

The Relationship Between SAT[®] Scores and Retention to the Second Year: Replication with the 2010 SAT Validity Sample

By Krista D. Mattern and Brian F. Patterson

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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[®] for use in college admission. A study by [Mattern and Patterson \(2009\)](#) examined the relationship between SAT scores and retention to the second year. 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 relevant student and institutional characteristics. Replication studies have been conducted for subsequent entering cohorts of students and similar results were found (Mattern & Patterson, [2011](#), [2012a](#), [2012b](#)).

Replicating the analyses of the previous four reports (Mattern & Patterson, [2009](#); [2011](#), [2012a](#), [2012b](#)), the current study examined the relationship between SAT performance and retention to the second year for first-time, first-year students that began in the fall of 2010. A total of 160 institutions provided data which translated to 287,881 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 215,704 students. The results from the current study based on the 2010 sample show the same pattern of results as the previous reports. Namely, higher SAT scores are associated with higher retention rates. This was true, even after controlling for student characteristics (gender, race/ethnicity, household income, parental education, and HSGPA) and institutional characteristics (control, size, and undergraduate admittance rate).

Table 1. Distribution of Institutional Characteristics

	Characteristic	%
U.S. Region	Midwest	18
	Mid-Atlantic	26
	New England	11
	South	19
	Southwest	9
	West	16
Control	Public	42
	Private	58
Size (number of undergraduates)	Small (750 to 1,999)	19
	Medium (2,000 to 7,499)	42
	Large (7,500 to 14,999)	18
	Very Large (15,000 or more)	21
Undergraduate Admittance Rate	< 50%	19
	50–75%	60
	> 75%	21

Note: Number of institutions = 160. Percentages may not sum to 100 due to rounding.

- The 2010 sample of institutions was diverse with regard to region, control, size, and undergraduate admittance rate.

Table 2. Returning Versus Nonreturning Students by Student and Institutional Characteristics

		Total	Return	Non-Return	
		Number of Students	215,704	186,257	29,447
Subgroup		Percentage of Students			
Gender	Female	54.8	55.2	52.7	
	Male	45.2	44.8	47.3	
Racial/ Ethnic Identity	American Indian	0.4	0.4	0.6	
	Asian	10.0	10.5	6.9	
	Black/African American	8.7	8.2	11.9	
	Hispanic	10.0	9.7	11.8	
	Other	2.3	2.3	2.4	
	White	66.3	66.6	64.3	
	No Response	2.3	2.3	2.1	
Household Income	< \$40,000	11.3	10.7	15.2	
	\$40,000–80,000	16.9	16.4	19.9	
	\$80,000–120,000	17.2	17.3	16.5	
	\$120,000–160,000	8.0	8.1	7.1	
	\$160,000–200,000	4.3	4.5	3.5	
	> \$200,000	7.7	8.0	5.5	
	No Response	34.6	35.0	32.2	
Highest Parental Education Level	No High School Diploma	2.6	2.5	3.4	
	High School Diploma	20.2	18.9	28.8	
	Associate Degree	6.7	6.4	8.7	
	Bachelor's Degree	33.2	33.7	30.0	
	Graduate Degree	32.5	33.8	24.0	
	No Response	4.8	4.7	5.2	
Control	Private	31.8	32.7	26.2	
	Public	68.2	67.3	73.8	
Size (number of undergraduates)	Small (750 to 1,999)	4.4	4.2	5.8	
	Medium (2,000 to 7,499)	20.1	19.9	21.4	
	Large (7,500 to 14,999)	24.2	23.6	27.4	
	Very Large (15,000 or more)	51.4	52.3	45.5	
Undergraduate Admittance Rate	< 50%	19.1	20.4	10.3	
	50–75%	69.7	68.8	74.8	
	> 75%	11.3	10.7	14.9	
		Mean (SD)			
Academic Performance Variable	SAT-CR	554 (97)	559 (96)	518 (93)	
	SAT-M	572 (99)	578 (98)	529 (95)	
	SAT-W	547 (99)	554 (98)	506 (94)	
	HSGPA	3.60 (0.50)	3.63 (0.48)	3.39 (0.54)	

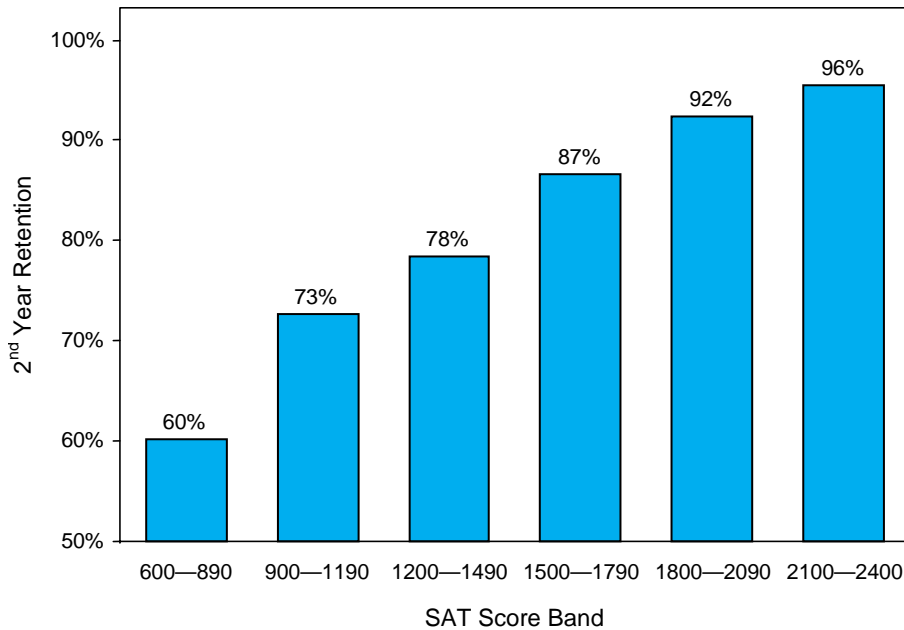
- The same basic patterns of results were found for the 2010 sample as the previous samples.
 - Specifically, 86.3% of the students returned for their second year.
 - African-American, Hispanic, and lower SES students comprised a larger percentage of non-returners than returners.
 - Non-returners were less likely to attend a private college (26.2% versus 32.7% of returners) or an institution that admits fewer than 50% of applicants (10.3% versus 20.4% of returners).
 - As for the academic preparation of the two groups, returners had higher SAT scores and HSGPAs than non-returners.

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

Subgroup / Characteristic	Returning			Non-Returning			
	n	Mean	SD	n	Mean	SD	
Gender	Female	102,732	1670	261	15,528	1530	248
	Male	83,525	1719	261	13,919	1579	252
Racial/ Ethnic Identity	American Indian	729	1650	239	171	1511	214
	Asian	19,598	1794	273	2,044	1662	277
	Black/African American	15,270	1470	240	3,511	1374	215
	Hispanic	18,040	1563	256	3,476	1450	241
	Other	4,232	1705	275	699	1545	267
	White	124,139	1719	241	18,938	1593	232
	No Response	4,249	1767	266	608	1614	275
Household Income	< \$40,000	19,877	1546	263	4,471	1440	235
	\$40,000–80,000	30,623	1642	249	5,861	1532	232
	\$80,000–120,000	32,305	1699	244	4,853	1578	233
	\$120,000–160,000	15,057	1728	242	2,102	1609	227
	\$160,000–200,000	8,302	1752	240	1,044	1624	237
	> \$200,000	14,894	1804	234	1,625	1690	239
	No Response	65,199	1715	267	9,491	1564	264
Highest Parental Education Level	No High School Diploma	4,610	1470	252	988	1384	227
	High School Diploma	35,135	1562	242	8,473	1467	227
	Associate Degree	11,965	1590	232	2,553	1486	211
	Bachelor's Degree	62,728	1699	240	8,842	1587	234
	Graduate Degree	62,986	1797	246	7,071	1671	249
	No Response	8,833	1662	289	1,520	1514	277
HSGPA	≤C-	330	1548	309	115	1429	291
	C	938	1384	235	453	1368	225
	C+	2,614	1422	236	1185	1388	224
	B-	6,888	1469	231	2,504	1436	224
	B	20,512	1536	231	5,530	1479	225
	B+	33,111	1606	238	6,586	1524	230
	A-	47,617	1704	238	6,381	1601	236
	A	54,565	1777	239	5,301	1668	242
	A+	19,682	1864	230	1,392	1751	242
Control	Private	60,950	1774	259	7,716	1627	260
	Public	125,307	1652	254	21,731	1527	242
Size (number of undergraduates)	Small (750 to 1,999)	7,834	1639	261	1,694	1513	237
	Medium (2,000 to 7,499)	36,990	1694	274	6,299	1537	256
	Large (7,500 to 14,999)	44,037	1673	282	8,062	1525	251
	Very Large (15,000 or more)	97,396	1704	247	13,392	1583	247
Undergraduate Admittance Rate	< 50%	38,076	1845	262	3,020	1707	284
	50–75%	128,218	1663	249	22,031	1541	242
	> 75%	19,963	1586	228	4,396	1511	232
Total		186,257	1692	262	29,447	1553	251

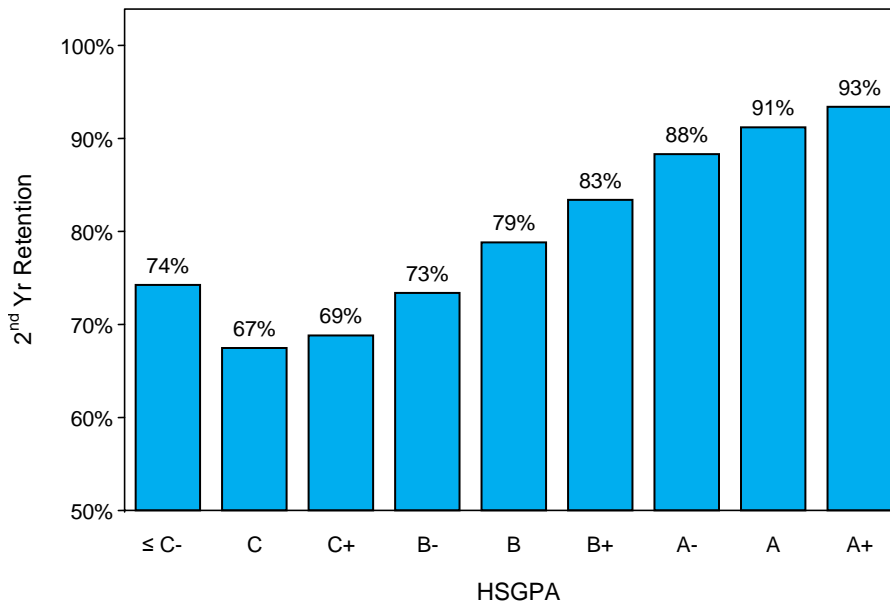
- Even after controlling for student and institutional characteristics, returners had higher SAT total scores than non-returners.
- On average, returners had an SAT total score that was over 100 points higher as compared to non-returners. For example, the average SAT score for female returners was 1670 as compared to 1530 for female non-returners.
- In sum, the SAT performance gap between returners and non-returners is not due to differences in the student and institutional characteristics of the two groups.

Figure 1. Retention by SAT score band.



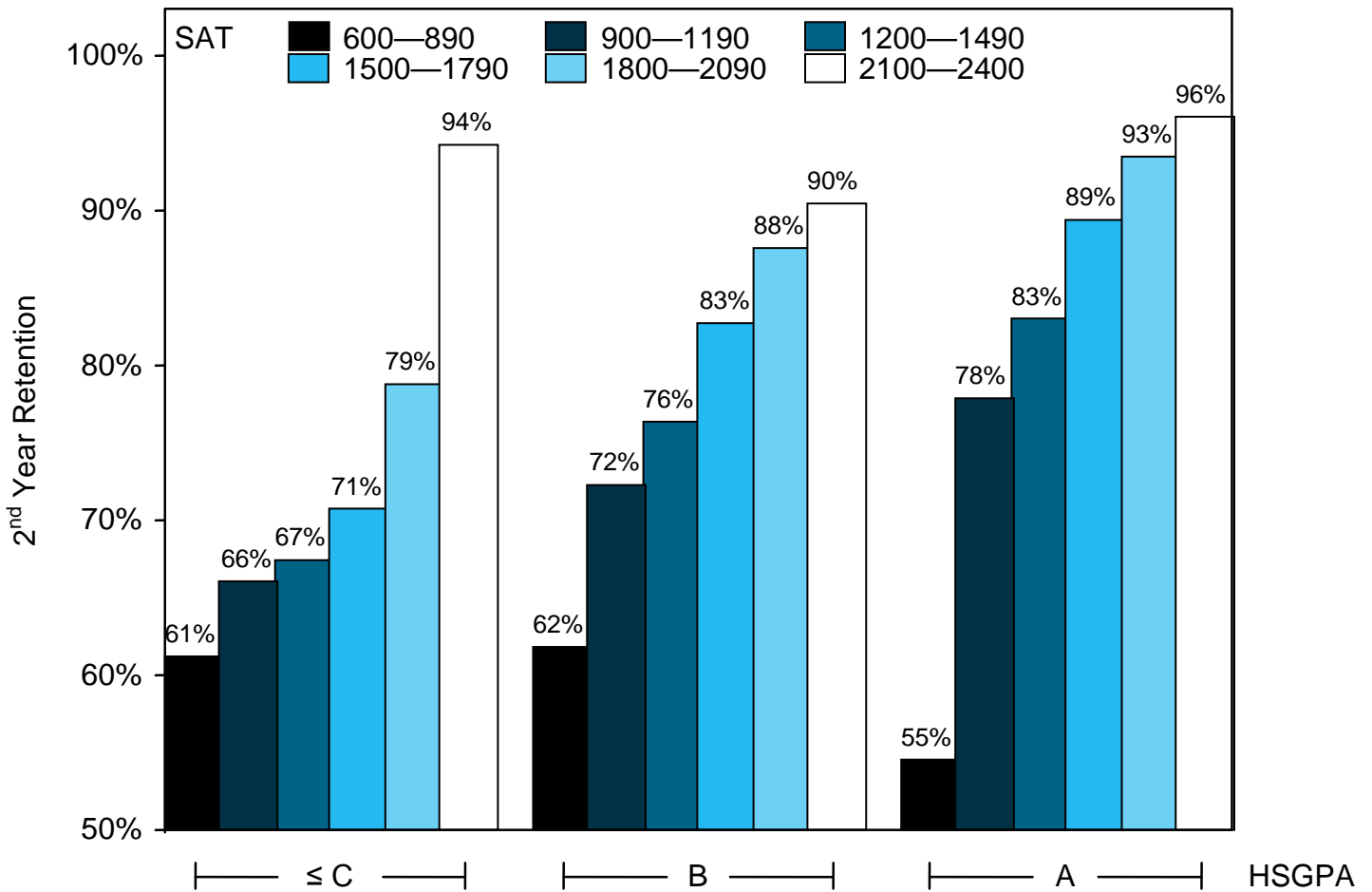
- Figure 1 presents the second year retention rate of students by SAT score band. This graphically demonstrates the positive relationship between SAT scores and retention. That is, as SAT total scores increased, retention rates increased from a low of 60% for students with an SAT total score between 600 and 890 to a high of 96% for students with a 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 $n = 253$, $n = 7,034$, $n = 48,942$, $n = 87,950$, $n = 59,224$, and $n = 12,301$, respectively.

Figure 2. Retention by HSGPA.



- Figure 2 presents the second year retention rate of students by HSGPA letter grade. Overall, there is a positive relationship between HSGPA and retention. Specifically, as HSGPA increased, retention rates generally increased from a low of 67% for students with a HSGPA of C to a high of 93% for students with an A+ HSGPA.
- There is a slight deviation from the general trend for students with a HSGPA of C- or lower with a retention rate of 74% but that is based on very small percentage of the sample ($n = 445$, $<1\%$) and should be interpreted with caution.
- Sample size (n) for each of the nine HSGPA bands from lowest to highest was $n = 445$, $n = 1,391$, $n = 3,799$, $n = 9,392$, $n = 26,042$, $n = 39,697$, $n = 53,998$, $n = 59,866$, and $n = 21,074$, respectively.

Figure 3. Incremental validity of SAT scores over HSGPA for predicting retention to second year.



Note: HSGPA ranges were 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+) or lower.

- Figure 3 presents students’ mean retention rate by SAT score band, controlling for HSGPA. Figure 3 graphically displays the unique information provided by SAT, 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 A HSGPA, those who had an SAT total score between 600 and 890 had a mean retention rate of 55% as compared to 96% for students with an SAT total score of 2100 or higher. See Table 5 for sample sizes.

Table 4. Retention Rates by Student Demographic Characteristics

Subgroup / Characteristic	n	Retention		
		Mean	SD	
Gender	Female	118,260	.87	.34
	Male	97,444	.86	.35
Racial/ Ethnic Identity	American Indian	900	.81	.39
	Asian	21,642	.91	.29
	Black/African American	18,781	.81	.39
	Hispanic	21,516	.84	.37
	Other	4,931	.86	.35
	White	143,077	.87	.34
	No Response	4,857	.87	.33
Household Income	< \$40,000	24,348	.82	.39
	\$40,000–80,000	36,484	.84	.37
	\$80,000–120,000	37,158	.87	.34
	\$120,000–160,000	17,159	.88	.33
	\$160,000–200,000	9,346	.89	.32
	> \$200,000	16,519	.90	.30
	No Response	74,690	.87	.33
Highest Parental Education Level	No High School Diploma	5,598	.82	.38
	High School Diploma	43,608	.81	.40
	Associate Degree	14,518	.82	.38
	Bachelor's Degree	71,570	.88	.33
	Graduate Degree	70,057	.90	.30
	No Response	10,353	.85	.35
Total	215,704	.86	.34	

- The retention rates by gender were similar with 87% of females and 86% of males returning.
- As for ethnicity, second year retention rates ranged from a high of 91% for Asian students to a low of 81% for American Indian and Black/African-American students.
- For socio-economic status, as household income and highest parental education level increased, retention rates increased from around 82% to 90%.

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

	Subgroup	SAT Score Band					
		600– 890	900– 1190	1200– 1490	1500– 1790	1800– 2090	2100– 2400
Gender	Female	0.55 (148)	0.74 (4,407)	0.80 (29,400)	0.88 (48,817)	0.93 (29,792)	0.96 (5,696)
	Male	0.67 (105)	0.71 (2,627)	0.77 (19,542)	0.85 (39,133)	0.92 (29,432)	0.95 (6,605)
Racial/ Ethnic Identity	American Indian	n/r (1)	0.67 (27)	0.70 (269)	0.85 (375)	0.90 (208)	1.00 (20)
	Asian	n/r (12)	0.81 (394)	0.83 (3,113)	0.89 (7,311)	0.93 (7,862)	0.95 (2,950)
	Black/African American	0.67 (108)	0.73 (2,396)	0.79 (8,736)	0.86 (5,871)	0.93 (1,558)	0.96 (112)
	Hispanic	0.57 (68)	0.74 (1,745)	0.79 (7,571)	0.86 (8,384)	0.92 (3,397)	0.94 (351)
	Other	n/r (6)	0.71 (192)	0.76 (1,110)	0.87 (1,864)	0.92 (1,421)	0.96 (338)
	White	0.55 (49)	0.70 (2,158)	0.78 (27,386)	0.86 (62,364)	0.92 (43,068)	0.96 (8,052)
	No Response	n/r (9)	0.72 (122)	0.78 (757)	0.86 (1,781)	0.92 (1,710)	0.95 (478)
	Household Income	< \$40,000	0.66 (95)	0.73 (2,210)	0.77 (9,240)	0.84 (8,877)	0.91 (3,467)
	\$40,000–80,000	0.60 (30)	0.72 (1,277)	0.77 (10,258)	0.85 (15,732)	0.91 (7,992)	0.94 (1,195)
	\$80,000–120,000	0.63 (16)	0.73 (680)	0.79 (7,979)	0.87 (16,258)	0.92 (10,342)	0.96 (1,883)
	\$120,000–160,000	n/r (1)	0.73 (218)	0.80 (3,102)	0.87 (7,449)	0.93 (5,323)	0.96 (1,066)
	\$160,000–200,000	n/r (1)	0.74 (89)	0.79 (1,464)	0.88 (3,959)	0.93 (3,166)	0.96 (667)
	> \$200,000	n/r (2)	0.72 (112)	0.81 (1,691)	0.89 (6,379)	0.93 (6,582)	0.96 (1,753)
	No Response	0.53 (108)	0.72 (2,448)	0.79 (15,208)	0.87 (29,296)	0.93 (22,352)	0.96 (5,278)

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

Table 5 (continued)

	Subgroup	SAT Score Band					
		600–890	900–1190	1200–1490	1500–1790	1800–2090	2100–2400
Highest Parental Education Level	No High School Diploma	0.69 (36)	0.76 (765)	0.80 (2,462)	0.86 (1,790)	0.92 (498)	0.98 (47)
	High School Diploma	0.52 (103)	0.70 (2,920)	0.76 (15,921)	0.83 (17,857)	0.89 (6,245)	0.94 (562)
	Associate Degree	0.76 (17)	0.71 (637)	0.76 (4,842)	0.85 (6,530)	0.92 (2,296)	0.94 (196)
	Bachelor's Degree	0.66 (32)	0.74 (1,383)	0.81 (14,585)	0.87 (31,842)	0.93 (20,536)	0.95 (3,192)
	Graduate Degree	0.58 (26)	0.77 (678)	0.81 (8,482)	0.88 (26,137)	0.93 (27,055)	0.96 (7,679)
	No Response	0.62 (39)	0.74 (651)	0.79 (2,650)	0.86 (3,794)	0.92 (2,594)	0.94 (625)
	HSGPA	≤ C-	n/r (2)	0.66 (70)	0.68 (155)	0.79 (125)	0.83 (77)
	C	0.82 (17)	0.65 (279)	0.67 (696)	0.70 (336)	0.69 (59)	n/r (4)
	C+	0.53 (30)	0.66 (654)	0.68 (1,841)	0.70 (1,047)	0.80 (213)	n/r (14)
	B-	0.61 (46)	0.71 (1,070)	0.72 (4,319)	0.75 (3,189)	0.77 (724)	0.89 (44)
	B	0.54 (61)	0.72 (1,755)	0.76 (10,341)	0.81 (10,589)	0.85 (3,080)	0.87 (216)
	B+	0.74 (42)	0.74 (1,679)	0.78 (12,373)	0.85 (17,601)	0.90 (7,274)	0.91 (728)
	A-	0.52 (21)	0.76 (868)	0.82 (10,606)	0.88 (24,170)	0.92 (15,712)	0.95 (2,621)
	A	0.55 (29)	0.79 (575)	0.85 (7,321)	0.90 (24,199)	0.94 (22,427)	0.96 (5,315)
	A+	n/r (5)	0.86 (84)	0.85 (1,290)	0.91 (6,694)	0.95 (9,658)	0.97 (3,343)
	Total	0.60 (253)	0.73 (7,034)	0.78 (48,942)	0.87 (87,950)	0.92 (59,224)	0.96 (12,301)

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

- Differences in retention rates by student subgroups are reduced and in some instances eliminated when controlling for SAT performance.
 - For example, there was a difference of 8 percentage points in retention rates for students whose household income was less than \$40,000 (82%, refer to Table 4) as compared to students whose household income was \$200,000 or more (90%). However, focusing on only students with an SAT score of 2100 or higher, the difference in retention rates was reduced to 2 percentage points, ranging from 94% to 96%.
- 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

	Characteristic	n	Retention	
			Mean	SD
Control	Private	68,666	0.89	0.32
	Public	147,038	0.85	0.35
Size (number of undergraduates)	Small (750 to 1,999)	9,528	0.82	0.38
	Medium (2,000 to 7,499)	43,289	0.85	0.35
	Large (7,500 to 14,999)	52,099	0.85	0.36
	Very Large (15,000 or more)	110,788	0.88	0.33
Undergraduate Admittance Rate	< 50%	41,096	0.93	0.26
	50–75%	150,249	0.85	0.35
	> 75%	24,359	0.82	0.38
Total		215,704	0.86	0.34

- Students at private institutions were slightly more likely to return for their second year (89% versus 85% at public institutions).
- As for institution size, retention rates were lowest at small institutions (82%) and highest at very large institutions (88%).
- For institutional selectivity as measured by undergraduate admittance rate, institutions that admit fewer than 50% of applicants had the highest retention rate (93%) whereas institutions that admit over 75% of applicants had the lowest retention rate (82%).

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

	Subgroup	SAT Score Band					
		600–890	900–1190	1200–1490	1500–1790	1800–2090	2100–2400
Control	Private	0.66 (44)	0.71 (1,163)	0.80 (10,396)	0.87 (25,641)	0.93 (24,284)	0.96 (7,138)
	Public	0.59 (209)	0.73 (5,871)	0.78 (38,546)	0.86 (62,309)	0.92 (34,940)	0.95 (5,163)
Size (number of undergraduates)	Small (750 to 1,999)	n/r (8)	0.69 (406)	0.75 (2,830)	0.83 (3,808)	0.90 (2,115)	0.94 (361)
	Medium (2,000 to 7,499)	0.60 (57)	0.68 (1,548)	0.77 (10,416)	0.86 (17,085)	0.92 (11,013)	0.96 (3,170)
	Large (7,500 to 14,999)	0.68 (73)	0.75 (2,413)	0.76 (13,902)	0.85 (19,013)	0.92 (13,518)	0.95 (3,180)
	Very Large (15,000 or more)	0.56 (115)	0.73 (2,667)	0.81 (21,794)	0.88 (48,044)	0.93 (32,578)	0.96 (5,590)
Undergraduate Admittance Rate	< 50%	0.80 (25)	0.85 (587)	0.84 (4,215)	0.91 (11,719)	0.95 (17,716)	0.96 (6,834)
	50–75%	0.59 (175)	0.72 (5,270)	0.78 (37,009)	0.86 (64,960)	0.92 (37,667)	0.95 (5,168)
	> 75%	0.55 (53)	0.70 (1,177)	0.78 (7,718)	0.84 (11,271)	0.88 (3,841)	0.90 (299)
Total		0.60 (253)	0.73 (7,034)	0.78 (48,942)	0.87 (87,950)	0.92 (59,224)	0.96 (12,301)

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

- Differences in retention rates by institutional subgroups are reduced and in some instances eliminated when controlling for SAT performance.
 - For example, there was a difference of 11 percentage points in retention rates for students who attended an institution that admitted over 75% of applicants (82%, Table 6) as compared to students who attended an institution that admitted less than 50% of applicants (93%). However, focusing on only students with an SAT score of 2100 or higher, the difference in retention rates was reduced to 6 percentage points, ranging from 90% to 96%.

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