

The Relationship Between SAT[®] Scores and Retention to the Second Year: 2008 SAT Validity Sample

By Krista D. Mattern and Brian F. Patterson

Executive Summary

The College Board formed a research consortium with four-year colleges and universities to build a national higher education database with the primary goal of validating the revised SAT[®], which consists of three sections: critical reading (SAT-CR), mathematics (SAT-M), and writing (SAT-W), for use in college admission. A study by [Mattern and Patterson \(2009\)](#) examined the relationship between SAT scores and retention to the second year of college. The sample included first-time first-year students entering college in fall 2006, with 106 of the original 110 participating institutions providing data on retention to the second year. Results showed that SAT performance was related to retention, even after controlling for HSGPA.

The following year, previously participating as well as new colleges and universities were invited to provide first-year performance data on the first-time first-year students who entered college in the fall of 2007. For the 2007 sample, a total of 72 of the original 110 institutions and 38 new institutions provided data. The 110 institutions in the 2007 sample contained 216,081 students. A replication of the Mattern and Patterson study (2009) was conducted with the new cohort and similar results were found ([Mattern & Patterson, 2011](#)).

Similarly, previously participating as well as new colleges and universities were invited to provide first-year performance data on the first-time first-year students who began in the fall of 2008. For the 2008 cohort of students, a total of 129 institutions provided data on a total of 246,652 students. Students without SAT scores, self-reported high school grade point average (HSGPA), or retention data were removed from analyses, resulting in a final sample size of 173,963 students. Replicating the analyses of the previous two reports (Mattern & Patterson, 2009; 2011), the tables below are based on the 2008 sample, and the findings are largely the same as those found in the earlier reports.

Results show that SAT performance is positively related to second-year retention rates, even after controlling for student and institutional characteristics. This was also true within HSGPA bands, showing that SAT scores provide incremental value over high school grades in predicting retention. Furthermore, controlling for SAT performance is seen to reduce and in some cases eliminate the differences in retention rates between student and institutional subgroups that are otherwise observed.

Table 1. Distribution of Institutional Characteristics

Subgroup / Characteristic		Percentage
U.S. Region	Midwest	17
	Mid-Atlantic	23
	New England	15
	South	14
	Southwest	11
	West	21
Control	Public	44
	Private	56
Size (Number of Undergraduates)	Small (750 to 1,999)	20
	Medium (2,000 to 7,499)	42
	Large (7,500 to 14,999)	16
	Very Large (15,000 or more)	23
Selectivity	< 50%	21
	50–75%	57
	> 75%	23

Note: Number of institutions = 129.

- The sample of 129 institutions was diverse with respect to U.S. region, control, size, and selectivity, and was largely representative of the target population.

Table 2. Returning vs. Nonreturning Students, by Student and Institutional Characteristics

Number of Students		Total	Returning	Nonreturning
		177,560	151,958	25,602
Subgroup / Characteristic		Percentage of Students		
Gender	Female	54.2	54.5	53.0
	Male	45.8	45.5	47.0
Race/ Ethnicity	American Indian	0.5	0.5	0.7
	Asian	10.4	11.0	7.1
	Black/African American	6.8	6.5	8.1
	Hispanic	8.7	8.4	10.2
	Other	2.6	2.6	2.6
	White	68.7	68.7	68.8
	No Response	2.4	2.3	2.5
Household Income	< \$40,000	11.2	10.6	14.2
	\$40,000–\$80,000	19.5	19.0	22.5
	\$80,000–\$120,000	19.1	19.2	18.5
	\$120,000–\$160,000	7.9	8.0	7.5
	\$160,000–\$200,000	4.1	4.2	3.5
	> \$200,000	6.7	6.9	5.6
	No Response	31.5	32.1	28.1
Highest Parental Education Level	No High School Diploma	2.3	2.3	2.6
	High School Diploma	20.7	19.4	28.5
	Associate Degree	6.6	6.3	8.3
	Bachelor's Degree	33.0	33.4	30.5
	Graduate Degree	31.8	33.0	24.4
	No Response	5.6	5.6	5.8
Control	Private	27.4	28.1	23.7
	Public	72.6	71.9	76.3
Size	Small (750 to 1,999)	4.0	3.9	5.0
	Medium (2,000 to 7,499)	19.3	18.6	23.2
	Large (7,500 to 14,999)	19.0	18.6	21.5
	Very Large (15,000 or more)	57.6	58.9	50.4
Admittance Rate	< 50%	19.3	20.9	9.6
	50–75%	65.9	65.5	68.4
	> 75%	14.8	13.5	22.0
Mean (SD) of Performance Variables				
	SAT-CR	553 (94.1)	559 (93.4)	522 (92.0)
	SAT-M	572 (95.9)	579 (94.8)	533 (93.1)
	SAT-W	547 (94.4)	553 (93.6)	511 (90.7)
	HSGPA	3.60 (0.494)	3.63 (0.477)	3.38 (0.540)

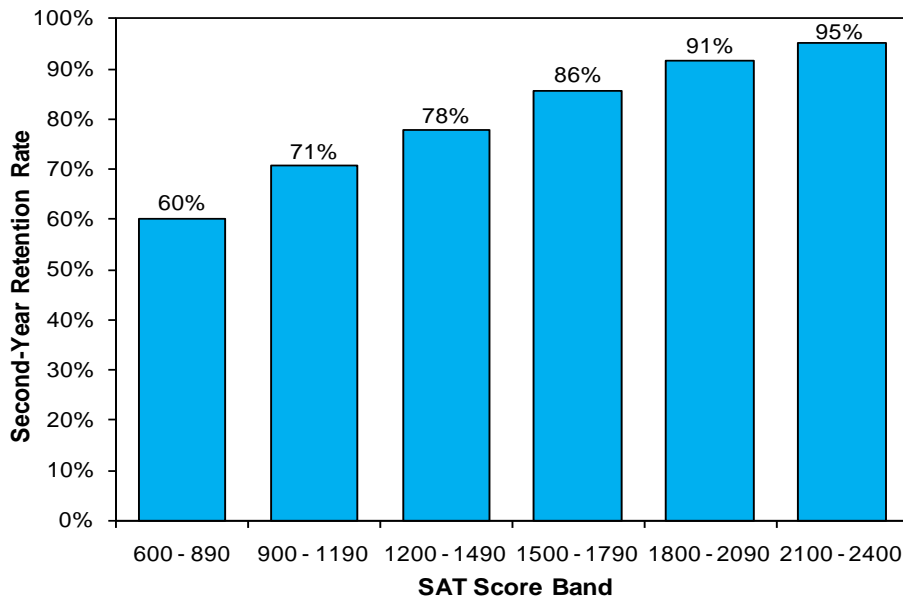
- The same basic pattern of results was found for the 2008 sample as for the 2006 and 2007 samples. Specifically, 85.6% of the students returned for their second year.
 - As for demographic characteristics, the percentage of nonreturners that were African American and Hispanic was slightly higher than for the total group. Students from lower-SES families made up a greater percentage of the nonreturners, as compared to the total group.
 - In terms of institutional characteristics, 27.4% of the total group attended a private college whereas 23.7% of nonreturners attended a private college. 19.3% of the sample attended a selective institution (i.e., admits less than 50% of applicants); however, only 9.6% of nonreturners attended a selective institution.
 - As for the academic preparation of the two groups, returners had higher SAT scores and HSGPAs than nonreturners.

Table 3. SAT Scores for Returners and Nonreturners by Student and Institutional Characteristics

Subgroup / Characteristic		Returning			Nonreturning		
		n	Mean	SD	n	Mean	SD
Gender	Female	82,745	1671	249	13,561	1546	240
	Male	69,213	1715	249	12,041	1589	245
Race/ Ethnicity	American Indian	707	1638	237	176	1536	231
	Asian	16,650	1745	261	1,822	1617	251
	Black/African American	9,924	1484	238	2,084	1381	227
	Hispanic	12,777	1568	239	2,621	1475	233
	Other	3,950	1689	256	657	1562	268
	White	104,384	1716	235	17,605	1594	230
	No Response	3,566	1745	262	637	1631	264
Household Income	< \$40,000	16,176	1555	252	3,645	1457	239
	\$40,000–\$80,000	28,875	1648	243	5,770	1540	233
	\$80,000–\$120,000	29,118	1700	236	4,735	1589	225
	\$120,000–\$160,000	12,158	1726	229	1,912	1616	223
	\$160,000–\$200,000	6,325	1739	233	907	1627	225
	> \$200,000	10,512	1773	225	1,438	1671	227
	No Response	48,794	1723	253	7,195	1585	254
Highest Parental Education Level	No High School Diploma	3,452	1489	235	657	1412	218
	High School Diploma	29,465	1572	234	7,301	1486	226
	Associate Degree	9,586	1604	228	2,126	1510	219
	Bachelor's Degree	50,773	1701	231	7,796	1595	229
	Graduate Degree	50,158	1783	235	6,243	1664	238
	No Response	8,524	1678	277	1,479	1544	273
HSGPA	≤C-	173	1426	300	96	1387	261
	C	793	1379	244	494	1379	233
	C+	1,939	1420	233	1,008	1384	220
	B-	5,385	1483	226	2,015	1454	223
	B	17,654	1550	225	5,006	1498	225
	B+	26,935	1618	229	5,574	1546	224
	A-	39,361	1702	227	5,633	1618	225
	A	43,721	1769	229	4,578	1666	232
	A+	15,997	1848	223	1,198	1750	227
Control	Private	42,645	1761	252	6,070	1622	251
	Public	109,313	1664	244	19,532	1548	238
Size	Small (750 to 1,999)	5,920	1665	293	1,270	1515	253
	Medium (2,000 to 7,499)	28,335	1682	268	5,934	1538	249
	Large (7,500 to 14,999)	28,251	1684	258	5,497	1558	244
	Very Large (15,000 or more)	89,452	1698	238	12,901	1588	237
Admittance Rate	< 50%	31,827	1831	239	2,455	1720	255
	50–75%	99,541	1672	235	17,505	1573	233
	> 75%	20,590	1565	240	5,642	1476	230
Total		151,958	1691	250	25,602	1566	243

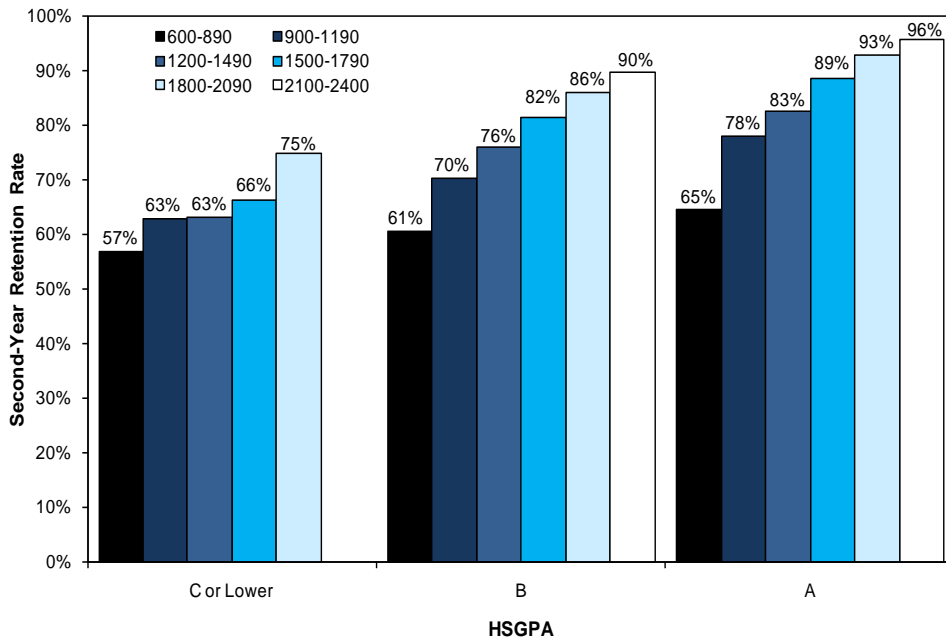
- Even after controlling for student and institutional characteristics, returners had higher SAT total scores than nonreturners, with the exception of students who had an HSGPA equivalent to a C, with both groups having an average SAT total score of 1379.
 - On average, across demographic groups listed in Table 3, returners had an SAT total score that was roughly 100 points higher than their nonreturning peers. For example, for Black/African American students, the average SAT score for returners was 1484, compared to 1381 for nonreturners.
- In sum, the SAT performance gap between returners and nonreturners is not due to differences in the demographic characteristics of the two groups.

Figure 1. *Second-year retention rates by SAT score band.*



- Figure 1 presents the second-year retention rate of students by SAT score band. This graphically demonstrates the positive relationship between SAT scores and retention. That is, as SAT total scores increased, retention rates increased from a low of 60% for students with a total SAT score between 600 and 890, to a high of 95% for students with an SAT total score of 2100 or higher.
- Sample size (n) for each of the six SAT score bands from lowest total score to highest was $n = 183$, $n = 5,107$, $n = 38,422$, $n = 76,452$, $n = 49,252$, and $n = 8,144$, respectively.

Figure 2. *Second-year retention rates by SAT score band, controlling for HSGPA.*



- Figure 2 presents students' mean retention rate by SAT score band, controlling for HSGPA. Figure 2 graphically displays the unique information provided by SAT scores, above and beyond high school grades. Even within HSGPA levels, there is still a positive relationship between SAT scores and second-year retention rates.
- For example, of students who had an HSGPA equivalent to an A, those who had an SAT total score between 600 and 890 had a mean retention rate of 65%, compared to 96% for students with an SAT total score between 2100 and 2400. See Table 5 for more details.
- HSGPA ranges are defined as follows: "A" range: 4.33 (A+), 4.00 (A), and 3.67 (A-); "B" range: 3.33 (B+), 3.00 (B), and 2.67 (B-); and "C or Lower" range: 2.33 (C+) and lower. Retention rates for categories containing fewer than 15 students are not reported. Sample sizes for the HSGPA-by-SAT score bands are reported below Figure 2.

HSGPA	SAT Band					
	600-890	900-1190	1200-1490	1500-1790	1800-2090	2100-2400
≤ C	58	830	2,107	1,259	235	14
B	94	3,148	21,075	27,896	9,638	718
A	31	1,129	15,240	47,297	39,379	7,412

Table 4. Retention Rates by Student Demographic Characteristics

Subgroup / Characteristic	n	Retention		
		Mean	SD	
Gender	Female	96,306	0.86	0.35
	Male	81,254	0.85	0.36
Race	American Indian	883	0.80	0.40
Ethnicity	Asian	18,472	0.90	0.30
	Black/African American	12,008	0.83	0.38
	Hispanic	15,398	0.83	0.38
	Other	4,607	0.86	0.35
	White	121,989	0.86	0.35
	No Response	4,203	0.85	0.36
Household Income	< \$40,000	19,821	0.82	0.39
	\$40,000–\$80,000	34,645	0.83	0.37
	\$80,000–\$120,000	33,853	0.86	0.35
	\$120,000–\$160,000	14,070	0.86	0.34
	\$160,000–\$200,000	7,232	0.87	0.33
	> \$200,000	11,950	0.88	0.33
	No Response	55,989	0.87	0.33
Highest Parental Education Level	No High School Diploma	4,109	0.84	0.37
	High School Diploma	36,766	0.80	0.40
	Associate Degree	11,712	0.82	0.39
	Bachelor's Degree	58,569	0.87	0.34
	Graduate Degree	56,401	0.89	0.31
	No Response	10,003	0.85	0.36
Total		177,560	0.86	0.35

- The retention rates for males and females were similar, with 86% of females and 85% of males returning.
- As for ethnicity, second-year retention rate ranged from a high of 90% for Asian students to a low of 80% for American Indian students.
- For socioeconomic status, as parental income and education increased, retention rates increased from around 82% to 89%.

Table 5. Retention Rates (and Sample Sizes) by SAT Score Band Within Student Subgroups

Subgroup / Characteristic		SAT Score Band					
		600– 890	900– 1190	1200– 1490	1500– 1790	1800– 2090	2100– 2400
Gender	Female	0.59 (91)	0.71 (3,133)	0.79 (22,933)	0.86 (41,989)	0.92 (24,424)	0.96 (3,736)
	Male	0.61 (92)	0.70 (1,974)	0.77 (15,489)	0.85 (34,463)	0.91 (24,828)	0.95 (4,408)
Race/ Ethnicity	American Indian	n/r (0)	0.66 (41)	0.73 (223)	0.81 (419)	0.90 (183)	0.88 (17)
	Asian	n/r (11)	0.79 (365)	0.84 (3,162)	0.89 (7,221)	0.94 (6,112)	0.96 (1,601)
	Black	0.60 (89)	0.74 (1,433)	0.80 (5,193)	0.87 (4,196)	0.92 (1,042)	0.91 (55)
	Hispanic	0.67 (33)	0.73 (955)	0.78 (5,459)	0.86 (6,416)	0.90 (2,346)	0.93 (189)
	Other	n/r (9)	0.72 (160)	0.78 (1,000)	0.87 (1,887)	0.91 (1,351)	0.94 (200)
	White	0.69 (32)	0.66 (2,032)	0.77 (22,692)	0.85 (54,703)	0.91 (36,762)	0.95 (5,768)
	No Response	n/r (9)	0.71 (121)	0.78 (693)	0.83 (1,610)	0.89 (1,456)	0.93 (314)
	Parental Income	< \$40,000	0.61 (69)	0.72 (1,538)	0.78 (7,303)	0.84 (7,756)	0.89 (2,839)
	\$40,000–\$80,000	0.57 (35)	0.69 (1,171)	0.77 (9,185)	0.84 (15,434)	0.90 (7,787)	0.95 (1,033)
	\$80,000–\$120,000	n/r (10)	0.69 (593)	0.78 (6,760)	0.86 (15,497)	0.91 (9,514)	0.95 (1,479)
	\$120,00–\$160,000	n/r (3)	0.72 (155)	0.77 (2,371)	0.86 (6,431)	0.92 (4,461)	0.95 (649)
	\$160,000–\$200,000	n/r (3)	0.75 (80)	0.80 (1,144)	0.86 (3,172)	0.92 (2,416)	0.96 (417)
	> \$200,000	n/r (4)	0.71 (77)	0.79 (1,415)	0.86 (5,085)	0.92 (4,534)	0.95 (835)
	No Response	0.59 (59)	0.71 (1,493)	0.79 (10,244)	0.87 (23,077)	0.92 (17,701)	0.96 (3,415)

Note: Categories with fewer than 15 students are not reported on and are indicated by “n/r.”

Table 5 (continued)

		SAT Score Band					
Subgroup		600– 890	900– 1190	1200– 1490	1500– 1790	1800– 2090	2100– 2400
Highest Parental Education Level	No High School Diploma	0.67 (15)	0.75 (420)	0.83 (1,840)	0.86 (1,443)	0.91 (363)	1.00 (28)
	High School Diploma	0.65 (74)	0.70 (2,150)	0.75 (12,715)	0.83 (16,057)	0.88 (5,378)	0.93 (392)
	Associate Degree	0.46 (24)	0.69 (444)	0.76 (3,626)	0.84 (5,444)	0.89 (2,011)	0.96 (163)
	Bachelor's Degree	0.50 (28)	0.71 (1,005)	0.79 (11,213)	0.86 (27,114)	0.92 (16,979)	0.95 (2,230)
	Graduate Degree	0.67 (15)	0.72 (554)	0.80 (6,749)	0.87 (22,511)	0.92 (21,782)	0.96 (4,790)
	No Response	0.63 (27)	0.72 (534)	0.79 (2,279)	0.85 (3,883)	0.91 (2,739)	0.94 (541)
	HSGPA	≤ C-	n/r (7)	0.61 (59)	0.63 (110)	0.65 (65)	0.76 (25)
	C	0.60 (20)	0.63 (276)	0.62 (610)	0.59 (318)	0.63 (57)	n/r (6)
	C+	0.52 (31)	0.63 (495)	0.64 (1,387)	0.69 (876)	0.79 (153)	n/r (5)
	B-	0.60 (30)	0.68 (705)	0.72 (3,357)	0.74 (2,675)	0.79 (609)	0.67 (24)
	B	0.53 (36)	0.69 (1,331)	0.75 (8,372)	0.80 (9,935)	0.83 (2,813)	0.87 (173)
	B+	0.71 (28)	0.73 (1,112)	0.79 (9,346)	0.84 (15,286)	0.88 (6,216)	0.92 (521)
	A-	n/r (14)	0.78 (636)	0.81 (8,303)	0.87 (21,043)	0.91 (13,355)	0.94 (1,643)
	A	0.63 (16)	0.77 (434)	0.84 (5,823)	0.89 (20,407)	0.93 (18,134)	0.96 (3,485)
	A+	n/r (1)	0.81 (59)	0.86 (1,114)	0.91 (5,847)	0.94 (7,890)	0.97 (2,284)
Total		0.60 (183)	0.71 (5,107)	0.78 (38,422)	0.86 (76,452)	0.91 (49,252)	0.95 (8,144)

Note: Categories with fewer than 15 students are not reported on and are indicated by "n/r."

- Differences in retention rates by student subgroups are minimized and in some instances eliminated when controlling for SAT performance.
- Recall from Table 4 that 82% of students whose parental incomes were less than \$40,000 returned, compared to 88% of students returning whose parental incomes were \$200,000 or more. Within each SAT score band, the difference in retention rates between the two groups dropped to 3% or less for the top four SAT scores bands. Larger differences were found for lower-scoring students (<1200). A similar pattern of results was found for parental education.
- With the exception of results for American Indian students, which are based on very small sample sizes, differences in retention rates by ethnicity are substantially reduced when controlling for SAT performance.

Table 6. Retention Rates by Institutional Characteristics

Subgroup/Characteristic	n	Retention		
		Mean	SD	
Control	Private	48,715	0.88	0.33
	Public	128,845	0.85	0.36
Size (Number of Undergraduates)	Small (750 to 1,999)	7,190	0.82	0.38
	Medium (2,000 to 7,499)	34,269	0.83	0.38
	Large (7,500 to 14,999)	33,748	0.84	0.37
	Very Large (15,000 or more)	102,353	0.87	0.33
Admittance Rate	< 50%	34,282	0.93	0.26
	50–75%	117,046	0.85	0.36
	> 75%	26,232	0.78	0.41
Total		177,560	0.86	0.35

- For control, students at private institutions were slightly more likely to return for their second year (88% versus 85%).
- For institution size, retention was the highest for students at very large institutions (87%) and lowest at small institutions (82%).
- For institutional selectivity, institutions that admit less than 50% of applicants had the highest retention rate (93%), whereas institutions that admit more than 75% of applicants had the lowest retention rate (78%).

Table 7. Retention Rates (and Sample Sizes) by SAT Score Band Within Institutional Subgroups

Subgroup / Characteristic	SAT Score Band						
	600– 890	900– 1190	1200– 1490	1500– 1790	1800– 2090	2100– 2400	
Control	Private	0.54 (35)	0.72 (813)	0.78 (7,523)	0.86 (19,183)	0.92 (17,035)	0.96 (4,126)
	Public	0.61 (148)	0.71 (4,294)	0.78 (30,899)	0.85 (57,269)	0.91 (32,217)	0.95 (4,018)
Size (Number of Undergraduates)	Small (750 to 1,999)	0.53 (15)	0.75 (434)	0.73 (1,880)	0.83 (2,660)	0.90 (1,735)	0.95 (466)
	Medium (2,000 to 7,499)	0.56 (45)	0.66 (1,361)	0.74 (8,430)	0.83 (13,587)	0.90 (8,972)	0.95 (1,874)
	Large (7,500 to 14,999)	0.66 (44)	0.69 (1,031)	0.76 (8,088)	0.83 (13,952)	0.91 (8,980)	0.94 (1,653)
	Very Large (15,000 or more)	0.61 (79)	0.73 (2,281)	0.81 (20,024)	0.87 (46,253)	0.92 (29,565)	0.95 (4,151)
Admittance Rate	< 50%	0.50 (10)	0.82 (381)	0.87 (2,863)	0.91 (11,487)	0.94 (15,135)	0.96 (4,406)
	50–75%	0.62 (105)	0.71 (2,922)	0.78 (26,356)	0.85 (53,849)	0.91 (30,380)	0.94 (3,434)
	> 75%	0.59 (68)	0.68 (1,804)	0.74 (9,203)	0.81 (11,116)	0.87 (3,737)	0.92 (304)
Total		0.60 (183)	0.71 (5,107)	0.78 (38,422)	0.86 (76,452)	0.91 (49,252)	0.95 (8,144)

- Controlling for SAT scores minimized and, in some instances, eliminated differences in retention rates by institutional subgroups.
- The difference in retention rates for private and public institutions is practically eliminated when controlling for SAT performance, though it should be pointed out that the difference was small to begin with (3%).
- Recall from Table 6 that 78% of students who attended an institution that admitted more than 75% of applicants returned for the second year, compared to 93% of students who attended an institution that admitted less than 50% of applicants. When controlling for SAT performance, the difference in retention rates between the two groups was reduced, most notably for higher SAT score bands.

References

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