

Admission Test Scores and Colleges' Retention Rates

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Most higher education institutions eliminated standardized test requirements for applicants following the COVID-19 pandemic. The impact of college admission criteria on college student retention has been the subject of extensive research in higher education. This literature suggests that admission criteria play a significant role in influencing student retention rates. However, the impacts of test-optional admissions procedures have been relatively understudied. Using a dataset of admissions requirements, institutional profiles, measures of collegiate success, financial aid, and demographics of full-time, first-year students at public or not-for-profit private 4-year institutions for the 2021-2022 academic year, we find that, of the different criteria used in admission policies, required or recommended letters of recommendation and graduation rates combined have an impact on college retention rates. Required or recommended admission test scores positively increase retention rates, albeit not robustly.

Keywords: retention, 4-year institution, admission policies, higher education, test-optional, standardized tests

INTRODUCTION

COVID-19 triggered changes for higher education institutions (HEIs) in enrollment and teaching modality. The pandemic also accelerated a change in admission policies, inducing widespread adoption of standardized (SAT/ACT) test-optional admissions (de Vise, 2022). Before the change, the few universities that made standardized tests (*tests*) an optional component of their admission packages cited fostering racial and socioeconomic diversity of the student body as their impetus (Felegi, 2024). During the pandemic, *tests* became onerous due to health risks, movement and gathering restrictions, testing site closures, and financial hardships, necessitating a reprieve from testing requirements. In 2000, about ten institutions implemented test-optional admissions, reaching about 250 (~12%) in 2019. By Fall 2023, 1700 HEIs (~80%) no longer required *tests* despite restoring pre-pandemic access and testing capabilities (Nietzel, 2023). While HEIs initially intended for this change to be temporary, many made the policy permanent to promote diversity and inclusion and address the impending enrollment cliff in higher education.

Aside from concerns that *tests* might perpetuate socioeconomic inequalities (Zwick, 2007; Bulman, 2015; Berg, 2016), their predictive power regarding college readiness is contentious. There is evidence that *tests* predict college academic success, especially if they are combined with high school GPA (Burton & Ramist, 2001; Carnevale & Rose, 2003; Zwick, 2007; Bettinger et al., 2011; D'Amico & Dika, 2013; Cardona et al., 2023). However, critics view *tests* as a narrow assessment of students' potential (Syverson et al., 2018).

Existing research focuses on the transition to test-optional admission policies on the number of applications and the socio-demographic characteristics of the applicants. There is a lack of consensus on whether the rise in applications from test-optional admissions translates into a more diverse student body, notably regarding under-represented minorities and Pell Grant recipients (Belasco et al., 2015; Syverson et al., 2018; Bennett, 2021; Shultz & Backstrom, 2021; Paris et al., 2022).

Furthermore, the test-optional admission policies pose challenges in identifying prospective student readiness, which may have implications for retention (Millea et al., 2018). Recently, elite universities announced they would reinstate *tests* as a required component of their admission policy. Research by MIT suggests that *tests* provide information about the applicant's academic preparation, irrespective of background (Wren, 2022).

The retention rate represents one measure of success for universities and students. For a university, retention impacts the institution's mission, revenues, reputation, and ranking. When students drop out, the financial loss is not limited to the funds allocated to recruiting students but also resources devoted to their academic success. There are additional losses stemming from recruitment to fill vacant spots and decreases in expected revenues from housing and meal plans.

For students, the decision to leave a university can be explained by factors that fall into three categories: institutional factors, student attributes, and students' financial security. Models of college retention (Bean & Metzger, 1985; Pascarella, 1991; Tinto, 1993) note that successful retention requires HEIs to have a good academic and social picture of the admitted students and to provide the social, financial, and academic assistance that students may need.

Students may leave if the HEI fails to provide an environment supportive of their learning and educational needs (Lau, 2003). The role HEI plays in students' retention can be controlled by institutional factors such as student/faculty ratios, student-life programs and services, and specific academic programs. Students may drop out due to attributes such as behaviors/student conduct, motivation, academic preparation, and family characteristics. Financial security is essential for student retention, particularly those from lower-income families (Pratt et al., 2019). Access to financial aid alleviates financial insecurity and the need to work while enrolled.

While retention rates are an important measure of academic success, and “[s]tudent retention starts with admission policies” (Soika, 2020), there is limited research on whether dropping *tests* from admission criteria impacts student retention. Our study fills this gap.

EMPIRICAL METHODOLOGY

The reduced form estimation is below:

$$Retention_Rate_i = \alpha + \beta_1 Admissions_Materials_i + \mathbf{Z}'_{ijt} \boldsymbol{\gamma} + \varepsilon_{ijt} \quad (1)$$

where $Retention_Rate_i$ is the “percentage of full-time, first-time bachelor’s degree-seeking undergraduates from the previous fall who are again enrolled in the current fall” at a four-year public (*public*) or not-for-profit institution i in 2021-2022 (NCES, 2024). $Admissions_Materials_i$ is a vector for different required or recommended application materials. Vector \mathbf{Z}_i accounts for other factors that may impact retention rates.

Required or recommended application materials include *Admissions Test Scores (tests)*, *Secondary School GPA (GPA)*, *Secondary School Rank (rank)*, *Secondary School Record (record)*, and *Letters of Recommendation (LOR)*. For each application material, we combine required and recommended to compare institutions because “[w]hen a college says something is ‘recommended, [applicants] should read that as ‘required.’” (Schade, 2024).

The data is from the Integrated Postsecondary Education Data System and College Scorecard Data. The average $Retention_Rate$ is 76.5% with a low of 21.0% at Williams Baptist College to 99.0% at CalTech, Chicago, Northwestern, MIT, and Columbia. The percentage of HEIs with required or recommended application materials for *test*, *GPA*, *rank*, *record*, and *LORs* were 22%, 89.4%, 19.3%, 96.2%, and 39.9%, respectively.

TABLE 1
SUMMARY STATISTICS FOR 2021-22 ACADEMIC YEAR

Variable	Mean	Std. dev.	Min	Max
Full-Time Retention Rate	76.46	11.43	21.00	99.00
% First-Time Students ACT Scores	30.63	27.52	0.00	100.00
% First-Time Students SAT Scores	24.80	17.45	0.00	91.00
Required or Recommended Admission Test Scores	0.22	0.41	0.00	1.00
Required or Recommended Secondary School Rank	0.19	0.39	0.00	1.00
Required or Recommended Secondary School Record	0.96	0.19	0.00	1.00
Required or Recommended Secondary School GPA	0.89	0.31	0.00	1.00
Required or Recommended Recommendations	0.40	0.49	0.00	1.00
Admission Rate	72.43	21.15	3.92	100.00
Four-Year Public Institution	0.41	0.49	0.00	1.00
% TT Faculty to Total Employees	18.71	6.15	0.05	40.50
50%+ Baccalaureate Carnegie	26.18	43.98	0.00	100.00
Student-to-Faculty Ratio	13.63	3.88	3.00	30.00
Total Student Enrollment (1000s)	8.60	11.76	0.21	103.07
Graduation Rate	61.09	16.67	8.00	98.00
Return on Investment 20 Years Later (10,000s)	31.38	21.94	-19.35	138.30
Net Tuition (1000s)	14.47	7.96	0.00	50.43
% with Pell Grant	32.29	13.46	7.42	88.69

Variable	Mean	Std. dev.	Min	Max
Average Loan Amount (1000s)	29.54	7.27	4.30	63.90
% Female Enrollment	56.22	12.46	0.00	100.00
% Female Faculty	49.48	8.80	15.74	87.50

Note: The number of observations is 1119, except for % First-Time Students ACT Scores at 827 and % First-Time Students SAT Scores at 816.

RESULTS

Initial OLS results are available in Table 2, column 1. *Ceteris paribus*, *rank* negatively impacts retention rate by 1.49 pp, whereas *LOR* is associated with higher retention rates by 0.84 pp. For the average institution, *LOR* is associated with tuition revenue that is higher by approximately \$1 million, using the average in Table 1. No statistical evidence shows that *tests*, *GPA*, or *records* affect retention rate. Higher *Admit* (rate) and *% female faculty* are correlated with a lower retention rate. Except for *Student/Faculty Ratio*, *%TT Faculty-to-Employees*, and *%Pell Grant*, the control variables positively correlate with the retention rate.

TABLE 2
RETENTION RATES REGRESSIONS

	OLS	Factor Analysis	2SLS Factor Analysis
	1	2	3
Required or Recommended Admission Test Scores	0.710 [0.473]	0.601 [0.503]	4.825*** [2.143]
Required or Recommended Secondary School Rank	-1.490*** [0.502]	-1.482*** [0.534]	-0.859 [0.690]
Required or Recommended Secondary School Record	0.619 [0.849]	0.964 [0.907]	0.133 [1.002]
Required or Recommended Secondary School GPA	0.571 [0.574]	0.739 [0.608]	0.859 [0.674]
Required or Recommended Recommendations	0.844** [0.430]	0.891** [0.446]	1.598*** [0.534]
Admission Rate	-0.025** [0.010]	-0.034*** [0.010]	-0.018 [0.014]
Four-Year Public Institution	1.293** [0.578]	0.782* [0.462]	0.108 [0.619]
% TT Faculty to Total Employees	0.027 [0.030]	0.028 [0.031]	0.022 [0.037]
<i>Undergraduate Factor</i>		-0.004 [0.006]	-0.002 [0.008]
50%+ Baccalaureate Carnegie	0.008* [0.008]		
Student-to-Faculty Ratio	0.081 [0.062]		
Total Student Enrollment (1000s)	0.092*** [0.017]		

	OLS	Factor Analysis	2SLS Factor Analysis
	1	2	3
<i>Outcomes Factor</i>		0.443*** [0.015]	0.448*** [0.020]
Graduation Rate	0.479*** [0.018]		
Return on Investment 20 Years Later (10,000s)	0.044*** [0.011]		
<i>Costs Factor</i>		0.062*** [0.016]	0.072*** [0.021]
Net Tuition (10,000s)	0.104*** [0.038]		
% with Pell Grant	-0.013 [0.018]		
Average Loan Amount (1000s)	0.053** [0.026]		
<i>Female Factor</i>		0.100*** [0.013]	0.084*** [0.016]
% Female Enrollment	0.078*** [0.017]		
% Female Faculty	-0.048** [0.024]		
Constant	38.55*** [2.530]	40.83*** [2.046]	40.77*** [2.596]
Observations	1,119	1,119	815
R-squared	0.785	0.751	0.756

Standard errors in parentheses, ***p<0.01, **p<0.05, *p<0.1

To address the potential impact of multicollinearity among our explanatory variables, we employed exploratory and confirmatory factor analysis to capture redundant information and identify the number of dimensions underlying the set of explanatory variables. Using the factor loadings, which are weights and correlations between the variables in defining the factor's dimensionality, the indexes that consisted of more than one variable in determining the factors are:

- Undergraduate:** 50%+ *Baccalaureate Carnegie, Student-to-Faculty Ratio, Total Student Enrollment*
- Outcome:** *Return on Investment 20 Years Later, Graduation Rate*
- Costs:** *Average Loan Amount, Net Tuition, % with Pell Grant*
- Female:** *% Female Enrollment, % Female Faculty*

Using the factor analysis, the results in column 2 show a negative association between *rank* and retention rates. Like the benchmark specification, *LORs* positively impact retention rates, whereas higher *Admit* lowers retention rates. There is no evidence to support the *Undergraduate Factor* as a consideration for a student's decision to continue or leave a HEI after their first year. The *Outcome Factor* is statistically significant, impacting retention rates positively by 0.44 pp. The *Costs Factor* also has a positive but smaller impact on retention rates, with a coefficient of 0.06. The presence of females, captured by the *% Female Enrollment* and *% Female Faculty*, given by the *Female Factor*, increases retention at HEIs.

Lastly, we include the four factors in a two-stage least-squares (2SLS) estimation, including the percent of *ACT* and *SAT Scores submission* as proxies for *tests*. The findings in column 3 show that *tests* are

associated with increased retention rates (4.83 pp). While *Rank* is no longer statistically significant, the impact of *LOR* increases to 1.60 pp. The results of the 2SLS estimation in column 3 are broadly similar to the basic factor analysis in column 2.

CONCLUSION

The literature suggests that college admission criteria have a substantial impact on student retention. Our results indicate that *letters of recommendation* and *Outcomes Factor*, which includes the *Graduation Rate* and *Return on Investment*, positively impact college retention rates. *Tests* positively increase retention rates, but only in the estimation that also includes the percentage of students submitting their ACT or SAT scores. *Rank* and higher *Admit* are negatively associated with retention rates. HEIs that do not solicit admission materials may increase the propensity of mis-assessing and mismatching prospective students, leading to a lower retention rate. Additionally, without *LORs*, HEIs may emphasize *GPA* or extracurricular activities to infer a student's college readiness and potential for success.

Institutional features, campus composition, postgraduate employment, and financial barriers also impact retention rates. HEIs with larger student enrollment have higher retention rates, likely driven by the positive relationship between enrollment and resources as students at larger HEIs can more easily participate in affinity groups. The positive association between the retention rates and the *Costs Factor* and *Admit* rate variables may be due to an indirect measure of institutional quality.

It is essential to adopt a holistic approach, recognizing that various academic and non-academic factors influence student retention. Providing adequate support systems and resources is crucial in ensuring that admitted students have the tools to succeed and graduate. A combination of well-informed admission practices and institutional commitment to student success can contribute to higher retention rates.

High schools could encourage students to engage in school to receive strong letters of recommendation in preparing students for college. This habit of engagement is likely to continue in college, thus leading to a greater sense of belonging and higher retention rates. HEIs that currently do not require or recommend submitting letters of recommendation could increase retention by changing this policy, as they explain academic potential that may not be evident from grades alone and provide information about any shortfalls that may impact a student's performance in college. Moreover, HEIs could increase their retention rates by providing resources to ensure that students graduate on time.

The availability of data limits our study. It would be helpful to include a longer period and additional demographic information such as racial and ethnic groups concerning retention rates and *Admission Materials*.

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APPENDIX 1: INSTITUTIONS WITH REQUIRED OR RECOMMENDED ADMISSION TEST SCORES

Albertus Magnus College, Albright College, Alcorn State University, Alvernia College, Anderson College, Arkansas State University-Main Campus, Arkansas Tech University, Auburn University at Montgomery, Auburn University Main Campus, Augustana College, Austin Peay State University, Barry University, Bemidji State University, Benedict College, Bethel College, Bethune Cookman College, Bloomsburg University of Pennsylvania, Bluffton College, Brevard College, Bryn Mawr College, California Institute of Technology, Carson-Newman College, Cedar Crest College, Central Missouri State University, Citadel Military College of South Carolina, Claflin College, Clarion University of Pennsylvania, Clayton State College, Cleveland State University, Coe College, College of Great Falls, Columbia College, Coppin State College, Daemen College, Davis and Elkins College, Delaware State University, Delta State University, Depaul University, Dickinson College, Drew University, Duke University, East Texas Baptist University, Eastern Connecticut State University, Eastern Kentucky University, Eastern New Mexico University-Main Campus, Edgewood College, Edward Waters College, Emporia State University, Fairmont State College, Fisk University, Florida Agricultural and Mechanical University, Florida Atlantic University, Florida

Baptist Theological College, Florida Institute of Technology, Florida International University, Florida Memorial College, Florida State University, Fort Hays State University, Fort Valley State College, Frostburg State University, Gallaudet University, Geneva College, Georgetown College, Georgetown University, Georgia College, Georgia Institute of Technology Main Campus, Georgia Southwestern College, Grand Canyon University, Grand Valley State University, Grinnell College, Hampton University, Henderson State University, Hood College, Illinois Wesleyan University, Indiana State University, Juniata College, Kansas State University of Agriculture and App Sci, Kansas Wesleyan University, Kentucky State University, King's College, Kutztown University of Pennsylvania, La Grange College, La Salle University, La Sierra University, Lake Superior State University, Le Moyne-Owen College, Lee College, Lenoir-Rhyne College, Lewis-Clark State College, Liberty University, Lincoln Memorial University, Lincoln University, Livingstone College, Lock Haven University, Louisiana College, Louisiana Tech University, Manhattan College, Marian College, Mars Hill College, Marshall University, Massachusetts Institute of Technology, Massachusetts Maritime Academy, Mayville State University, Mcneese State University, Mcpherson College, Medaille College, Midland Lutheran College, Minot State University, Mississippi State University, Mississippi University for Women, Missouri Southern State College, Moravian College, Morehead State University, Morningside College, Mount Marty College, Mount Mercy College, Muskingum College, New College of the University of South Florida, New Mexico Institute of Mining and Technology, Nicholls State University, Norfolk State University, Northeast Louisiana University, Northeastern University, Northern Arizona University, Northwestern Oklahoma State University, Northwestern State University of Louisiana, Norwich University, Oakwood College, Ohio Dominican College, Oklahoma Baptist University, Oklahoma Christian University of Science and Arts, Old Dominion University, Pacific Union College, Paine College, Piedmont College, Prairie View A & M University, Randolph-Macon College, Regent University, Reinhardt College, Rivier College, Rollins College, Saint Francis College, Saint Michaels College, Saint Thomas Aquinas College, Salisbury State University, Salve Regina University, San Jose Christian College, Seattle Pacific University, Seton Hill College, Siena College, Sioux Falls College, Slippery Rock University of Pennsylvania, South Carolina State University, Southeast Missouri State University, Southeastern Louisiana University, Southeastern Oklahoma State University, Southern Arkansas University Main Campus, Southern Oregon State College, Southern University and A & M College-Baton Rouge, Southern University-New Orleans, Southwest Baptist University, Southwest Missouri State University, Southwest State University, Southwestern Oklahoma State University, Spring Arbor College, St Francis College, Stephen F Austin State University, Suny at Albany, Suny College at New Paltz, Suny College at Oneonta, Suny College of Technology at Delhi, Susquehanna University, Tabor College, Taylor University-Upland, Tennessee Technological University, Texas A & M International University, Texas A & M University, Texas A & M University-Corpus Christi, The University of Texas at Dallas, The University of Texas at El Paso, The University of Texas-Pan American, The University of West Florida, Thomas More College, Tougaloo College, Touro College, Trevecca Nazarene College, Troy State University-Main Campus, Tuskegee University, Union University, United States Merchant Marine Academy, University of Akron Main Campus, University of Alabama In Huntsville, University of Alaska Anchorage, University of Alaska Fairbanks, University of Alaska Southeast, University of Arkansas at Fayetteville, University of Arkansas at Little Rock, University of Arkansas at Pine Bluff, University of Central Florida, University of Central Oklahoma, University of Colorado at Colorado Springs, University of Connecticut, University of Delaware, University of Florida, University of Iowa, University of Maine at Fort Kent, University of Maine at Presque Isle, University of Maryland Eastern Shore, University of Michigan-Ann Arbor, University of Mississippi Main Campus, University of Mobile, University of Nebraska at Kearney, University of Nebraska at Omaha, University of Nevada-Las Vegas, University of Nevada-Reno, University of North Alabama, University of North Dakota-Main Campus, University of North Florida, University of Northern Colorado, University of Richmond, University of Scranton, University of South Alabama, University of South Florida, University of Southern Maine, University of Southern Mississippi, University of Southwestern Louisiana, University of West Alabama, Upper Iowa University, Utica College of Syracuse University, Valdosta State University, Vermont Technical College, Wagner College, Washington College, Wayne State University, Waynesburg

College, West Georgia College, West Liberty State College, West Virginia State College, Western Connecticut State University, Western Kentucky University, Western Montana College-University of Montana, Willamette University, William Woods University, Williams Baptist College, Wilmington College, Yeshiva University.

APPENDIX B: LIST OF CATEGORICAL AND CONTINUOUS VARIABLES

Categorical Variable

- Required/Recommended Admission Test Scores
- Required/Recommended Secondary School Rank
- Required/Recommended Secondary School Record
- Required/Recommended Secondary School GPA
- Required/Recommended Recommendations
- Four-Year Public Institution
- 50%+ Baccalaureate Carnegie

Continuous Variable

- % First-Time Students ACT Scores
- % First-Time Students SAT Scores
- Admission Rate
- Graduation Rate
- Student-to-faculty ratio
- Total Student Enrollment (1000s)
- % TT Faculty to Total Employees
- Net Tuition (1000s)
- % with Pell Grant
- Average Loan Amount (1000s)
- Return on Investment 20 Years Later (10,000s)
- Women % Enrollment
- % Female Faculty