rural areas of Alaska (figure 3). Developmental education placement rates in English were higher among Alaska Native students from rural areas pursuing a bachelor's degree (58 percent) than among their urban counterparts

Developmental education placement rates in English and math vary for students of different racial/ethnic groups and from urban or rural areas of Alaska

Figure 3. Alaska Native students from rural Alaska had the highest developmental English placement rate among University of Alaska students pursuing a bachelor's degree, 2008/09–2011/12
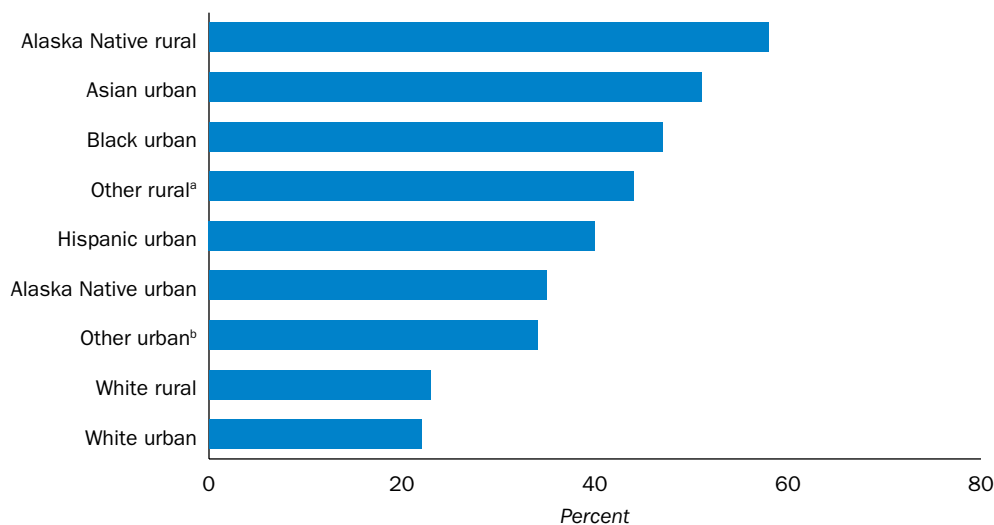
Note: Sample includes 9,884 fall 2008 to spring 2012 bachelor's degree entrants. Course placement was based on authors' calculations using placement policies shown in table B2 in appendix B. Across the student groups 4–9 percent of students have unknown placement; the remaining students were placed in college English. Results for students who pursued an associate's degree or a certificate are shown in tables C4 and C5 in appendix C. Groups with sample sizes less than 10 were collapsed into the "other rural" and "other urban" categories.

a. Includes Asian, Black, Hawaiian/Pacific Islander, Hispanic, and other race/ethnicity.

b. Includes Hawaiian/Pacific Islander and other race/ethnicity.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

Figure 4. Black students from urban Alaska had the highest developmental math placement rate among University of Alaska students pursuing a bachelor's degree, 2008/09–2011/12

Percent

Note: Sample includes 9,884 fall 2008 to spring 2012 bachelor's degree entrants. Course placement was based on authors' calculations using placement policies shown in table B2 in appendix B. Across the student groups 4–9 percent of students have unknown placement; the remaining students were placed in college math. Results for students who pursued an associate's degree or a certificate are shown in tables C4 and C5 in appendix C. Groups with sample sizes less than 10 were collapsed into the "other rural" and "other urban" categories.

a. Includes Asian, Black, Hawaiian/Pacific Islander, Hispanic, and other race/ethnicity.

b. Includes Hawaiian/Pacific Islander and other race/ethnicity.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

(35 percent) or any other student subgroup (rates varied from 22 percent to 51 percent). Developmental placement rates in math were higher among Black students from urban areas (79 percent) than among all other student subgroups (rates varied from 43 percent to 70 percent; figure 4). For both English and math White students from urban and rural parts of the state had the lowest developmental education placement rates.

Among students pursuing a bachelor's degree who enrolled in developmental education, 47 percent eventually passed college English and 23 percent eventually passed college math

Most bachelor's degree students must take at least one college English and one college math course as part of their degree program. Yet, overall, less than half of fall 2008 entrants who were placed and enrolled in developmental education eventually passed a college English or math course within four years. Among students pursuing a bachelor's degree who were placed and enrolled in developmental English, 63 percent later enrolled in college English and 47 percent passed college English (figure 5; table C6 in appendix C reports results for all students). Among students pursuing a bachelor's degree who were placed and enrolled in developmental math, 39 percent later enrolled in college math and 23 percent passed college math (see figure 5; table C6 in appendix C reports results for all students).

Figure 5. Less than half of fall 2008 University of Alaska bachelor's degree entrants who were placed and enrolled in developmental education eventually passed a college English or math course within four years, 2008/09–2011/12

Percent

Note: Course placement is based on authors' calculations using placement policies shown in table B2 in appendix B.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

Among students pursuing a bachelor's degree who were placed and enrolled in developmental English, 63 percent later enrolled in college English and 47 percent passed college English; among students pursuing a bachelor's degree who were placed and enrolled in developmental math, 39 percent later enrolled in college math and 23 percent passed college math

Among students pursuing a bachelor's degree who were placed in developmental education but instead took college English and math courses, more than 60 percent passed those courses

Students who took credit classes instead of their recommended developmental education placement did well in those classes. Among bachelor's degree students who were placed in developmental English but enrolled directly in college English, for example, 79 percent passed college English; among students who were placed in developmental math but enrolled directly in college math, 62 percent passed college math (table C6 in appendix C). These students also had academic and economic advantages compared to the students who followed their developmental education placements. Specifically, they tended to have a higher high school grade point average and lower rates of receiving federal Pell Grants, a measure of socioeconomic status, than did students who followed their developmental education placement (table C7 in appendix C), which may explain their ability to succeed in college courses. Overall, these students represent a group of students who may have been misassigned to developmental education based on their standardized exam score and should have instead been assigned directly to college courses.

Among students who enrolled directly in college courses, high school grade point average was a stronger predictor of performance in college English and math than were SAT, ACT, or ACCUPLACER scores

Many factors, including prior achievement as measured by exam scores and high school grade point average, are related to the grades students later earn in college English and math courses. For students who enrolled directly in college English and math courses, their high school grade point average explained far more of the variation in the grades they

Figure 6. Among University of Alaska students who enrolled directly in college English courses, high school grade point average explained more of the variation in college English grades than did exam scores, 2008/09–2011/12

Percent of variance explained

Note: Figure reports *R*-squared from linear regression models as percentage of explained variance where the dependent variable is students' course grade in their first college English course, and the independent variable is the exam score or high school grade point average. More detailed results, including sample sizes, are shown in table C8 in appendix C.
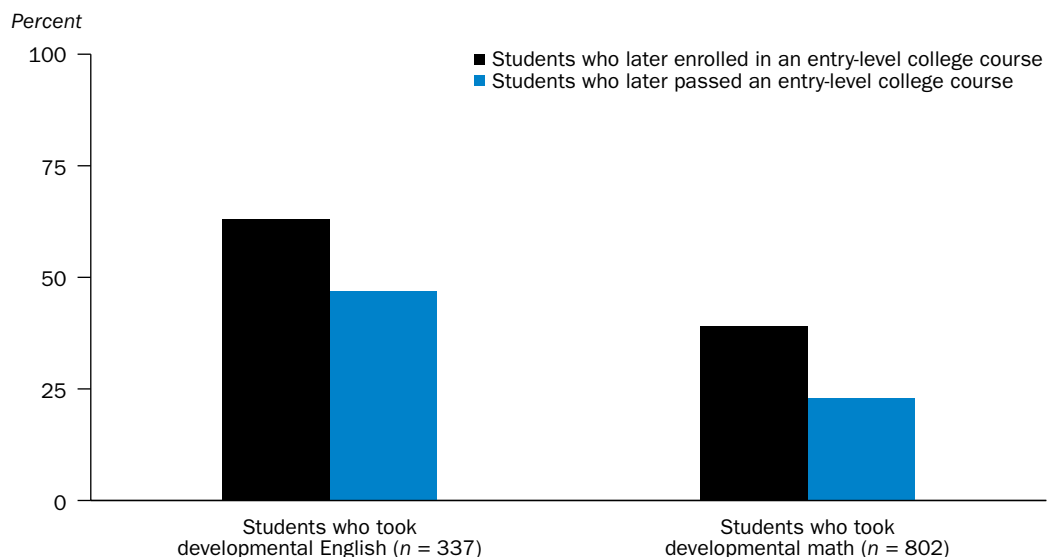
Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

For college English courses high school grade point average explained between 6 percent and 19 percent of the differences in students' grades, whereas SAT, ACT, or ACCUPLACER scores explained less than 3 percent of the differences across all student groups

earned in their first college English and math courses than did their scores on standardized exams. For college English courses high school grade point average explained between 6 percent (for associate's degree or certificate students who took the ACCUPLACER) and 19 percent (for bachelor's degree students who took the SAT) of the differences in students' grades, whereas SAT, ACT, or ACCUPLACER scores explained less than 3 percent of the differences across all student groups (figure 6). Similarly, for college math courses high school grade point average explained 10–16 percent of the differences in students' grades, whereas SAT, ACT, or ACCUPLACER scores explained 5 percent or less of the differences across all student groups (figure 7). The exam scores seem to have slightly more explanatory power in math (2–5 percent) than in English (1–3 percent), which is consistent with prior research (Scott-Clayton, 2012).

High school grade point averages consistently had the most positive and significant relationship with students' college course success (see table C9 in appendix C). Specifically, a one-unit increase in high school grade point average (for example, an increase from 2.0 to 3.0) increases a student's likelihood of earning a C or higher 25–29 percentage points in college English and 27–33 percentage points in college math.

Figure 7. Among University of Alaska students who enrolled directly in college math courses, high school grade point average explained more of the variation in college math grades than did exam scores, 2008/09–2011/12

Percent of variance explained

Note: Figure reports *R*-squared from linear regression models as percentage of explained variance where dependent variable is students' course grade in their first college math course, and the independent variable is the exam score or high school grade point average. More detailed results, including sample sizes, are given in table C8 in appendix C.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

For college math courses high school grade point average explained 10–16 percent of the differences in students' grades, whereas SAT, ACT, or ACCUPLACER scores explained less than 5 percent of the differences across all student groups

Implications of the study's findings

Findings from the study have several implications for stakeholders seeking to support college readiness, more accurately place students in appropriate courses, broaden access to college coursework, and improve the college success of all students. Two implications—strategies for addressing high rates of developmental education placement and using grade point average in placement decisions—are described below.

Addressing high rates of developmental education placement among certain student groups

At the University of Alaska nontraditional students—those who have a gap between high school exit and college entry, enter college with a GED rather than a high school diploma, or enter in the spring—had relatively high developmental math placement rates compared with traditional students. These students were less likely to have taken the SAT or ACT in high school and more likely to have taken the ACCUPLACER placement exam when they entered college (see table C2 in appendix C). Many colleges already offer free or low-cost online brush-up courses during the matriculation process to prepare for placement exams (Hodara, 2013), but nontraditional students may be less likely to hear about these courses or understand their importance (Fay, Bickerstaff, & Hodara, 2013). Therefore, one strategy for reducing the proportion of students placed in developmental math is to increase efforts at colleges to ensure that students who are not entering college directly from high school are aware of placement exam preparation and resources (Fay et al., 2013).

This study found that Alaska Native students from rural areas of the state and Black students from urban areas of the state had lower average scores across all standardized exams used for placement and therefore higher developmental education placement rates compared with other students. Unlike the nontraditional student groups discussed above, these groups include a large number of recent high school graduates. One way to address the needs of these students is to improve their awareness of college readiness standards before their senior year in high school. For example, high schools could administer an early college readiness exam and then provide students with targeted supports in their senior year that address academic challenges they are experiencing and prepare them for life beyond high school (Barnett, Fay, Trimble, & Pheatt, 2013). Such supports might include a fourth year of math or accelerated learning opportunities, such as dual credit, that allow students to earn college credit in high school. These supports are often implemented through partnerships between high schools and colleges.

Finally, colleges may be able to lower developmental education placement rates by better identifying which students need developmental education. This study found that a proportion of students placed in developmental education managed to enroll directly in college credit courses instead and to succeed in those courses, which suggests that some students may be inaccurately placed in developmental education. By improving course placement methods, colleges may find that fewer students need to be placed in developmental education classes.

By improving course placement methods, colleges may find that fewer students need to be placed in developmental education classes

Exploring the use of high school grade point averages in placement

Students' high school grade point average was more predictive of course success in college English and math than were scores on standardized exams for students who enrolled directly in college courses. High school grade point average may be more predictive than exam scores because it is a measure of cumulative performance over time and thus quantifies other skills or competencies—beyond reading and math proficiency—that are necessary to succeed in college.

These findings may motivate further conversation among college stakeholders and additional research on whether and how to consider measures such as high school grade point average as part of the placement process. Additional research might be modeled after research in California that uses school district data linked to college campus data to examine relationships between high school grade point average and college performance (Dadgar et al., 2015).

Such research efforts and subsequent changes to practice may reduce developmental education placement for certain groups of students. For example, rural Alaska Native students had lower average exam scores compared with other student groups but higher average high school grade point averages (table C3 in appendix C). However, placement policies that use high school grade point averages generally pertain to recent high school graduates only and thus may have no effect on the developmental education placement of older students returning to college after a gap in their education (Bracco et al., 2014).

Limitations of the study

This study has three main limitations.

The first limitation is that the course placement of 20 percent of the sample could not be identified. There were three reasons for this. First, 16 percent of students in the sample were missing scores on all three exams (SAT, ACT, and ACCUPLACER). Second, math course placement at the University of Alaska Southeast was based on ACCUPLACER scores only, so students with unknown math placement at that university may have had SAT or ACT scores, but they did not have ACCUPLACER scores; this applied to an additional 1 percent of the total sample. Third, 3 percent of the total sample had ACCUPLACER scores but took the test after their first English or math course, so their original course placement could not be determined. Students with unknown course placement tended to be older and were pursuing an associate's degree or a certificate.

The second limitation is that the study calculated placement based on exam scores alone, whereas developmental education placement also involves recommendations by faculty and advisors and other informal practices and processes that were not recorded in the data files available for the study. Therefore, the study's developmental education placement rates do not reflect exceptions to placement policies that may have allowed some students who were placed in developmental education based on their exam scores to enroll directly in college courses.

The study's developmental education placement rates do not reflect exceptions to placement policies that may have allowed some students who were placed in developmental education based on their exam scores to enroll directly in college courses

The third limitation is that findings on the greater predictive power of high school grade point averages compared with exam scores pertain only to students who enrolled directly in college English or math and had a high school grade point average on file.[2] The extent to which these findings will hold for students who first took developmental education is unclear.

Appendix A. Student assessment and placement process

Colleges determine students' first-term English and math course placement primarily by using SAT, ACT, ACCUPLACER, and ACT Compass scores (Fields & Parsad, 2012). SAT and ACT scores are submitted as part of a college application, whereas colleges administer ACCUPLACER and ACT Compass exams to students during the matriculation process. (ACT Compass is being discontinued and is not used at the University of Alaska.) Cutscores on these exams determine whether students should be assigned to college English and math or to noncredit developmental education courses. Students who score below the college-ready cutoff are assigned to a level of developmental coursework based on their score.

The proportion of freshmen assigned to developmental education varies from college to college and state to state because of differences in standards of readiness for entry-level college English and math courses (Fields & Parsad, 2012; Hodara, Jaggars, & Karp, 2012; Hughes & Scott-Clayton, 2011). In fall 2011 two- and four-year colleges across the country used cutscores that varied substantially (table A1). Cutscores for entry-level college courses also vary widely both within and across institutions. Additionally, average cutscores on SAT, ACT, and ACT Compass math are higher at two-year colleges than at four-year colleges, which may lead to higher developmental placement rates at two-year colleges.

Table A1. Cutscore ranges and averages at colleges across the country, fall 2011

Exam[a] and college type	Placed into developmental English if student scores below cutscore			Placed into developmental math if student scores below cutscore		
	Lowest	Highest	Average	Lowest	Highest	Average
SAT						
2-year college	340	550	471*	380	600	483*
4-year college	320	750	447*	330	600	467*
ACT						
2-year college	14	25	19*	10	25	20*
4-year college	14	25	18*	12	24	19*
ACCUPLACER[b]						
2-year college	50	106	77	25	110	68*
4-year college	52	103	76	29	109	73*
ACT Compass[b]						
2-year college	20	91	76	15	86	51*
4-year college	19	88	77	25	76	44*

* indicates that the average two-year and four-year college cutscores are significantly different.

a. The exam score ranges are as follows: SAT (200–800), ACT (1–36), ACCUPLACER (20–120), and ACT Compass (0–100).

b. ACCUPLACER and ACT Compass math exams have multiple sections. Math scores reported in this table refer to the elementary algebra section of ACCUPLACER and the algebra section of ACT Compass.

Source: Adapted from information in Fields & Parsad (2012), a comprehensive National Assessment Governing Board report that collected survey data on "Evaluating student need for developmental or remedial coursework at postsecondary education institutions." The sample included 1,560 institutions in a nationally representative sample of two-year and four-year public and private (both for-profit and not-for-profit) institutions in all 50 states and the District of Columbia.

Appendix B. Data and methodology

This appendix describes data sources and data cleaning and the study methodology.

Data sources

The University of Alaska system provided its administrative data for this study. The university's three main campuses in Anchorage, Fairbanks, and Juneau (Southeast) provided the data on developmental education placement policies.

Quantitative data. Education Northwest, which administers the Regional Educational Laboratory Northwest, has a data-sharing agreement with the University of Alaska for administrative data on all new students who entered the university from fall 2008 to spring 2012. The data elements provided are shown in table B1.

Table B1. University of Alaska data elements provided, 2008–12

Category	Element
Student identifier	Student unique identifier (not tied to any identifying information)
Demographics	Age
	Place of birth
	Gender
	Race/ethnicity: Alaska Native, Asian, Black, Hispanic, Hawaiian/Pacific Islander, White, Other
	High school name
	High school degree type: General Educational Development (GED) certificate, high school diploma
	Date of high school graduation
College entry and financial aid information	College of entry
	Date of first enrollment
	Declared major
	Degree pursued
	Federal Pell Grant eligible
	Expected family contribution
	Dependency status
High school academic information	SAT reading and math scores
	ACT English and math scores
	Cumulative grade point average
	GED scores
ACCUPLACER placement exam information	Placement exam subject area Math: arithmetic, elementary algebra, college algebra English: reading comprehension, sentence skills
	Placement exam scores
	Placement exam administration dates
Course transcript data	College name (where course taken)
	Course name and number
	Grade, including fail and withdrawal
	Course credits attempted and earned
	Course name and number
	Indicator if course is developmental education
	Indicator if course is a college-level "core" (that is, general education) course

Source: University of Alaska data provided to Regional Educational Laboratory Northwest.

Qualitative data. Placement in developmental education courses is based on policies established by each of the University of Alaska's three universities. Those policies specify the minimum SAT, ACT, or ACCUPLACER scores needed to qualify for placement into college English and math courses. Because cutscores change over time, table B2 presents course placement policies for each university and each year in the data (academic years 2008/09–2011/12).

Table B2. University of Alaska placement policies, fall 2008 to spring 2012

Campus	Data collection	Subject	Cutscores
University of Alaska Anchorage	SAT and ACT cutscores were retrieved from University of Alaska Anchorage catalogs, which are archived online (http://www.uaa.alaska.edu/records/catalogs/historic-catalogs.cfm). All scores were verified by the testing manager at the University of Alaska Anchorage Advising and Testing Center. The testing manager also provided cutscores for ACCUPLACER's reading comprehension and sentence skills exams for 2008/09 to 2011/12 because they could not be found online.	Math	For 2008/09–2011/12: SAT math >519 or ACT math >21 or ACCUPLACER college math >49
		English	For 2008/09: SAT reading >529 or ACT English >21 or ACCUPLACER reading >84 and ACCUPLACER sentence skills >94 or combined ACCUPLACER reading + sentence skills >184
			For 2009/10 and 2011/12: SAT reading >529 or ACT English >21 or ACCUPLACER reading >84 and ACCUPLACER sentence skills >94 or combined ACCUPLACER reading + sentence skills >179
			For 2010/11: SAT reading >529 or ACT English >21 or ACCUPLACER reading >84 and ACCUPLACER sentence skills >94
University of Alaska Fairbanks	SAT, ACT, and ACCUPLACER cutscores were retrieved from University of Alaska Fairbanks catalogs from 2008/09 to 2011/12, which are archived online (http://uaf.edu/catalog/archives.html).	Math	For 2008/09: SAT math >519 or ACT math >21[a]
			For 2009/10–2011/12: SAT math >469 or ACT math >19 or ACCUPLACER elementary algebra >69[b]
		English	For 2008/09 and 2009/10: SAT reading >429 or ACT English >17 or ACCUPLACER sentence skills >79[c]
			For 2010/11 and 2011/12: SAT reading >509 or ACT English >17 or ACCUPLACER sentence skills >79 and ACCUPLACER reading >104[d]
University of Alaska Southeast (Juneau)	SAT, ACT, and ACCUPLACER cutscores for all years were provided by the director of the learning center at University of Alaska Southeast. University of Alaska Southeast does not accept SAT or ACT scores for math placement.	Math	For 2008/09–2011/12: ACCUPLACER college math >62
		English	For 2008/09–2011/12: SAT reading > 679 or ACT English > 29 or the following ACCUPLACER scores:
			For academic terms fall 2008 through summer 2009: ACCUPLACER sentence skills >98 and ACCUPLACER reading >98
			For academic terms fall 2009 through summer 2010: ACCUPLACER sentence skills >69 and ACCUPLACER reading >69
			For academic terms fall 2010 through spring 2012: ACCUPLACER sentence skills >84 and ACCUPLACER reading >94

a. Retrieved from digitally archived 2008/09 University of Alaska Fairbanks catalog: http://www.uaf.edu/catalog/catalog_08-09/admissions/transfer_placement.html#Minimum_Math.

b. Retrieved from digitally archived 2009/10–2011/12 University of Alaska Fairbanks catalogs: http://www.uaf.edu/catalog/catalog_09–10/admissions/transfer_placement_math_table.html, http://uaf.edu/catalog/catalog_10–11/admissions/transfer_placement_math_table.html, http://uaf.edu/catalog/catalog_11–12/admissions/transfer_placement_math_table.html.

c. Retrieved from 2008/09 and 2009/10 digitally archived University of Alaska Fairbanks catalogs: http://www.uaf.edu/catalog/catalog_08-09/admissions/transfer_placement.html#Minimum_Math, http://www.uaf.edu/catalog/catalog_09–10/admissions/transfer_placement_english_table.html.

d. 2010/11 and 2011/12 English cutscores retrieved from 2010/11 and 2011/12 digitally archived University of Alaska Fairbanks catalogs: http://uaf.edu/catalog/catalog_10–11/admissions/course_placement_act_sat_english_table.html, http://uaf.edu/catalog/catalog_10–11/admissions/course_placement_ACCUPLACER_asset_english_table.html, http://uaf.edu/catalog/catalog_11–12/admissions/course_placement_act_sat_english_table.html, http://uaf.edu/catalog/catalog_11–12/admissions/course_placement_ACCUPLACER_asset_english_table.html.

Source: Authors' review of college course catalogs and placement policy documents.

Data cleaning and key variables

All data cleaning and analysis were conducted in Stata (version 12.1), a statistical software program.

Missing standardized exam scores and high school grade point averages. The largest categories of missing data were for standardized exam scores and high school grade point averages. Sixteen percent of the sample had no SAT, ACT, or ACCUPLACER score. Eighty-five percent of students missing all three standardized exam scores were pursuing an associate's degree or a certificate. Students without standardized exam scores were older and had a large gap between high school exit and college entry. Their average age at college entry was 29, with an average gap of six years between high school exit and college entry. Students with standardized exam scores had an average age of 24 at entry and an average gap of two years between high school exit and college entry. To answer the first research question, the sample excluded students with missing exam scores.

In addition, 15 percent of students had no high school grade point average. As with the sample of students missing all three exams, most of these students were older and had a relatively large gap between high school exit and college entry. Their average age at college entry was 31, and the average gap was eight years between high school and college. For comparison, students with a high school grade point average had an average entry age of 24 and their average gap was two years between high school exit and college entry. To answer the third research question, the sample excluded students with missing exam scores and missing high school grade point average.

Standardized exam scores and course placement. Some students had multiple standardized exam scores, particularly for ACCUPLACER. For students with multiple scores for the same exam the study used the highest score prior to their first English or math course. For students with multiple scores across different exams the study used the score that qualified a student for the highest level of placement before the first course in that subject. For example, students who took both the SAT math and ACCUPLACER college math exams before enrolling in their first math course were assigned the score that placed them in the highest level math course for which they qualified. For students who did not enroll in an English or math course, the score that placed them in the highest level course was used, regardless of when they took the exam. Students who enrolled in English and math courses before they took ACCUPLACER in the relevant subject (and did not have SAT and ACT scores) or who did not take the SAT, ACT, or ACCUPLACER were assigned a missing or unknown course placement.

Course enrollment. Data that identified developmental education courses and college courses were flagged in the University of Alaska system core curriculum. General education courses are required for most degree programs across the University of Alaska system. The study team further categorized these courses into developmental English courses (reading and writing) and developmental math courses and college credit English and math courses and determined whether students ever took courses in each of these categories and, if they had, the first course they took in each category.

Course performance. Course performance was based on student grades in each course, with dichotomous and continuous grade variables. For the dichotomous variables of

passing the course, students were assigned a 1 if they ever earned a C or higher or a 0 if they earned a C- or lower. For continuous or ordinal variables, the highest grade, A, was assigned a value of 5 and the lowest grade, F or withdrawal, was assigned a value of 1.

Degree intent. The University of Alaska offers four-year degrees, two-year degrees, certificates, and nondegree programs. To remain consistent with other University of Alaska reports on developmental education, students were categorized into two groups: students whose intended degree on entry was a bachelor's degree and students whose intended degree on entry was an associate's degree or a certificate.

Rural versus urban hometown. Students from Alaska were classified as rural or urban based on the 2010 U.S. Census classification of their hometown. The study identified six urban areas: Anchorage and the cities/towns in the Anchorage school district, Fairbanks and the cities in the Fairbanks school district, Juneau, Ketchikan, Kodiak and the cities in the Kodiak school district, and Matanuska-Susitna (Mat-Su) and the cities in the Mat-Su school district. All other home cities were classified as rural.

Socioeconomic status. Receipt of a federal Pell Grant award in the student's first term was used as the main indicator of socioeconomic status because the grant is awarded to students based on income.

Methodology

First research question. *What percentage of incoming students pursuing an associate's degree or a certificate and what percentage pursuing a bachelor's degree were placed in developmental English and math at the University of Alaska?*
- *How do developmental education placement rates vary for bachelor's degree students who immediately enroll in college after high school versus those who delay college enrollment?*
- *How do developmental education placement rates vary for Alaska students of different racial/ethnic groups and from rural and urban areas of the state?*

The study identified each student's highest score on the standardized exams used for placement in English and math courses prior to the term in which the student first enrolled in those courses. For students with multiple scores on the same exam, the study used the highest score. For students with multiple scores across different exams, the study used the score that qualified a student for the highest level of placement. For students who did not enroll in an English or math course, the study used the score that placed them in the highest level course, regardless of when the exam was taken. If all of a student's highest scores fell below the minimum cutscores for college English and math, the student was placed in developmental English or math for the purposes of this study. Students who enrolled in English and math courses before they took the ACCUPLACER exam in the relevant subject (and did not have SAT and ACT scores) or who did not take the SAT, ACT, or ACCUPLACER were classified as missing or unknown placement.

Cross-tabulations were used to explore developmental English (reading/writing) and math placement rates among different degree programs, student populations, and universities in the University of Alaska system. Students were considered eligible for college English and math courses if their scores on a university-approved assessment exam met the cutscores prescribed by their university at the time they enrolled in their first English or math

courses (see table B2). Students who did not have placement scores before their first course enrollment were categorized as having unknown placement.

Cross-tabulations were calculated for the percentages of students with associate's degree or certificate intent and students with bachelor's degree intent who were placed in developmental English, college English, or who had unknown placement based on the study calculations. The same calculations were run for developmental math, college math, and unknown math placements. Cross-tabulations were also used to compare the percentages of students placed in developmental education (English or math) by the elapsed time between high school exit and college entry and—for Alaska students only—racial/ethnic groups and whether they came from urban or rural areas of the state.

The study team focused on developmental education placement rates for students who pursued a bachelor's degree, for two reasons. First, less is known about the developmental education placement rates of bachelor's degree students because research has focused on community college students. Second, the data for students pursuing an associate's degree or a certificate contained a large number of unknown course placements. Specifically, 36–38 percent of students pursuing an associate's degree or a certificate had unknown placement, whereas only 6–7 percent of students pursuing a bachelor's degree had unknown placement. Students with unknown placement did not take the SAT, ACT, or ACCUPLACER. (Math course placement at the University of Alaska Southeast is based on ACCUPLACER scores only, so students with unknown math placement at that university may have had SAT or ACT scores, but they did not have ACCUPLACER scores.) These students may have avoided taking ACCUPLACER when they were enrolled in courses that did not require an English or math prerequisite during the time period covered in the dataset.

Second research question. Among students placed in developmental education, what percentage later enrolled in and passed a college English and math course?

The sample was limited to the fall 2008 entrants in order to track them for four years.

Cross-tabulations and summary statistics were used to explore college enrollment and pass rates for students placed in developmental education who followed their placement and for students placed in developmental education who bypassed their placement and enrolled directly in college courses. Specifically, for students placed in developmental education who followed their placement, three outcomes were calculated:

- College course enrollment rate: the number of students placed in a developmental subject who enrolled in the developmental subject and within four years enrolled in a relevant college course, divided by the number of students who were placed in a developmental subject who enrolled in the developmental subject.
- College course pass rate: the number of students placed in a developmental subject who enrolled in the developmental subject and within four years passed the relevant college course, divided by the number of students who were placed in a developmental subject who enrolled in the developmental subject.
- College course pass rate only among students who eventually enrolled in a relevant college course: the number of students placed in a developmental subject who enrolled in the developmental subject and within four years passed a relevant college course, divided by the number of students placed in a developmental

subject who enrolled in the developmental subject and within four years enrolled in a relevant college course.

For students placed in developmental courses who enrolled directly in college English or math, one outcome was calculated:

College course pass rate: the number of students placed in a developmental subject who enrolled directly in a college course and within four years passed the relevant college course divided by the number of students placed in a developmental subject who enrolled directly in a college course.

Third research question. Among students who enrolled directly in college-level courses, to what extent did their high school grade point average or SAT, ACT, or ACCUPLACER scores predict their grades in college English and math courses?

To answer this question, nine ordinal regression models were run for English and math and for students with bachelor's degree intent and associate's degree or certificate intent. In the models described below, the dependent variable is an ordinal variable: the highest grade (A) is equal to 5 and the lowest grade (F or withdrawal) is equal to 1. Only the R-squared from these estimation equations is presented in the study.

Sample includes students who took the SAT and enrolled directly in college English or math:

$$\text{Grade} = \alpha + \beta SAT_i + \varepsilon_i$$

$$\text{Grade} = \alpha + \beta HSGPA_i + \varepsilon_i$$

$$\text{Grade} = \alpha + \beta SAT_i + \beta HSGPA_i + \varepsilon_i$$

Sample includes students who took ACT exams and enrolled directly in college English or math:

$$\text{Grade} = \alpha + \beta ACT_i + \varepsilon_i$$

$$\text{Grade} = \alpha + \beta HSGPA_i + \varepsilon_i$$

$$\text{Grade} = \alpha + \beta ACT_i + \beta HSGPA_i + \varepsilon_i$$

Sample includes students who took ACCUPLACER placement exams and enrolled directly in college English or math:

$$\text{Grade} = \alpha + \beta ACCUPLACER_i + \varepsilon_i$$

$$\text{Grade} = \alpha + \beta HSGPA_i + \varepsilon_i$$

$$\text{Grade} = \alpha + \beta ACCUPLACER_i + \beta HSGPA_i + \varepsilon_i$$

Additionally, logistic regression models estimated the probability of college course success given a large set of independent variables. The model was estimated separately for English and math for each sample of students who took the SAT, ACT, or ACCUPLACER. In the English course model the dependent variable was equal to 1 if the student earned a C or higher in the first college English course and 0 if not. In the math model the dichotomous dependent variable was equal to 1 if the student earned a C or higher in the first college math course and 0 if not.

The regression model was:

$$\Pr(Success = 1)_{iysc} = \alpha + \beta Demo_i + \beta SES_i + \beta Acad_i + \beta Intent_i + \beta EntryYr_y + \beta HS_s + \beta Coll_c + \varepsilon_{iysc}$$

The independent variables were:
- *Demo*: demographic characteristics
  - Gender, race/ethnicity, geographic origin.
  - Age at college entry, years between high school exit and college entry.
- *SES*: socioeconomic status
  - Awarded a federal Pell Grant in first term.
- *Acad*: academic characteristics
  - High school diploma, General Educational Development (GED) certificate, or dropout/unknown graduation status; cumulative grade point average; SAT, ACT, or ACCUPLACER scores.
- *Intent*: degree and program of study intent upon entry
  - Bachelor's degree, associate's degree, or certificate intent; an indicator of program of study.
- *EntryYr*: College entry year.
- *HS*: High school attended.
- *Coll*: First University of Alaska college attended.
- ε_i: residual term that captures the effect of random noise.

After the regression model was estimated for each sample and subject, the Stata "predict" command was used to save the predicted, or fitted, values of the probability of earning a C or higher in the first college English or math course. To compute the marginal effects from the logistic regression models, the study used the Stata "margins, dydx(*)" command. The results are presented in table C9 in appendix C.

Appendix C. Student characteristics and detailed study results

Appendix C provides descriptive characteristics for students in the sample, including developmental education placement rates, outcomes in college courses, and results from regression analyses that predict college course outcomes.

Sample characteristics

Tables C1, C2, and C3 present demographic and academic characteristics of first time students at the University of Alaska from fall 2008 to spring 2012.

Table C1. Key characteristics of first-time freshmen at University of Alaska, fall 2008 to spring 2012 entrants

Characteristics	Percentage of students
Gender	
Male	46
Female	54
Race/ethnicity	
Alaska Native[a]	18
Asian	7
Black[b]	4
Hawaiian/Pacific Islander[a]	1
Hispanic[b]	4
White	53
Other	13
Hometown	
Rural Alaska	22
Urban Alaska[c]	72
Another U.S. state	5
International	1
High school completion	
High school diploma	77
General Educational Development certificate	8
Dropout/unknown	15
College enrollment	
Enrolled fall after high school exit	53
Average number of years between high school exit and college entry	3
College of entry	
University of Alaska Anchorage	63
University of Alaska Fairbanks	29
University of Alaska Southeast	8
Degree intent on college entry	
Associate's degree	39
Certificate	6
Bachelor's degree	55
Total sample size	17,940

a. The U.S. Department of Education typically includes Alaska Native under American Indian and Native Hawaiian and Other Pacific Islander under Asian.

b. Black includes African American, and Hispanic includes Latino.

c. The six urban areas are Anchorage and the cities/towns in the Anchorage school district, Fairbanks and the cities/towns in the Fairbanks school district, Juneau, Ketchikan, Kodiak and the cities/towns in the Kodiak school district, and Mat-Su and the cities/towns in the Mat-Su school district. All other areas are designated rural.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

Table C2. Sample characteristics of University of Alaska students, by standardized exams taken, fall 2008 to spring 2012 entrants (percent)

Student characteristic	SAT English (n = 5,785)	SAT Math (n = 5,779)	ACT English (n = 3,645)	ACT Math (n = 3,643)	ACCUPLACER English (n = 9,034)	ACCUPLACER Math (n = 3,863)
Gender						
Male	45	45	43	43	46	50
Female	55	55	57	57	54	50
Race/ethnicity						
Alaska Native[a]	13	13	21	21	19	15
Asian	8	8	5	5	10	14
Black[b]	3	3	3	3	5	3
Hawaiian/Pacific Islander[a]	1	1	1	1	2	2
Hispanic[b]	3	3	3	3	4	4
White	62	62	55	55	49	52
Other	8	8	9	11	10	10
Hometown						
Rural Alaska	19	19	27	27	20	16
Urban Alaska	73	73	63	63	75	77
Another U.S. state	7	7	10	10	4	5
International	1	1	<1	<1	2	2
Socioeconomic status indicator						
Awarded federal Pell Grant	16	16	21	21	32	29
High school completion						
High school diploma	96	96	96	96	86	93
General Educational Development certificate	<1	<1	<1	<1	8	3
Unknown graduation status	3	3	4	4	6	4
College of entry						
University of Alaska Anchorage	63	63	49	49	83	78
University of Alaska Fairbanks	33	33	48	48	12	19
University of Alaska Southeast	4	4	3	3	5	3
Degree intent on college entry						
Associate's degree	15	15	16	16	37	22
Certificate	1	1	2	2	3	2
Bachelor's degree	83	83	82	82	60	76
Time between high school exit and college entry						
No delay (enrolled fall after high school exit)	79	79	79	79	53	69
Delay	22	22	22	21	47	31
Other student characteristics						
Average age at college entry	18.8	18.8	19.0	19.0	21.2	20.5
Average high school grade point average	3.2	3.2	3.2	3.2	2.5	3.1

(continued)

Table C2. Sample characteristics of University of Alaska students, by standardized exams taken, fall 2008 to spring 2012 entrants (percent) *(continued)*

Student characteristic	SAT English (*n* = 5,785)		SAT Math (*n* = 5,779)		ACT English (*n* = 3,645)		ACT Math (*n* = 3,643)		ACCUPLACER English (*n* = 9,034)		ACCUPLACER Math (*n* = 3,863)	
Average performance on relevant exam	No delay	Delay	No delay	Delay	No delay	Delay	No delay	Delay	No delay	Delay	No delay	Delay
SAT reading	516***	499***										
SAT math			511***	488***								
ACT English					20**	19**						
ACT math							21**	19**				
ACCUPLACER reading									82	83		
ACCUPLACER sentence skills									87	88		
ACCUPLACER elementary algebra											93***	88***
ACCUPLACER college algebra											43***	36***

** significant at *p* < .01; *** significant at *p* < .001. Significant difference in scores between students who did not delay entry and those who delayed entry to college.

Note: Percentages may not sum to 100 because of rounding.

a. The U.S. Department of Education typically includes Alaska Native under American Indian and Native Hawaiian and Other Pacific Islander under Asian.

b. Black includes African American, and Hispanic includes Latino.

c. The six urban areas are Anchorage and the cities/towns in the Anchorage school district, Fairbanks and the cities/towns in the Fairbanks school district, Juneau, Ketchikan, Kodiak and the cities/towns in the Kodiak school district, and Mat-Su and the cities/towns in the Mat-Su school district. All other areas are designated rural.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

Table C3. Selected characteristics of University of Alaska students pursuing a bachelor's degree, by race/ethnicity and urban or rural origin, fall 2008 to spring 2012 entrants (percent)

Student characteristic	Alaska Native[a] Rural (n = 757)	Alaska Native[a] Urban (n = 828)	Asian Urban (n = 759)	Black[b] Urban (n = 330)	Hispanic[b] Urban (n = 305)	White Rural (n = 696)	White Urban (n = 4,221)
Gender							
Male	36	41	45	38	45	49	46
Female	64	59	55	62	55	51	54
Socioeconomic status indicator							
Awarded federal Pell Grant	37	36	36	38	31	18	16
High school completion							
High school diploma	94	84	95	95	93	94	92
General Educational Development certificate	2	11	3	5	5	2	5
Unknown graduation status	4	4	2	<1	2	4	3
Grade point average							
High school grade point average missing	4	5	2	2	2	4	3
College enrollment							
Enrolled fall/spring after high school graduation	76	58	71	65	63	7	69
Other student characteristics							
Average age at entry	19.3	20.7	19.2	20.0	19.9	19.3	19.7
Average high school grade point average (among those who have one)	3.2	2.9	3.1	2.8	2.9	3.3	3.1
Average performance on relevant exam							
SAT reading	459	509	474	463	495	540	539
SAT math	444	498	511	444	485	525	526
ACT English	16	20	18	17	18	22	22
ACT math	18	21	22	18	20	22	22
ACCUPLACER reading	71	83	73	78	81	90	89
ACCUPLACER sentence skills	82	88	83	84	87	96	94
ACCUPLACER elementary algebra	63	63	73	59	66	72	70
ACCUPLACER college algebra	37	42	79	38	39	46	43

Note: Excludes groups with fewer than 10 students.

a. The U.S. Department of Education typically includes Alaska Native under American Indian and Native Hawaiian and Other Pacific Islander under Asian.

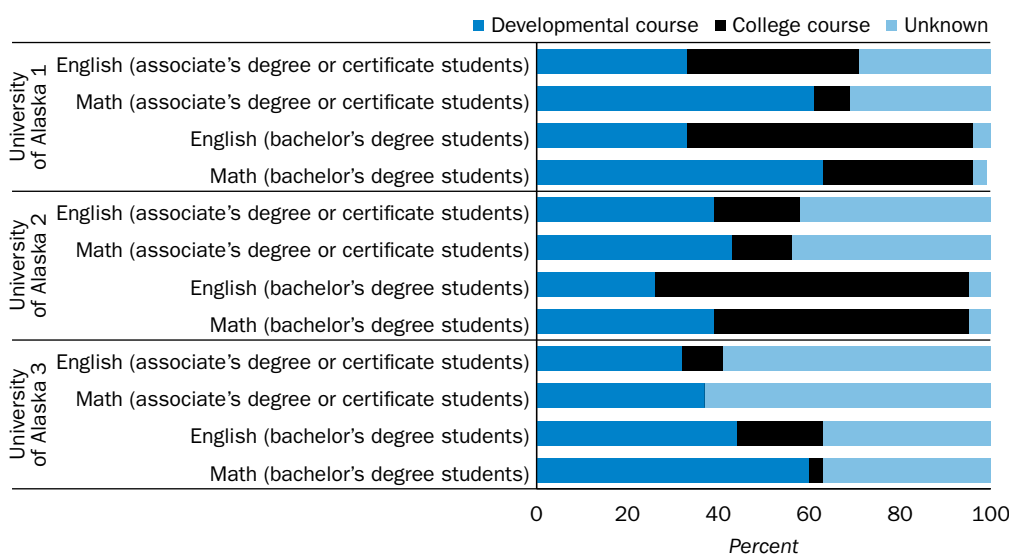**b.** Black includes African American, and Hispanic includes Latino.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

Figure C1 and Tables C4 and C5 report on the percentage of students placed in developmental English or math courses by their degree type and race/ethnicity, with a detailed breakdown for rural and urban Alaska students.

Figure C1. Course placement for University of Alaska students, by college degree intent and university, fall 2008 to spring 2012 entrants (percent)

Note: University of Alaska 1, 2, and 3 are used to protect the identities of the three universities. Because the universities had different cutscores on the exams for determining course placement (see table B2 in appendix B), they had different developmental placement rates. Percentages may not sum to 100 percent because of rounding.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

Table C4. Developmental placement rates for University of Alaska students from urban Alaska pursuing an associate's degree or a certificate, by race/ethnicity, fall 2008 to spring 2012 entrants (percent)

Course placement	Alaska Native (*n* = 820)	Asian (*n* = 318)	Black[a] (*n* = 301)	Hispanic[b] (*n*= 301)	White (*n* = 2,933)	Other[c] (*n* = 958)
English placement						
Developmental course	37	50	49	45	29	39
College course	25	26	26	30	36	21
Unknown placement	38	25	25	25	35	40
Math placement						
Developmental course	59	66	70	67	54	52
College course	4	13	3	6	10	6
Unknown placement	37	21	27	27	36	41

Note: Percentages may not sum to 100 because of rounding.

a. Includes African American.

b. Includes Latino.

c. Includes Hawaiian/Pacific Islander and other races/ethnicities.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

Table C5. Developmental placement rates for University of Alaska students from rural Alaska pursuing an associate's degree or a certificate, by race/ethnicity, fall 2008 to spring 2012 entrants (percent)

Course placement	Alaska Native (n = 821)	White (n = 935)	Other[a] (n = 473)
English placement			
Developmental course	43	30	36
College course	12	37	30
Unknown placement	45	33	34
Math placement			
Developmental course	46	49	52
College course	5	9	9
Unknown placement	49	42	39

a. Includes Asian, Black, Hawaiian/Pacific Islander, Hispanic, and other races/ethnicities.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

Outcomes for students placed in developmental education

Table C6 compares college English or math enrollment rates (outcome 1) and college English or math pass rates (outcomes 2 and 3) for students who were placed in developmental English or math and enrolled in those courses and students who were placed in developmental English or math and enrolled directly in college English or math instead. Outcomes 2 and 3 are the same for students who were placed in developmental English or math and enrolled directly in college English or math instead. However, they are different for students who were placed in developmental English or math and enrolled in those courses. Outcome 2 is the college English or math pass rate for all students who were placed and enrolled in developmental English or math, whereas outcome 3 is the college English or math pass rate only for students who were placed and enrolled in developmental English or math and eventually enrolled in college English or math.

Table C6. Outcomes for University of Alaska students placed in developmental English or math courses, fall 2008 entrants tracked to spring 2012

Course placement and enrollment	(1) College English or math enrollment rate	(2) College English or math pass rate	(3) College English or math pass rate only for students who enrolled in college course
Students placed in developmental English			
Associate's degree or certificate students			
Took developmental English (*n* = 203)	58	40	69
Enrolled directly in college English (*n* = 67)	100	70	70
Bachelor's degree students			
Took developmental English (*n* = 337)	63	47	75
Enrolled directly in college English (*n* = 161)	100	79	79
Students placed in developmental math			
Associate's degree or certificate students			
Took developmental math (*n* = 328)	24	14	58
Enrolled directly in college math (*n* = 35)	100	49	49
Bachelor's degree students			
Took developmental math (*n* = 802)	39	23	59
Enrolled directly in college math (*n* = 92)	100	62	62

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university in fall 2008, as described in appendix B.

Table C7 compares the high school grade point average, average age, and socioeconomic status of students placed in developmental education courses with the same characteristics for students not placed in these courses.

Table C7. Selected characteristics of students placed in developmental education, by first English or math course enrollment, fall 2008 entrants

Student degree intent	First English or math course	Students' average high school grade point average	Students' average age at college entry	Percentage of students who received federal Pell Grants
Associate's degree or certificate	First English course			
	Developmental course (n = 203)	2.72	22	39
	College course (n = 67)	3.00	22	29
	None (n = 61)	2.62	24	35
	First math course			
	Developmental course (n = 328)	2.72	23	37
	College course (n = 35)	3.05	23	30
	None (n = 107)	2.60	24	37
Bachelor's degree	First English course			
	Developmental course (n = 337)	2.94	20	33
	College course (n = 161)	3.13	19	16
	None (n = 72)	2.89	19	26
	First math course			
	Developmental course (n = 802)	2.96	20	27
	College course (n = 92)	3.27	19	15
	None (n = 129)	2.87	20	28

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university in fall 2008, as described in appendix B.

Regression analysis results

Regression analyses show that high school grade point average consistently had the most positive and significant relationship with students' college course success from among a variety of factors, including scores on standardized exams (tables C8 and C9).

Table C8. Relationship between prior academic performance and grades in entry-level college English or math courses for University of Alaska students who enrolled directly in college English or math, 2008–2012 cohorts

Variable	Students who took the SAT			Students who took the ACT			Students who took the ACCUPLACER		
	SAT only	High school grade point average only	SAT + high school grade point average	ACT only	High school grade point average only	ACT + high school grade point average	ACCUPLACER scores only	High school grade point average only	ACCUPLACER + high school grade point average
Associate's degree or certificate students									
College English grade	0.01	0.14	0.14	0.01	0.08	0.08	0.01	0.06	0.07
Sample size	520	520	520	283	283	283	1,144	1,144	1,144
College math grade	0.02	0.16	0.16	0.01	0.10	0.10	0.01	0.10	0.11
Sample size	227	227	227	102	102	102	160	160	160
Bachelor's degree students									
College English grade	0.01	0.19	0.19	0.03	0.17	0.18	0.02	0.13	0.14
Sample size	3,309	3,309	3,309	2,407	2,407	2,407	2,403	2,403	2,403
College math grade	0.02	0.14	0.15	0.02	0.16	0.17	0.05	0.10	0.13
Sample size	1,922	1,922	1,922	1,057	1,057	1,057	1,019	1,019	1,019

Note: Table reports R-squared, or the proportion of variation in the outcome explained by the linear regression model. The outcome is the student's grade in college English or math: the highest grade, A, is equal to 5 and the lowest grade, F or withdrawal, is equal to 1.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

Table C9. Predicted probability of college course success, fall 2008 to spring 2012 entrants

Variable	Probability of earning C or higher in first college math class			Probability of earning C or higher in first college English class		
	Took SAT	Took ACT	Took ACCUPLACER	Took SAT	Took ACT	Took ACCUPLACER
SAT score	0.000***			0.000**		
ACT score		0.003**			0.004*	
ACCUPLACER score 1[a]			0.003*			0.002**
ACCUPLACER score 2[b]			0.001**			0.001**
High school grade point average	0.328**	0.309**	0.270**	0.282**	0.293**	0.253**
Female	0.056*	0.019	0.049	–0.005	0.006	0.033
Age at college entry	–0.006	–0.005	–0.001	0.002	–0.009	0.001
Alaska Native[c]	–0.049	–0.053	–0.065	–0.063*	0.004	–0.092**
Asian	0.010	0.049	0.059	–0.030	–0.036	–0.042
Black[d]	–0.035	–0.051	–0.193*	–0.023	–0.027	0.029
Hispanic[e]	–0.010	0.041	0.162*	–0.028	–0.022	0.031
Pacific Islander[c]	–0.192	–0.089	–0.296	–0.100	0.170	–0.046
Other race/ethnicity	0.015	0.011	–0.012	0.014	0.021	–0.001
Student from rural Alaska	–0.097*	–0.093	–0.033	–0.056	–0.092*	–0.023
Student from other U.S. state	–0.026	–0.020	0.034	0.074	0.083	0.041
International student	0.185	–0.118	0.160	0.153*	0.062	0.190**
Federal Pell Grant awarded	–0.060	–0.014	–0.044	–0.028	–0.057*	–0.029
Earned General Educational Development certificate	–0.350**	–0.545	–0.407*	0.385**	0.003	–0.339**
Dropped out/unknown high school graduation	0.047	–0.025	0.013	0.021	–0.007	–0.002
Years between high school exit and college entry	0.038**	0.017	0.030**	0.013	0.022	0.007
Pursued associate's degree at entry	0.036	0.135*	0.039	–0.014	0.033	–0.007
Pursued certificate at entry	0.034	0.028	0.149	–0.012	–0.005	–0.073
Constant	0.328**	0.309**	–0.684*	–0.051	–0.011	–0.179
High school attended	f	f	f	f	f	f
College of entry	f	f	f	f	f	f
College entry year	f	f	f	f	f	f
Program of study	f	f	f	f	f	f
Number of observations	2,174	1,180	1,189	3,835	2,266	3,553
R-squared	0.192	0.222	0.206	0.173	0.184	0.152

*** is significant at $p < 0.001$; ** is significant at $p < 0.01$, * is significant at $p < 0.05$.

a. Reading comprehension score for English and elementary algebra score for math.

b. Sentence skills score for English and college algebra score for math.

c. The U.S. Department of Education typically includes Alaska Native under American Indian and Native Hawaiian and Other Pacific Islander under Asian.

d. Includes Latino.

e. Includes African American.

f. Coefficient estimates are not displayed because of the large number of coefficients for these variables.

Note: The table reports average marginal effects (*dy/dx*) from the logistic regression model. The Stata "margins, dydx(*)" command computes average change in each variable if the dependent variable changes from 0 to 1 (from did not pass to pass). Full regression results that report logistic regression coefficient estimates, robust standard errors, and estimates on all coefficients (including indicators of high school, college, college entry year, and program of study) are available upon request. Because most students only have one type of test, each model estimates the relative contribution of a single test type (SAT, ACT, or ACCUPLACER). Blank cells mean variable is not included in regression model.

Source: Authors' analysis of University of Alaska administrative data on all new students who entered the university from fall 2008 to spring 2012, as described in appendix B.

Notes

1. As a first step toward reform, the University of Alaska system released "Developmental Education at University of Alaska: Reference 33" (University of Alaska, 2013) in June 2013. This study builds on that report by conducting new descriptive analyses.
2. As noted earlier, some of these students placed in developmental education but avoided their placement and enrolled in college English or math instead. Therefore, the findings may also be generalizable to students whose test scores fell below the cutscore to be placed in college-level courses.

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