



What's Happening

May 2015

Comparing postsecondary enrollment and persistence among rural and nonrural students in Oregon

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Key findings

Rural Oregon students were less likely than nonrural students to enroll in postsecondary education after high school graduation and to persist to the second year of college at all levels of high school student achievement in math and reading. Rural and nonrural students were equally likely to enroll immediately in college after exiting high school. These findings imply that rural students may be at a disadvantage for postsecondary success in Oregon.

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Summary

This study found that rural students were less likely than their nonrural counterparts to enroll in postsecondary education and to persist to the second year of college at all achievement levels—including students with the highest scores on standardized tests. Specific subgroups of rural students were less likely than their nonrural counterparts to enroll and persist in college. These findings imply that to fulfill the state’s goal of having 80 percent of its high school graduates earn a postsecondary degree or credential by 2025, Oregon stakeholders should examine postsecondary education outcomes for rural students, who seem to be at a disadvantage for postsecondary success, as well as for nonrural students. Because a requirement for good policymaking is first knowing the dimensions of the challenge, this report provides an in-depth look at college enrollment and persistence in Oregon with a rural lens.

The study team examined postsecondary enrollment patterns and persistence among rural and nonrural high school students in Oregon. Specifically, the study team looked at how the postsecondary outcomes of college enrollment, enrollment timing, and persistence varied by student characteristics and whether students enrolled and later persisted in a two- or four-year postsecondary institution. The study included data on students who were in grade 9 in 2005, 2006, or 2007 and who graduated or left high school between 2005 and 2012.

Key findings include:

- Enrollment.
 - Rural students were less likely than nonrural students to enroll in postsecondary education at any time after high school.
 - Across all achievement levels (as measured by statewide assessment scores), rural students had lower likelihood of postsecondary enrollment than nonrural students.
 - Rural high school graduates were less likely than nonrural graduates to enroll in postsecondary education.
 - Rural male, Black, and Asian students were less likely than their nonrural counterparts to enroll in postsecondary education, while rural Hispanic students were more likely than their nonrural counterparts to enroll.
- Enrollment timing.
 - Rural and nonrural students were equally likely to enroll immediately in postsecondary education (that is, to enroll in college in the term after exiting high school, typically the fall).
 - Students who did not enroll accounted for the largest share of rural students, while students who enrolled immediately accounted for the largest share of nonrural students.
 - Rural Black students were less likely than their nonrural counterparts to enroll immediately in postsecondary education; other racial/ethnic subgroups did not show a significant difference in likelihood.
 - A larger percentage of rural students than nonrural students enrolled immediately in a two-year public in-state postsecondary institution.
 - Among community college students, rural recipients of loans were less likely than nonrural recipients of loans to enroll immediately in postsecondary education.

- Persistence.
 - Rural students were less likely than nonrural students to persist to the second year of college.
 - At all types of two- and four-year institutions—private, public, in-state, and out-of-state—rural students had lower rates of persistence to the second year of college than nonrural students.
 - Across all levels of high school achievement, rural students persisted in college at lower rates than nonrural students.
 - Among all students, those who received financial aid were more likely than their counterparts who did not receive financial aid to persist in college; the relationship between financial aid and persistence was similar for rural and nonrural students.
 - For most community college students, passing the first college-level math or writing course in a sequence was not associated with an increased likelihood of persisting.

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Why this study?

Oregon recently developed a set of college readiness and success goals that link secondary and postsecondary success in the state accountability system. In 2011 national initiatives such as the Common Core State Standards and federal actions such as the flexibility waivers for the Elementary and Secondary Education Act prompted Oregon to adopt the 40–40–20 goal, described in Senate Bill 253 (H.R. 253, Or. 2011). This bill established the goal that 80 percent of Oregon adults would have a postsecondary degree by 2025, with 40 percent of adults holding at least a bachelor's degree, 40 percent holding an associate's degree or postsecondary certificate, and the remaining 20 percent holding a high school diploma or equivalent (Oregon Department of Education, 2012).

In order to achieve this goal, Oregon will need to increase educational attainment for both current students and adults. Among adults over 25 in Oregon in 2010, 28.9 percent had a bachelor's degree or higher, 26.7 percent had a one-year certificate or associate's degree, and 11.1 percent lacked a high school diploma (Oregon University System, 2012). School districts are held accountable for meeting the 40–40–20 goal through achievement compacts—partnership agreements between the state and school districts that define key measures of student success and set targets for achievement that are defined by the district. These achievement compacts have linked secondary and postsecondary success for the first time in Oregon.

This study examines postsecondary enrollment and persistence patterns among Oregon students, exploring who goes to and who stays in college

Given the emphasis on postsecondary outcomes in the achievement compacts, it is particularly relevant to study the link between secondary and postsecondary education levels. Oregon education stakeholders—including data warehouse and district staff, school principals, state government employees, and foundation and nonprofit staff—identified an urgent need for more information about college enrollment and persistence patterns among rural students in Oregon.

A focus on students in rural areas

This study examines postsecondary enrollment and persistence patterns among Oregon students, exploring who goes to college and who stays there. Of particular interest was how postsecondary enrollment, enrollment timing, and persistence vary for rural and nonrural high school students. The study team also explored how enrollment and persistence vary across student subgroups, analyzing gaps by nonrural–rural high school location as well as by student gender, racial/ethnic group, Oregon Assessment of Knowledge and Skills (OAKS) standardized assessment scores in math and reading, high school completion status, and type of postsecondary institution attended.

Rural Oregon schools can use the findings in this study to strategically improve their college access and readiness efforts. Oregon's postsecondary institutions may also be interested in the results, which highlight possible postsecondary enrollment, persistence, and performance gaps between students from rural and nonrural areas in the state. Finally, state education policymakers can gain a statewide perspective on rural students' high school and postsecondary outcomes.

This study also provides information that can inform state and stakeholder efforts to prepare rural students to achieve the statewide 40–40–20 goal. The legislative goal holds

districts accountable for meeting ambitious postsecondary readiness targets, including outcomes for groups of students who have historically been underserved by Oregon's public education system, such as English learner students, students from low-income households, students with disabilities, and racial/ethnic minority students. This study examines postsecondary performance for these demographic groups by rural and nonrural high school location and provides statewide results by student characteristics, giving stakeholders interested in rural education and college-going behavior previously unavailable information regarding rural students in Oregon.

Little research exists concerning the college enrollment and persistence patterns of rural students, particularly those in northwestern states, where advances in technology have increased the level of education of employees in fields common in rural areas, such as timber, agriculture, and tourism (Oregon University System, 2011). However, there is a large body of work that examines the transition from high school to college and the factors associated with college enrollment and persistence (see appendix A). Some of these factors guided the inquiry for this study. However, the cited research does not have a particular focus on rural students unless otherwise noted. This study begins to illuminate whether the patterns in the research for students nationally are also present for rural students in Oregon and highlights how rural students in Oregon differ from their nonrural counterparts.

Although nearly every state in the country has substantial rural and semi-rural areas, the majority of education research has focused on students from nonrural areas. And much of the education research that has focused on rural areas has not been of high quality (Arnold, Newman, Gaddy, & Dean, 2005). However, previous research has shown that rural students often have lower enrollment and persistence rates in postsecondary institutions than their nonrural counterparts (Provasnik et al., 2007) and may experience different barriers to accessing postsecondary education, such as fewer advanced course offerings, a shortage of highly qualified teachers, and more financial constraints at the high school level (Gibbs, 2004). For rural students, attending college often requires moving away from the home community (Demi, Coleman-Jensen, & Snyder, 2010). Education research conducted with a nonrural focus often fails to address these unique needs. Given the national emphasis on improving access to and enrollment in college for all students, highlighting differences between nonrural and rural students is particularly important to ensure education policies are serving rural communities and promoting rural educational attainment as well as attainment in urban and suburban locations.

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Rural and postsecondary education in Oregon

Rural education. In 2009, Oregon Senate Bill 442 required the Joint Boards of Education to investigate strategies to increase rural students' enrollment and success in postsecondary education (H.R. 442, Or. 2013), demonstrating that rural education is a priority for the state. In 2010 nearly 99 percent of Oregon's land area was classified as rural, and 19 percent of residents lived in rural areas (U.S. Census Bureau, 2010). In 2010/11 nearly a third of Oregon preK–12 public school students were in rural schools, and 158 of the state's 200 school districts were considered rural in 2010/11 (see appendix B for the definition of rural used in this study). Those 158 districts included approximately 574 public schools, serving nearly 180,000 students, or 32 percent of Oregon public school students (U.S. Department of Education, 2011a, 2011b).

Oregon has a larger rural English learner student population and higher rural poverty rates than the country as a whole (Strange, Johnson, Showalter, & Klein, 2012), and both rural and nonrural areas in Oregon are increasingly diverse. From 2001 to 2011 the percentage of Hispanic students rose 7.2 percentage points in rural areas of Oregon (from 9.7 percent to 16.9 percent), compared with 11.3 percentage points in nonrural areas, while the percentage of White students fell 10 percentage points in rural areas (from 84 percent to 74 percent), compared with nearly 15 percent in nonrural areas. Nearly 7 percent of rural students in 2011 were classified as English learner students. From 2001 to 2011 eligibility for free or reduced-price lunch increased from 41 percent to 56 percent in rural areas and from 31 percent to 47 percent in nonrural areas (U.S. Department of Education, 2011a, 2011b).

Postsecondary education. In 2012 Oregon had 26 postsecondary institutions that granted a certificate or two-year degree, 17 of them public community colleges, and 42 institutions that granted a four-year degree, 9 of them public four-year universities. Eleven public community colleges and two public four-year universities were located in rural areas, as were two private nonprofit, four-year institutions. The 15 degree- or certificate-granting postsecondary institutions in rural areas served approximately 40,000 students. By comparison, the 53 institutions in nonrural areas served approximately 210,000 students (U.S. Department of Education, 2012).

Since the 1970s the job market for individuals with postsecondary degrees has been expanding, while those with lower levels of education have seen fewer opportunities to earn a family-sustaining wage (Haveman & Smeeding, 2006). In 1975 the difference in average annual earnings between individuals with an advanced degree and individuals without a high school diploma was about \$10,000 (equivalent to \$42,000 in 2010 dollars). By 2010 that gap had increased to \$63,000 and was even larger among men, reaching almost \$80,000 (U.S. Census Bureau, 2012a).

These data are mirrored by the disparity in postsecondary education between urban and rural populations in Oregon and the country. As of 2012, 32 percent of Oregon adults ages 25 and older in urban areas held at least a four-year degree, compared with 22 percent in rural areas; these rates are slightly higher than the U.S. average of 31 percent for urban areas and 20 percent for rural areas (U.S. Census Bureau, 2012b). Less demand for highly educated workers in rural areas than in urban areas may lead rural college completers to settle in urban areas (Gibbs, 2004), leaving fewer highly educated adults in rural areas. Additionally, the wage gap between urban and rural areas may encourage movement to urban areas, particularly for college graduates with student loan debts (Hardy & Katsinas, 2008). Highlighting the importance of postsecondary education in the current economy, the fastest growing and highest paying occupations from 2012 to 2022 are estimated to be those typically requiring some type of postsecondary education (U.S. Department of Labor, 2013). Disparities also exist in secondary education. Oregon rural districts with low achievement tend to receive fewer resources than rural districts with high achievement, indicating a resource gap that may exacerbate achievement gaps in rural areas (Johnson, 2006).

As of 2012, 32 percent of Oregon adults in urban areas held at least a four-year degree, compared with 22 percent in rural areas; these rates are slightly higher than the U.S. average of 31 percent for urban areas and 20 percent for rural areas

What the study examined

The goal of this study is to provide information on rural enrollment and persistence patterns in Oregon and to highlight gaps between groups of students that may direct further inquiry.

The study was guided by three research questions developed in consultation with stakeholders to ensure the study was pertinent to Oregon's education interests.

- How does college enrollment vary among rural and nonrural high school students in Oregon and what student and school factors may explain these differences?
- How does the timing of college enrollment vary among rural and nonrural high school students in Oregon and what student and school factors may explain these differences?
- How does persistence to the second year of college vary between rural and nonrural high school students in Oregon and what student and school factors may explain these differences?

The student and school factors referred to in the research questions are: student demographic factors (gender and race/ethnicity), high school academic performance (OAKS scores), and parent and community factors (socioeconomic status and nonrural–rural high school location), college type, full-time attendance status, financial aid received, and performance in first-year classes in community colleges in Oregon.

Methods of analysis included descriptive statistics, as well as analytical methods to adjust statistically for the differences between rural and nonrural student characteristics (that is, regression analysis). Box 1 summarizes the methods and data sources, and appendix B provides more details.

The study does not provide evidence of a causal link between student characteristics or secondary school characteristics or performance and postsecondary outcomes. The study should be considered a first look at this issue in Oregon, as it is an initial exploration of factors related to postsecondary outcomes by rural–nonrural location. Suggestions for the possible direction of additional research in rural education in Oregon are provided at the end of the report.

This study does not provide evidence of a causal link between student characteristics or secondary school characteristics or performance and postsecondary outcomes. This study is an initial exploration of factors related to postsecondary outcomes by rural–nonrural location

Box 1. Data and methodology

This study included data on students who attended an Oregon public high school in grade 9 in 2005, 2006, or 2007¹ and who graduated or left high school between 2005 and 2012. Thus, three grade 9 cohorts are included in the study.

The data were from four sources:

- The Oregon Department of Education (student demographic information, OAKS test scores, high school outcomes, and school information [including rural–nonrural location information] covering Oregon public high school students for 2004/05–2011/12).
- The National Student Clearinghouse (basic college information such as type of college, enrollment, and persistence covering attendees at colleges that participate in the National Student Clearinghouse for 2008–12).
- The Oregon Department of Community Colleges and Workforce Development (detailed college information such as number of credits and grade point average covering Oregon community college attendees for 2008–12).
- The Oregon University System (detailed college information such as number of credits and grade point average covering attendees within the system for 2008–12).

The sample included 157,309 students, 64,392 (41 percent) of whom attended high school in a rural area or a distant or remote town according to the National Center for Education

(continued)

Box 1. Data and methodology *(continued)*

Statistics locale code (referred to as rural students), and 92,917 (59 percent) of whom attended high school in a city, suburb, or fringe town (referred to as nonrural students; see appendix B for more on rural–nonrural classifications). The sample included high school graduates, dropouts, and those with an unknown high school completion status (dropouts are included in the analysis because they may eventually enroll in college, typically after passing the General Education Development tests).

Data on receipt of financial aid were available only for students who attended Oregon public community colleges, so the relevant models were restricted to these students and included indicators for receiving need-based financial aid, merit-based financial aid, and loan aid, as well as interactions for the aid variables with rural school location.

To answer the research questions, the study team identified enrollment and persistence gaps for rural and nonrural students based on factors such as race/ethnicity, gender, socioeconomic status, and OAKS scores by calculating descriptive statistics that show the percentage of students in each category (see table B4 in appendix B and detailed tables in appendix C). The study examines these gaps and compares student outcomes between rural and nonrural students across in-state and out-of-state colleges, public and private colleges, two- and four-year colleges, and full- and part-time enrollment status.

In addition, logistic regression (an analysis technique that adjusts statistically for differences between included characteristics) was used to estimate the likelihood that a student will enroll in college at any time, the likelihood of enrolling immediately (in the first term after exiting high school) compared with the likelihood of enrolling anytime following the first term after exiting high school, and the likelihood of persisting to the second year of college, given student characteristics (such as race/ethnicity, gender, high school graduation status, and rural–nonrural high school location status) and postsecondary school characteristics (such as two- or four-year, private, public, in-state, and out-of-state).

For the third research question, the study also examined college academic performance in certain first-year courses (college-level algebra and English composition I) for students who enrolled in Oregon community colleges. These “gatekeeper” courses in math and English are the first college-level course a student takes in that subject, and students must pass them to proceed to higher level math and English courses. Logistic regression was performed to estimate the likelihood of persisting to the second year of college given student characteristics, college characteristics, and earning a credit in gatekeeper courses.

This study found that the patterns of enrollment and persistence of rural students differ from those of nonrural students

Note

1. For students who transferred into Oregon public schools after their grade 9 year, the study team used the expected grade 9 year based on the grade and year of entry to Oregon schools.

What the study found

The study found that the patterns of enrollment and persistence of rural students differ from those of nonrural students. This section summarizes the key findings. Detailed results are provided in appendix C, including full descriptive statistics and regression output tables.

Enrollment

Rural students were less likely than nonrural students to enroll in postsecondary education at any time after high school. The postsecondary enrollment rate was 55 percent among rural students, compared with 63 percent among nonrural students (see tables

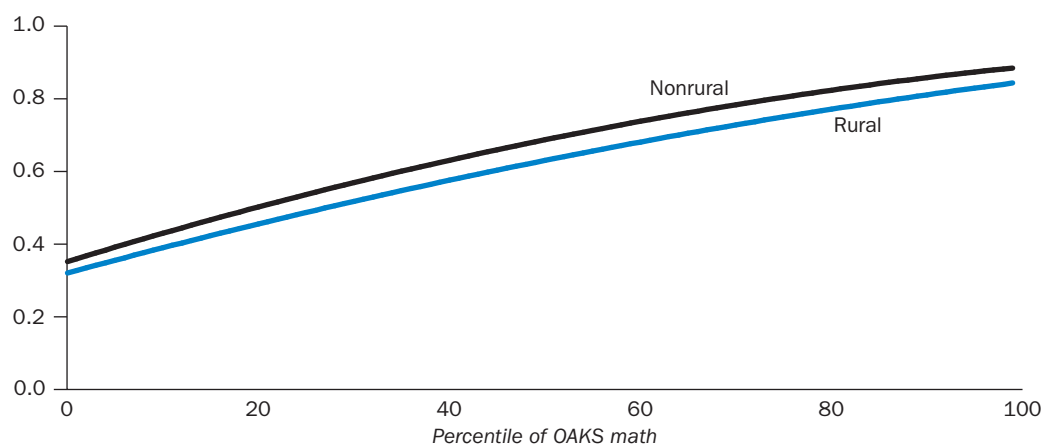
C1–C3 in appendix C). In addition, rural students' odds of enrolling in postsecondary education after high school were 20 percent less than nonrural students, with demographic factors and OAKS achievement levels held constant (see table C10 in appendix C).

Across all achievement levels (as measured by statewide assessment scores), rural students had lower likelihood of postsecondary enrollment than nonrural students. This finding was true even for rural students in the highest percentiles of math and reading achievement (figure 1; see also table C10 in appendix C).

Figure 1. Across all achievement levels in both math and reading, rural students had lower likelihood of postsecondary enrollment than nonrural students

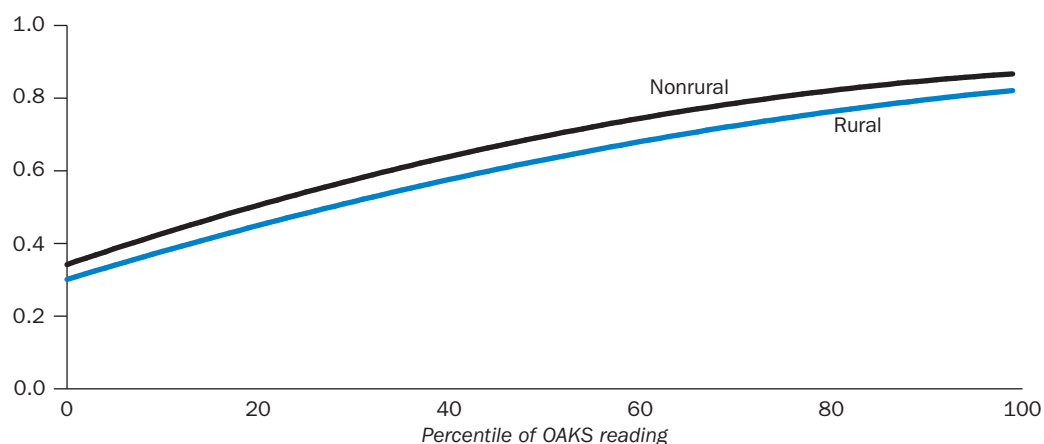
Math

Probability of enrolling in college at any time after high school



Reading

Probability of enrolling in college at any time after high school



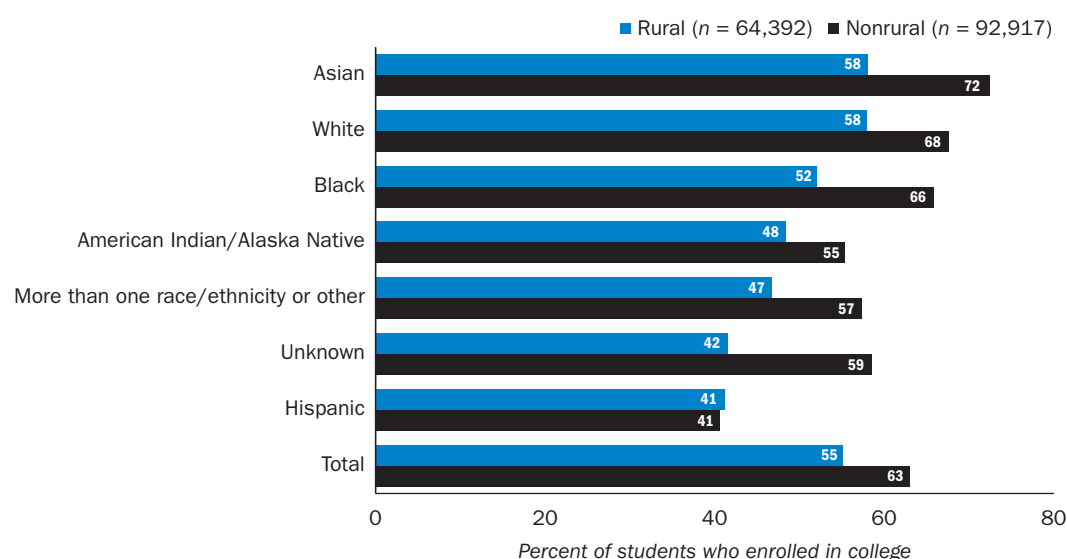
OAKS is Oregon Assessment of Knowledge and Skills, a statewide assessment.

Note: This figure shows the relationship between the probability of enrolling in college at any time after high school (y-axis) and the percentile scored on OAKS math and reading standardized achievement tests, by location of student high school (rural and nonrural).

$n = 55,102$ for rural students and $82,544$ for nonrural students.

Source: Authors' calculations based on data described in appendix B.

Figure 2. Among rural students, White and Asian students had the highest postsecondary enrollment rates



Source: Authors' calculations based on data described in appendix B.

Rural high school graduates were less likely than nonrural graduates to enroll in postsecondary education. The odds of enrolling in postsecondary education were 14 percent lower for rural high school graduates than for nonrural graduates.

Rural male, Black, and Asian students were less likely than their nonrural counterparts to enroll in postsecondary education, while rural Hispanic students were more likely than their nonrural counterparts to enroll. The odds of enrolling in postsecondary education were 3 percent lower for rural male students, 8 percent lower for rural Black students, and 6 percent lower for rural Asian students than for nonrural students of the same demographic characteristic (see table C10 in appendix C). Rural Hispanic students were 6 percent more likely than nonrural Hispanic students to enroll in postsecondary education (when holding other factors constant). White and Asian rural students had the highest postsecondary enrollment rates, followed by Black, American Indian/Alaska Native, more than one race/ethnicity or other, unknown race/ethnicity, and Hispanic students. Across all race/ethnicity categories except Hispanic students, rural students had lower rates of enrollment than nonrural students (figure 2; see also tables C1–C3 in appendix C).

Across all race/ethnicity categories except Hispanic students, rural students had lower rates of enrollment than nonrural students

Enrollment timing

Rural and nonrural students were equally likely to enroll immediately in postsecondary education (that is, to enroll in college in the term after exiting high school, typically the fall). Among all enrolling students, students who attended a four-year, public, or in-state institution were more likely to enroll immediately in college.

While rural students had lower overall postsecondary enrollment rates, their likelihood of enrolling immediately after high school was similar to that of nonrural students with comparable characteristics (when conducting regression analysis and controlling for various factors; see table C11 in appendix C).

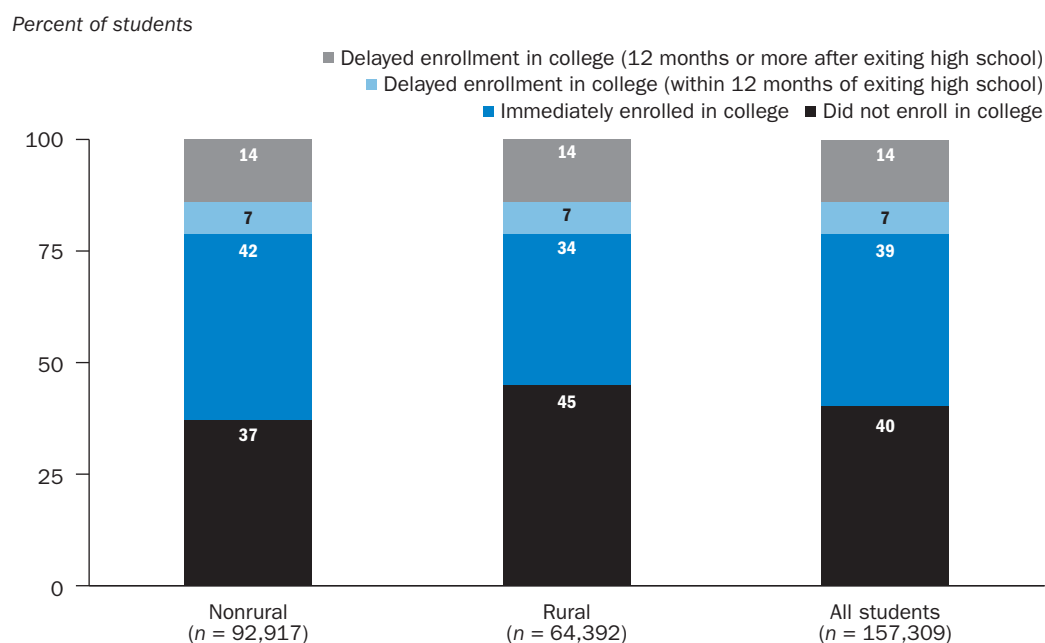
Students who did not enroll accounted for the largest share of rural students, while students who enrolled immediately accounted for the largest share of nonrural students. Some 45 percent of rural students did not enroll in postsecondary education (compared with 37 percent of nonrural students), 34 percent enrolled immediately (compared with 42 percent of nonrural students), and 21 percent delayed enrollment (the percentage was the same for nonrural students; figure 3). However, when holding other demographic and achievement factors constant, rural students were not less likely than nonrural students to enroll immediately (see table C11 in appendix C). This indicates that other characteristics besides rural status may be driving the difference in immediate enrollment rates between rural and nonrural students.

Rural Black students were less likely than their nonrural counterparts to enroll immediately in postsecondary education; other racial/ethnic subgroups did not show a significant difference in likelihood. Among students who enrolled in postsecondary education at any time, the odds of immediate enrollment were 25 percent lower for rural Black students than for nonrural Black students (see table C11 in appendix C). These results take into account demographic and achievement factors as well as interactions between rural and other independent variables.¹ Other demographic and racial/ethnic subgroups, except students of unknown race/ethnicity, did not show a statistically significant difference in likelihood of immediate enrollment between nonrural and rural students.

A larger percentage of rural students than nonrural students enrolled immediately in a two-year public in-state postsecondary institution. Some 48 percent of rural students and 39 percent of nonrural students enrolled immediately in a two-year public in-state institution (figure 4). A smaller percentage of rural students (30 percent) than nonrural students (36 percent) enrolled immediately in a four-year public in-state institution.

Some 45 percent of rural students did not enroll in postsecondary education (compared with 37 percent of nonrural students), 34 percent enrolled immediately (compared with 42 percent of nonrural students), and 21 percent delayed enrollment (the percentage was the same for nonrural students)

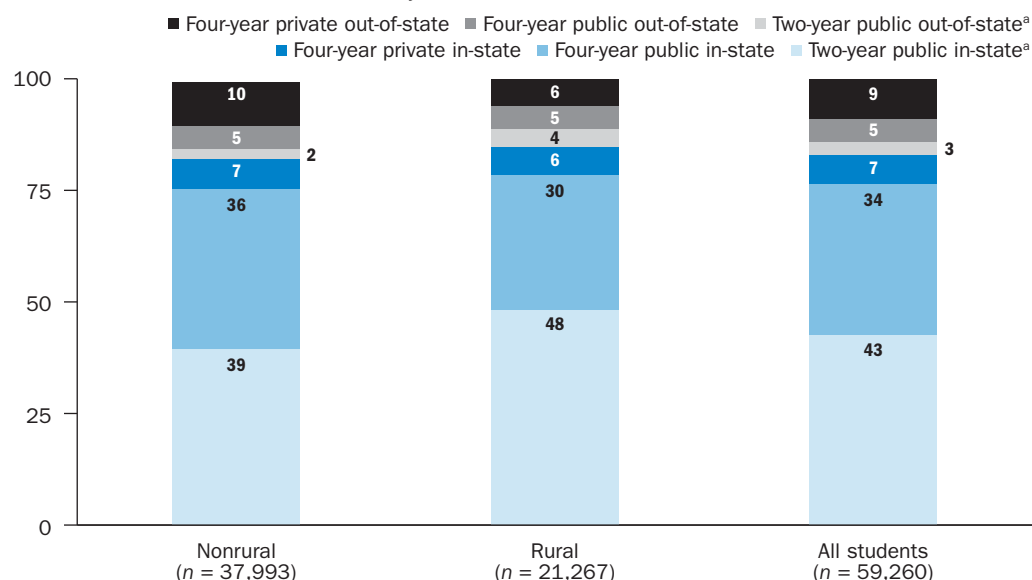
Figure 3. Students who did not enroll accounted for the largest share of rural students, while students who enrolled immediately accounted for the largest share of nonrural students



Source: Authors' calculations based on data described in appendix B.

Figure 4. A larger percentage of rural students than nonrural students enrolled immediately in a two-year public in-state institution

Percent of students who enrolled immediately



Some 48 percent of rural students and 39 percent of nonrural students enrolled immediately in a two-year public in-state institution

a. Includes institutions that offer solely programs and certificates of less than two years.

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

Source: Authors' calculations based on data described in appendix B.

Among community college students, rural recipients of loans were less likely than nonrural recipients of loans to enroll immediately in postsecondary education. The odds of immediate enrollment were 16 percent lower for rural recipients of loans than for nonrural recipients of loans at Oregon community colleges (see table C11 in appendix C). However, loan and merit scholarship recipients overall (both rural and nonrural) were more likely to enroll immediately than those students who did not receive loans or scholarships; the odds were 18 percent higher for recipients of loans and 200 percent higher for recipients of a merit scholarship than for nonrecipients.

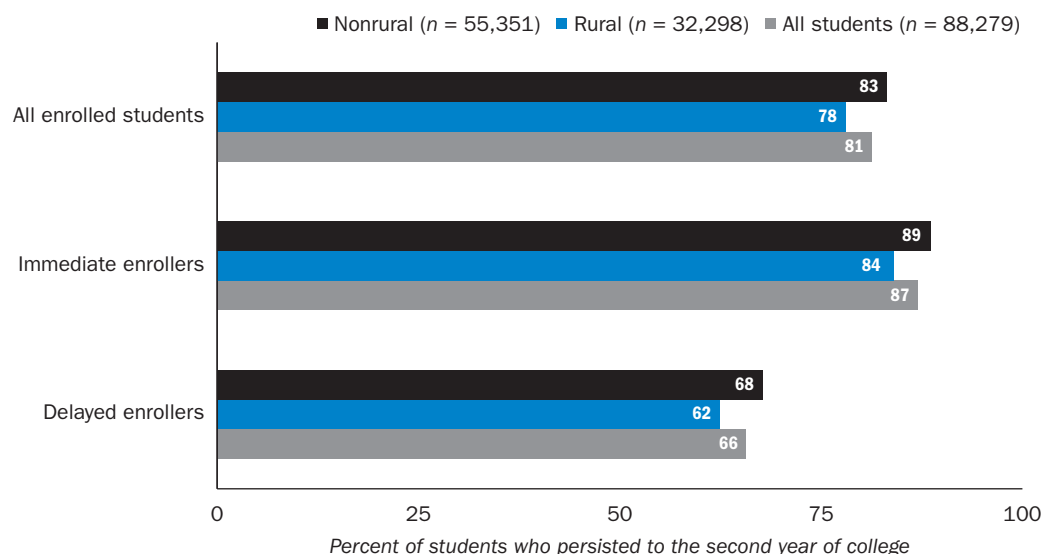
Persistence

Rural students were less likely than nonrural students to persist to the second year of college. The percentage of students who persisted to the second year of college was lower for rural students (78 percent) than for nonrural students (83 percent; figure 5; see also table C5 in appendix C); the pattern was the same for delayed and immediate enrollers.

Among students who enrolled in college at any time after high school (including both immediate and delayed enrollers), having attended a rural high school was negatively associated with persisting to the second year of college (see table C12 in appendix C). The odds of persisting were 19 percent lower for rural students than for nonrural counterparts (controlling for the factors shown in table C12 in appendix C).

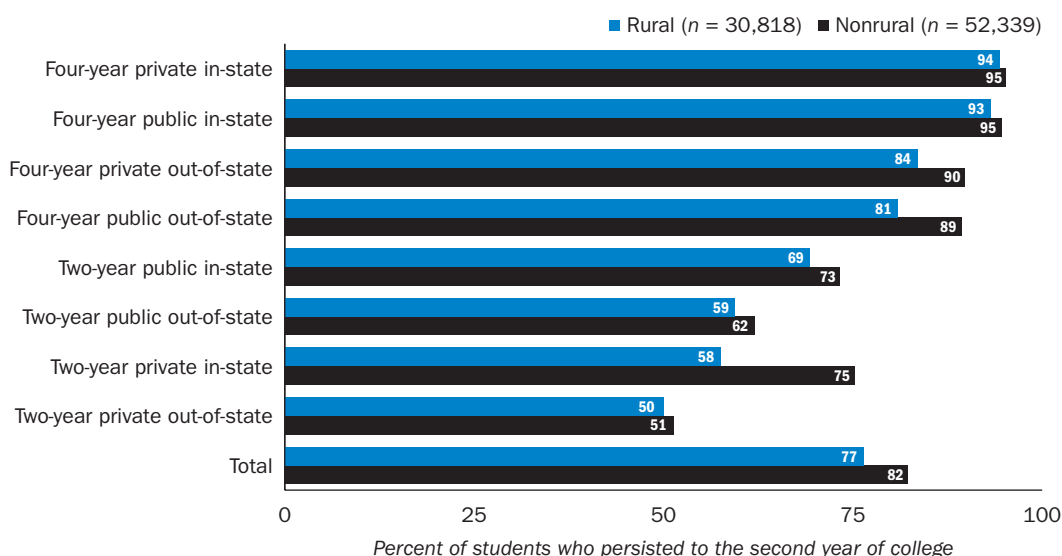
At all types of two- and four-year institutions—private, public, in-state, and out-of-state—rural students had lower rates of persistence to the second year of college than nonrural students. Rural students persisted to the second year at lower rates than

Figure 5. The percentage of students who persisted to the second year of college was lower for rural students than for nonrural students across all enrollment categories



Source: Authors' calculations based on data described in appendix B.

Figure 6. Rural students who attended a four-year postsecondary institution had higher rates of persistence than rural students who attended a two-year institution



Source: Authors' calculations based on data described in appendix B.

nonrural students in all college categories (figure 6; see also tables C4–C6 in appendix C). Examining persistence among rural and nonrural students by college type, the study team found that 18 percent fewer rural students than nonrural students persisted at two-year, private, and in-state institutions and that 9 percent fewer rural students persisted at four-year, public, and out-of-state institutions (see figure 6).

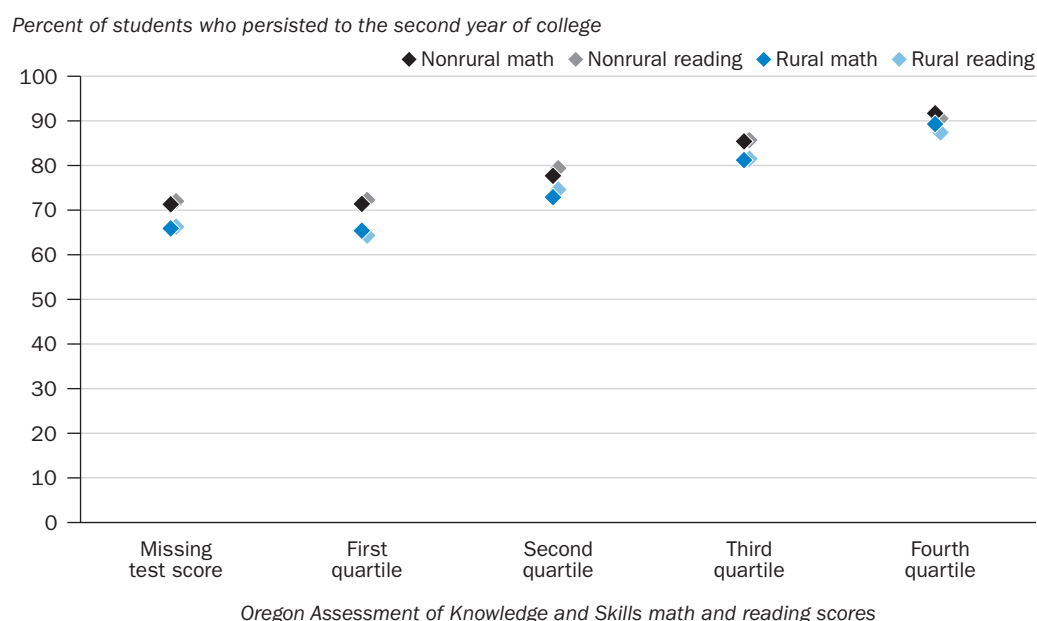
Across all levels of high school achievement, rural students persisted in college at lower rates than nonrural students. Among both groups of students, persistence rates increased for students in higher OAKS quartiles compared with students in lower OAKS quartiles (figure 7). Based on regression analysis, rural students were less likely to persist than nonrural students at all levels of math and reading achievement, even after demographic and academic indicators were controlled for (results are available from the study team on request).

Among all students, those who received financial aid were more likely than their counterparts who did not receive financial aid to persist in college; the relationship between financial aid and persistence was similar for rural and nonrural students. Receipt of financial aid had a strong relationship with persistence to the second year of college for all students in all categories of aid (need-based, merit-based, and loan; see table C12 in appendix C). The likelihood of persisting in college was similar for rural and nonrural students who received aid, indicating that access to aid does not predict persistence among rural students.

For most community college students, passing the first college-level math and writing course in a sequence was not associated with an increased likelihood of persisting.² Passing a gatekeeper course in either math or English was not associated with persisting to the second year of college for most community college students (without controlling for interaction effects; see tables C13 and C14 in appendix C for full results). The relationship between passing a gatekeeper course and persisting in college was similar for rural and nonrural students, with one exception: passing a gatekeeper course in writing was positively associated with persisting to the second year of college for nonrural students.

Rural students were less likely to persist than nonrural students at all levels of math and reading achievement, even after demographic and academic indicators were controlled for

Figure 7. Rural students persisted to the second year of college at lower rates than nonrural students for all quartiles of math and reading scores on the Oregon Assessment of Knowledge and Skills



Note: 16,538 students persisted and 11,740 students did not persist for rural math and reading, and 33,256 students persisted and 15,487 students did not persist for nonrural math and reading.

Source: Authors' calculations based on data described in appendix B.

Implications of the study findings

The findings of this study have implications for promoting college enrollment and improving persistence among rural students in Oregon. Overall, this study shows that rural students are less likely than their nonrural counterparts to enroll in college and persist to the second year of college. This implies that to fulfill the 40–40–20 goal, Oregon stakeholders should examine postsecondary education outcomes for rural students, who seem to be at a disadvantage for postsecondary success, as well as for nonrural students. These interventions could be targeted at certain factors or groups identified in the key findings as being less likely to enroll or persist.

This study is particularly useful for rural school leaders, offering them detailed information about their former students' enrollment and persistence patterns in Oregon's two- and four-year colleges and in postsecondary institutions across the country. In addition, Oregon public four-year universities and the Oregon Department of Community Colleges and Workforce Development may use these results to direct future research on how to better support rural students at public postsecondary institutions. Finally, the study provides baseline information regarding the college-going behavior of rural students in Oregon that may be of use for statewide policy and for future studies. The results of this study do not imply causal relationships but rather provide a framework to reflect on current practice and from which to begin collecting additional evidence and exploring differences shown here.

Given rural students' lower overall college enrollment rates, they may need additional supports; such supports may be useful even for higher achieving students because rural students were less likely to enroll in college at all achievement levels

Enrollment

The differences between rural and nonrural students in the results of this study can inform efforts to target college enrollment interventions, policies, and programs to rural students. Given rural students' lower overall college enrollment rates, they may need additional supports. Such supports may be useful even for higher achieving students because rural students were less likely to enroll in college at all achievement levels.

The findings related to demographic characteristics indicate that certain groups of rural students may be at a disadvantage in terms of postsecondary success. For example, rural male, Asian, and Black students were less likely than their nonrural counterparts to enroll in college. Further research should be conducted to explore these findings and understand why certain rural groups were less likely than their nonrural counterparts to enroll in college. An exploration of particular barriers for college access among these groups may yield ways to target policies and programs to increase their enrollment.

Overall, rural students and nonrural students were equally as likely to delay enrollment in college, and rurality did not seem to be a driving factor in the timing of enrollment. Certain groups of rural students with higher likelihood for delayed enrollment may benefit from targeted strategies to encourage immediate enrollment. Rural students may also need additional supports related to enrollment in four-year institutions, as they were less likely than nonrural students to enroll immediately in these institutions.

Persistence

Rural students were less likely than nonrural students to persist to the second year of college, again indicating that different support and policies targeting rural students may

be needed to close the gap. Rural students at all high school math and reading achievement levels were less likely to persist. This again indicates that programs and policies may need to be targeted to rural students across the achievement spectrum. Financial aid had a strong relationship with persistence for all students, providing additional evidence that both rural and nonrural students may benefit from expanding aid programs or program access.

Rural Hispanic and American Indian students were more likely than their nonrural counterparts to persist, indicating that there may be existing strategies in place for serving these students or that these rural student groups face fewer barriers to access and success than their nonrural counterparts. Future research in this area should consider examining two-year and four-year colleges separately, as this study found evidence of different enrollment and persistence between these types of institutions (see figures 4 and 6).

Suggestions for further research

Because “rural” can be defined in various ways (see section on limitations of the study), future research may want to consider alternative definitions of rural. Some factors previously identified as being related to postsecondary outcomes of enrollment and completion—including the postsecondary factors of institution size, part-time faculty proportion, tuition, distance to college, and selectivity—were unavailable for this study and could be explored with further research. This study was unable to examine parent and community factors beyond eligibility for free or reduced-price lunch and high school location (nonrural or rural); other factors, such as parent expectations and distance from home community to postsecondary institution, may be examined in future studies. Finally, noncognitive factors such as academic tenacity and mindset may be related to postsecondary outcomes (see appendix A for more information); additional research could incorporate data on these noncognitive factors to examine differences in rural and nonrural college enrollment and persistence.

Rural students at all high school math and reading achievement levels were less likely to persist; programs and policies may need to be targeted to rural students across the achievement spectrum

Limitations of the study

There are five limitations of the study that should be highlighted. None pose an insurmountable threat to the relevance of the results.

First, rural schools in Oregon may differ from rural schools in other states in unobservable ways. As a result, findings from this study should not be generalized to rural schools in other states, although the findings may be of interest as an example of research in this area.

Second, the study team had access to data on academic performance in gatekeeper courses only for students enrolled in Oregon community colleges. It was not feasible within the scope of the study to request data from all the higher education institutions in which Oregon high school students enrolled. However, as shown in the results, many Oregon public high school students who attend college attend an Oregon community college. Additionally, lack of data about some students’ postsecondary academic performance does not preclude the study from providing meaningful information to education stakeholders and the public. Given the large percentage of Oregon students who enroll in community colleges, education stakeholders determined that information about these students’ academic performance in gatekeeper courses was important and useful even without the

inclusion of college academic performance information for students who attended four-year, private, and out-of-state colleges.

Third, the National Student Clearinghouse does not include all U.S. colleges and includes only a limited number of international colleges and universities. It covers about 96 percent of domestic postsecondary institutions (National Student Clearinghouse, n.d.), but it is possible that some Oregon students attended a college that does not subscribe to the clearinghouse's services. This could drive some of the difference between rural and non-rural enrollment rates. Appendix D contains a list of the higher education institutions in Oregon that do not subscribe to the clearinghouse. Students who attended those institutions would be shown in the data as not enrolling in college.

The fourth limitation relates to the definition of rural and nonrural schools used in this study. As described in appendix B, federal agencies and previous research studies define rural in many different ways. Alternative definitions of rural could be used to separate suburban and town areas and to look at the four main categories of classification used by the National Center for Education Statistics. Another option would have been to use a different source of location data, such as the town name or county. A different definition of rural may yield different results, and this is an area recommended for future studies.

Finally, the sample size for this study is large enough that statistically significant results should be interpreted with caution, as large sample sizes may lead to a greater likelihood of finding significant results. Given the number of statistical significance tests included in this study, one or more relationships may appear statistically significant due to chance.

Appendix A. Previous research on factors that influence college enrollment and persistence

Research has identified several factors, such as poverty (often proxied by eligibility for free or reduced-price lunch), that influence college enrollment and persistence. Some of these factors are more prevalent in rural than nonrural populations and may operate differently among rural students than among their nonrural counterparts.

High school factors

A large body of research concludes that secondary school academic performance is a strong predictor of postsecondary success. At the secondary level, three key factors are associated with postsecondary enrollment and persistence: high school grade point average, the rigor of high school courses, and performance on standardized tests (Warburton, Bugarin, & Nuñez, 2001; Endsley & Maruyama, 2008; Geiser & Santelices, 2007; Horn & Kojaku, 2001; Smalley, Lichtenberger, & Brown, 2010; Wiley, Wyatt, & Camara, 2010). A study focusing on rural students that used nationally representative data showed that curriculum intensity was positively related to bachelor's degree completion (Byun, Irvin, & Meece, 2012). However, the authors found no relationship between standardized test scores and degree completion for rural students.

In the current study, the study team considers performance on the OAKS standardized tests when examining college enrollment and persistence patterns. Others have examined similar associations. Endsley and Maruyama (2008) found a correlation of 0.34 between the combined scores on all four OAKS tests (reading, writing, math, and science) and overall first-year college grade point average for Oregon students. Other research indicates that differences among students identified as high performing or low performing through standardized test scores influenced college persistence (DuBrock, 2000; Ishitani & Desjardins, 2002/2003), with the high performers showing better persistence rates.

College enrollment is also associated with the high school attended (Conger & Long, 2013). Secondary school practices related to college attendance, including resource investment in college planning and parent outreach, have been found to be related to college enrollment (Hill, 2008). College-going climate at the school—as assessed by teachers and estimated by the percentage of past graduates attending college and average number of applications for the Free Application for Federal Student Aid—was found to be positively associated with planning for, applying to, and being accepted into a college (Roderick, Coca, & Nagaoka, 2011). Average demographic factors also play a role. Students at schools with low average levels of socioeconomic status were less likely to enroll in college than students at schools with high average levels (Engberg & Wolniak, 2010; Palardy, 2013) and were less likely to persist in college (Niu & Tienda, 2013). Having a rigorous, academic-focused curriculum and high teacher morale at the high school were both positively associated with students attending a four-year college (Palardy, 2013). Peer effects also may influence postsecondary outcomes, particularly in terms of peer aspirations of attending college (Engberg & Wolniak, 2010; Palardy, 2013).

Postsecondary school factors

Numerous postsecondary school factors have been found to influence college enrollment and persistence, including enrollment timing, attending college as a part-time or full-time

student, academic performance and courses, and college type. For example, delay in college enrollment is negatively associated with student persistence toward college graduation (Ahlburg, McCall, & Na, 2002; Berkner, He, & Cataldi, 2002; Bozick & DeLuca, 2005; Gururaj, 2011; Horn, Cataldi, & Sikora, 2005). Part-time enrollment might suggest that students have to work to support themselves or that they have other commitments that prevent them from full-time attendance (such as family responsibilities). Some research has indicated that part-time enrollment obstructs degree attainment (Berker, Horn, & Carroll, 2003), while other research has indicated that persistence rates are nearly as high for students who enrolled part-time for at least one semester as for full-time enrollees (for example, O'Toole, Stratton, & Wetzel, 2003). The current study considers both delayed enrollment and part-time enrollment as factors influencing college persistence. Byun, Irvin, and Meece (2012) found that, among rural students, delayed enrollment and attending college part-time were negatively associated with bachelor's degree completion, while first-year college grade point average and participation in social clubs, fraternities, or sororities had a positive relationship with degree completion.

The type of college and college factors are also related to postsecondary outcomes. Among students who first attended a community college, large college size and part-time faculty proportion were negatively associated with receiving a degree or certificate or transferring to a four-year institution (Calcagno, Bailey, Jenkins, Kienzl, & Leinbach, 2008). Other factors that may be related to enrollment are fees (tuition) and distance to college (Gonzalez & Hilmer, 2006). Distance to college may be particularly relevant for rural students, who may come from communities located far from postsecondary education options. Other studies have found college selectivity to be positively related to degree completion (Bowen, Chingos, & McPherson, 2009; Horn, 2006; Melguizo & Dowd, 2009).

There is a debate in the research literature regarding the effect of attending a two-year institution compared with a four-year institution (Doyle, 2009). Accounting for education expectations, Alfonso (2006) found that attending community college was negatively related to earning a bachelor's degree. Doyle (2009) used propensity score matching to examine this issue and found that attending community college lowered the rate of bachelor's degree completion. However, Gonzalez and Hilmer (2006) found that attending community college positively influenced bachelor's degree attainment for Hispanics. Melguizo and Dowd (2009) found, after controlling for socioeconomic status, that the negative influence of attending community college on bachelor's degree completion was overstated.

Gibbs (1998) found that rural students were more likely than urban students to attend public, nonselective colleges. The author attributed this to various factors—including that public colleges, rather than private colleges, are more prevalent in rural areas; that public colleges tend to have larger enrollments, require less rigorous coursework, and are lower cost; and that more selective colleges tend to be located in urban areas. These findings—the likelihood of rural students attending public and nonselective colleges—were confirmed by Byun, Meece, and Irvin (2012). The current study examines public and private college type but did not include data on college selectivity.

Hardy and Katsinas (2008) found that community colleges in rural areas had more first-time and full-time students than community colleges in nonrural areas (urban and suburban) did and that the financial aid patterns of rural students attending community colleges differed from those of their nonrural counterparts. In addition, community college

students in rural areas took out student loans and received institutional grant aid in higher numbers than their nonrural peers. Rural students may have less ability to commute to college because of distance and may need to pay for housing, which could explain higher loan rates.

The type of postsecondary coursework students pursue also appears to be associated with persistence in college, although findings are inconsistent across studies. Enrollment in developmental education courses, for example, has been found to be a predictor of attrition in some studies (Hawley & Harris, 2006; Wirt et al., 2004) and a predictor of persistence in others (St. John, Carter, Chung, & Musoba, 2006).³ In the current study, the study team examines how performance in certain first-year, college-level courses in community college relates to persistence.

Parent and community factors

Several researchers have found that parent and community factors, including socioeconomic status and rural school location, might influence postsecondary enrollment and persistence. Sandefur, Meier, and Campbell (2006) found that parent expectations and involvement were positively associated with college enrollment. Johnson (2008) identified distance to college as a barrier to matriculation and persistence. By contrast, Byun, Meece, and Irvin (2012) found that rural students had more community and social resources—a characteristic they claimed is associated with a significant increase in the likelihood of obtaining a bachelor's degree. However, they also found that low socioeconomic status served as a disadvantage to rural students and played a major role in the disparity in four-year degree attainment between rural and nonrural students. Howley (2006) found that rural students had similar rates of aspiring to graduate from a four-year college as urban students but lower rates of aspiring to more than four years of college (that is, a master's or doctorate). The author also found that rural families were more likely to turn down a job in a different community, indicating a sense of attachment to place that may also affect rural students' education aspirations and eventual attainment. In the current study, the study team used eligibility for free or reduced-price lunch receipt as a proxy for socioeconomic status and performed analyses that accounted for nonrural–rural high school location, but additional data on parent and community factors were unavailable.

Demographic factors

There is evidence that gender and race/ethnicity are associated with college enrollment and persistence rates. The current study compares postsecondary outcomes for these subgroups, which allows stakeholders to identify gaps and assess whether they are providing equitable services. Increasingly, women outnumber and outperform men in higher education, which may be associated with differences in high school academic performance (Cho, 2007; Ewert, 2010) and postsecondary outcomes (Conger & Long, 2010). Race/ethnicity has long been associated with variation in college access and degree attainment. Many of those differences can be explained by other factors, such as academic achievement and socioeconomic status. However, some students of historically underrepresented racial/ethnic groups experience social and emotional discomfort on their new campuses (Ewert, 2010; Fry, 2004; Zea, Reisen, Beil, & Caplan, 1997). Hispanics, the largest racial/ethnic minority group in the United States and a growing population in rural Oregon, have some of the country's lowest college enrollment and persistence rates among racial/ethnic

groups, even when controlling for academic achievement (Fry, 2004). Byun, Meece, and Irvin (2012) found that rural Hispanic students were less likely than rural White students to complete a bachelor's degree, although they found no significant relationship between degree completion and identification with other racial/ethnic groups. The current study compares the college enrollment and persistence of Hispanic students with those of other groups while accounting for gender and other racial/ethnic groups in the analysis.

Noncognitive factors

Noncognitive or nonacademic factors, such as study skills, time management, and self-regulation, may also be related to postsecondary outcomes. In their literature review, Farrington et al. (2012) found five categories of noncognitive factors that are related to academic outcomes:

- Academic behaviors, including completion of homework.
- Academic perseverance, including tenacity and self-discipline.
- Academic mindset, including belief in one's ability to succeed.
- Learning strategies, including goal-setting and study skills.
- Social skills, including interpersonal skills and empathy.

The current study examines demographic factors of gender and race/ethnicity; the parent and community factors of socioeconomic status and rural–nonrural high school location; the high school factor of performance on standardized tests in math and reading (OAKS tests); and the postsecondary factors of enrollment timing, attending college part-time or full-time, academic performance in certain courses, and college type (that is, two-year, four-year, public, private, in-state, and out-of-state). In addition to these factors, the current study focuses on rural status and contributes to the literature on college enrollment and persistence for rural students.

Appendix B. Data and methodology

Data

This study included data on students who attended an Oregon public high school between 2004 and 2012. The data are from four sources:

- The Oregon Department of Education (ODE), which provided student demographic information, Oregon Assessment of Knowledge and Skills (OAKS) test scores, and school information covering Oregon public high school students for 2004/05–2011/12.
- The National Student Clearinghouse (NSC), which provided information on where students enrolled in college, the type of college they enrolled in (public or private, two-year or four-year, and in-state or out-of-state), the semester in which students first enrolled in college, and additional semesters in which they were enrolled in college. The NSC verifies student enrollment for 96 percent of domestic colleges and universities (National Student Clearinghouse, n.d.). Some students in the study sample may have attended an Oregon postsecondary institution not included in the NSC; see appendix D for a list of such institutions.
- The Oregon Department of Community Colleges and Workforce Development (CCWD), which provided data on students who enrolled in an Oregon community college between 2005/06 and 2011/12, including number of credits taken and passed, major and minor areas of study, grade point average, financial aid received, and other transcript information. For Oregon community college students, CCWD data were the source of enrollment and persistence information when NSC data were not available.
- The Oregon University System (OUS), which provided data on students from Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) high schools who enrolled in four-year OUS colleges between 2006/07 and 2011/12, including number of credits taken and passed, major and minor areas of study, grade point average, financial aid received, and other transcript information. Because these data were available for only a subsample of students, detailed transcript information from OUS was not analyzed. For GEAR UP high school students, OUS data were the source of enrollment and persistence information when NSC data were not available.

The Regional Educational Laboratory Northwest signed data-sharing agreements with three organizations (ODE, OUS, and CCWD); the fourth source (NSC) was already linked with ODE data.

Data cleaning. This section identifies issues that emerged while preparing data for use in this study and how the study team resolved them:

- *Conflicting demographic information among ODE, OUS, and CCWD.* The study team considered data reported to ODE for accountability purposes to be the most accurate because ODE is held accountable under the No Child Left Behind Act of 2001 to report accurate student achievement scores on the OAKS tests to the federal government.
- *Different values for time-invariant variables.* If a time-invariant variable such as race/ethnicity varied within the same student in the ODE dataset, the student was assigned the modal race/ethnicity across all observations of that student in the

combined ODE, OUS, and CCWD longitudinal datasets. If there was no modal value, students were categorized as more than one race/ethnicity.

- *Multiple test scores in the same school year.* If a student had more than one test score in the same subject in the same school year, the first score was used. A possible reason for multiple scores for the same test in the same year is that some students may be allowed to retake the test. If multiple tests in the same subject and same test date were reported, scores were averaged.
- *Different course codes and course names across the OUS and CCWD systems.* For the analysis of whether some courses are gatekeepers (that is, many students who do not pass these courses do not persist to the second year of college), the study team needed to identify students' course subjects. Course codes and names are standardized within the OUS and CCWD systems. When variation across colleges in course codes and course names were encountered, the subject for each course was identified using course names. The course subject variable identified whether a student failed a core course. In this analysis, results were presented only for CCWD gatekeepers because the OUS data were present for only the sample of students at GEAR UP schools.

Missing data. Minimal missing demographic data were encountered because four data sources (ODE, NSC, CCWD, and OUS) were used. Longitudinal data were used to fill in missing values for time-invariant variables such as race/ethnicity and gender. For demographic variables with missing data, listwise deletion was performed on the cases with missing information, resulting in removal of 235 students for missing gender information, 87 students for missing special education information, and 202 students for missing socioeconomic status. Other missing data were dealt with as follows:

- *Missing OAKS scores.* If grade 10 OAKS scores were missing, grade 8 OAKS scores were substituted, standardized with a mean of 0 and a standard deviation of 1 within a school year. If grade 8 OAKS scores were not available, grade 7 OAKS scores were used. The study team created an indicator variable marking if middle school OAKS scores were used that was included in regression models. OAKS scores had frequent missing values; to avoid removing a large number of students from the sample or imputing scores, indicator variables for OAKS score quartiles and for missing OAKS scores were used rather than the OAKS score itself. A student with a missing OAKS score would have a value of 1 for the missing OAKS score indicator variable and a 0 for the OAKS quartile variables; a student in the top quartile would have a value of 1 for the top quartile indicator variable and a 0 for remaining quartiles and the missing OAKS score indicator.
- *Missing high school locale code.* Students whose high school locale code was missing were excluded from the analysis because the study team could not determine whether the high school was nonrural or rural for the purposes of this study. This resulted in the removal of 9,524 students.
- *Missing high school withdrawal code.* Withdrawal codes are sometimes missing when students withdraw at the end of a school year and are not recorded as enrolled the following school year. Since the study team worked with a statewide database, they were able to confirm whether a student transferred to another school within the state. If withdrawal codes were missing and students did not have a high school diploma, they could have finished high school in another state or dropped out; these students are included in the sample. If they enrolled in a college captured by the NSC database and matched to OUS data (OUS stores NSC data), they were included in the analysis of delayed enrollment and persistence.

Variables of interest

College enrollment and persistence. The study team examined enrollment and persistence data from the NSC data by student race/ethnicity, gender, socioeconomic status, and OAKS scores in math and reading. Comparisons were made across in-state and out-of-state colleges, public and private colleges, and two-year and four-year colleges. Students were classified based on when they enrolled in college:

- Immediate enrollment (seamless enrollment), enrolling in college the fall after exiting high school.
- Delayed enrollment, enrolling in college anytime following the first term after exiting high school.

Students who did not enroll in college were included in the enrollment analysis (but not in the enrollment timing or the persistence analysis, as the persistence analysis is conducted only among enrollers). Students were also examined by their credit load in college (full-time or part-time enrollment).

Small numbers of students were missing demographic characteristics; in each of those cases, the study team performed listwise deletion and did not include that student in the analyses. Approximately 13 percent of students were missing OAKS scores. To include those students in the analyses, indicator variables for OAKS score quartile categories as well as for missing OAKS scores were included in the regression analyses.

Table B1. Description of student groupings for reporting college enrollment and persistence rates

Indicator	Groups	Comments
Gender	Male	
	Female	
Race/ethnicity	Black	Descriptive results for all these groups are presented where sample sizes allow (10 or more). The regression analyses include all racial/ethnic categories.
	Asian	
	Hispanic	
	American Indian/Alaska Native	
	White	
	More than one race/ethnicity or other	
Free or reduced-price lunch status	Eligible for free or reduced-price lunch status	Individual free or reduced-price lunch status in the Oregon Department of Education database. If a student is ever marked as eligible for free or reduced-price lunch, he or she is considered to have been eligible for free or reduced-price lunch for the duration of his or her time in the data. This is used as a proxy for student socioeconomic status.
	Not eligible for free or reduced-price lunch status	
Special education status	Received special education services in K–12	Individual special education status in the Oregon Department of Education database. If a student is ever marked as receiving special education services, he or she is considered to have received special education services for the duration of his or her time in the data.
	Did not receive special education services in K–12	

(continued)

Table B1. Description of student groupings for reporting college enrollment and persistence rates
(continued)

Indicator	Groups	Comments
English learner student status	English learner student Not English learner student	English learner student status at the student level in the Oregon Department of Education database. If a student is ever marked as being an English learner student, he or she is considered to have been an English learner student for the duration of his or her time in the data.
Repeated a grade	Repeated a grade Did not repeat a grade	Marker for whether student ever repeated a grade in the Oregon Department of Education records.
Graduated	Graduated with high school diploma Did not graduate	Marker for whether student was recorded as graduating from an Oregon public high school.
Dropped out	Dropped out of high school Did not drop out	Marker for whether student was recorded as dropping out from an Oregon public high school. Those who do not drop out may graduate or may be marked as neither graduating nor dropping out, as some students' graduation or dropout outcomes are not captured by the school.
Grade 9 year	2005, 2006, or 2007	The actual grade 9 year of record in the Oregon Department of Education data or the presumed grade 9 year of record if student began attending an Oregon Department of Education school in grade 10, 11, or 12. Presumed year was calculated by subtracting one, two, or three years from the first year of record depending on the student's grade level.
Final Oregon Department of Education year	2005 to 2012	Year of high school graduation for graduates; for others, the last year the student appeared in the Oregon Department of Education data.
Years to graduate	Four or less Five or more	If student took three or four years to graduate versus five to eight years to graduate from high school.
Rural	Rural or nonrural	Whether high school location was in a rural or nonrural area, defined using National Center for Education Statistics locale codes (see table B3).
Grade 10 OAKS scores in math and reading	Quartiles 1–4 based on standardized scale score; those missing OAKS scores were given a value of 0. Indicator variables were used for regression analyses.	Grade 10 OAKS scale scores were standardized among students with a mean of 0 and a standard deviation of 1 within test and school year. If grade 10 scores were missing, grade 8 scores were used; if both grade 10 and grade 8 scores were missing, grade 7 scores were used. A variable is included in regression analyses to mark these students as having middle school test scores if scores came from grade 7 or 8. If grades 7, 8, and 10 scores were missing, students were given a value of 0 for the quartile indicators and a separate indicator for missing OAKS score was created.

OAKS is Oregon Assessment of Knowledge and Skills.

Source: Authors.

The analysis also covers type of college and time of college enrollment. College types are two-year, four-year, in-state, out-of-state, public, and private. Table B2 defines time-of-enrollment indicators and persistence to the second year of college.

High school location. Since the focus of the study was to examine differences in enrollment and persistence between students in rural and nonrural areas, defining rurality was key—and challenging. There were more than 24 different definitions of rural used by federal agencies in 2008 (Cromartie & Bucholtz, 2008), multiple definitions are used in education research and policymaking (Arnold, Biscoe, Farmer, Robertson, & Shapley, 2007), and there is no single definition of rural in use in Oregon. The study team determined rural and nonrural high school locations for the purposes of this study by using the urban-centric National Center for Education Statistics (NCES) locale code, which classifies schools as city, suburb, town, or rural (table B3). High schools located in a city, suburb, or fringe town were classified as nonrural, and those in a distant or remote town or a rural area were classified as rural. To avoid issues of changing locale codes during the study timespan, a high school was classified as rural if it was ever categorized as being in a distant or remote town or a rural area during any year of data included in the study. Students at high schools without an NCES locale code (9,524 students) were excluded from the analysis (many of these high schools were juvenile detention centers). This study used the last high school attended before graduating or leaving high school as the high school of record.

Table B2. Description of college outcomes and other college variables of interest

Outcome	Definition	Comments
Immediate enrollment	Student initially enrolled in college the first term after exiting high school	This indicates enrollment in the fall after high school graduation.
Delayed enrollment after exiting high school	Student initially enrolled in college 12 months or more after exiting high school	There are more delayed enrollers from earlier graduating classes in the data since they have had more time to delay enrollment.
Persisted to the second year of college	Student was enrolled in any college, as reported by the National Student Clearinghouse, one year after the date of initial enrollment	For example, a student who was enrolled in college in the fall of 2009 needed to be enrolled in any two- or four-year college in the fall of 2010 to be counted as persisting to the second year by the 2011/12 school year.
Enrolled full-time	Student enrolled in college and took 12 or more credits during the first semester	
Enrolled part-time	Student enrolled in college and took fewer than 12 credits during the first semester	
Need-based financial aid	Indicator for receipt of need-based financial aid (Pell Grant, Oregon Opportunity Grant, Supplemental Educational Opportunity Grant, or Work Study program)	Only for Oregon community college students.
Merit-based financial aid	Indicator for receipt of merit-based financial aid (including private scholarships)	Only for Oregon community college students.
Loan aid	Indicator for Stafford loan receipt	Only for Oregon community college students.
Passed gatekeeper	Whether student passed gatekeeper class	College algebra and college English were examined in detail in this study for Oregon community college students.

Source: Authors' analysis.

Table B3. National Center for Education Statistics locale code description

Code	Classification	Definition
Classified as nonrural for this study		
11	City, large	Territory inside an urbanized area and inside a principal city with population of 250,000 or more.
12	City, midsize	Territory inside an urbanized area and inside a principal city with population less than 250,000 and greater than or equal to 100,000.
13	City, small	Territory inside an urbanized area and inside a principal city with population less than 100,000.
21	Suburb, large	Territory outside a principal city and inside an urbanized area with population of 250,000 or more.
22	Suburb, midsize	Territory outside a principal city and inside an urbanized area with population less than 250,000 and greater than or equal to 100,000.
23	Suburb, small	Territory outside a principal city and inside an urbanized area with population less than 100,000.
31	Town, fringe	Territory inside an urban cluster that is less than or equal to 10 miles from an urbanized area.
Classified as rural for this study		
32	Town, distant	Territory inside an urban cluster that is more than 10 miles and less than or equal to 35 miles from an urbanized area.
33	Town, remote	Territory inside an urban cluster that is more than 35 miles from an urbanized area.
41	Rural, fringe	Census-defined rural territory that is less than or equal to 5 miles from an urbanized area, as well as rural territory that is less than or equal to 2.5 miles from an urban cluster.
42	Rural, distant	Census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an urban cluster.
43	Rural, remote	Census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster.

Source: National Center for Education Statistics Common Core of Data.

Study sample

The study includes all Oregon public high school students who:

- Attended an ODE high school between 2004/05 and 2010/11 with an actual or presumed first grade 9 year of 2005, 2006, or 2007 and have a record of a final year.⁴
- Attended a high school with a NCES locale code.
- Did not have missing data on gender, special education status, or eligibility for free or reduced-price lunch.

Those who left high school (either graduated or exited without a diploma) in 2010/11 were included in the sample and the enrollment analyses but were not included in the persistence analyses, as they would not have had time to persist to the second year of college (given that the enrollment and persistence data went through 2012). In all analyses, grade 9 cohort, graduation status, and years spent in high school were accounted for. Table B4 provides details on student characteristics of the sample used in the analysis.

The sample also included high school graduates (107,231), dropouts (15,616), and those of unknown completion status who had a final year in the ODE database (34,462). Approximately a third of the sample was in each grade 9 cohort: 53,525 in 2004/05, 52,586 in 2005/06,

Table B4. Student characteristics of the sample used in the analysis (percent)

	Nonrural (<i>n</i> = 92,917)	Rural (<i>n</i> = 64,392)	All students (<i>n</i> = 157,309)
Gender			
Male	50.6	52.3	51.2
Race/ethnicity			
Black	3.8	1.0	2.7
Asian	6.3	2.2	4.6
Hispanic	16.0	12.5	14.6
American Indian/Alaska Native	1.4	3.5	2.2
White	68.4	77.8	72.3
More than one race/ethnicity or other	3.0	2.0	2.6
Unknown	1.1	1.0	1.1
Total	100.0	100.0	100.0
Other demographics			
Free or reduced-price lunch status	46.4	52.6	48.9
Special education status	15.0	16.2	15.5
English learner status	12.8	8.2	10.9
Graduated from Oregon high school	70.6	64.7	68.2
Dropped out of Oregon high school	9.8	10.1	9.9
Achievement			
OAKS math score not available	11.2	14.4	12.5
OAKS math score in first quartile	22.7	24.9	23.6
OAKS math score in second quartile	19.3	20.9	19.9
OAKS math score in third quartile	24.5	23.6	24.2
OAKS math score in fourth quartile	22.3	16.1	19.8
OAKS reading score not available	12.1	15.1	13.3
OAKS reading score in first quartile	21.7	22.5	22.0
OAKS reading score in second quartile	22.1	24.0	22.9
OAKS reading score in third quartile	21.1	20.4	20.8
OAKS reading score in fourth quartile	23.0	17.9	21.0
College outcomes			
Enrolled in college after high school	63.0	55.1	59.8
First enrolled in college the fall after high school graduation ^a	66.6	61.4	64.6
Persisted to the second year of college ^b	68.2	58.5	64.6

OAKS is Oregon Assessment of Knowledge and Skills.

a. *n* = 58,501 for nonrural students, *n* = 35,504 for rural students, and *n* = 94,005 for all students.

b. *n* = 48,743 for nonrural students, *n* = 28,278 for rural students, and *n* = 77,021 for all students.

Source: Authors' calculations based on data from the Oregon Department of Education, the National Student Clearinghouse, the Oregon Department of Community Colleges and Workforce Development, and the Oregon University System.

and 51,198 in 2006/07. The study team used student names and birth dates to match records across the data sources. Students who did not match from CCWD or OUS data to ODE data (for example, who did not attend high school in Oregon) were not included in the sample.

Methods

To address the research questions, descriptive results relating to enrollment and persistence rates were generated by tabulating different combinations of variables. In the descriptive tables, the study team compared results by student characteristics and by nonrural–rural

high school location (see tables C1–C9 in appendix C). Variables tabulated included gender, race/ethnicity, free or reduced-price lunch status, special education status, English learner status, quartiles of grade 10 OAKS scores (based on percentiles from z-scores standardized by grade and subject), year of high school graduation (or last year in ODE data), various types of colleges (four-year, two-year, in-state, out-of-state, public, private, and for profit), and performance in gatekeeper courses in community college.

The study team also conducted regression analyses of enrollment at any time after high school, immediate enrollment, and persistence to the second year of college on the background characteristics of students, the characteristics of the colleges they first enrolled in, and whether students passed a gatekeeper class. A logistic regression model was used with the dependent variable of “whether a student enrolled in college after high school” (see table C10 in appendix C), “whether a student enrolled immediately in college” (see table C11 in appendix C), or “whether a student persisted to the second year of college” (see tables C12–C14 in appendix C). Including background characteristics of students in the analysis model as control variables allowed the study team to examine the variable of interest (rural school) while accounting for variation that might be caused by demographic and achievement factors. This approach was adopted because the outcomes of interest are binary—either a student enrolls or does not, or persists or does not. To more easily report results of the logistic regression model, percentage increase or decrease in odds was calculated using the following formula: $(\text{Odds ratio} - 1) * 100$. In other cases, the percent of students predicted to have a certain outcome was reported by calculating the marginal effect at the mean (holding all covariates at the mean) of the variable in question after estimating the likelihood of success from the statistical model.

The logistic regression model was developed by testing the inclusion of variables one by one to check whether they added to the overall fit of the model. The study team based the list of variables on theory (factors shown in the literature to have a relationship with postsecondary outcomes) and data availability. Some variables that did not add to the fit of the model were not included (such as whether the high school received certain federal funding programs or how many years the student spent in high school), while others with a strong theory for inclusion were kept in the model regardless of statistical significance. Adding variables in this method also allowed the study team to examine the stability of the estimates as the model was developed.

Logistic modeling has been used in several similar education studies. For example, Wang (2009) used a logistic model to predict bachelor’s degree attainment and persistence among students who attended community colleges and transferred to four-year universities. Herreid and Miller (2009) developed predictive models of college student attrition at the University of South Florida using a logistic model. Another study used a logistic model to examine the relationship between student engagement, college grade point average, and persistence for students from different racial and ethnic backgrounds (Kuh et al., 2008).

The models for binary outcomes describe the probability of enrolling at any time after high school, of enrolling immediately after high school, or of persisting to the second year of college. Variables were selected for inclusion based on theory; the literature review in appendix A provides a theoretical basis about what factors may be related to postsecondary outcomes. The study team then added variables into the model one by one, examining each variable’s effect on the model and overall fit (as reported by the pseudo R-squared).

Each added variable improved the overall fit of the model, and the coefficient estimates of previously added variables did not change dramatically, indicating that the added variables were appropriate. The study team then tested the sensitivity of the model by splitting the sample and running the model on two (separate) random 10 percent samples, two random 20 percent samples, and two 50 percent samples to see whether they yielded similar estimates. The split models produced similar results, with the exception of the race/ethnicity indicators for American Indian/Alaska Native, more than one race/ethnicity or other, and race/ethnicity unknown for the 10 percent samples. These differences lessened for the 20 percent samples and were not present in the 50 percent samples, indicating that the lack of stability for those variables may be due to small numbers of students (2.5 percent of the sample or less) and that those variables are appropriate to use in the full sample.

This study does not attempt to establish a causal relationship between the independent variables in the models and the outcome (enrollment at any time, immediate enrollment, or persistence to the second year of college). Rather, these analyses are used to make comparisons between rural and nonrural students while controlling for a variety of factors. The goal of this modeling exercise was to find a well fitting, parsimonious model that will begin to highlight the relationship between certain factors and the college outcomes.

Equation B1 is a model for binary outcomes such as enrollment, enrollment timing, and persistence:

$$(B1) \quad \log \left[\frac{\phi_i}{1-\phi_i} \right] = \beta_1 \text{MALE}_i + \beta_2 \text{RACE}_i + \beta_3 \text{SPECED}_i + \beta_4 \text{LEP}_i + \beta_5 \text{FRPL}_i + \beta_6 \text{OAKS}_i \\ + \beta_7 \text{FIRSTHSYR}_i + \beta_8 \text{REPEAT}_i + \beta_9 \text{GRADUATE}_i + \beta_{10} \text{DROPOUT}_i \\ + \beta_{11} \text{MIDSCHL}_i + \beta_{12} \text{RURAL}_i + \beta_{13} \text{HALFTIME}_i + \beta_{14} \text{PRIVATE}_i + \beta_{15} \text{OUTSTATE}_i \\ + \beta_{16} \text{NEEDFINAID}_i + \beta_{17} \text{MERITFINAID}_i + \beta_{18} \text{LOANAID}_i + \beta_{19} \text{ENROLLFALL}_i \\ + \beta_{20} \text{PASSCOLLALG}_i + \beta_{21} \text{PASSENGCOMP}_i,$$

where ϕ_i is the probability that student i enrolls, enrolls immediately, or persists to the second year of college (depending on the model in question), given *MALE*, an indicator for whether student i is male; *RACE*, a set of binary indicators for each racial/ethnic category; *SPECED*, an indicator for whether a student received special education services; *LEP*, an indicator for English learner status; *FRPL*, an indicator for eligibility for free or reduced-price lunch; *OAKS*, a set of indicator variables marking the quartile of student i 's grade 10 *OAKS* scores in math and reading (quartiles based on standardized scale scores across the sample to have a mean of 0 and a standard deviation of 1 and an indicator variable for missing *OAKS* scores); *FIRSTHSYR*, a set of binary indicators for 2005 and 2006 that marks if the student was in grade 9 in that year (2007 is the reference category); *REPEAT*, an indicator for whether the student ever repeated a grade; *GRADUATE*, an indicator for whether the student graduated; *DROPOUT*, an indicator for if the student dropped out of high school; *MIDSCHL*, a set of indicators for if the *OAKS* scores used for either math or reading were from middle school rather than high school; and *RURAL*, an indicator for whether the student attended a rural high school, based on NCES locale codes (this variable was included only for regressions with the full sample included and not for regressions that were restricted to either rural or nonrural students).

Additional variables were included for selected models presented in tables C11–C14 in appendix C: *HALFTIME*, an indicator for whether student i initially enrolled in college part time; *PRIVATE*, an indicator for if the initial college is private; *OUTSTATE*, an

indicator for if the initial college was out of state (included only in select enroll immediately and persistence models); *NEEDFINAID*, an indicator for whether the student received need-based financial aid in college (used only for CCWD enrollees); *MERITFINAID*, an indicator whether the student received any merit-based financial aid, such as academic scholarships and merit-based grants (used only for CCWD enrollees); *LOANAID*, an indicator whether the student received Stafford loans (used only for CCWD enrollees); *ENROLLFALL*, an indicator for whether student i initially enrolled in college immediately; *PASSCOLLALG*, an indicator for whether the student passed college algebra (used only for persistence with the gatekeeper analysis for CCWD students; see table C13 in appendix C); and *PASSENGCOMP*, an indicator for whether the student passed English composition I (used only for persistence with the gatekeeper analysis for CCWD students; see table C14 in appendix C).

For all regressions, the analysis was first conducted on a full sample, then on only rural students, then on only nonrural students, then with interactions between rural–nonrural status and the independent variables, and then on subsamples (for example, only two-year colleges, only four-year colleges, CCWD students only, or only high achievers). The study team explored interactions for rural and all independent variables to examine the differences between rural and nonrural students related to these factors. Robust standard errors were clustered at the school level for all regressions to control for correlation at the school level in the error terms. This was done to avoid type I errors (false positives) when testing hypotheses using two-tailed z -tests, because robust standard errors are typically larger than regular standard errors. The models were run without robust standard errors, with robust unclustered standard errors, with robust standard errors clustered at the school level, and with robust standard errors clustered at the district level (results not shown). Statistical significance and the size of the standard errors did not change dramatically between these models with different standard errors, indicating that these models and standard errors are relatively stable. The study team selected robust standard errors (to reduce type I errors) and clustered at the high school level to account for variation at the school level that is not being picked up in the model (as the only school-level variable included is rural school location). Given that schools may vary widely within a district clustering, the study team felt it was more appropriate to cluster on the school level than on the district level. Future studies using these data could explore creation and inclusion of high school– and district-level variables and different methods of standard errors. However, given the large number of statistical tests, there may be type I errors even when using robust standard errors, and therefore caution should be used when interpreting results, particularly for subgroups.

This study does not use hierarchical modeling methods given that its goal is to provide a baseline for future research (which could include hierarchical modeling). In addition, students in this study are nested within high schools and then colleges, with no clear classification structure between those two levels, making interpretation and estimation challenging. As this study is designed to be accessible to policymakers in Oregon, the study team chose to use logistic regression rather than a more complicated cross-classified hierarchical model. In addition, because this study attempts to identify factors related to enrollment and persistence rather than to obtain a precise estimate of the effect of a factor, the study team feels that logistic regression serves that purpose and does not result in a loss of precision.

Appendix C. Detailed results

This appendix provides detailed results of the descriptive statistics and regression analysis.

Descriptive statistics

Tables C1–C9 provide detailed results of the descriptive statistics.

Table C1. College enrollment at any point after high school, all students (rural and nonrural)

Characteristic	Did not enroll in college (number)	Enrolled in college after high school (number)	Total (number)	Did not enroll in college (percent)	Enrolled in college after high school (percent)	Total (percent)
Student gender						
Female	27,680	49,010	76,690	36.1	63.9	100.0
Male	35,624	44,995	80,619	44.2	55.8	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0
Student race/ethnicity						
Black	1,530	2,691	4,221	36.2	63.8	100.0
Asian	2,204	5,052	7,256	30.4	69.6	100.0
Hispanic	13,562	9,344	22,906	59.2	40.8	100.0
American Indian/Alaska Native	1,725	1,794	3,519	49.0	51.0	100.0
White	41,618	72,067	113,685	36.6	63.4	100.0
More than one race/ethnicity or other	1,855	2,182	4,037	45.9	54.1	100.0
Unknown	810	875	1,685	48.1	51.9	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0
Free or reduced-price lunch status						
No	24,836	55,515	80,351	30.9	69.1	100.0
Yes	38,468	38,490	76,958	50.0	50.0	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0
Special education status						
No	48,998	83,951	132,949	36.9	63.1	100.0
Yes	14,306	10,054	24,360	58.7	41.3	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0
English learner status						
No	52,941	87,206	140,147	37.8	62.2	100.0
Yes	10,363	6,799	17,162	60.4	39.6	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0
Graduated from Oregon high school						
No	32,126	17,952	50,078	64.2	35.8	100.0
Yes	31,178	76,053	107,231	29.1	70.9	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0
Dropped out of Oregon high school						
No	51,976	89,717	141,693	36.7	63.3	100.0
Yes	11,328	4,288	15,616	72.5	27.5	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0

(continued)

Table C1. College enrollment at any point after high school, all students (rural and nonrural) *(continued)*

Characteristic	Did not enroll in college (number)	Enrolled in college after high school (number)	Total (number)	Did not enroll in college (percent)	Enrolled in college after high school (percent)	Total (percent)
Repeated a grade						
No	51,903	88,843	140,746	36.9	63.1	100.0
Yes	11,401	5,162	16,563	68.8	31.2	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0
High school graduation year or final year in file						
2005	1,166	865	2,031	57.4	42.6	100.0
2006	3,024	2,182	5,206	58.1	41.9	100.0
2007	5,498	4,108	9,606	57.2	42.8	100.0
2008	15,476	29,785	45,261	34.2	65.8	100.0
2009	17,090	29,205	46,295	36.9	63.1	100.0
2010	16,094	26,357	42,451	37.9	62.1	100.0
2011	3,997	1,336	5,333	74.9	25.1	100.0
2012	959	167	1,126	85.2	14.8	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0
Years to graduate from first grade 9 year						
Four or fewer	24,571	69,160	93,731	26.2	73.8	100.0
Five or more	3,518	2,136	5,654	62.2	37.8	100.0
Total	28,089	71,296	99,385	28.3	71.7	100.0
High school is rural or distant/remote town						
Nonrural	34,416	58,501	92,917	37.0	63.0	100.0
Rural	28,888	35,504	64,392	44.9	55.1	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0
OAKS math score						
Not available	12,905	6,758	19,663	65.6	34.4	100.0
First quartile	21,757	15,413	37,170	58.5	41.5	100.0
Second quartile	13,085	18,294	31,379	41.7	58.3	100.0
Third quartile	10,598	27,410	38,008	27.9	72.1	100.0
Fourth quartile	4,959	26,130	31,089	16.0	84.0	100.0
Total	63,304	94,005	147,309	40.2	59.8	100.0
OAKS reading score						
Not available	13,633	7,340	20,973	65.0	35.0	100.0
First quartile	20,508	14,164	34,672	59.1	40.9	100.0
Second quartile	14,288	21,697	35,985	39.7	60.3	100.0
Third quartile	9,182	23,533	32,715	28.1	71.9	100.0
Fourth quartile	5,693	27,271	32,964	17.3	82.7	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0
First grade 9 year						
2005	20,423	33,102	53,525	38.2	61.8	100.0
2006	21,168	31,418	52,586	40.3	59.7	100.0
2007	21,713	29,485	51,198	42.4	57.6	100.0
Total	63,304	94,005	157,309	40.2	59.8	100.0

Source: Authors' calculations based on data described in appendix B.

Table C2. College enrollment at any point after high school, rural students

Characteristic	Did not enroll in college (number)	Enrolled in college after high school (number)	Total (number)	Did not enroll in college (percent)	Enrolled in college after high school (percent)	Total (percent)
Student gender						
Female	12,206	18,537	30,743	39.7	60.3	100.0
Male	16,682	16,967	33,649	49.6	50.4	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0
Student race/ethnicity						
Black	318	345	663	48.0	52.0	100.0
Asian	585	812	1,397	41.9	58.1	100.0
Hispanic	4,732	3,317	8,049	58.8	41.2	100.0
American Indian/Alaska Native	1,155	1,085	2,240	51.6	48.4	100.0
White	21,037	29,076	50,113	42.0	58.0	100.0
More than one race/ethnicity or other	679	598	1,277	53.2	46.8	100.0
Unknown	382	271	653	58.5	41.5	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0
Free or reduced-price lunch status						
No	11,356	19,170	30,526	37.2	62.8	100.0
Yes	17,532	16,334	33,866	51.8	48.2	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0
Special education status						
No	22,324	31,623	53,947	41.4	58.6	100.0
Yes	6,564	3,881	10,445	62.8	37.2	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0
English learner status						
No	25,574	33,561	59,135	43.2	56.8	100.0
Yes	3,314	1,943	5,257	63.0	37.0	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0
Graduated from Oregon high school						
No	14,889	7,829	22,718	65.5	34.5	100.0
Yes	13,999	27,675	41,674	33.6	66.4	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0
Dropped out of Oregon high school						
No	24,178	33,728	57,906	41.8	58.2	100.0
Yes	4,710	1,776	6,486	72.6	27.4	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0
Repeated a grade						
No	23,981	33,365	57,346	41.8	58.2	100.0
Yes	4,907	2,139	7,046	69.6	30.4	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0
High school graduation year or final year in file						
2005	538	362	900	59.8	40.2	100.0
2006	1,361	938	2,299	59.2	40.8	100.0
2007	2,557	1,783	4,340	58.9	41.1	100.0

(continued)

Table C2. College enrollment at any point after high school, rural students *(continued)*

Characteristic	Did not enroll in college (number)	Enrolled in college after high school (number)	Total (number)	Did not enroll in college (percent)	Enrolled in college after high school (percent)	Total (percent)
2008	7,086	11,130	18,216	38.9	61.1	100.0
2009	7,936	10,896	18,832	42.1	57.9	100.0
2010	7,335	9,822	17,157	42.8	57.2	100.0
2011	1,698	517	2,215	76.7	23.3	100.0
2012	377	56	433	87.1	12.9	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0
Years to graduate from first grade 9 year						
Four or fewer	11,088	25,050	36,138	30.7	69.3	100.0
Five or more	1,482	884	2,366	62.6	37.4	100.0
Total	12,570	25,934	38,504	32.6	67.4	100.0
High school is rural or distant/remote town						
Rural	28,888	35,504	64,392	44.9	55.1	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0
OAKS math score						
Not available	6,342	2,948	9,290	68.3	31.7	100.0
First quartile	9,756	6,278	16,034	60.8	39.2	100.0
Second quartile	5,999	7,453	13,452	44.6	55.4	100.0
Third quartile	4,805	10,413	15,218	31.6	68.4	100.0
Fourth quartile	1,986	8,412	10,398	19.1	80.9	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0
OAKS reading score						
Not available	6,599	3,140	9,739	67.8	32.2	100.0
First quartile	8,965	5,529	14,494	61.9	38.1	100.0
Second quartile	6,751	8,722	15,473	43.6	56.4	100.0
Third quartile	4,156	8,980	13,136	31.6	68.4	100.0
Fourth quartile	2,417	9,133	11,550	20.9	79.1	100.0
Total	28,888	35,504	64,391	44.9	55.1	100.0
First grade 9 year						
2005	9,325	12,548	21,873	42.6	57.4	100.0
2006	9,634	11,769	21,403	45.0	55.0	100.0
2007	9,929	11,187	21,116	47.0	53.0	100.0
Total	28,888	35,504	64,392	44.9	55.1	100.0

Source: Authors' calculations based on data described in appendix B.

Table C3. College enrollment at any point after high school, nonrural students

Characteristic	Did not enroll in college (number)	Enrolled in college after high school (number)	Total (number)	Did not enroll in college (percent)	Enrolled in college after high school (percent)	Total (percent)
Student gender						
Female	15,474	30,473	45,947	33.7	66.3	100.0
Male	18,942	28,028	46,970	40.3	59.7	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
Student race/ethnicity						
Black	1,212	2,346	3,558	34.1	65.9	100.0
Asian	1,619	4,240	5,859	27.6	72.4	100.0
Hispanic	8,830	6,027	14,857	59.4	40.6	100.0
American Indian/Alaska Native	570	709	1,279	44.6	55.4	100.0
White	20,581	42,991	63,572	32.4	67.6	100.0
More than one race/ethnicity or other	1,176	1,584	2,760	42.6	57.4	100.0
Unknown	428	604	1,032	41.5	58.5	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
Free or reduced-price lunch status						
No	13,480	36,345	49,825	27.1	72.9	100.0
Yes	20,936	22,156	43,092	48.6	51.4	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
Special education status						
No	26,674	52,328	79,002	33.8	66.2	100.0
Yes	7,742	6,173	13,915	55.6	44.4	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
English learner status						
No	27,367	53,645	81,012	33.8	66.2	100.0
Yes	7,049	4,856	11,905	59.2	40.8	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
Graduated from Oregon high school						
No	17,237	10,123	27,360	63.0	37.0	100.0
Yes	17,179	48,378	65,557	26.2	73.8	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
Dropped out of Oregon high school						
No	27,798	55,989	83,787	33.2	66.8	100.0
Yes	6,618	2,512	9,130	72.5	27.5	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
Repeated a grade						
No	27,922	55,478	83,400	33.5	66.5	100.0
Yes	6,494	3,023	9,517	68.2	31.8	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
High school graduation year or final year in file						
2005	628	503	1,131	55.5	44.5	100.0
2006	1,663	1,244	2,907	57.2	42.8	100.0
2007	2,941	2,325	5,266	55.8	44.2	100.0

(continued)

Table C3. College enrollment at any point after high school, nonrural students *(continued)*

Characteristic	Did not enroll in college (number)	Enrolled in college after high school (number)	Total (number)	Did not enroll in college (percent)	Enrolled in college after high school (percent)	Total (percent)
2008	8,390	18,655	27,045	31.0	69.0	100.0
2009	9,154	18,309	27,463	33.3	66.7	100.0
2010	8,759	16,535	25,294	34.6	65.4	100.0
2011	2,299	819	3,118	73.7	26.3	100.0
2012	582	111	693	84.0	16.0	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
Years to graduate from first grade 9 year						
Four or fewer	13,483	44,110	57,593	23.4	76.6	100.0
Five or more	2,036	1,252	3,288	61.9	38.1	100.0
Total	15,519	45,362	60,881	25.5	74.5	100.0
High school is rural or distant/remote town						
Nonrural	34,416	58,501	92,917	37.0	63.0	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
OAKS math score						
Not available	6,563	3,810	10,373	63.3	36.7	100.0
First quartile	12,001	9,135	21,136	56.8	43.2	100.0
Second quartile	7,086	10,841	17,927	39.5	60.5	100.0
Third quartile	5,793	16,997	22,790	25.4	74.6	100.0
Fourth quartile	2,973	17,718	20,691	14.4	85.6	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
OAKS reading score						
Not available	7,034	4,200	11,234	62.6	37.4	100.0
First quartile	11,543	8,635	20,178	57.2	42.8	100.0
Second quartile	7,537	12,975	20,512	36.7	63.3	100.0
Third quartile	5,026	14,553	19,579	25.7	74.3	100.0
Fourth quartile	3,276	18,138	21,414	15.3	84.7	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0
First grade 9 year						
2005	11,098	20,554	31,652	35.1	64.9	100.0
2006	11,534	19,649	31,183	37.0	63.0	100.0
2007	11,784	18,298	30,082	39.2	60.8	100.0
Total	34,416	58,501	92,917	37.0	63.0	100.0

Source: Authors' calculations based on data described in appendix B.

Table C4. Persistence to the second year of college, all students (rural and nonrural)

High school location and college type	Did not persist to the second year of college (number)	Persisted to the second year of college (number)	Total (number)	Did not persist to the second year of college (percent)	Persisted to the second year of college (percent)	Total (percent)
High school is rural or distant/remote town						
Nonrural	9,292	46,059	55,351	16.8	83.2	100.0
Rural	7,258	25,670	32,928	22.0	78.0	100.0
Total	16,550	71,729	88,279	18.7	81.3	100.0
College type						
Two or less year private in-state	109	269	378	28.8	71.2	100.0
Two or less year public in-state	11,305	28,655	39,960	28.3	71.7	100.0
Two or less year private out-of-state	93	95	188	49.5	50.5	100.0
Two or less year public out-of-state	2082	3,219	5,301	39.3	60.7	100.0
Four-year private in-state	217	4,037	4,254	5.1	94.9	100.0
Four-year public in-state	1,264	20,313	21,577	5.9	94.1	100.0
Four-year private out-of-state	827	6,100	6,927	11.9	88.1	100.0
Four-year public out-of-state	635	3,937	4,572	13.9	86.1	100.0
Total	16,532	66,625	83,157	19.9	80.1	100.0

Note: Data are for students who enrolled in college on or before February 1, 2011.

Source: Authors' calculations based on data described in appendix B.

Table C5. Persistence to the second year of college, rural students

College type	Did not persist to the second year of college (number)	Persisted to the second year of college (number)	Total (number)	Did not persist to the second year of college (percent)	Persisted to the second year of college (percent)	Total (percent)
Two or less year private in-state	37	50	87	42.5	57.5	100.0
Two or less year public in-state	4,912	11,094	16,006	30.7	69.3	100.0
Two or less year private out-of-state	54	54	108	50.0	50.0	100.0
Two or less year public out-of-state	1,037	1,517	2,554	40.6	59.4	100.0
Four-year private in-state	81	1,364	1,445	5.6	94.4	100.0
Four-year public in-state	474	6,448	6,922	6.8	93.2	100.0
Four-year private out-of-state	317	1,617	1,934	16.4	83.6	100.0
Four-year public out-of-state	337	1,425	1,762	19.1	80.9	100.0
Total	7,249	23,569	30,818	23.5	76.5	100.0

Note: Data are for students who enrolled in college on or before February 1, 2011.

Source: Authors' calculations based on data described in appendix B.

Table C6. Persistence to the second year of college, nonrural students

College type	Did not persist to the second year of college (number)	Persisted to the second year of college (number)	Total (number)	Did not persist to the second year of college (percent)	Persisted to the second year of college (percent)	Total (percent)
Two or less year private in-state	72	219	291	24.7	75.3	100.0
Two or less year public in-state	6,393	17,561	23,954	26.7	73.3	100.0
Two or less year private out-of-state	39	41	80	48.8	51.3	100.0
Two or less year public out-of-state	1,045	1,702	2,747	38.0	62.0	100.0
Four-year private in-state	136	2,673	2,809	4.8	95.2	100.0
Four-year public in-state	790	13,865	14,655	5.4	94.6	100.0
Four-year private out-of-state	510	4,483	4,993	10.2	89.8	100.0
Four-year public out-of-state	298	2,512	2,810	10.6	89.4	100.0
Total	9,283	43,056	52,339	17.7	82.3	100.0

Note: Data are for students who enrolled in college on or before February 1, 2011.

Source: Authors' calculations based on data described in appendix B.

Table C7. Persistence to the second year of college by gatekeeper course passing status, all students at Oregon community colleges

Gatekeeper course passing status	Did not persist to the second year of college (number)	Persisted to the second year of college (number)	Total (number)	Did not persist to the second year of college (percent)	Persisted to the second year of college (percent)	Total (percent)
Student passed college algebra						
No	327	1,548	1,875	17.4	82.6	100.0
Yes	50	214	264	18.9	81.1	100.0
Total	377	1,762	2,139	17.6	82.4	100.0
Student passed English composition I						
No	1,749	4,186	5,935	29.5	70.5	100.0
Yes	256	624	880	29.1	70.9	100.0
Total	2,005	4,810	6,815	29.4	70.6	100.0

Source: Authors' calculations based on data described in appendix B.

Table C8. Persistence to the second year of college by gatekeeper course passing status, rural students at Oregon community colleges

Gatekeeper course passing status	Did not persist to the second year of college (number)	Persisted to the second year of college (number)	Total (number)	Did not persist to the second year of college (percent)	Persisted to the second year of college (percent)	Total (percent)
Student passed college algebra						
No	154	695	849	18.1	81.9	100.0
Yes	22	80	102	21.6	78.4	100.0
Total	176	775	951	18.5	81.5	100.0
Student passed English composition I						
No	767	1,730	2,497	30.7	69.3	100.0
Yes	104	205	309	33.7	66.3	100.0
Total	871	1,935	2,806	31.0	69.0	100.0

Source: Authors' calculations based on data described in appendix B.

Table C9. Persistence to the second year of college by gatekeeper course passing status, nonrural students at Oregon community colleges

Gatekeeper course passing status	Did not persist to the second year of college (number)	Persisted to the second year of college (number)	Total (number)	Did not persist to the second year of college (percent)	Persisted to the second year of college (percent)	Total (percent)
Student passed college algebra						
No	173	853	1,026	16.9	83.1	100.0
Yes	28	134	162	17.3	82.7	100.0
Total	201	987	1,188	16.9	83.1	100.0
Student passed English composition I						
No	982	2,456	3,438	28.6	71.4	100.0
Yes	152	419	571	26.6	73.4	100.0
Total	1,134	2,875	4,009	28.3	71.7	100.0

Source: Authors' calculations based on data described in appendix B.

Regression analysis

Results from the logistic regressions in tables C10–C14 are reported in odds ratios that represent the strength of the relationship between the factor in question and the outcome being examined. Odds ratios above 1 indicate that having that factor increases the odds of the outcome, while odds ratios below 1 indicate a decrease in odds and an odds ratio of 1 indicates no relationship between the factor and the outcome.

Table C10. Likelihood of enrolling in college after high school (odds ratios)

Characteristic	All students	All students, with interactions
Male	0.746*** [0.0108]	0.792*** [0.0138]
Black	1.786*** [0.0900]	1.891*** [0.104]
Asian	1.307*** [0.0596]	1.371*** [0.0713]
Hispanic	0.769*** [0.0253]	0.708*** [0.0268]
American Indian/Alaska Native	0.959 [0.0560]	0.961 [0.0689]
More than one race/ethnicity or other	1.043 [0.0442]	1.010 [0.0542]
Race/ethnicity unknown	0.966 [0.0606]	1.036 [0.0806]
In special education	0.812*** [0.0164]	0.833*** [0.0222]
English learner student	0.785*** [0.0351]	0.796*** [0.0427]
Eligible for free or reduced-price lunch	0.737*** [0.0133]	0.719*** [0.0169]
OAKS math score not available	0.387*** [0.0163]	0.396*** [0.0206]
OAKS math score in first quartile	0.389*** [0.0105]	0.395*** [0.0144]
OAKS math in second quartile	0.504*** [0.0128]	0.508*** [0.0169]
OAKS math score in third quartile	0.662*** [0.0148]	0.671*** [0.0204]
OAKS reading score not available	0.407*** [0.0162]	0.421*** [0.0204]
OAKS reading score in first quartile	0.468*** [0.0120]	0.470*** [0.0145]
OAKS reading score in second quartile	0.632*** [0.0144]	0.633*** [0.0186]
OAKS reading score in third quartile	0.742*** [0.0159]	0.734*** [0.0207]
First grade 9 year 2005	1.253*** [0.0216]	1.271*** [0.0297]
First grade 9 year 2006	1.109*** [0.0184]	1.126*** [0.0251]

(continued)

Table C10. Likelihood of enrolling in college after high school (odds ratios) (continued)

Characteristic	All students	All students, with interactions
Repeated a grade	0.514*** [0.0163]	0.494*** [0.0216]
Graduated	2.285*** [0.0575]	2.445*** [0.0862]
Dropped out	0.791*** [0.0259]	0.756*** [0.0307]
OAKS math score from middle school used instead of score from high school	0.938 [0.0410]	0.905 [0.0508]
OAKS reading score from middle school used instead of score from high school	0.958 [0.0384]	0.955 [0.0467]
Rural male		0.872*** [0.0247]
Rural Black		0.706*** [0.0727]
Rural Asian		0.782** [0.0744]
Rural Hispanic		1.283*** [0.0784]
Rural American Indian/Alaska Native		1.005 [0.108]
Rural more than one race/ethnicity or other		1.103 [0.0914]
Rural race/ethnicity unknown		0.829 [0.109]
Rural in special education		0.940 [0.0378]
Rural English learner student		0.935 [0.0884]
Rural eligible for free or reduced-price lunch		1.057 [0.0376]
Rural OAKS math score unavailable		0.956 [0.0828]
Rural OAKS math score in first quartile		0.967 [0.0527]
Rural OAKS math score in second quartile		0.988 [0.0510]
Rural OAKS math score in third quartile		0.975 [0.0436]
Rural OAKS reading score not available		0.941 [0.0769]
Rural OAKS reading score in first quartile		1.000 [0.0529]
Rural OAKS reading score in second quartile		0.998 [0.0456]
Rural OAKS reading score in third quartile		1.029 [0.0446]
Rural first grade 9 year 2005		0.970 [0.0333]
Rural first grade 9 year 2006		0.969 [0.0320]

(continued)

Table C10. Likelihood of enrolling in college after high school (odds ratios) (continued)

Characteristic	All students	All students, with interactions
Rural repeated a grade		1.089 [0.0687]
Rural graduate		0.858** [0.0413]
Rural dropped out		1.128 [0.0707]
Rural OAKS math score from middle school used instead of score from high school		1.090 [0.0968]
Rural OAKS reading score from middle school used instead of score from high school		1.005 [0.0823]
Rural school	0.805*** [0.0274]	0.944 [0.0616]
Constant	4.053*** [0.150]	3.758*** [0.155]
Observations	157,309	157,309

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

Note: Numbers in brackets are robust standard errors (clustered on school).

Source: Authors' calculations based on data described in appendix B.

Table C11. Likelihood of enrolling immediately in college among enrollers only (odds ratios)

Characteristic	All students	All students, with interactions	Students at community colleges ^a	Students at community colleges ^a , with interactions
Male	0.825*** [0.0147]	0.842*** [0.0177]	0.902*** [0.0205]	0.915*** [0.0251]
Black	1.235*** [0.0747]	1.279*** [0.0836]	1.081 [0.0775]	1.059 [0.0810]
Asian	1.404*** [0.0580]	1.438*** [0.0661]	1.256*** [0.0797]	1.201*** [0.0831]
Hispanic	0.833*** [0.0297]	0.809*** [0.0372]	0.820*** [0.0383]	0.783*** [0.0453]
American Indian/Alaska Native	0.840** [0.0499]	0.794** [0.0691]	0.833* [0.0745]	0.733* [0.0989]
More than one race/ethnicity or other	0.969 [0.0511]	1.001 [0.0584]	0.961 [0.0646]	0.98 [0.0752]
Race/ethnicity unknown	1.126 [0.0948]	1.283* [0.129]	1.082 [0.123]	1.169 [0.149]
Special education	0.848*** [0.0272]	0.862*** [0.0374]	1 [0.0383]	1.022 [0.0502]
Rural English learner student	1.158*** [0.0466]	1.189*** [0.0573]	1.238*** [0.0537]	1.286*** [0.0632]
Eligible for free or reduced-price lunch	0.590*** [0.0129]	0.594*** [0.0178]	0.673*** [0.0189]	0.723*** [0.0263]
OAKS math score not available	0.482*** [0.0315]	0.472*** [0.0362]	0.663*** [0.0617]	0.643*** [0.0715]
OAKS math score in first quartile	0.399*** [0.0152]	0.385*** [0.0188]	0.677*** [0.0293]	0.693*** [0.0377]
OAKS math score in second quartile	0.534*** [0.0169]	0.541*** [0.0216]	0.821*** [0.0323]	0.852** [0.0425]
OAKS math score in third quartile	0.685*** [0.0170]	0.674*** [0.0206]	0.914* [0.0332]	0.908* [0.0432]
OAKS reading score not available	0.524*** [0.0331]	0.547*** [0.0443]	0.859 [0.0801]	0.94 [0.112]
OAKS reading score in first quartile	0.531*** [0.0215]	0.554*** [0.0313]	0.785*** [0.0385]	0.830** [0.0509]
OAKS reading in second quartile	0.684*** [0.0210]	0.700*** [0.0298]	0.891** [0.0366]	0.923 [0.0462]
OAKS reading in third quartile	0.834*** [0.0233]	0.845*** [0.0317]	0.977 [0.0398]	0.996 [0.0518]
First grade 9 year 2005	0.667*** [0.0180]	0.697*** [0.0244]	0.657*** [0.0230]	0.688*** [0.0307]
First grade 9 year 2006	0.784*** [0.0191]	0.820*** [0.0244]	0.779*** [0.0247]	0.817*** [0.0322]
Repeated a grade	0.949 [0.0530]	0.882* [0.0665]	1.133** [0.0681]	1.03 [0.0709]
Graduated	8.189*** [0.425]	8.732*** [0.651]	3.804*** [0.184]	3.626*** [0.236]
Dropped out	0.908 [0.0688]	1.085 [0.106]	0.700*** [0.0560]	0.774** [0.0759]
OAKS math score from middle school used instead of score from high school	0.832* [0.0653]	0.851 [0.0841]	0.929 [0.0962]	0.896 [0.117]

(continued)

Table C11. Likelihood of enrolling immediately in college among enrollers only (odds ratios) (continued)

Characteristic	All students	All students, with interactions	Students at community colleges ^a	Students at community colleges ^a , with interactions
OAKS reading score from middle school used instead of score from high school	0.501*** [0.0366]	0.505*** [0.0453]	0.599*** [0.0610]	0.576*** [0.0748]
Rural male		0.95 [0.0362]		0.968 [0.0465]
Rural Black		0.747* [0.105]		0.897 [0.174]
Rural Asian		0.854 [0.0845]		1.169 [0.200]
Rural Hispanic		1.123 [0.0801]		1.186 [0.114]
Rural American Indian/Alaska Native		1.113 [0.130]		1.27 [0.228]
Rural more than one race/ethnicity or other		0.902 [0.119]		0.947 [0.149]
Rural race/ethnicity unknown		0.658* [0.114]		0.762 [0.203]
Rural special education		0.966 [0.0617]		0.956 [0.0734]
English learner student		0.876 [0.0735]		0.805* [0.0779]
Rural eligible for free or reduced-price lunch		0.98 [0.0427]		0.842** [0.0461]
Rural OAKS math score not available		1.064 [0.151]		1.113 [0.221]
Rural OAKS math score in first quartile		1.089 [0.0857]		0.941 [0.0849]
Rural OAKS math score in second quartile		0.971 [0.0645]		0.911 [0.0735]
Rural OAKS math score in third quartile		1.04 [0.0539]		1.015 [0.0731]
Rural OAKS reading score not available		0.891 [0.115]		0.775 [0.149]
Rural OAKS reading score in first quartile		0.901 [0.0713]		0.863 [0.0875]
Rural OAKS reading score in second quartile		0.941 [0.0558]		0.911 [0.0781]
Rural OAKS reading score in third quartile		0.965 [0.0527]		0.948 [0.0787]
Rural first grade 9 year 2005		0.893* [0.0487]		0.882 [0.0632]
Rural first grade 9 year 2006		0.893* [0.0447]		0.886 [0.0582]
Rural repeated a grade		1.187 [0.128]		1.239 [0.144]
Rural graduated		0.865 [0.0858]		1.131 [0.110]
Rural dropped out		0.636*** [0.0840]		0.756 [0.117]

(continued)

Table C11. Likelihood of enrolling immediately in college among enrollers only (odds ratios) (continued)

Characteristic	All students	All students, with interactions	Students at community colleges ^a	Students at community colleges ^a , with interactions
Rural OAKS math score from middle school used instead of score from high school		0.942 [0.151]		1.09 [0.231]
Rural OAKS reading score from middle school used instead of score from high school		0.984 [0.150]		1.116 [0.233]
Received need-based financial aid			0.989 [0.0274]	0.973 [0.0337]
Received loan aid			1.110** [0.0410]	1.180*** [0.0446]
Received merit-based financial aid			3.046*** [0.209]	2.997*** [0.210]
Rural received need-based aid				1.031 [0.0596]
Rural received merit-based aid				1.045 [0.127]
Rural received loan aid				0.845* [0.0712]
Rural school	0.971 [0.0326]	1.284* [0.150]	0.993 [0.0379]	1.221 [0.160]
Constant	1.328*** [0.0765]	1.182* [0.0829]	1.083 [0.0746]	1.002 [0.0841]
Observations	94,005	94,005	40,747	40,747

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

a. Refers to Oregon public two-year institutions.

Note: Numbers in brackets are robust standard errors (clustered on school).

Source: Authors' calculations based on data described in appendix B.

Table C12. Likelihood of persisting to the second year of college (odds ratios)

Characteristic	All students	All students, with interactions	Students at community colleges ^a	Students at community colleges ^a , with interactions
Male	0.668*** [0.0144]	0.674*** [0.0171]	0.771*** [0.0217]	0.800*** [0.0255]
Black	1.217** [0.0809]	1.221** [0.0895]	1.165 [0.0913]	1.146 [0.101]
Asian	1.675*** [0.0974]	1.626*** [0.108]	1.391*** [0.0978]	1.325*** [0.0999]
Hispanic	1.132*** [0.0424]	1.084 [0.0510]	1.108* [0.0518]	1.05 [0.0623]
American Indian/Alaska Native	0.864* [0.0580]	0.838 [0.0921]	0.783** [0.0653]	0.720* [0.0936]
More than one race/ethnicity or other	0.983 [0.0523]	0.974 [0.0583]	0.973 [0.0688]	0.976 [0.0766]
Race/ethnicity unknown	0.968 [0.0968]	0.928 [0.115]	0.803 [0.121]	0.742 [0.137]
Special education	0.942 [0.0307]	0.924 [0.0413]	0.986 [0.0400]	0.988 [0.0546]
English learner student	1.506*** [0.0711]	1.561*** [0.0813]	1.653*** [0.112]	1.717*** [0.124]
Eligible for free or reduced-price lunch	0.641*** [0.0160]	0.623*** [0.0208]	0.560*** [0.0184]	0.552*** [0.0257]
OAKS math score not available	0.519*** [0.0350]	0.515*** [0.0444]	0.615*** [0.0600]	0.590*** [0.0689]
OAKS math score in first quartile	0.418*** [0.0153]	0.434*** [0.0187]	0.518*** [0.0250]	0.574*** [0.0299]
OAKS math score in second quartile	0.471*** [0.0170]	0.474*** [0.0221]	0.585*** [0.0269]	0.617*** [0.0354]
OAKS math score in third quartile	0.635*** [0.0211]	0.650*** [0.0273]	0.729*** [0.0324]	0.775*** [0.0423]
OAKS reading score not available	0.689*** [0.0418]	0.734*** [0.0537]	0.977 [0.0962]	1.155 [0.137]
OAKS reading score in first quartile	0.612*** [0.0229]	0.639*** [0.0289]	0.739*** [0.0340]	0.774*** [0.0436]
OAKS reading score in second quartile	0.698*** [0.0234]	0.704*** [0.0324]	0.846*** [0.0358]	0.866* [0.0487]
OAKS reading score in third quartile	0.829*** [0.0253]	0.843*** [0.0324]	0.982 [0.0363]	1.004 [0.0457]
First grade 9 year 2005	0.851*** [0.0224]	0.845*** [0.0309]	0.818*** [0.0267]	0.780*** [0.0341]
First grade 9 year 2006	0.883*** [0.0214]	0.885*** [0.0282]	0.883*** [0.0283]	0.833*** [0.0356]
Repeated a grade	0.908 [0.0596]	0.892 [0.0714]	1.027 [0.0898]	0.961 [0.0827]
Graduated	1.405*** [0.0481]	1.439*** [0.0671]	1.340*** [0.0583]	1.342*** [0.0783]
Dropped out	1.017 [0.0560]	0.896 [0.0649]	0.919 [0.0603]	0.850* [0.0656]
OAKS math score from middle school used instead of score from high school	0.783** [0.0608]	0.777** [0.0757]	0.796* [0.0797]	0.807 [0.105]

(continued)

Table C12. Likelihood of persisting to the second year of college (odds ratios) (continued)

Characteristic	All students	All students, with interactions	Students at community colleges ^a	Students at community colleges ^a , with interactions
OAKS reading score from middle school used instead of score from high school	1.154 [0.0915]	1.186 [0.119]	1.231* [0.126]	1.221 [0.158]
Enrolled in fall	2.286*** [0.0612]	2.402*** [0.0880]	1.751*** [0.0542]	1.822*** [0.0736]
Received need-based financial aid			1.666*** [0.0520]	1.719*** [0.0757]
Received merit-based financial aid			1.626*** [0.0975]	1.506*** [0.156]
Received loan aid			1.481*** [0.0528]	1.530*** [0.0755]
Rural male		0.979 [0.0442]		0.919 [0.0542]
Rural Black		0.931 [0.159]		0.92 [0.187]
Rural Asian		1.124 [0.148]		1.193 [0.223]
Rural Hispanic		1.161 [0.0914]		1.212 [0.122]
Rural American Indian/Alaska Native		1.056 [0.146]		1.168 [0.194]
Rural more than one race/ethnicity or other		1.021 [0.126]		0.989 [0.164]
Rural race/ethnicity unknown		1.11 [0.227]		1.238 [0.377]
Rural special education		1.052 [0.0676]		0.998 [0.0804]
Rural English learner student		0.862 [0.0938]		0.822 [0.128]
Rural eligible for free or reduced price lunch		1.068 [0.0524]		1.032 [0.0673]
Rural OAKS math score not available		1.019 [0.141]		1.098 [0.225]
Rural OAKS math score in first quartile		0.917 [0.0686]		0.784* [0.0757]
Rural OAKS math score in second quartile		0.986 [0.0720]		0.88 [0.0802]
Rural OAKS math score in third quartile		0.946 [0.0640]		0.865 [0.0759]
Rural OAKS reading score not available		0.855 [0.108]		0.674 [0.139]
Rural OAKS reading score in first quartile		0.902 [0.0706]		0.894 [0.0859]
Rural OAKS reading score in second quartile		0.984 [0.0660]		0.948 [0.0817]
Rural OAKS reading score in third quartile		0.961 [0.0607]		0.949 [0.0735]
Rural first grade 9 year 2005		1.02 [0.0529]		1.114 [0.0727]

(continued)

Table C12. Likelihood of persisting to the second year of college (odds ratios) (continued)

Characteristic	All students	All students, with interactions	Students at community colleges ^a	Students at community colleges ^a , with interactions
Rural first grade 9 year 2006		0.995 [0.0490]		1.139* [0.0729]
Rural repeated a grade		1.047 [0.141]		1.155 [0.205]
Rural graduated		0.945 [0.0646]		0.998 [0.0863]
Rural dropped out		1.381** [0.151]		1.228 [0.163]
Rural OAKS math score from middle school used instead of score from high school		1.026 [0.166]		0.968 [0.201]
Rural OAKS reading score from middle school used instead of score from high school		0.932 [0.153]		1.017 [0.215]
Rural enrolled in fall		0.890* [0.0456]		0.907 [0.0553]
Rural received need-based aid				0.929 [0.0564]
Rural received merit-based aid				1.146 [0.144]
Rural received loan aid				0.917 [0.0637]
Rural school	0.815*** [0.0290]	0.928 [0.0947]	0.785*** [0.0320]	0.966 [0.115]
Constant	6.818*** [0.390]	6.447*** [0.457]	3.626*** [0.227]	3.339*** [0.251]
Observations	85,397	85,397	38,860	38,860

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

a. Refers to Oregon public two-year institutions.

Note: Numbers in brackets are robust standard errors (clustered on school).

Source: Authors' calculations based on data described in appendix B.

Table C13. Likelihood of persisting to the second year of college related to passing gatekeeper courses at Oregon community colleges (odds ratios), college algebra

Characteristic	All students	All students, with interactions
Passed college algebra	0.892 [0.152]	1.021 [0.227]
Male	0.677** [0.0834]	0.683* [0.105]
Black	0.965 [0.476]	1.098 [0.651]
Asian	2.197 [1.194]	2.976 [2.495]
Hispanic	1.146 [0.292]	1.622 [0.569]
American Indian/Alaska Native	0.663 [0.287]	0.954 [0.693]
More than one race/ethnicity or other	1.468 [0.786]	1.203 [0.707]
Race/ethnicity unknown	0.758 [0.401]	0.538 [0.330]
Special education	0.968 [0.238]	0.934 [0.299]
English learner student	1.65 [0.492]	1.513 [0.575]
Eligible for free or reduced-price lunch	0.566*** [0.0819]	0.597* [0.127]
OAKS math score not available	1.29 [0.874]	0.798 [0.748]
OAKS math score in first quartile	2.155* [0.751]	2.117 [0.866]
OAKS math score in second quartile	1.229 [0.207]	1.451 [0.336]
OAKS math score in third quartile	1.091 [0.157]	0.892 [0.139]
OAKS reading score not available	0.824 [0.494]	1.502 [1.299]
OAKS reading score in first quartile	0.766 [0.221]	0.612 [0.217]
OAKS reading score in second quartile	0.822 [0.133]	0.901 [0.189]
OAKS reading score in third quartile	0.925 [0.145]	0.982 [0.195]
First grade 9 year 2005	0.652* [0.109]	0.707 [0.169]
First grade 9 year 2006	0.783 [0.125]	0.702 [0.149]
Repeated a grade	2.385** [0.636]	1.687 [0.639]
Graduated	0.847 [0.215]	0.516 [0.188]
Dropped out	1.871 [1.203]	0.7 [0.427]

(continued)

Table C13. Likelihood of persisting to the second year of college related to passing gatekeeper courses at Oregon community colleges (odds ratios), college algebra
(continued)

Characteristic	All students	All students, with interactions
Half-time enrollment in college (first enrollment record)	0.464*** [0.0703]	0.396*** [0.0777]
Out-of-state college (first enrollment record)	0.871 [0.939]	0.8 [0.823]
Received need-based financial aid	0.982 [0.133]	1.017 [0.192]
Received merit-based financial aid	1.414 [0.314]	0.946 [0.358]
Received loan aid	0.891 [0.144]	0.852 [0.172]
OAKS math score from middle school used instead of score from high school	0.36 [0.216]	0.66 [0.553]
OAKS reading score from middle school used instead of score from high school	1.494 [0.948]	0.81 [0.636]
Enrolled in fall	1.196 [0.157]	1.281 [0.243]
Rural male		0.956 [0.246]
Rural Black		0.824 [0.864]
Rural Asian		0.392 [0.422]
Rural Hispanic		0.526 [0.271]
Rural American Indian/Alaska Native		0.599 [0.535]
Rural more than one race/ethnicity or other		2.289 [3.017]
Rural race/ethnicity unknown		3.47 [4.142]
Rural special education		1.088 [0.556]
Rural English learner student		1.341 [0.831]
Rural eligible for free or reduced price lunch		0.858 [0.252]
Rural OAKS math score not available		6.443 [9.897]
Rural OAKS math score in first quartile		1.177 [0.873]
Rural OAKS math score in second quartile		0.713 [0.247]
Rural OAKS math score in third quartile		1.595 [0.491]
Rural OAKS reading score not available		0.148 [0.200]
Rural OAKS reading score in first quartile		1.862 [1.157]

(continued)

Table C13. Likelihood of persisting to the second year of college related to passing gatekeeper courses at Oregon community colleges (odds ratios), college algebra
(continued)

Characteristic	All students	All students, with interactions
Rural OAKS reading score in second quartile		0.761 [0.257]
Rural OAKS reading score in third quartile		0.837 [0.272]
Rural first grade 9 year 2005		0.806 [0.270]
Rural first grade 9 year 2006		1.238 [0.405]
Rural repeated a grade		1.872 [0.908]
Rural graduated		2.674 [1.389]
Rural OAKS math score from middle school used instead of score from high school		0.237 [0.283]
Rural OAKS reading score from middle school used instead of score from high school		5.217 [6.582]
Rural enrolled in fall		0.906 [0.245]
Rural half-time enrollment in college (first enrollment record)		1.421 [0.434]
Rural received need-based financial aid		0.933 [0.252]
Rural received merit-based financial aid		1.897 [0.897]
Rural received loan aid		1.042 [0.337]
Rural passed college algebra		0.749 [0.261]
Rural school	0.933 [0.140]	0.387 [0.248]
Constant	9.258*** [2.842]	14.77*** [6.440]
Observations	2,097	2,087

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

Note: Numbers in brackets are robust standard errors (clustered on school).

Source: Authors' calculations based on data described in appendix B.

Table C14. Likelihood of persisting to the second year of college related to passing gatekeeper courses at Oregon community colleges (odds ratios), English composition I

Characteristic	All students	All students, with interactions
Passed English composition I	1.134 [0.0905]	1.229* [0.118]
Male	0.761*** [0.0497]	0.792** [0.0674]
Black	1.243 [0.238]	1.096 [0.235]
Asian	1.287 [0.205]	1.309 [0.242]
Hispanic	1.069 [0.114]	1.058 [0.141]
American Indian/Alaska Native	0.650* [0.124]	0.568* [0.160]
More than one race/ethnicity or other	0.886 [0.169]	0.978 [0.232]
Race/ethnicity unknown	1.488 [0.506]	1.324 [0.519]
Special education	1.131 [0.130]	1.136 [0.170]
English learner student	1.521** [0.232]	1.478* [0.264]
Eligible for free or reduced-price lunch	0.641*** [0.0396]	0.603*** [0.0499]
OAKS math score not available	0.843 [0.200]	0.671 [0.183]
OAKS math score in first quartile	0.696*** [0.0732]	0.841 [0.112]
OAKS math score in second quartile	0.763** [0.0738]	0.851 [0.112]
OAKS math score in third quartile	0.826* [0.0670]	0.853 [0.0947]
OAKS reading score not available	1.044 [0.228]	1.405 [0.360]
OAKS reading score in first quartile	1.317* [0.154]	1.360* [0.195]
OAKS reading score in second quartile	1.165 [0.0935]	1.266* [0.122]
OAKS reading score in third quartile	1.056 [0.0769]	1.143 [0.103]
First grade 9 year 2005	0.680*** [0.0496]	0.670*** [0.0642]
First grade 9 year 2006	0.764*** [0.0508]	0.790** [0.0663]
Repeated a grade	1.969*** [0.308]	1.482* [0.247]
Graduated	1.223 [0.127]	1.085 [0.142]
Dropped out	0.763 [0.127]	0.825 [0.165]

(continued)

Table C14. Likelihood of persisting to the second year of college related to passing gatekeeper courses at Oregon community colleges (odds ratios), English composition I *(continued)*

Characteristic	All students	All students, with interactions
Half-time enrollment in college (first enrollment record)	0.590*** [0.0423]	0.595*** [0.0566]
Private college (first enrollment record)	2.571 [2.957]	631,257*** [316,165]
Out-of-state college (first enrollment record)	0.812 [0.398]	0.376 [0.280]
Received need-based financial aid	1.161* [0.0792]	1.19 [0.114]
Received merit-based financial aid	1.353** [0.146]	1.055 [0.192]
Received loan aid	1.210** [0.0803]	1.314*** [0.109]
OAKS math score from middle school used instead of score from high school	0.757 [0.220]	0.769 [0.303]
OAKS reading score from middle school used instead of score from high school	1.028 [0.253]	1.15 [0.400]
Enrolled in fall	1.193** [0.0699]	1.245** [0.0969]
Rural male		0.911 [0.122]
Rural Black		1.798 [0.857]
Rural Asian		0.948 [0.355]
Rural Hispanic		1.028 [0.232]
Rural American Indian/Alaska Native		1.199 [0.458]
Rural more than one race/ethnicity or other		0.801 [0.326]
Rural race/ethnicity unknown		1.521 [1.157]
Rural special education		0.966 [0.230]
Rural English learner student		1.086 [0.383]
Rural eligible for free or reduced price lunch		1.145 [0.144]
Rural OAKS math score not available		2.139 [1.136]
Rural OAKS math score in first quartile		0.669 [0.145]
Rural OAKS math score in second quartile		0.791 [0.152]
Rural OAKS math score in third quartile		0.943 [0.148]
Rural OAKS reading score not available		0.419 [0.207]

(continued)

Table C14. Likelihood of persisting to the second year of college related to passing gatekeeper courses at Oregon community colleges (odds ratios), English composition I *(continued)*

Characteristic	All students	All students, with interactions
Rural OAKS reading score in first quartile		0.918 [0.227]
Rural OAKS reading score in second quartile		0.81 [0.140]
Rural OAKS reading score in third quartile		0.812 [0.125]
Rural first grade 9 year 2005		1.03 [0.151]
Rural first grade 9 year 2006		0.907 [0.125]
Rural repeated a grade		1.740* [0.463]
Rural graduated		1.355 [0.290]
Rural dropped out		0.867 [0.311]
Rural OAKS math score from middle school used instead of score from high school		0.785 [0.465]
Rural OAKS reading score from middle school used instead of score from high school		0.874 [0.428]
Rural enrolled in fall		0.909 [0.106]
Rural half-time enrollment in college (first enrollment record)		0.953 [0.139]
Rural private college (first enrollment record)		3.50e-07*** [5.29e-07]
Rural out-of-state college (first enrollment record)		6.093 [6.967]
Rural received need-based financial aid		0.958 [0.133]
Rural received merit-based financial aid		1.457 [0.322]
Rural received loan aid		0.81 [0.108]
Rural passed English composition I		0.79 [0.133]
Rural school	0.877 [0.0637]	0.982 [0.290]
Constant	3.197*** [0.498]	3.034*** [0.621]
Observations	6,654	6,654

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

Note: Numbers in brackets are robust standard errors (clustered on school).

Source: Authors' calculations based on data described in appendix B.

Appendix D. List of Oregon higher education institutions not in the National Student Clearinghouse

Box D1 lists higher education institutions in Oregon that do not subscribe to the National Student Clearinghouse and whose student information was thus not included in this study. Students attending these institutions appear in the data as not enrolling or persisting in college. As of fall 2012, the National Student Clearinghouse enrollment data covered 96.4 percent of Oregon institutions and 94.2 percent of U.S. institutions. Coverage rates for Oregon are higher than the national average for all four-year, all two-year, and all public institutions but are lower than the national average for private institutions (National Student Clearinghouse, 2014).

Box D1. Oregon higher education institutions that do not participate in the National Student Clearinghouse, October 2013

Abdill Career College Inc.	Oregon College of Art and Craft
Academy of Hair Design Inc.	Oregon College of Oriental Medicine
American College of Healthcare Sciences	Pacific Northwest College of Art
Aveda Institute Portland	Phagans Beauty College
Beau Monde College of Hair Design	Phagans Central Oregon Beauty College
Birthingway College of Midwifery	Phagans Grants Pass College of Beauty
College of Cosmetology	Phagans Medford Beauty School
College of Hair Design Careers	Phagans Newport Academy of Cosmetology Careers
Columbia Gorge Community College ¹	Phagans School of Beauty
Concorde Career College-Portland	Phagans School of Hair Design
East West College of the Healing Arts	Phagans School of Hair Design-Portland
Institute of Technology, Inc.	Phagans Tigard Beauty School
Le Cordon Bleu College of Culinary Arts-Portland	Pioneer Pacific College
Marinello School of Beauty	Portland Actors Conservatory
Mount Angel Seminary	Roseburg Beauty College
New Hope Christian College	Sage School of Massage & Healing Arts
Northwest College	Sanford-Brown College-Portland
Northwest College	Springfield College of Beauty
Northwest College	Sumner College
Northwest College of Hair Design	The Art Institute of Portland
Northwest College of Hair Design	Tillamook Bay Community College ¹
Northwest Nannies Institute	University of Phoenix-Oregon Campus
Oregon Coast Community College ¹	Western Seminary

Note

1. Data on students at these Oregon community colleges were incorporated in this study because information on them was provided by the Oregon Department of Community Colleges and Workforce Development.

Source: National Student Clearinghouse (n.d.) and U.S. Department of Education (2014).

Notes

1. The results hold when accounting for college characteristics (results available on request). Rural students whose first enrollment was in a private institution were less likely than nonrural students whose first enrollment was in a private institution to enroll immediately (accounting for demographics, achievement, interactions, and college type).
2. The findings apply only to Oregon community college students because data on enrollment in gatekeeper courses at four-year postsecondary institutions were not available for all students in the sample who attended four-year postsecondary institutions.
3. Developmental education (sometimes referred to as remedial education) refers to courses that are taught at colleges and that are designed to raise skills to college-level standards.
4. Some 156 students had no exit year from ODE data but appeared in the NSC file. These students were excluded from the analysis.

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