

The Relationship between SAT Scores and Retention to the Second Year: Replication with 2009 SAT Validity Sample

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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, [2011a](#), [2011b](#)).

Replicating the analyses of the previous three reports (Mattern & Patterson, [2009](#); [2011a](#), [2011b](#)), 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 2009. A total of 131 institutions provided data which translated to 262,949 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 199,366 students. The results from the current study based on the 2009 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 selectivity).

Table 1. *Distribution of Institutional Characteristics*

Subgroup / Characteristic	%	
U.S. Region	Midwest	18
	Mid-Atlantic	21
	New England	12
	South	15
	Southwest	11
	West	22
Control	Public	46
	Private	54
Size (number of undergraduates)	Small (750 to 1,999)	18
	Medium (2,000 to 7,499)	40
	Large (7,500 to 14,999)	18
	Very large (15,000 or more)	24
Selectivity	< 50%	21
	50-75%	57
	> 75%	22

Note. Number of institutions =131. Percentages may not sum to 100 due to rounding.

- The 2009 sample of institutions was diverse with regard to control, size, and selectivity (admittance rate).

Table 2. Returning versus Non-returning Students by Student and Institutional Characteristics

Number of Students		Total 199,366	Return 172,993	Non-Return 26,373
Subgroup / Characteristic		Percentage of Students		
Gender	Female	54.0	54.3	52.1
	Male	46.0	45.7	47.9
Race/ Ethnicity	American Indian	0.5	0.5	0.8
	Asian	11.0	11.5	7.9
	Black/African American	8.1	7.7	10.8
	Hispanic	9.4	9.1	10.9
	Other	2.6	2.6	2.5
	White	66.3	66.5	65.0
	No Response	2.1	2.1	2.1
Household Income	< \$40,000	11.2	10.6	14.9
	\$40,000-80,000	18.3	17.8	21.5
	\$80,000-120,000	18.3	18.3	17.6
	\$120,000-160,000	8.3	8.4	7.6
	\$160,000-200,000	4.4	4.5	3.6
	> \$200,000	7.3	7.6	5.8
	No Response	32.3	32.8	28.9
Highest Parental Education Level	No High School Diploma	2.4	2.3	3.1
	High School Diploma	20.4	19.1	28.8
	Associate Degree	6.6	6.3	8.4
	Bachelor Degree	32.7	33.1	29.7
	Graduate Degree	31.6	32.8	23.6
	No Response	6.4	6.3	6.4
Control	Private	26.4	27.1	22.1
	Public	73.6	72.9	77.9
Size (number of undergraduates)	Small (750 to 1,999)	3.4	3.3	4.3
	Medium (2,000 to 7,499)	17.0	16.8	18.0
	Large (7,500 to 14,999)	19.7	18.7	25.9
	Very large (15,000 or more)	59.9	61.1	51.8
Selectivity	< 50%	17.8	19.1	9.7
	50-75%	65.3	64.8	68.8
	> 75%	16.9	16.2	21.6
Performance Variable		Mean (SD)		
SAT-CR		556 (96)	561 (95)	520 (94)
SAT-M		575 (98)	582 (97)	534 (96)
SAT-W		550 (97)	556 (96)	509 (93)
HSGPA		3.61 (0.49)	3.64 (0.47)	3.39 (0.54)

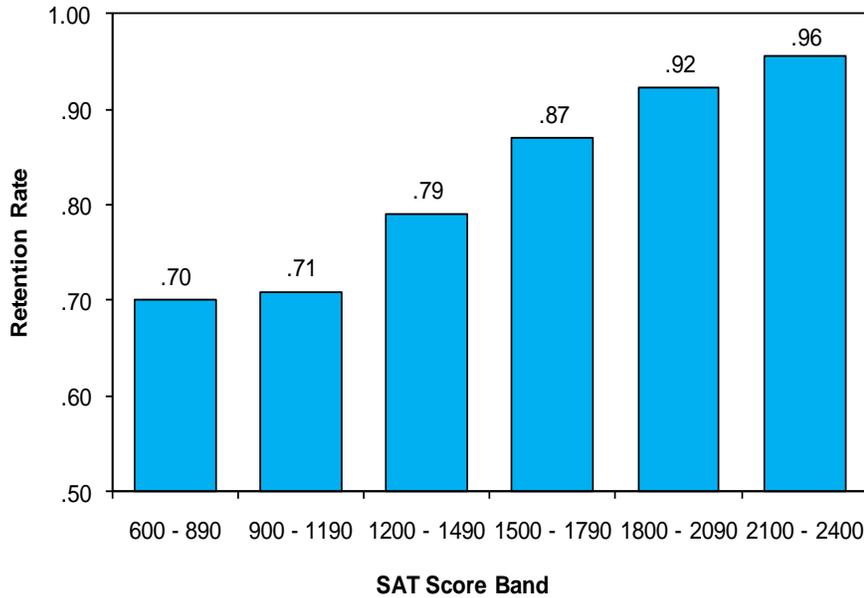
- The same basic patterns of results were found for the 2009 sample as the previous samples.
 - Specifically, 86.8% of the students returned for their second year.
 - As for demographic characteristics, the percentages of non-returners that were African-American, Hispanic, and from lower SES households were slightly higher than for the total group.
 - In terms of institutional characteristics, 26.4% of the total group attended a private college whereas 22.1% of non-returners attended a private college. 17.8% of the sample attended a selective institution (i.e., admits fewer than 50% of applicants); however, only 9.7% of non-returners attended a selective institution.
 - 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 Non-Returners by Student and Institutional Characteristics

Subgroup / Characteristic		Returning			Non-Returning		
		n	Mean	SD	n	Mean	SD
Gender	Female	93,990	1676	255	13,751	1537	247
	Male	79,003	1726	257	12,622	1592	253
Ethnicity	American Indian	788	1649	244	198	1524	238
	Asian	19,858	1773	268	2,075	1649	267
	Black/African-American	13,298	1475	238	2,861	1363	221
	Hispanic	15,790	1577	242	2,887	1472	233
	Other	4,551	1711	267	668	1543	270
	White	115,119	1727	239	17,143	1602	234
	No Response	3,589	1759	264	541	1620	276
Household Income	< \$40,000	18,325	1553	255	3,936	1455	242
	\$40,000-80,000	30,807	1649	250	5,682	1533	242
	\$80,000-120,000	31,737	1705	241	4,654	1591	233
	\$120,000-160,000	14,581	1733	234	1,992	1609	229
	\$160,000-200,000	7,772	1752	234	962	1642	225
	> \$200,000	13,063	1793	229	1,537	1677	229
	No Response	56,708	1732	260	7,610	1581	264
Highest Parental Education Level	No High School Diploma	4,033	1495	242	812	1406	229
	High School Diploma	33,029	1575	239	7,601	1474	228
	Associate Degree	10,984	1597	233	2,210	1504	221
	Bachelor Degree	57,289	1708	235	7,841	1597	236
	Graduate Degree	56,678	1797	242	6,222	1678	245
	No Response	10,980	1696	279	1,687	1545	282
HSGPA	≤C-	206	1456	288	118	1344	242
	C	889	1379	229	478	1345	218
	C+	2,137	1413	235	1,009	1387	225
	B-	5,896	1481	229	2,125	1446	223
	B	18,906	1552	232	5,069	1490	226
	B+	30,158	1616	234	5,687	1540	235
	A-	44,879	1708	233	5,790	1616	237
	A	51,723	1779	236	4,810	1675	240
	A+	18,199	1861	227	1,287	1739	234
Control	Private	46,842	1775	260	5,838	1632	262
	Public	126,151	1670	249	20,535	1544	245
Size (number of undergraduates)	Small (750 to 1,999)	5,740	1665	285	1,122	1515	262
	Medium (2,000 to 7,499)	29,069	1699	285	4,750	1534	267
	Large (7,500 to 14,999)	32,401	1667	271	6,842	1528	247
	Very large (15,000 or more)	105,783	1711	241	13,659	1596	243
Selectivity	< 50%	32,978	1868	243	2,550	1728	282
	50-75%	112,065	1673	241	18,132	1557	242
	> 75%	27,950	1601	244	5,691	1510	237
Total		172,993	1699	257	26,373	1564	252

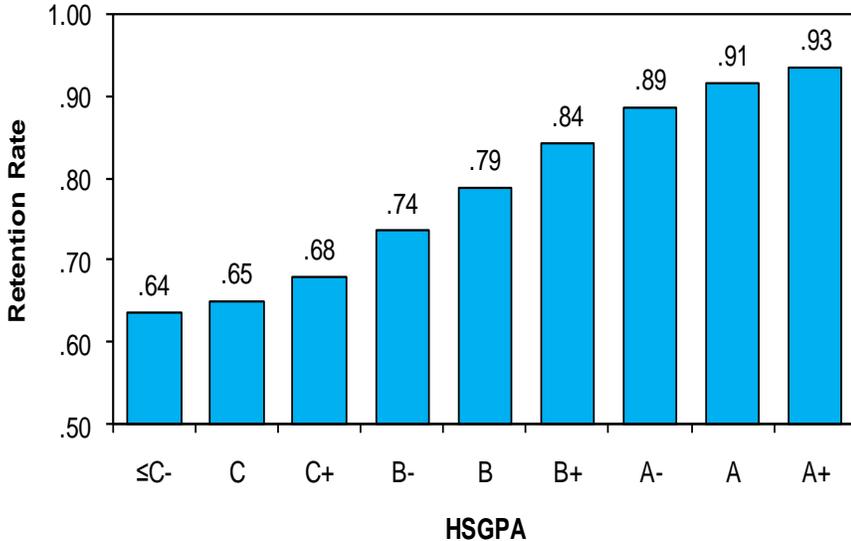
- Even after controlling for student and institutional characteristics, returners had higher SAT total scores than non-returners.
- On average, returners had an SAT total score that was over 100 points higher as compared to non-returners. For example, the average SAT score for female returners was 1676 as compared to 1537 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



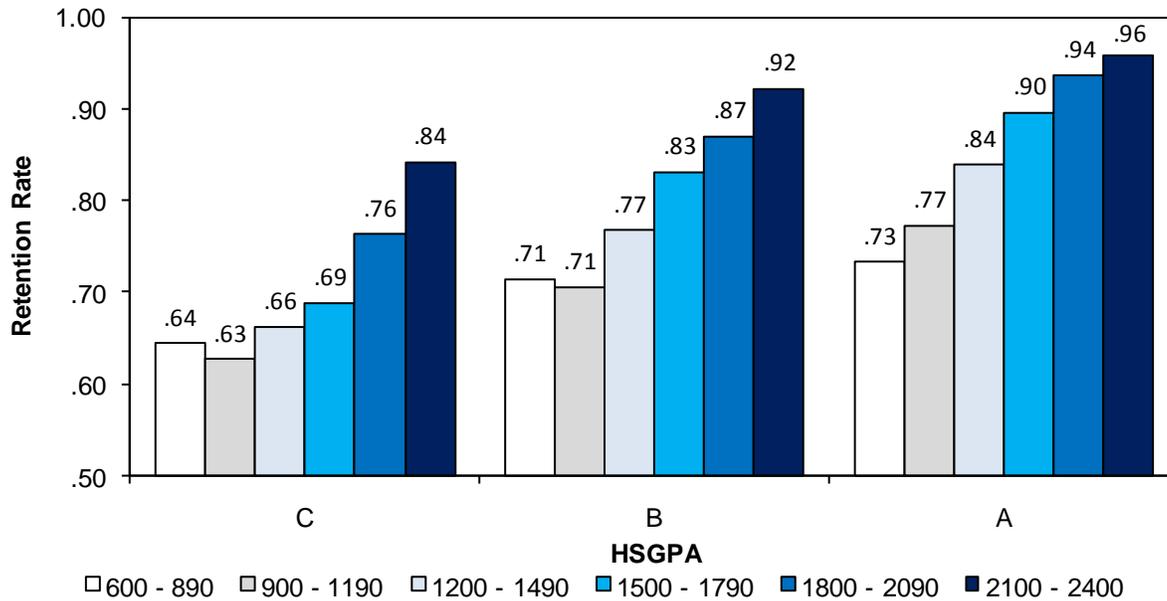
- Figure 1 presents the second year retention rate of students by SAT score band. This graphically demonstrates the positive relationship between SAT scores and retention. That is, as SAT total scores increased, retention rates increased from a low of 70% for students with an SAT total score between 600 and 890 to a high of 96% for students with an SAT total score of 2100 or higher.
- Sample size (n) for each of the 6 SAT score bands from lowest total score to highest was $n = 187$, $n = 6,022$, $n = 42,326$, $n = 82,759$, $n = 57,132$, and $n = 10,940$, respectively.

Figure 2. Retention Rate by HSGPA



- Similar to Figure 1, Figure 2 presents the second year retention rate of students by HSGPA letter grade. Again, the positive relationship between HSGPA and second year retention rate is evident. In other words, as HSGPA increased, retention rates generally increased from 64% for students with a HSGPA of C- or lower to a high of 93% for students with an A+ HSGPA.
- Sample size (n) for each of the 9 HSGPA letter grades from lowest to highest was $n = 324$, $n = 1,367$, $n = 3,146$, $n = 8,021$, $n = 23,975$, $n = 35,845$, $n = 50,669$, $n = 56,533$, and $n = 19,486$, respectively.

Figure 3. Incremental Validity of SAT Scores over HSGPA for Predicting Retention to Second Year



- 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 73% as compared to 96% for students with an SAT total score between 2100 and 2400. See Table 5 for more details.

Table 4. Retention Rates by Student Demographic Characteristics

Subgroup / Characteristic	n	Retention		
		Mean	SD	
Gender	Female	107,741	.87	.33
	Male	91,625	.86	.34
Race	American Indian	986	.80	.40
Ethnicity	Asian	21,933	.91	.29
	Black/African-American	16,159	.82	.38
	Hispanic	18,677	.85	.36
	Other	5,219	.87	.33
	White	132,262	.87	.34
	No Response	4,130	.87	.34
Household	< \$40,000	22,261	.82	.38
Income	\$40,000-80,000	36,489	.84	.36
	\$80,000-120,000	36,391	.87	.33
	\$120,000-160,000	16,573	.88	.33
	\$160,000-200,000	8,734	.89	.31
	> \$200,000	14,600	.89	.31
	No Response	64,318	.88	.32
Highest Parental	No High School Diploma	4,845	.83	.37
Education Level	High School Diploma	40,630	.81	.39
	Associate Degree	13,194	.83	.37
	Bachelor Degree	65,130	.88	.33
	Graduate Degree	62,900	.90	.30
	No Response	12,667	.87	.34
Total		199,366	.87	.34

- The retention rate for males and females 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 82% for American Indian students.
- For socio-economic status, as household income and education increased, retention rates increased from around 82% to 90%.

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	.69 (106)	.71 (3,683)	.80 (25,292)	.88 (45,590)	.93 (28,219)	.96 (4,851)
	Male	.72 (81)	.70 (2,339)	.78 (17,034)	.86 (37,169)	.92 (28,913)	.95 (6,089)
Race / Ethnicity	American Indian	n/r (0)	.56 (36)	.71 (261)	.81 (444)	.89 (215)	.97 (30)
	Asian	n/r (11)	.80 (383)	.84 (3,389)	.90 (7,958)	.93 (7,630)	.96 (2,562)
	Black	.66 (97)	.71 (2,113)	.79 (7,216)	.88 (5,348)	.93 (1,299)	.94 (86)
	Hispanic	.74 (27)	.72 (1,173)	.81 (6,401)	.87 (7,799)	.92 (3,016)	.93 (261)
	Other	n/r (7)	.67 (175)	.78 (1,088)	.88 (2,054)	.92 (1,548)	.97 (347)
	White	.82 (39)	.69 (2,017)	.78 (23,337)	.87 (57,647)	.92 (41,930)	.96 (7,292)
	No Response	n/r (6)	.70 (125)	.78 (634)	.86 (1,509)	.91 (1,494)	.95 (362)
	Parental Income	< \$40,000	.77 (71)	.71 (1,853)	.78 (8,134)	.85 (8,579)	.90 (3,256)
	\$40,000-80,000	.63 (35)	.70 (1,376)	.78 (9,713)	.86 (15,745)	.91 (8,430)	.95 (1,190)
	\$80,000-120,000	n/r (9)	.73 (630)	.80 (7,252)	.87 (16,161)	.92 (10,521)	.96 (1,818)
	\$120,000-160,000	n/r (4)	.69 (222)	.79 (2,723)	.87 (7,401)	.93 (5,272)	.96 (951)
	\$160,000-200,000	n/r (3)	.77 (77)	.80 (1,291)	.88 (3,703)	.92 (3,052)	.96 (608)
	> \$200,000	n/r (4)	.68 (101)	.81 (1,541)	.88 (5,833)	.93 (5,853)	.96 (1,268)
	No Response	.64 (61)	.71 (1,763)	.79 (11,672)	.88 (25,337)	.93 (20,748)	.96 (4,737)

Note. n/r: Categories with fewer than 15 students are not reported.

Table 5 (continued)

		SAT Score Band					
		600-890	900-1190	1200-1490	1500-1790	1800-2090	2100-2400
Highest Parental Education	No High School Diploma	.74 (19)	.73 (521)	.81 (2,113)	.87 (1,692)	.91 (444)	1.00 (56)
	High School Diploma	.67 (82)	.69 (2,502)	.76 (13,966)	.84 (17,338)	.90 (6,273)	.94 (469)
	Associate Degree	n/r (10)	.71 (591)	.78 (4,146)	.85 (6,009)	.91 (2,242)	.95 (196)
	Bachelor Degree	.67 (33)	.74 (1,168)	.80 (12,108)	.88 (29,266)	.92 (19,696)	.95 (2,859)
	Graduate Degree	.80 (15)	.73 (633)	.82 (7,216)	.88 (23,708)	.93 (24,818)	.96 (6,510)
	No Response	.68 (28)	.70 (607)	.80 (2,777)	.87 (4,746)	.92 (3,659)	.96 (850)
HSGPA	≤ C-	n/r (5)	.50 (62)	.60 (147)	.73 (78)	.81 (26)	n/r (6)
	C	n/r (13)	.60 (306)	.66 (663)	.65 (334)	.82 (50)	n/r (1)
	C+	.67 (27)	.65 (573)	.67 (1,489)	.70 (893)	.74 (152)	n/r (12)
	B-	.73 (33)	.69 (833)	.71 (3,605)	.76 (2,833)	.79 (691)	.85 (26)
	B	.74 (39)	.70 (1,471)	.75 (8,976)	.81 (10,106)	.85 (3,142)	.90 (241)
	B+	.68 (40)	.73 (1,383)	.80 (10,315)	.86 (16,395)	.89 (7,096)	.93 (616)
	A-	.67 (15)	.76 (812)	.83 (9,246)	.88 (22,870)	.92 (15,502)	.94 (2,224)
	A	n/r (13)	.80 (502)	.85 (6,688)	.90 (22,898)	.94 (21,535)	.96 (4,897)
	A+	n/r (2)	.78 (80)	.86 (1,197)	.91 (6,352)	.95 (8,938)	.97 (2,917)
Total		.70 (187)	.71 (6,022)	.79 (42,326)	.87 (82,759)	.92 (57,132)	.96 (10,940)

Note. n/r: Categories with fewer than 15 students are not reported.

- Differences in retention rates by student subgroups are reduced and in some instances eliminated when controlling for SAT performance.
- Recall from Table 4 that 82% of students whose household income was less than \$40,000 returned compared to 89% of students returning whose household income was \$200,000 or more. Within each SAT score band, the difference in retention rates between the two groups dropped to 3% or less across all SAT scores bands. A similar pattern of findings 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	52,680	.89	.31
	Public	146,686	.86	.35
Size (number of undergraduates)	Small (750 to 1,999)	6,862	.84	.37
	Medium (2,000 to 7,499)	33,819	.86	.35
	Large (7,500 to 14,999)	39,243	.83	.38
	Very large (15,000 or more)	119,442	.89	.32
Admittance Rate	< 50%	35,528	.93	.26
	50-75%	130,197	.86	.35
	> 75%	33,641	.83	.37
Total		199,366	.87	.34

- Students at private institutions were slightly more likely to return for their second year (89% versus 86% at public institutions).
- As for institution size, no clear pattern emerged between size of the institution and retention rates.
- For institutional selectivity, 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 (83%).

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	.69 (35)	.71 (942)	.81 (7,850)	.87 (19,438)	.93 (18,907)	.96 (5,508)
	Public	.70 (152)	.71 (5,080)	.79 (34,476)	.87 (63,321)	.92 (38,225)	.95 (5,432)
Size (number of undergraduates)	Small (750 to 1,999)	n/r (10)	.68 (349)	.76 (1,889)	.85 (2,528)	.91 (1,604)	.95 (482)
	Medium (2,000 to 7,499)	.71 (45)	.70 (1,554)	.79 (7,897)	.86 (12,427)	.92 (9,316)	.97 (2,580)
	Large (7,500 to 14,999)	.73 (41)	.70 (1,601)	.74 (10,752)	.83 (15,094)	.91 (9,691)	.94 (2,064)
	Very large (15,000 or more)	.69 (91)	.73 (2,518)	.82 (21,788)	.88 (52,710)	.93 (36,521)	.96 (5,814)
Admittance Rate	< 50%	n/r (8)	.75 (456)	.84 (2,502)	.91 (9,968)	.95 (16,550)	.96 (6,044)
	50-75%	.67 (129)	.71 (3,865)	.79 (29,427)	.87 (58,105)	.92 (34,443)	.95 (4,228)
	> 75%	.76 (50)	.70 (1,701)	.79 (10,397)	.85 (14,686)	.90 (6,139)	.93 (668)
Total		.70 (187)	.71 (6,022)	.79 (42,326)	.87 (82,759)	.92 (57,132)	.96 (10,940)

Note. n/r: Categories with fewer than 15 students are not reported.

- Differences in retention rates by institutional subgroups are reduced and in some instances eliminated when controlling for SAT performance.
- Recall from Table 6 that 83% of students who attended an institution that admitted over 75% of applicants returned 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, especially for the higher SAT score bands.

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