OREGON DEPARTMENT OF EDUCATION

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RESEARCH BRIEF

Office of Research, Assessment, Data, Accountability, and Reporting

Abstract

This study examines how student performance in English Language Arts (ELA) and Mathematics predicts later college enrollment. The results show a strong and consistent relationship over time: students who score at the highest performance level are more than twice as likely to enroll in college compared with students scoring at the lowest level. Mathematics performance is a stronger predictor of enrollment in four-year colleges than in two-year colleges, and it also remains more influential than ELA when both subjects are considered together. Students with high mathematics scores are likely to enroll in a four-year college even if their ELA scores are lower, while high ELA performance alone is less strongly associated with four-year college enrollment. These findings suggest that mathematics proficiency plays a particularly important role in shaping postsecondary pathways.

Predictive Validity: Post-Secondary Enrollment

Oregon's statewide assessment system (OSAS) is designed to support measurement of student progress toward Oregon's statewide standards. In high school, the assessment is delivered in 11th grade and the standards are selected to align with and be anchored by what students approaching the end of their K-12 enrollment need in order to be successful in their next steps: college, career, or other plans. Students who meet or exceed established cut scores on the assessments are considered to be proficient in the English Language Arts and/or Mathematics that all students should study in order to be college and career ready,[1] and therefore better prepared for college and career. The common core state standards upon which Oregon's standards are based were developed by experts, including teachers, to include what students need to know to be college and career ready, and call for the results of the assessment system to be validated against the performance of students in college.[2] The work presented here is part of Oregon's efforts to evaluate that validity.

Predictive validity is the evaluation of how well a measure, in this case assessment results, predicts an outcome that should be theoretically related to the measure. This brief focuses on the outcome of post-secondary enrollment, or a student's likelihood of enrolling in two- or four-year college following high school graduation. It is the first in a planned series of briefs examining the predictive validity of assessment results on various post-assessment outcomes.

Key Takeaways:

- Both English Language Arts and Mathematics assessment performance are strongly predictive of a student's future college enrollment, and the effect is consistent over time. For both assessments, students scoring at level 4 were more than twice as likely as students scoring at level 1 to enroll in college.

[1] Oregon Math Standards, pg 4.
[2] Common Core Math Standards, pg 84

Juliana Pacicco and Josh Rew

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- Assessment performance is a stronger predictor of four-year college enrollment than of two-year college enrollment.
- When considered in combination, a student's Mathematics assessment performance was more strongly predictive than their English Language Arts assessment performance – students with high math scores but lower ELA scores were still likely to attend 4-year college, while students with high ELA scores and lower math scores were comparatively less likely to attend.

Background

The predictive validity of high school assessments is of interest in the state for a number of reasons. Validating the tests as an accurate measure of a student's readiness for post-high school opportunities enables high schools to better understand assessment performance as an indicator of which students need additional supports to achieve their high school and post-high school goals. Showing that assessments predict postsecondary outcomes can also support their use as college-entrance mechanisms, perhaps allowing colleges and universities to extend admissions offers to students who do not see themselves as traditional college students and may not have pursued traditional college entrance exams such as the ACT or SAT. Previous work has found that high school assessments in other states are correlated with post-secondary success at similar levels to the SAT,[3,4] but in Oregon, many students do not take the SAT, and those that do are more likely to come from higher-income backgrounds.[5] In general, these studies have also found that high school grade point average (GPA) is a stronger predictor than either type of assessment, although some studies have found that while high school GPA is a stronger differentiator within a school, assessment is a substantial predictor of college performance between schools[6,7] - in other words, the use of 11th grade assessment data as a consideration in college admissions might help to offset the impact of differences in grading practices between schools by offering a more standardized measure.

We limited our sample to 20,266 students who took the 11th grade OSAS English language arts and mathematics summative tests in 2021-22, were enrolled on the first school day in May of 2021-22, and were expected to graduate in the 2022-23 school year.[8] Our data sources include ODE achievement and graduation data, and postsecondary enrollment data from National Student Clearinghouse (NSC). The outcome in our analysis is postsecondary enrollment within the academic year following the completion of high school (i.e., July 1, 2023 to June 30, 2024). Our sample included 5,035 students enrolled in a community college, 5,355 enrolled in a 4-year college, and 9,876 students who did not enroll in a post-secondary institution between July 1, 2023 to June 30, 2024. Among students enrolled in a postsecondary institution in our sample, 82% (i.e., 8,482 students) enrolled in an Oregon postsecondary institution, and 87% (i.e., 9,050 students) were enrolled in a public postsecondary institution in either Oregon or in another state.

English Language Arts

Overall Predictive Validity

The graph below shows the relationship between performance on English Language Arts (ELA) standardized tests for students in 11th grade in 2021-2022 and their postsecondary enrollment in 2023-2024. ELA assessment (OSAS) performance is displayed in four levels. Students performing at levels 1 and 2 are not yet proficient (though level 2 represents grade-level performance below the level of proficiency), while those performing in level 3 and level 4 are already proficient in ELA. Postsecondary

[3] Koretz, D., Yu, C., Mbekeani, P. P., Langi, M., Dhaliwal, T., & Braslow, D. (2016). Predicting Freshman Grade Point Average From College Admissions Test Scores and State High School Test Scores. AERA Open, 2(4). https://doi.org/10.1177/2332858416670601

[4] Cimetta, Adriana D., Jerome V. D'Agostino, and Joel R. Levin. "Can high school achievement tests serve to select college students?." *Educational Measurement: Issues and Practice* 29, no. 2 (2010): 3-12.

[5] College Board. 2024 Oregon SAT Suite of Assessments Annual Report. https://reports.collegeboard.org/media/pdf/2024-oregon-sat-suite-of-assessments-annual-report-ADA.pdf.

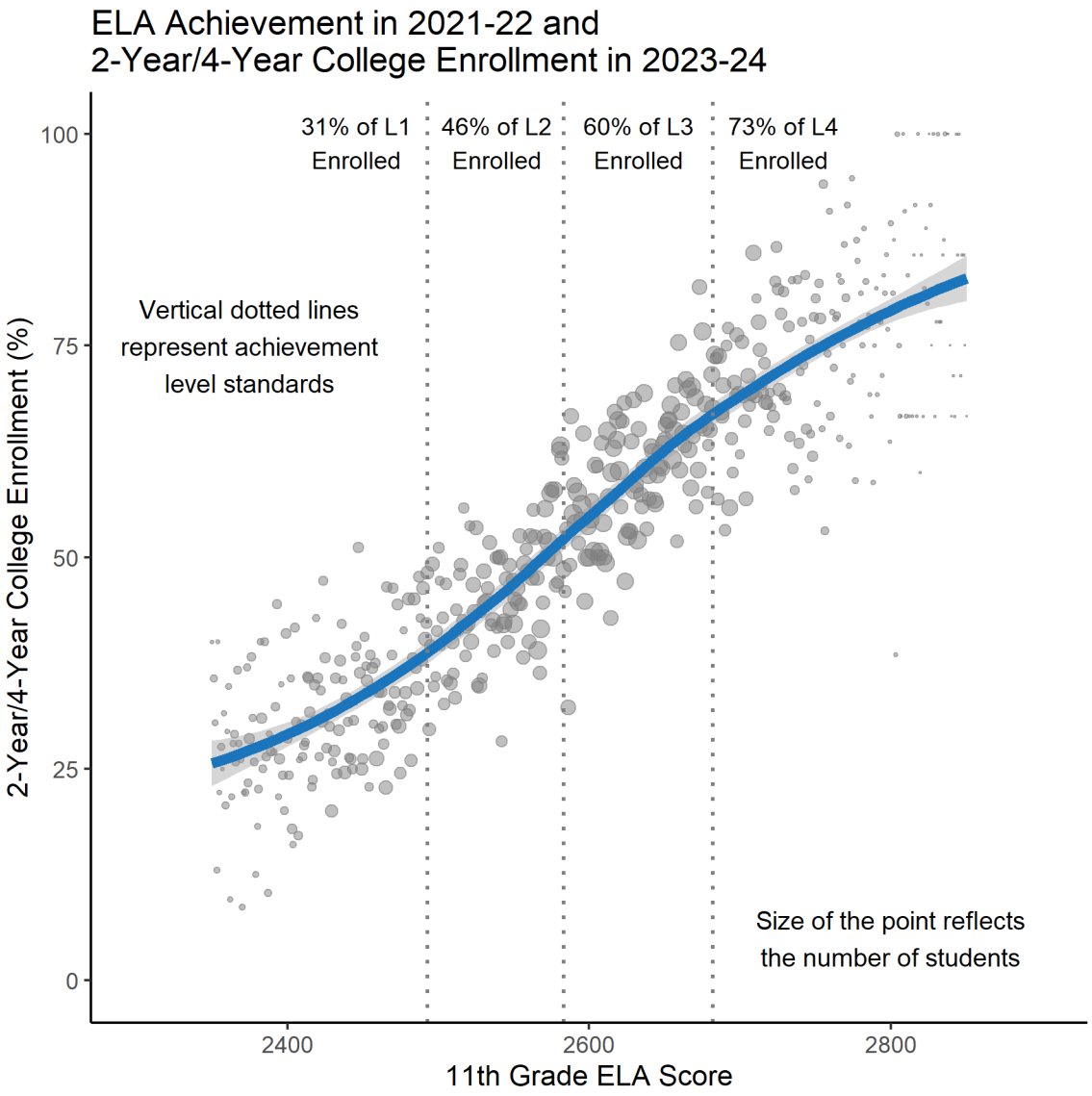
[6] Koretz, D., and M. Langi. "Predicting freshman grade-point average from test scores: Effects of variation within and between high schools." *Educational Measurement: Issues and Practice* 37, no. 2 (2018): 9-19.

[7] Mbekeani, P. P., & Koretz, D. (2024). Differential Prediction for Disadvantaged Students and Schools: The Role of High School Characteristics. *AERA Open*, *10*. https://doi.org/10.1177/23328584241245088

[8] Note. The ethnic composition of students enrolled in 2021-2022 and students participating in the Oregon Statewide Assessments in ELA and Math were compared. The composition of the two groups of students was very similar if not identical, suggesting that the group of students participating in the assessment represented the students enrolled in school that year.

enrollment refers to the enrollment in postsecondary institutions (e.g., Colleges, Universities). The graph shows a positive association between ELA performance in 11th grade and postsecondary enrollment; that is, as the student performance on the 11th grade assessment improves, the likelihood of enrolling in a post-secondary institution increases. It is possible to observe on the graphic that 31% of students who scored at Level 1 and 46% of students who scored at Level 2 (non-proficient) enrolled at a postsecondary institution, while 60% of students who scored at Level 3 and 73% of students who scored at Level 4 enrolled.

Figure 1: English Language Arts Assessment Performance is Strongly Correlated with a Student's Likelihood of Postsecondary Enrollment



The blue line represents a LOESS curve, which offers a summary of nearby points (based on local regression) to illustrate the trend.

Consistency Over Time

Results in the table below are presented as odds ratios, which can be interpreted as a percentage change in the odds of an outcome occurring (in this case, enrolling in a postsecondary institution). Odds ratios above 1.0 indicate an increased likelihood, while odds ratios below 1.0 indicate a decreased likelihood. For example, an odds ratio of 2.37 indicates that the odds of a student enrolling in postsecondary are 137% higher when a student scores one standard deviation higher on the assessment. Note that a 1 standard deviation change in assessment performance is very large and unlikely for any given student. The results below should be interpreted as a measure of consistency of this prediction across multiple years.

Figure 2: Association between ELA Achievement and First-Year Postsecondary Enrollment

Years listed are the years in which college enrollment occurred; 11th grade ELA assessments were generally taken two years prior.

Summary Statistics	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22*	2022-23*	2023-24
Odds Ratio (for a one SD change in test scores)	2.37	2.46	2.61	2.34	2.33	...	...	2.02
Effect Size	0.47	0.50	0.53	0.47	0.47	...	...	0.39

* Oregon statewide assessments were suspended or significantly reduced in 2019-20 and 2020-21 in response to the onset of the COVID-19 pandemic. Data for 11th grade students in these years is not included in this analysis.

Note. The odds ratio is a measure of the odds an event will occur given certain conditions, relative to the odds of the same event occurring in the absence of those conditions. The effect size is a measure of the magnitude of the difference between groups where the conditions are present or absent, given the underlying variation within the groups.

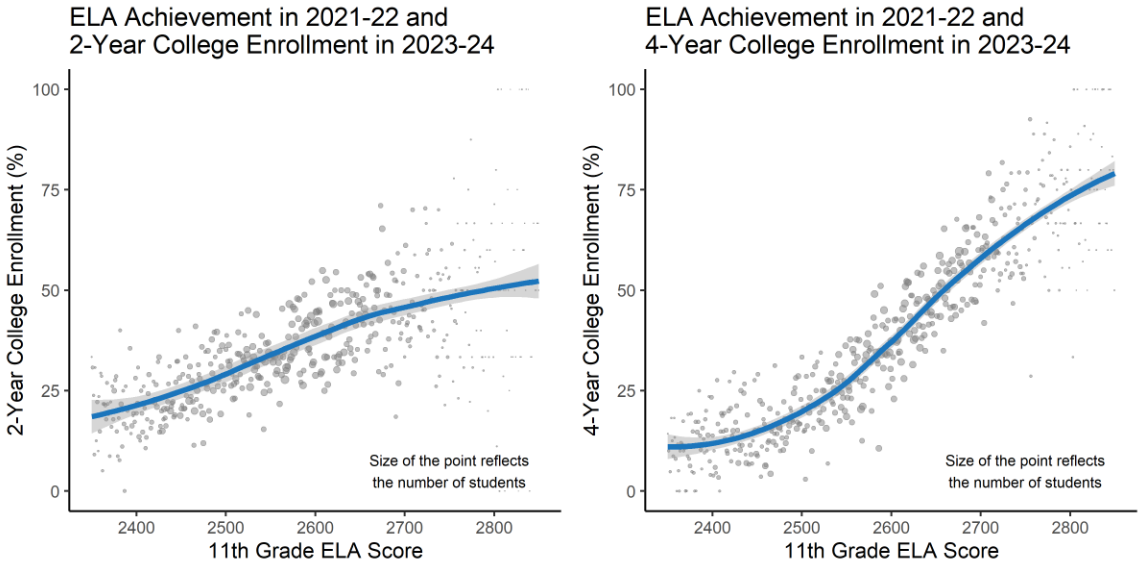
Consistency Across Student Groups

We evaluated the strength of this relationship across student groups, including gender and race/ethnicity. Although there was some variation between groups, the assessments exhibited strong predictive validity across all of these groups. Further research expanding on this project may incorporate evaluations of additional student groups, such as multilingual learners and students with disabilities. While poverty status is also important, changes to Oregon's student-level poverty measure as a result of increased eligibility during the COVID-19 pandemic and changes to the definition of the measure mean that this will be an area reserved for future study.

Predictive Validity by School Type

Although ELA assessment scores were predictive of both two- and four-year college enrollment, the relationship was significantly stronger for four-year postsecondary institutions. Students at the lower end of assessment performance were more likely to enroll in community colleges than 4-year colleges, and students at the high end were less likely. This is representative of Oregon community colleges' mission to support accessible high-quality learning opportunities and remove barriers, expanding access to all students. Many community colleges describe themselves as "open-door" or otherwise welcoming of all students.

Figure 3: English Language Arts Assessment Performance is Strongly Correlated with 4-year College Enrollment and More Weakly Correlated with 2-year College Enrollment



Note: The charts above show enrollees as a percentage of students who did not enroll in another type of postsecondary institution; for example, the 2-year college enrollment figure excludes students who enrolled in 4-year college, and vice versa.

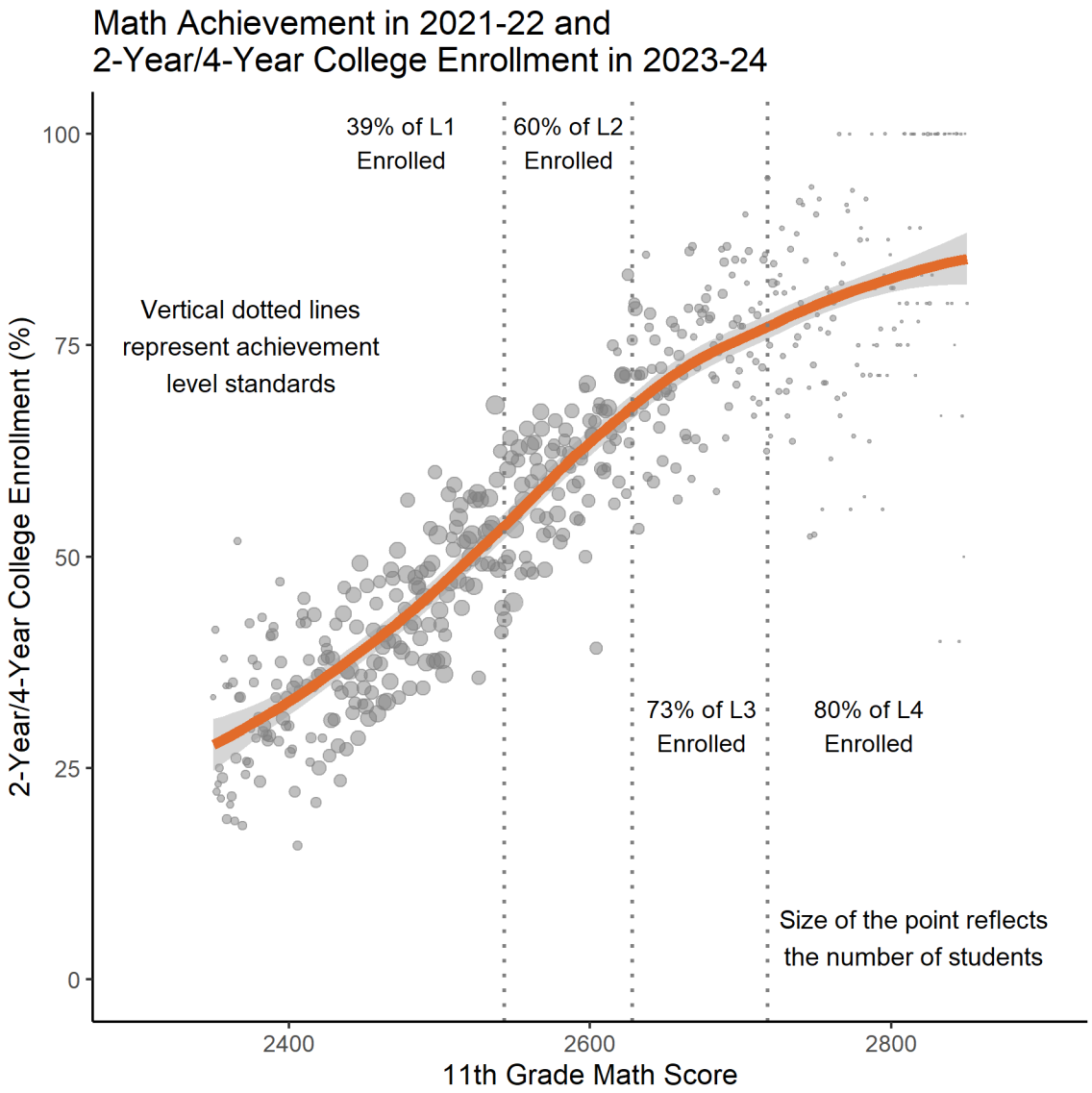
The blue line represents a LOESS curve, which offers a summary of nearby points (based on local regression) to illustrate the trend.

Mathematics

Overall Predictive Validity

The graph below shows the relationship between performance on Mathematics standardized tests for students in 11th grade in the school year of 2021-2022 and their postsecondary enrollment in higher education institutions in the school year of 2023-2024. Four levels of performance in mathematics standardized tests (OSAS) are displayed. Students performing in levels 1 and 2 are not yet proficient (though level 2 represents grade-level performance below the level of proficiency), while those performing in levels 3 and 4 have reached proficiency. A positive association between performance in Mathematics standardized tests and postsecondary enrollment is shown on the graph below. That is, students with higher scores on standardized tests also show a higher likelihood of enrollment in postsecondary institutions. Only 39% of students performing at Level 1 in the mathematics standardized test enrolled in postsecondary education. As the performance increases, the enrollment also does: 60% of students performing on Level 2, 73 % of students performing on Level 3 and 80% of students on Level 4 enrolled in postsecondary institutions.

Figure 4: Mathematics Assessment Performance is Strongly Correlated with a Student's Likelihood of Postsecondary Enrollment



The orange line represents a LOESS curve, which offers a summary of nearby points (based on local regression) to illustrate the trend.

Consistency Over Time

The table below shows how students' mathematics scores are related to their likelihood of enrolling in college, using odds ratios. A positive odds ratio means that higher math scores are linked to higher enrollment, while a negative odds ratio would mean that lower scores are linked to higher enrollment. Across all years shown, the table indicates a consistent positive relationship: students with higher math proficiency are more likely to enroll in post-secondary education. For example, in 2023–24, a student who scores one standard deviation above the average has at least 107% higher odds of enrolling in post-secondary education.

Figure 5: Association between Math Achievement and First-Year Postsecondary Enrollment

Summary Statistics	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22*	2022-23*	2023-24
Odds-Ratio	2.50	2.60	2.65	2.54	2.57	...	...	2.07
Effect Size	0.50	0.53	0.54	0.51	0.52	...	...	0.40

* Oregon statewide assessments were suspended or significantly reduced in 2019-20 and 2020-21 in response to the onset of the COVID-19 pandemic. Data for 11th grade students in these years is not included in this analysis.

Note. The odds ratio is a measure of the odds an event will occur given certain conditions, relative to the odds of the same event occurring in the absence of those conditions. The effect size is a measure of the magnitude of the difference between groups where the conditions are present or absent, given the underlying variation within the groups.

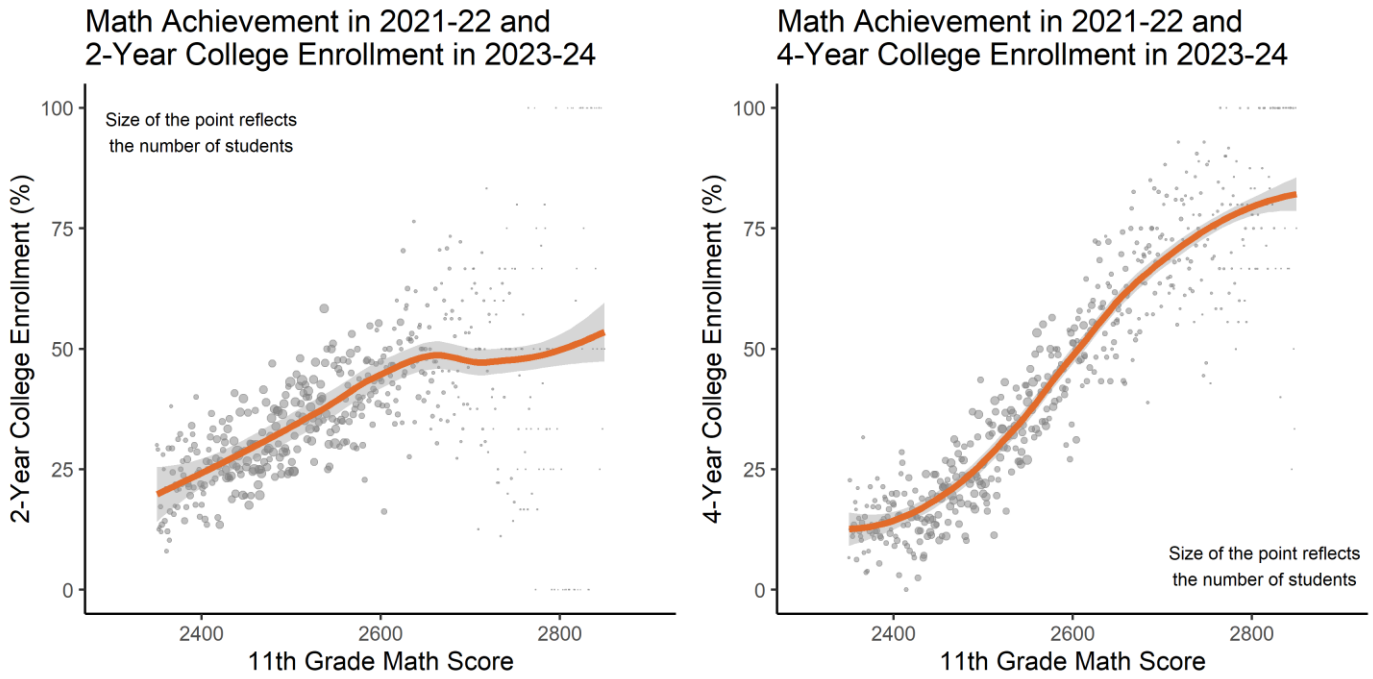
Consistency Across Student Groups

We found similar consistency effects for math as for ELA, with only small variations between student groups. Future study to incorporate an evaluation of additional student groups may be needed.

Predictive Validity by School Type

As with ELA, math achievement was much more strongly correlated with 4-year college enrollment than with 2-year college enrollment. Very few high-scoring students enrolled in community college, and the association was present but weaker for lower-scoring students.

Figure 6: English Language Arts Assessment Performance is Strongly Correlated with 4-year College Enrollment and More Weakly Correlated with 2-year College Enrollment



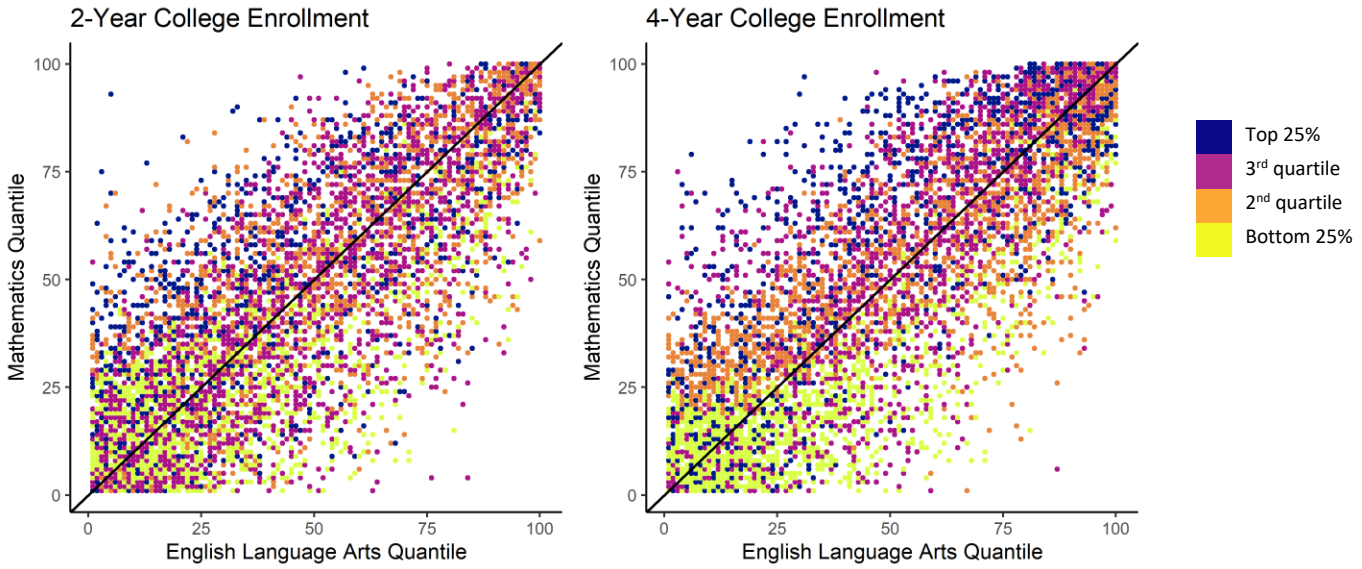
Note: The charts above show enrollees as a percentage of students who did not enroll in another type of postsecondary institution; for example, the 2-year college enrollment figure excludes students who enrolled in 4-year college, and vice versa.

The orange line represents a LOESS curve, which offers a summary of nearby points (based on local regression) to illustrate the trend.

In Combination

The figure below shows the probability of college enrollment (relative to not attending college at all) by a combination of the math and ELA assessment performance of each student, with darker shades representing higher likelihoods of attending a postsecondary institution. In general, students with higher mathematics performance are more likely to attend both 2-year and 4-year college, even when they have lower ELA performance. Students with relatively high ELA performance but lower math performance are not likely to attend 4-year college, and somewhat less likely to attend 2-year college.

Figure 7: A Student's Mathematics Assessment Performance is More Strongly Predictive of Postsecondary Enrollment than their English Language Arts Assessment Performance



Note: Darker colors indicate higher probabilities of enrollment.

Discussion

This brief provides compelling evidence that Oregon's Statewide Assessment System is measuring constructs that are correlated with postsecondary enrollment, as designed. While both ELA and Math assessments are correlated with postsecondary enrollment, in general mathematics was the stronger predictor, particularly for 4-year college enrollment, with students who had high ELA scores but lower Math scores relatively unlikely to enroll. The results presented here may lay the groundwork for use of assessment results in making college admissions decisions in the future, though additional work is needed to evaluate how assessment scores in high school predict not just college enrollment but college success.

Even among the highest scoring students, at least 1 in 5 do not enroll in college within the year following expected high school graduation. Oregon is working on programs to streamline college admissions, reducing burden on students and families while helping to identify students who would benefit from and be successful in college but might not have considered themselves "college material" without intervention. While such a system is unlikely to rely solely on assessment, it might incorporate those results as one possible measure. Assessments administered in 11th grade provide a more leading indicator than many other measures, which are not finalized or available until a student's final year of high school (e.g. GPA, AP scores, SAT scores).

Limitations include assessment participation rates, which are lower in 11th grade than in earlier grades, and below Oregon's participation targets. There are also a small number of students who complete high school more than four years after their high school entry, whose eventual enrollment would not be included in this study. Some of the students included in the study did not graduate from high school at all and would therefore be ineligible for admission to most 4-year colleges – additional work on the relationship between assessment results and high school graduation is forthcoming.

Future briefs will review demographic differences, the predictive validity of the science assessment (once more years of data are available), and the relationship between assessment results and a student's likelihood of high school graduation and college persistence and performance.