

Determinants of Student Retention Rates at the University of New Mexico

Yury Bosin, Jing Feng, Ameer Slim

Office of Institutional Analytics



Research objective

The primary goal of this research is to identify and analyze the most critical factors influencing one-year student retention rates across departments at the University of New Mexico. By examining academic, demographic, financial, engagement-related, and department-level variables, the study aims to provide evidence-based insights to support institutional retention strategies and student success.

Data

The analysis will use administrative data covering the full undergraduate student population at the University of New Mexico over the past twenty-five academic years. The dataset includes detailed information on student demographics, academic preparation, enrollment characteristics, financial aid, academic performance, and campus engagement. Specific department-level data may be acquired through surveys.

Predictors of retention

Pre-enrollment Characteristics

- Demographics
 - Gender
 - Race/ethnicity
 - First-generation student status
 - Age at matriculation
 - Urban vs. rural background
- Academic preparation
 - Prior educational attainment
 - SAT score
 - High school GPA

Enrollment and Academic Experience

- Enrollment characteristics
 - Residency status (in-state vs. out-of-state)
 - First-time student
 - Transfer student
 - On-campus vs. off-campus residence
 - Major or field of study
- Academic performance
 - Fall & Spring semester GPA
 - Fall & Spring attempted credit hours
 - Fall & Spring pass ratio (credit hours passed / credit hours attempted)

Predictors of retention (cont'd)

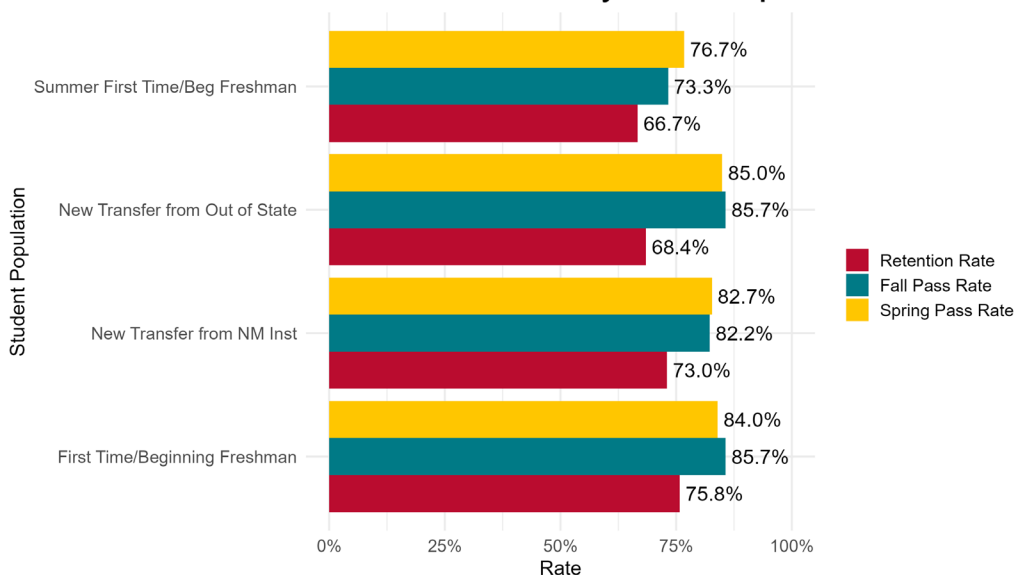
Financial and Engagement Factors

- Financial aid
 - Loan amount (or indicator variable)
 - Grant amount (or indicator variable)
 - Scholarship amount (or indicator variable)
 - Work-study participation (or indicator variable)
 - Expected Family Contribution (or indicator variable)
- Student attributes and engagement
 - Honors College participation
 - Student-athlete status
 - Participation in student organizations (e.g., sorority/fraternity, ASUNM)
 - CAPS utilization (subject to data availability)

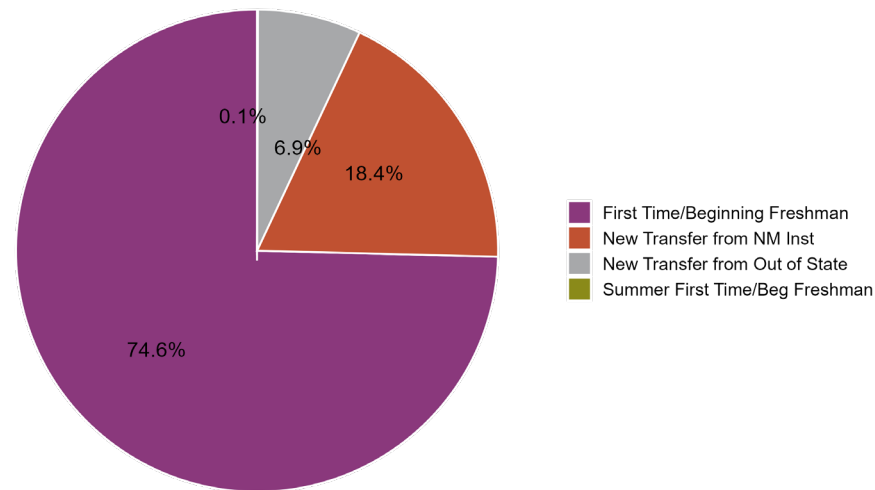
Descriptive Statistics

Retention and pass rates by student population

Retention and Pass Rates by Student Population

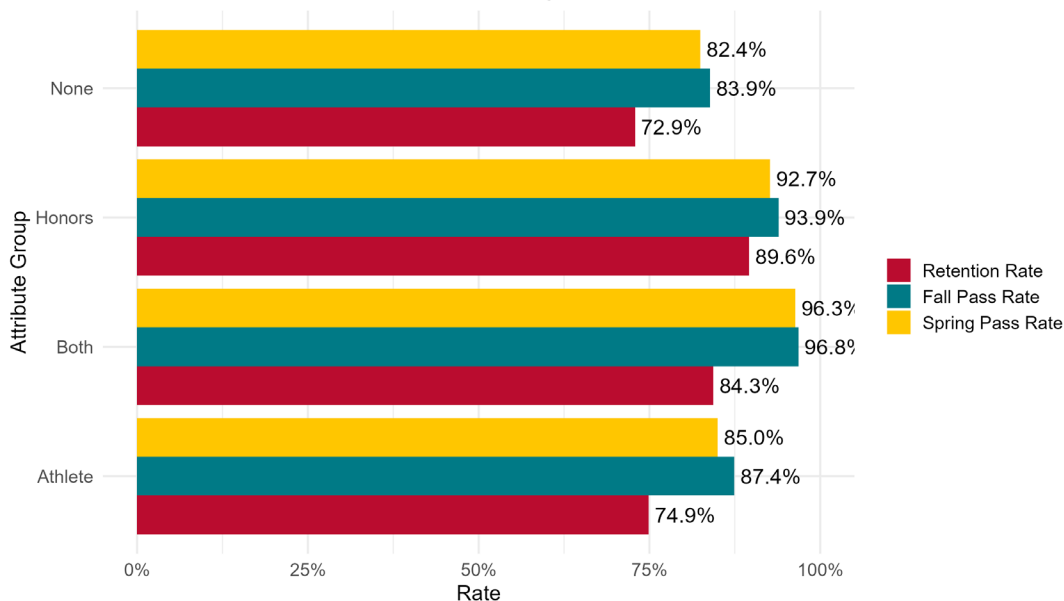


Student Distribution by Population

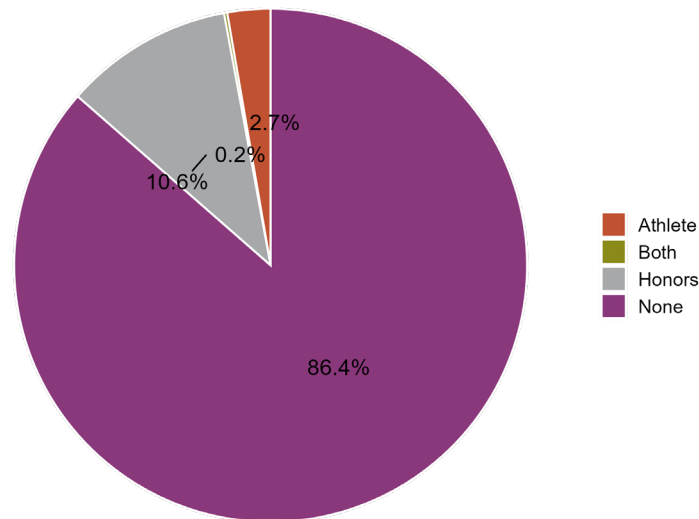


Retention and pass rates by attribute groups

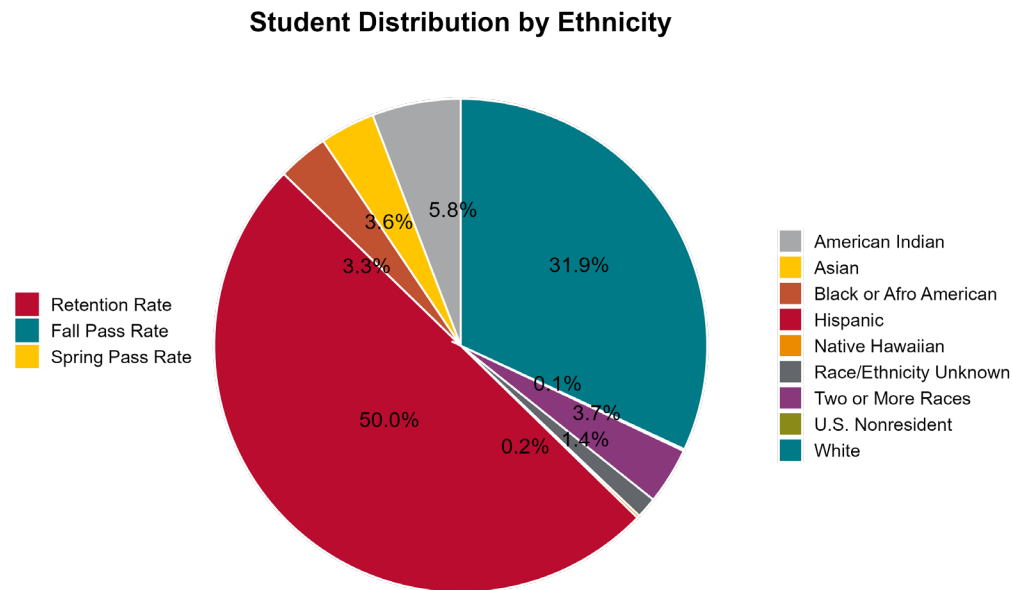
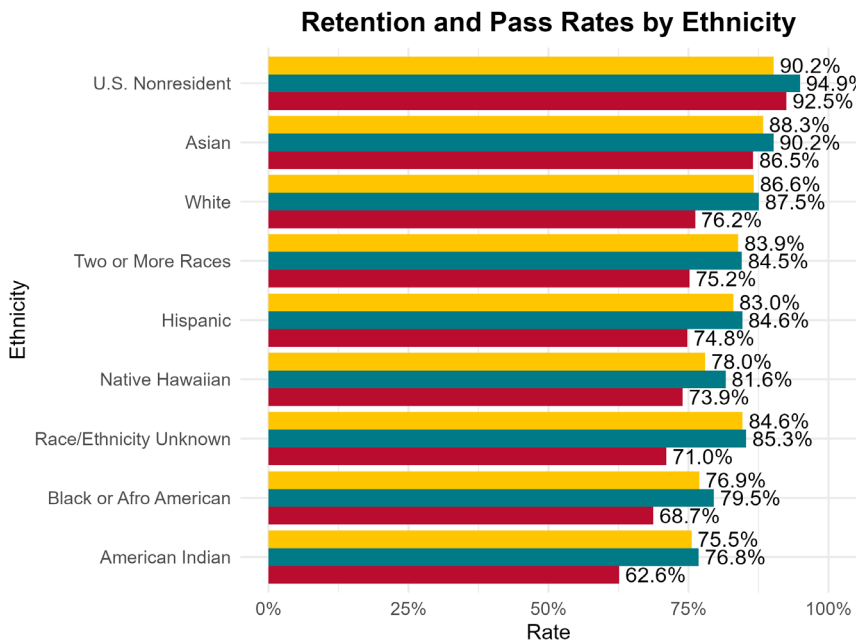
Retention and Pass Rates by Attribute Group



Student Distribution by Attribute Group

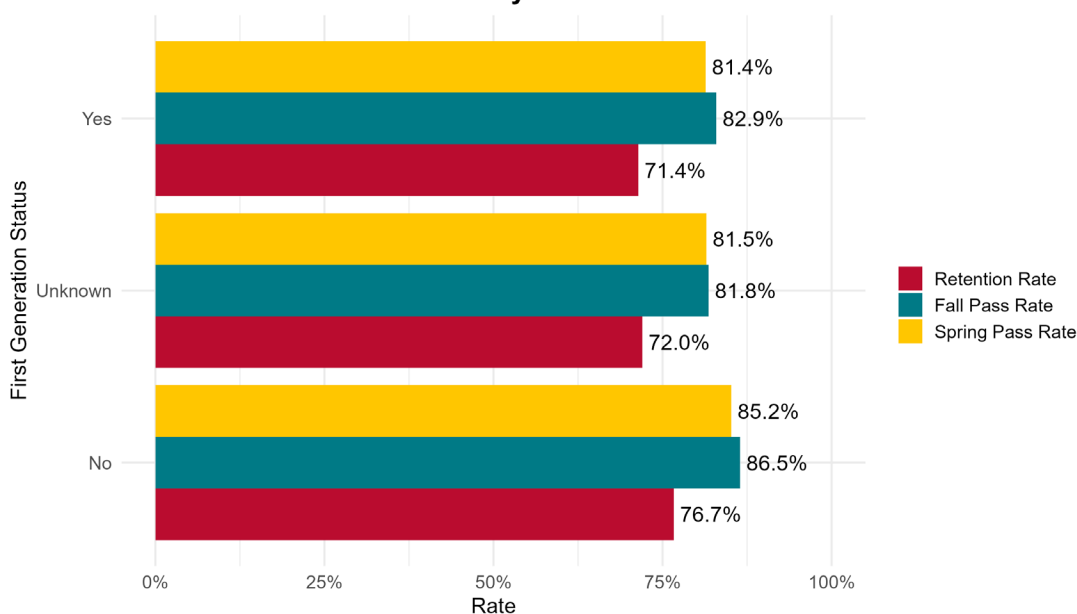


Retention and pass rates by ethnicity

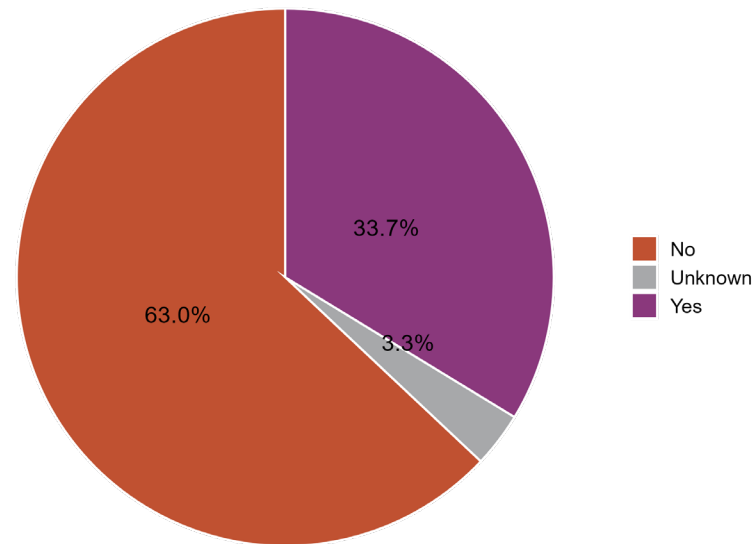


Retention and pass rates by first generation

Retention and Pass Rates by First Generation Status

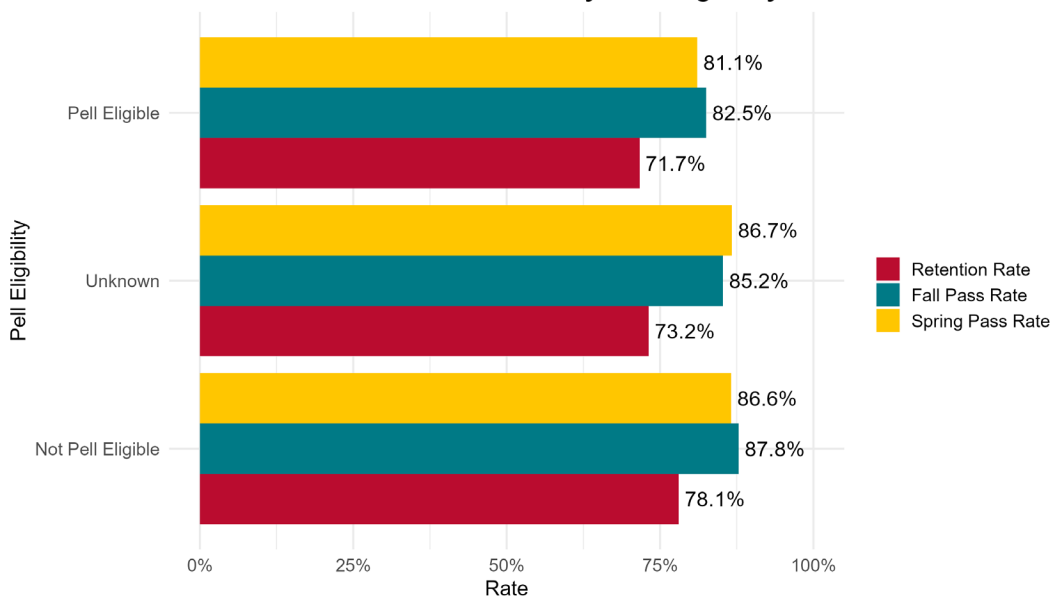


Student Distribution by First Generation Status

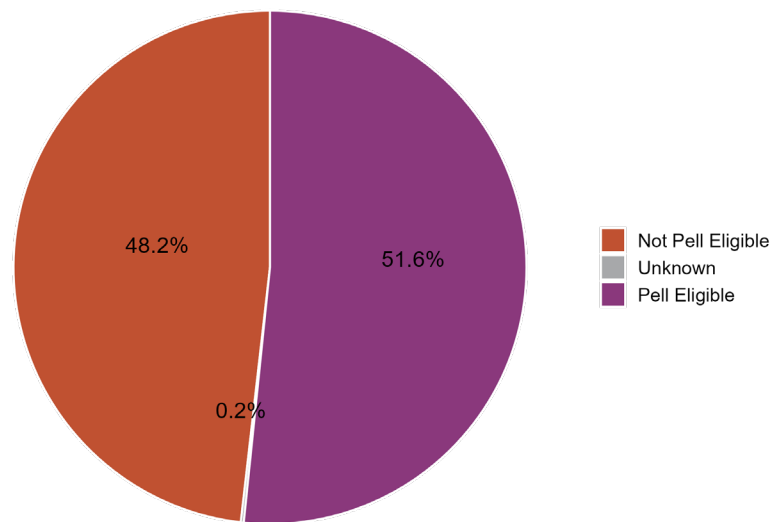


Retention and pass rates by Pell eligibility

Retention and Pass Rates by Pell Eligibility

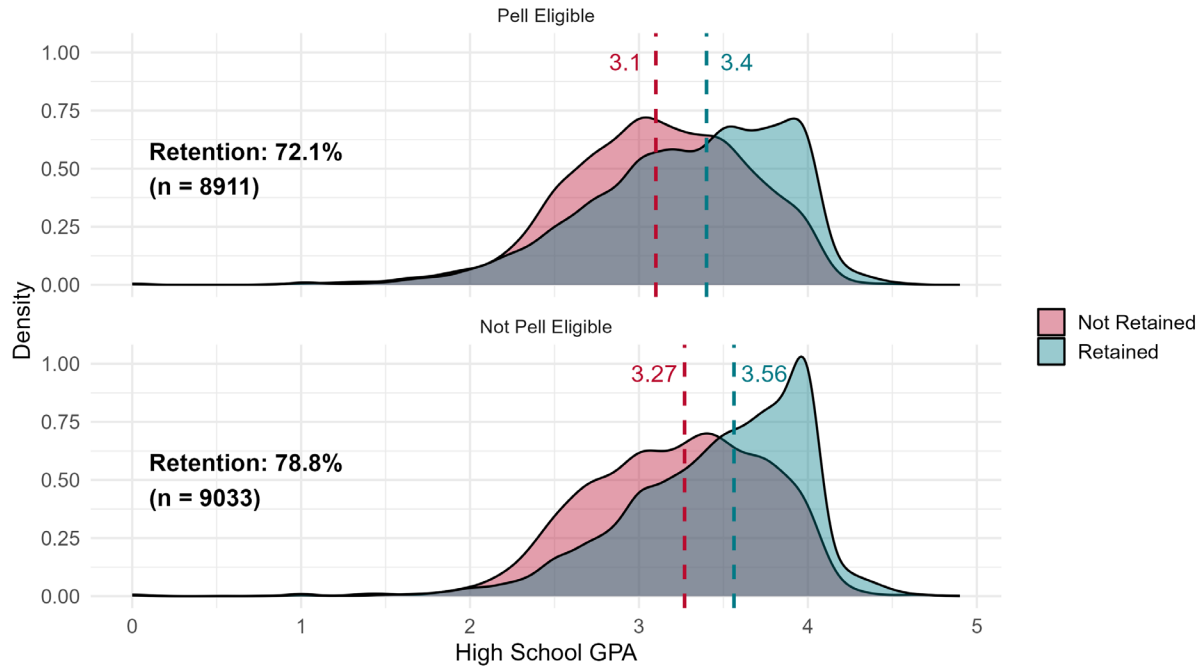


Student Distribution by Pell Eligibility



Retention by high school GPA and Pell eligibility

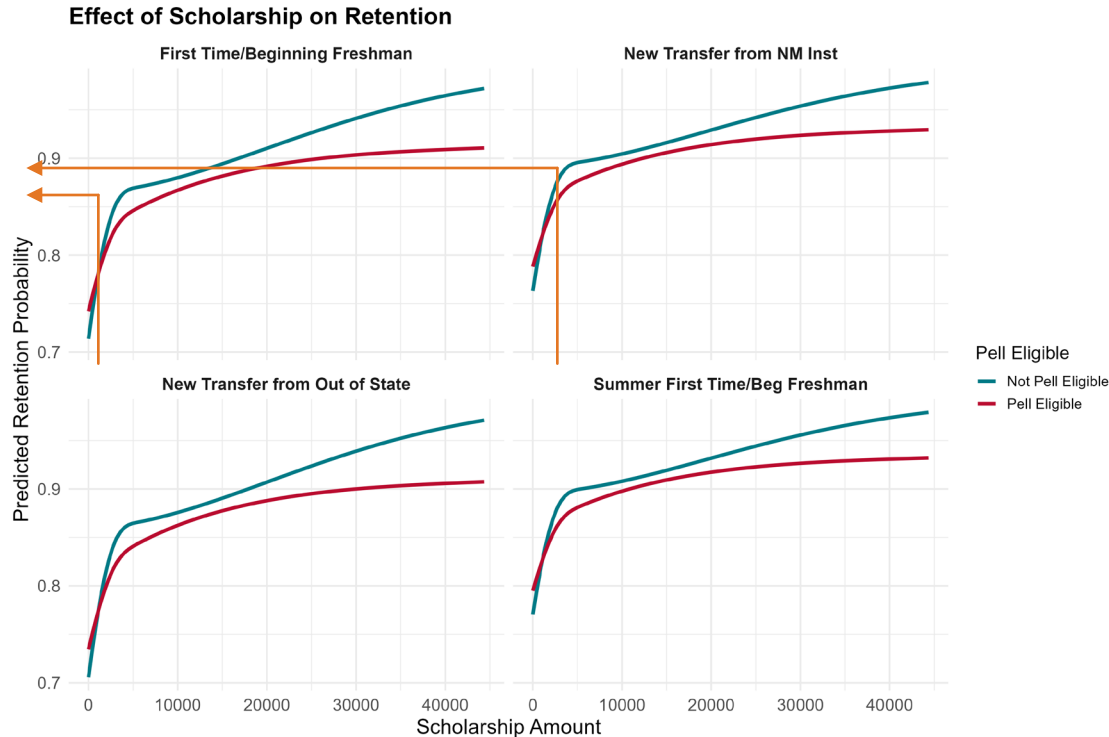
HSGPA Distribution by Retention within Pell Groups



- Retained students tend to have higher high school GPAs.
- Non-Pell students generally show higher high school GPAs than Pell-eligible students.
- Retention rates are higher among non-Pell students.

Regression Analysis

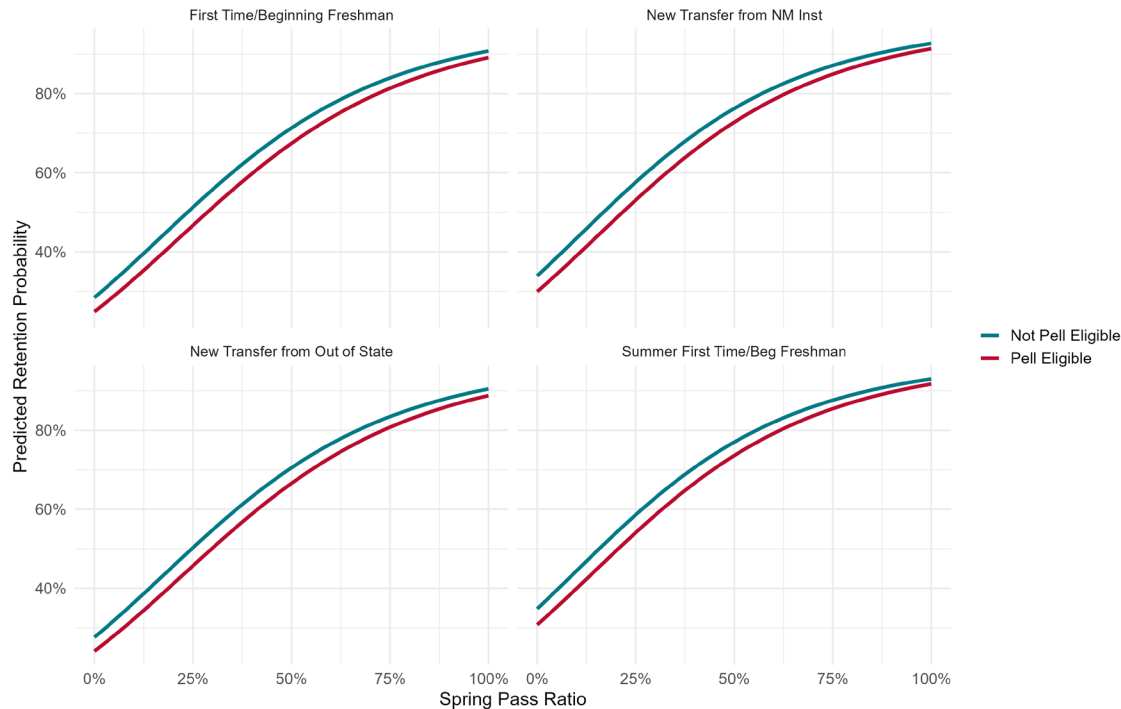
Retention by Scholarship, Student Population, and Pell Eligibility



- Predicted retention probability increases as scholarship amount increases.
- Non-Pell students generally show higher predicted retention probabilities.
- Scholarship effects appear strongest at lower award amounts before leveling off.
- At the same scholarship amount, NM transfer students show higher predicted retention than first-time freshmen.

Retention by Spring Pass Rate, Student Population, and Pell Eligibility

Effect of Spring Pass Ratio on Retention



- Predicted retention probability increases substantially as spring pass ratio increases.
- Students with higher spring pass ratios consistently exhibit higher predicted retention probabilities across all student populations.
- Non-Pell students generally show slightly higher predicted retention probabilities.
- At the same scholarship amount, NM transfer students show higher predicted retention than first-time freshmen.

Retention by Fall Pass Rate, Student Population, and Pell Eligibility

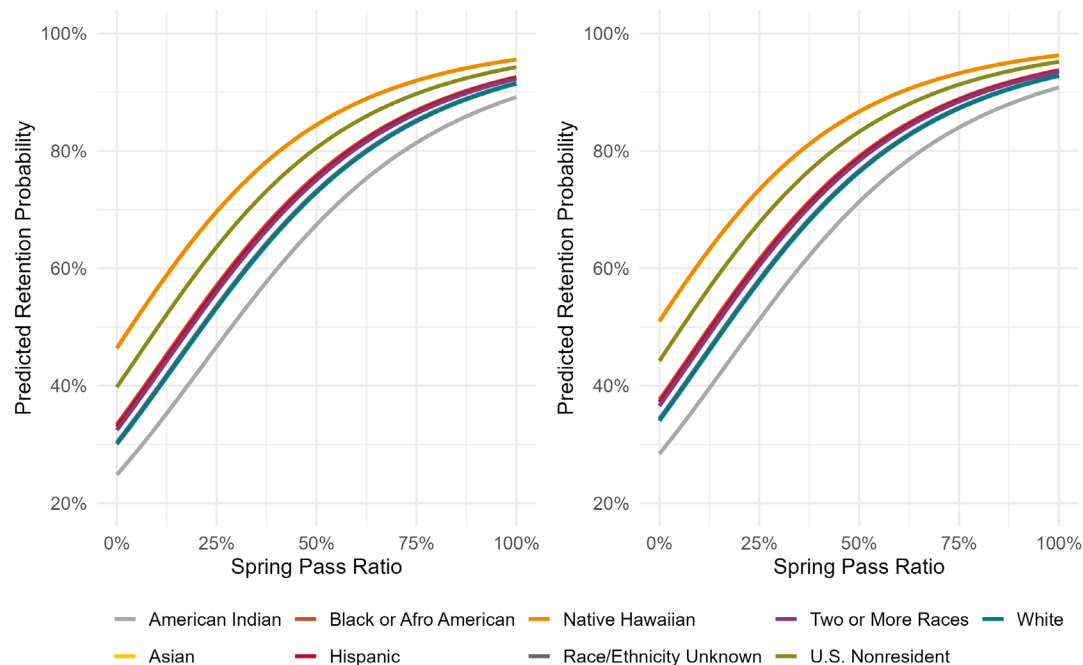


- Predicted retention probability increases as fall pass ratio increases.
- Higher fall pass ratios are associated with higher predicted retention probabilities across all student populations.
- Non-Pell students generally exhibit higher predicted retention probabilities.
- Compared with spring pass ratio, fall pass ratio demonstrates a more moderate relationship with retention.

Retention by Spring pass rate, ethnicity, and Pell award

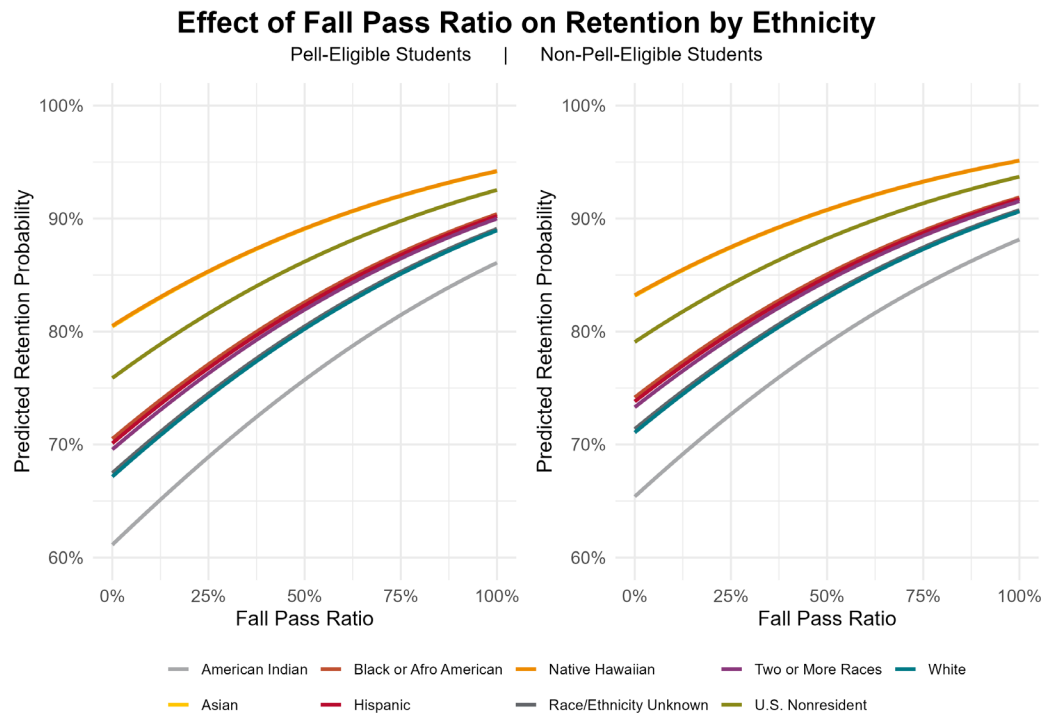
Effect of Spring Pass Ratio on Retention by Ethnicity

Pell-Eligible Students | Non-Pell-Eligible Students



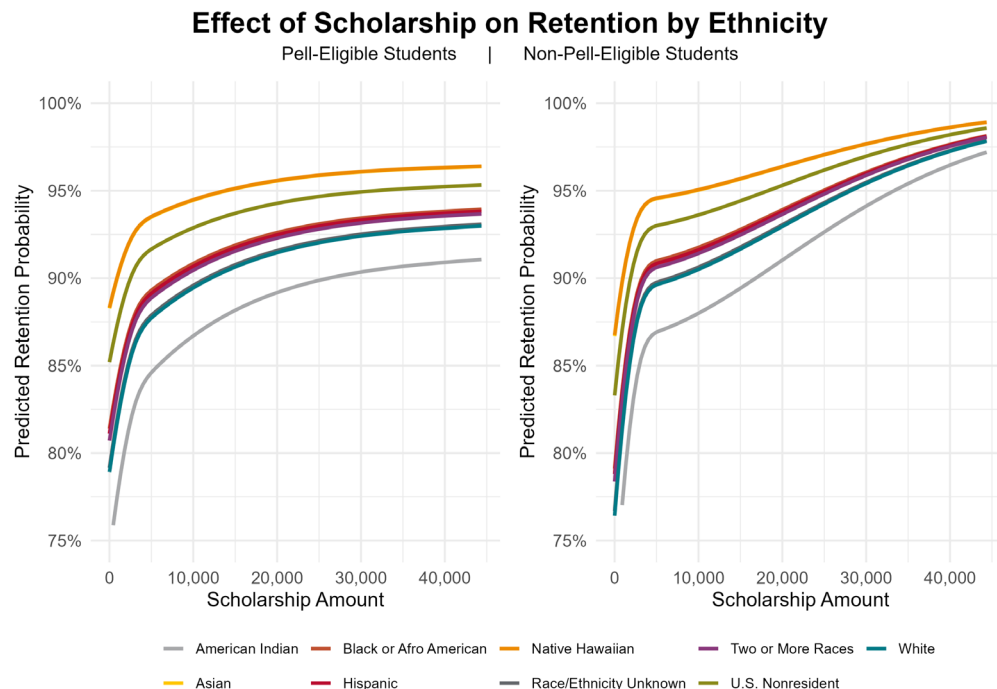
- Non-Pell-eligible students generally exhibit slightly higher predicted retention probabilities across ethnic groups.
- Asian, Native Hawaiian, and U.S. Nonresident students show the highest predicted retention probabilities.
- Predicted retention probability increases substantially as spring pass ratio increases across all ethnic groups.

Retention by Fall pass rate, ethnicity, and Pell award



- Predicted retention probability increases as fall pass ratio increases across all ethnic groups.
- Non-Pell-eligible students generally exhibit slightly higher predicted retention probabilities.
- Asian, Native Hawaiian, and U.S. Nonresident students generally display the highest predicted retention probabilities in the model.
- Compared with spring pass ratio, fall pass ratio demonstrates a more moderate relationship with retention.

Retention by scholarship, ethnicity, and Pell award



- Predicted retention probability increases as scholarship amount increases across all ethnic groups.
- Retention gains appear strongest at lower scholarship amounts before gradually leveling off.
- Non-Pell-eligible students generally exhibit slightly higher predicted retention probabilities.
- Asian, Native Hawaiian, and U.S. Nonresident students generally display the highest predicted retention probabilities in the model.
- Compared with spring pass ratio, scholarship demonstrates a more moderate relationship with retention.

Key factors associated with first-year retention

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)	
(Intercept)	0.39959	0.11281	3.542	0.000397	***
fall_pass_ratio	0.35146	0.01794	19.596	< 2e-16	***
poly(spr_pass_ratio, 2)1	182.19820	2.92362	62.319	< 2e-16	***
poly(spr_pass_ratio, 2)2	-15.96315	2.70510	-5.901	3.61e-09	***
ns(Scholarship, df = 3)1	0.74288	0.20462	3.630	0.000283	***
ns(Scholarship, df = 3)2	2.73633	0.47606	5.748	9.04e-09	***
ns(Scholarship, df = 3)3	2.21019	0.96922	2.280	0.022585	*
PELL_ELIGIBLE_INDY	0.14405	0.08213	1.754	0.079450	.
Attribute_GroupBoth	-0.24720	0.27102	-0.912	0.361711	
Attribute_GroupHonors	0.73351	0.09037	8.116	4.80e-16	***
Attribute_GroupNone	0.38030	0.07676	4.955	7.25e-07	***
GENDERM	-0.03512	0.02844	-1.235	0.216915	
GENDERN	-0.73172	0.78983	-0.926	0.354224	
GENDERUnknown	7.67018	72.46286	0.106	0.915702	
FIRST_GENERATION_INDUnknown	0.13206	0.08619	1.532	0.125452	
FIRST_GENERATION_INDYes	-0.02582	0.03153	-0.819	0.412872	
STUDENT_POPULATION_DESCNew Transfer from NM Inst	0.25631	0.04459	5.748	9.04e-09	***
STUDENT_POPULATION_DESCNew Transfer from Out of State	-0.03935	0.06584	-0.598	0.550037	
STUDENT_POPULATION_DESCSummer First Time/Beg Freshman	0.29725	0.54243	0.548	0.583700	
ETHNICITYAsian	0.96111	0.10441	9.206	< 2e-16	***
ETHNICITYBlack or Afro American	0.41865	0.09113	4.594	4.34e-06	***
ETHNICITYHispanic	0.39984	0.05588	7.156	8.31e-13	***
ETHNICITYNative Hawaiian	0.96584	0.37991	2.542	0.011013	*
ETHNICITYRace/Ethnicity Unknown	0.27733	0.13954	1.987	0.046873	*
ETHNICITYTwo or More Races	0.37391	0.08917	4.193	2.75e-05	***
ETHNICITYU.S. Nonresident	0.69329	0.51786	1.339	0.180652	
ETHNICITYWhite	0.26249	0.05935	4.422	9.76e-06	***
ns(Scholarship, df = 3)1:PELL_ELIGIBLE_INDY	0.16745	0.26881	0.623	0.533322	
ns(Scholarship, df = 3)2:PELL_ELIGIBLE_INDY	-1.04261	0.62823	-1.660	0.096994	.
ns(Scholarship, df = 3)3:PELL_ELIGIBLE_INDY	-1.19702	1.27386	-0.940	0.347384	

Strongest Predictors

- Spring Pass Ratio showed the strongest association with first-year retention.
- Fall Pass Ratio was also strongly associated with higher retention probabilities.
- Scholarship Amount was positively associated with retention, particularly at lower-to-moderate award levels.

Additional Significant Factors

- Student Population Type showed meaningful differences across freshmen and transfer groups.
- Ethnicity was associated with differences in predicted retention probabilities.

Smaller or Limited Effects

- Pell Eligibility Status showed weaker evidence of association after adjusting for other variables.
- Gender and First-Generation Status showed relatively limited effects in the adjusted model.

Additional Models

Program complexity

Program Complexity:

A measure of how difficult a curriculum structure is to navigate and complete based on course connectivity and delay characteristics.

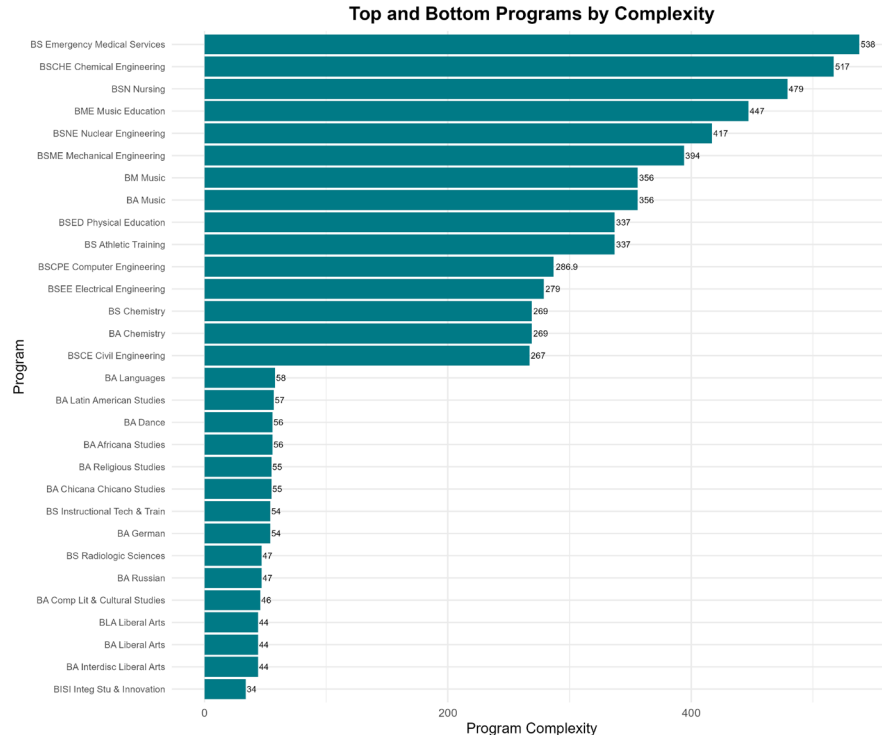
- **Connectivity:**

The number of courses linked through prerequisite relationships within the curriculum.

- **Delay Factor:**

The extent to which delays or failures in key courses may extend progress toward degree completion.

Distribution of Complexity



- Program complexity varies substantially across academic programs.
- Engineering, nursing, and STEM-related programs tend to exhibit the highest complexity levels.
- Liberal arts and interdisciplinary programs generally exhibit lower complexity levels.

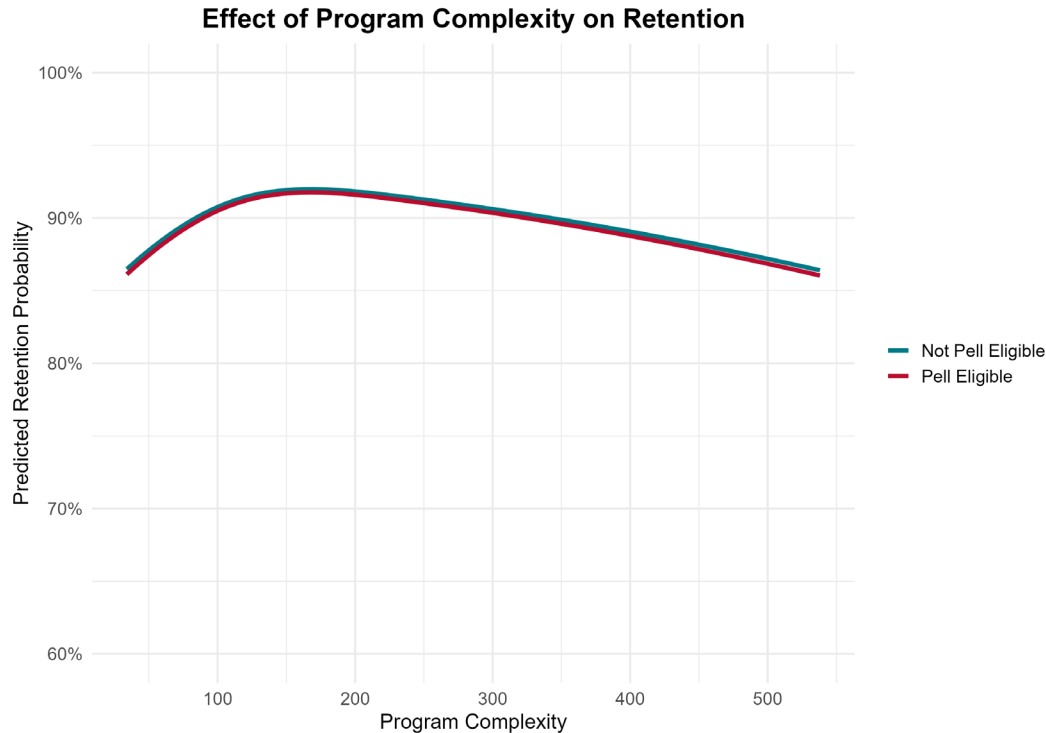
Retention model including program complexity

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.30381	0.20813	1.460	0.14437
fall_pass_ratio	0.34644	0.03006	11.526	< 2e-16 ***
ns(COMPLEXITY_PROGRAM_AVG, df = 3)1	0.19339	0.11464	1.687	0.09160 .
ns(COMPLEXITY_PROGRAM_AVG, df = 3)2	0.75284	0.22759	3.308	0.00094 ***
ns(COMPLEXITY_PROGRAM_AVG, df = 3)3	-0.33367	0.07566	-4.410	1.03e-05 ***
poly(spr_pass_ratio, 2)1	106.15812	2.93978	36.111	< 2e-16 ***
poly(spr_pass_ratio, 2)2	-17.08804	2.76408	-6.182	6.32e-10 ***
ns(Scholarship, df = 3)1	0.90663	0.38598	2.349	0.01883 *
ns(Scholarship, df = 3)2	3.23411	0.78983	4.095	4.23e-05 ***
ns(Scholarship, df = 3)3	3.15673	1.66168	1.900	0.05747 .
PELL_ELIGIBLE_INDY	0.06614	0.12841	0.515	0.60650
Attribute_GroupBoth	-0.44728	0.51044	-0.876	0.38089
Attribute_GroupHonors	0.44789	0.16079	2.786	0.00534 **
Attribute_GroupNone	0.06056	0.13573	0.446	0.65546
GENDERM	0.01764	0.04820	0.366	0.71443
FIRST_GENERATION_INDUnknown	0.18196	0.14317	1.271	0.20375
FIRST_GENERATION_INDYes	-0.09176	0.04937	-1.859	0.06309 .
STUDENT_POPULATION_DESCNew Transfer from NM Inst	0.14982	0.06881	2.177	0.02946 *
STUDENT_POPULATION_DESCNew Transfer from Out of State	-0.04688	0.10955	-0.428	0.66868
STUDENT_POPULATION_DESCSummer First Time/Beg Freshman	-0.17832	0.64748	-0.275	0.78300
ETHNICITYAsian	0.87837	0.16600	5.291	1.21e-07 ***
ETHNICITYBlack or Afro American	0.46526	0.15036	3.094	0.00197 **
ETHNICITYHispanic	0.35477	0.08287	4.281	1.86e-05 ***
ETHNICITYNative Hawaiian	1.17641	0.64502	1.824	0.06818 .
ETHNICITYRace/Ethnicity Unknown	0.43029	0.23169	1.857	0.06329 .
ETHNICITYTwo or More Races	0.37976	0.14414	2.635	0.00842 **
ETHNICITYU.S. Nonresident	0.12772	0.81795	0.156	0.87592
ETHNICITYWhite	0.26083	0.08913	2.926	0.00343 **
ns(Scholarship, df = 3)1:PELL_ELIGIBLE_INDY	0.44347	0.48229	0.920	0.35783
ns(Scholarship, df = 3)2:PELL_ELIGIBLE_INDY	-1.68509	0.97908	-1.721	0.08523 .
ns(Scholarship, df = 3)3:PELL_ELIGIBLE_INDY	-3.28319	2.04865	-1.603	0.10902

- Program complexity remained statistically significant after controlling for pass ratios, scholarship, Pell eligibility, ethnicity, gender, and student population.
- The nonlinear spline terms indicate that the relationship between complexity and retention is not strictly linear.
- Moderate program complexity levels were associated with the highest predicted retention probabilities.
- Complexity analyses were conducted on a reduced sample (~19.6K students vs ~51.1K in the primary model) due to missing complexity measures.

Retention by program complexity and Pell award



- Predicted retention is highest at moderate levels of program complexity.
- Both very low- and very high-complexity programs show slightly lower predicted retention probabilities.
- Lower retention among highly complex programs may reflect increased curriculum difficulty and sequencing barriers.

Limitations of the complexity model

- The primary retention model included approximately 51,000 students.
- Incorporating program complexity reduced the analytic sample to approximately 19,600 students due to missing complexity values across programs.
- Consequently, complexity-related findings should be interpreted cautiously and viewed as exploratory despite statistical significance.

Summary

Strategic areas for improving student retention

Strategic Areas for Improving Student Retention

- **Academic Performance**
 - Students with lower spring pass ratios exhibited substantially lower retention probabilities.
 - Early academic intervention during the spring semester may improve retention outcomes.
- **Financial Support**
 - Pell-eligible students generally showed lower adjusted retention probabilities.
 - Financial and advising support initiatives may help reduce retention gaps.
- **Scholarship Support**
 - Scholarship support was positively associated with retention, particularly at lower-to-moderate award amounts.
 - Additional targeted aid may provide the greatest benefit to financially vulnerable students.
- **Program Complexity**
 - Highly complex programs showed slightly lower predicted retention probabilities.
 - Enhanced advising and pathway planning may help students navigate sequencing-intensive curricula.
- **Student Populations**
 - New transfer students from New Mexico institutions demonstrated strong adjusted retention outcomes.
 - Transfer-support practices may provide insights for broader retention strategies.
 - First-time freshmen showed lower adjusted retention probabilities relative to NM transfer students.
 - Earlier academic structure, advising, and first-year engagement initiatives may help improve retention outcomes.

What's Next

Focus on departments

Retention is not driven solely by who students are when they arrive, but by how departments structure the first-year academic experience. Departments have meaningful control over many of the most influential determinants of student persistence.

The next step is to isolate and analyze how department-level institutional variables directly influence undergraduate student retention rates, moving beyond broad, university-wide metrics to pinpoint localized academic and advisory bottlenecks. Shifting the research focus to the department level transforms retention data from an unalterable diagnostic report into a practical, localized toolkit for actionable academic reform.

Predictors of retention at the dep. level

Department-level Factors

- Presence of dedicated first-year or major-specific advisors
- Number of required gateway courses in the first year
- Availability of remedial or co-requisite courses
- Average class size in first-year courses
- Availability of tutoring or supplemental instruction linked to the department
- Share of courses with discussion/lab sections
- Pass/fail policies in introductory courses
- Course sequencing rigidity (how constrained the first-year curriculum is)
- Advisor-to-student ratio within the department
- Faculty-to-student ratio
- Use of early alert or progress monitoring systems

Data

To put this research into action, a targeted survey will be distributed to academic departments across UNM. The survey focuses on department chairs, undergraduate program directors, and lead academic advisors—the individuals with the firsthand, practical knowledge needed to accurately report on how their departments operate.