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Research Notes
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Determining SAT® Benchmarks for College Readiness

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Introduction

There is wide concern that students in our nation's high schools are earning diplomas but are still not leaving high school with the knowledge and skills needed to be successful in college. By itself, a high school diploma is not a sufficient measure of college readiness. According to the U.S. Department of Education (2006), 28 percent of students entering college in fall 2000 required remedial course work, and for students entering public two-year colleges, 42 percent required such course work.

There are several different ways of conceptualizing and measuring college readiness. Greene and Winters (2005) developed a measure of public high school college readiness intended to reflect the minimum standards of the least selective four-year colleges. The standard includes earning a regular high school diploma, completing a minimum set of course requirements, and being able to read at a basic level (scoring at or above the basic level on the National Assessment of Educational Progress [NAEP] reading assessment). According to their measure of college readiness, Greene and Winters estimated that in 2002 only 34 percent of high school graduates in the nation had the skills and qualifications necessary to attend college.

The National Center for Educational Statistics (NCES) calculated college readiness in a slightly different manner. The NCES measure of college readiness was based on a student's cumulative grades in high school academic course work, senior class rank, the National Education Longitudinal Study (NELS) 1992 test scores, and the SAT® and ACT college entrance examination scores (Berkner and Chavez, 1997). Each student was rated on a five-point scale ranging from "marginally or not qualified" to "very highly qualified," based on his or her highest rated criterion. In addition, students were moved up one category if they took rigorous academic course work (at least four years of English; three years each of a natural science, social science, and math; and two years of a foreign language) and demoted one category if they did not take such course work. According to this college qualification index, among all 1992 high school graduates, nearly two-thirds (65 percent) appeared to have been at least minimally qualified for admission to a four-year college or university. Among those seniors classified as marginally or not qualified for regular four-year college admission, half entered postsecondary education, but only 15 percent enrolled in a four-year college or university. Among those seniors who were minimally qualified, three-quarters enrolled in some postsecondary education and 35 percent attended a four-year institution. Fifty-six percent of the somewhat qualified, 73 percent of the highly qualified, and 87 percent of the very highly qualified high school graduates enrolled in four-year institutions.

The NCES estimation of the percentage of students qualified to enter college differs markedly from that estimated by Greene and Winters (2005). Greene and Winters suggested that the discrepancy was due to the fact that the NCES method of calculating college readiness did not align with the way four-year colleges actually select students; that is, NCES used a compensatory model whereby its rating of college readiness was based on each student's highest criterion, regardless of their level on any of the other criteria. For example, a student with a 2.7 high school grade point average (HSGPA) was rated as ready for college whether or not he or she performed well on any of the other measures.

High school graduation decisions typically follow a conjunctive model, since students do not receive diplomas until they complete all required course work satisfactorily *and* pass the required tests (Phillips, 1991, as cited in the Committee of Appropriate Test Use, 1999). The Committee on Appropriate Test Use of the National Research Council (1999) asserts that

the compensatory model is more compatible with current professional testing standards, which state that "in elementary or secondary education, a decision or characterization that will have a major impact on a test taker should not automatically be made on the basis of a single test score. Other relevant information…should also be taken into account" (American Educational Research Association et al., 1985:54, Standard 8.12, cited in Committee on Appropriate Test Use, 1999, p. 166).

Neither Greene and Winters (2005) nor NCES (Berkner and Chavez, 1997) considered actual student performance in college when producing their college readiness estimates. The American College Testing program (ACT, 2004) reported college readiness benchmarks on their ACT Assessment using actual student performance in college as the criterion. In their report, *Crisis at the Core: Preparing All Students for College and Work* (2004), ACT indicated that most of America's high school students are not ready for college-level course work. Using the criteria of a 75 percent chance of earning a grade of C or better and a 50 percent chance of earning a B or better in first-year college English composition, algebra, and biology courses, only 26 percent of ACT-tested high school graduates met the benchmark in biology, 40 percent in algebra, and 68 percent in English composition. Only 22 percent of the 1.2 million students tested in 2004 met all three benchmarks. The ACT figures are more similar to Greene and Winters's estimates than they are to the NCES estimates, suggesting that only a small percentage of students graduating from high school are prepared to meet the academic demands of college. It is noted that Greene and Winters and NCES were concerned with the percentage of all high school graduates who are ready for college, while ACT addressed what percentage of ACT test-takers are ready for college. These are different populations, the latter being a more selective and restricted group.

Use of the SAT Reasoning Test™ to Predict College Readiness

Many colleges use SAT scores in conjunction with HSGPA to predict students' likelihood of success at their institutions. Many of these colleges calculate an academic index, which is usually based on institutional research about the performance of enrolled students. The elements and weightings used to create the academic index, and how this index is actually used, reflect institutional priorities (Rigol, 2003). While many colleges have information on the range of SAT scores that students need to be successful at their own institutions, to date there has been no attempt to determine benchmark SAT scores that can be used as an indicator of college readiness at the national level. SAT college readiness benchmarks may be useful as reference points against which one may compare an individual's score, or estimate the level of college readiness in a group or cohort.

The purpose of this study was to determine benchmark scores on the SAT Reasoning Test™ that predict a 65 percent probability or higher of getting a first-year college grade point average (FGPA) of either 2.7 or higher (approximately a B-average) or 2.0 or higher (C average), to use these benchmarks to describe the level of college readiness in the nation and in certain demographic subgroups, and to examine how the benchmarks vary according to certain college characteristics. Note that this study examined benchmarks for predicting overall first-year college grades, while the ACT study *Crisis at the Core* (2004) developed benchmarks for predicting grades in selected first-year college courses.

The 65 percent probability criterion was chosen because this criterion has been used in research with NAEP data (e.g., Beaton and Allen, 1992; Zwick, Senturk, and Wang, 2001) and has been accepted as an appropriate standard for defining success in a domain. Zwick, Senturk, and Wang explained that the choice of a "response probability (RP) criterion" is somewhat arbitrary, but found in their study of item-mapping on the NAEP that a criterion of 65 percent was in alignment with the beliefs of subject-area experts on a sufficient standard to measure knowledge or success.[1]

Methods

The database used for the analyses in this report includes SAT scores and college grades for the entering class of 1995 at 41 institutions. There were 167,171 students in this database with valid SAT scores, and 166,419 with FGPAs. The 165,781 students that had valid SAT scores and FGPAs were included in the analyses.

Logistic regression was used to determine the predicted probability of success for each student, where success was defined as achieving a first-year cumulative GPA of 2.7 or higher, or 2.0 or higher. Among those students with a predicted probability of at least .65, the *minimum* SAT score was identified as the "bench-

[1]It is noted that the cited studies examining the 65 percent criteria were concerned with the percentage of students who could answer a test question correctly, while the current study is concerned with the probability of earning a certain FGPA. However, the rationale underlying the choice of criteria in both types of studies is similar.

mark" score. The benchmark scores were computed for the total sample and separate benchmarks were computed within each of the 41 institutions. The mean institution-level benchmark weighted by the number of students at each institution, as well as the median benchmark across institutions, was compared with the benchmark scores based on the total sample.

Results

Tables 1a through 1c show the mean and standard deviation of FGPA and the percentage of students earning a FGPA equivalent to a B- (2.7) or higher and the percentage of students earning an FGPA equivalent to a C (2.0) or higher, by score intervals on the SAT, for the total score (SAT-T) and separately for verbal (SAT-V) and mathematics (SAT-M) scores. Figures 1 through 3 display this information.

Table 2 shows the benchmark scores that were obtained for the SAT verbal and mathematics sections, the total SAT score for the 2.7 and 2.0 criterion levels across institutions, and the median and weighted mean within an institution. The benchmarks computed on the total sample are equal to or slightly higher than the weighted mean and median of the institution-level benchmarks. Table 3 shows the percentage of students achieving each of the benchmarks in the study sample, and in the College-Bound Seniors 1995 and 2005 databases.[2] The College-Bound Seniors databases include SAT scores for cohorts of graduating high school seniors and do not include information on college performance. The percentage of students in the College-Bound Seniors population meeting the benchmarks at the 2.7 criterion level was very similar to those reported by ACT (2004). In 1995, a mere 22 percent of students met the SAT total score benchmark, and in 2005 the percentage increased slightly to 25 percent.

Tables A1 and A2 in the Appendix show the percentage of students achieving the benchmarks by gender and race/ethnicity. A higher percentage of males than females achieved the benchmarks; the gender difference in the percentage achieving the SAT verbal score benchmark was much smaller than the gender difference in meeting the SAT mathematics score or SAT total score benchmarks. The percentage of students meeting the benchmarks was smallest among African American students and highest among Asian American and white students; this trend was consistent across SAT-T, SAT-V, and SAT-M, and for both 1995 and 2005.

Table 1a

Mean FGPA and Percentage of Successful Students by SAT Total Score Intervals

SAT Total Score Interval	*N*	*Mean FGPA*	*SD FGPA*	*% with FGPA ≥ 2.7*	*% with FGPA ≥ 2.0*
400–500	21	1.76	.96	19	33
500–600	166	1.91	.86	17	50
600–700	727	2.02	.82	20	58
700–800	2,919	2.12	.75	22	64
800–900	9,906	2.28	.71	28	71
900–1000	21,885	2.44	.71	39	78
1000–1100	33,277	2.62	.72	50	83
1100–1200	37,671	2.82	.69	62	89
1200–1300	31,191	3.00	.67	73	92
1300–1400	18,047	3.19	.62	82	95
1400–1500	7,866	3.36	.58	89	97
1500–1600	2,105	3.48	.54	92	98

Table 1b

Mean FGPA and Percentage of Successful Students by SAT Verbal Score Intervals

SAT Verbal Score Interval	*N*	*Mean FGPA*	*SD FGPA*	*% with FGPA ≥ 2.7*	*% with FGPA ≥ 2.0*
200–300	607	2.20	.88	30	65
300–400	6,296	2.29	.78	31	70
400–500	37,077	2.47	.73	41	78
500–600	69,062	2.76	.72	59	87
600–700	41,544	3.06	.67	75	93
700–800	11,195	3.31	.61	86	96

Table 1c

Mean FGPA and Percentage of Successful Students by SAT Mathematics Score Intervals

SAT-M Score Interval	*N*	*Mean FGPA*	*SD FGPA*	*% with FGPA ≥ 2.7*	*% with FGPA ≥ 2.0*
200–300	418	1.99	.84	18	55
300–400	5,280	2.17	.76	25	65
400–500	32,907	2.45	.73	39	78
500–600	62,414	2.73	.71	57	86
600–700	50,148	3.01	.68	72	92
700–800	14,614	3.30	.61	85	96

[2]The percentage of students in the study sample achieving the benchmarks is given for reference only. Since this is a restricted sample, the focus should be on the percentage of the population of college-bound seniors meeting the benchmarks.

Table 2

Benchmark Scores Determined by Logistic Regression Analyses

	FGPA ≥ 2.7			*FGPA ≥ 2.0*		
	Benchmark for Total Sample	*Institution-Level Wgt. Mean*	*Institution-Level Median*	*Benchmark for Total Sample*	*Institution-Level Wgt. Mean*	*Institution-Level Median*
SAT Verbal	590	546	590	360	309	340
SAT Mathematics	610	562	590	370	336	340
SAT Total	1180	1129	1170	800	744	740

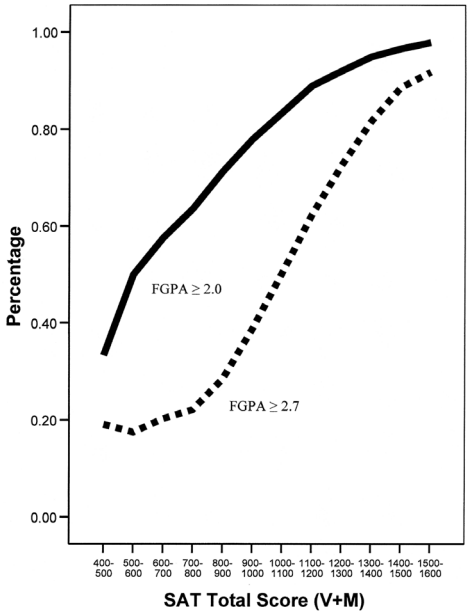

Figure 1. Percentage of students earning FGPAs of 2.7 or higher and 2.0 or higher by SAT total score.

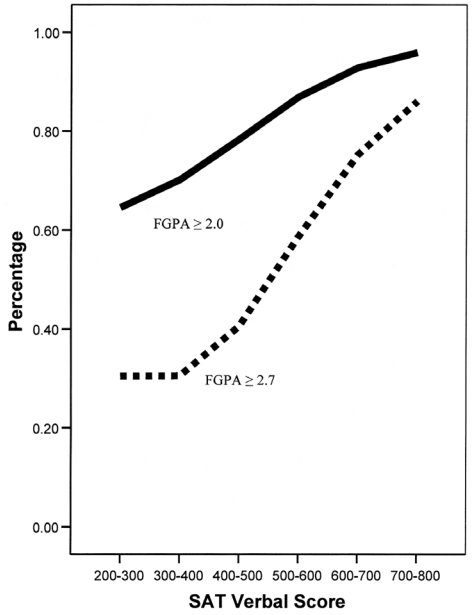

Figure 2. Percentage of students earning FGPAs of 2.7 or higher and 2.0 or higher by SAT verbal score.

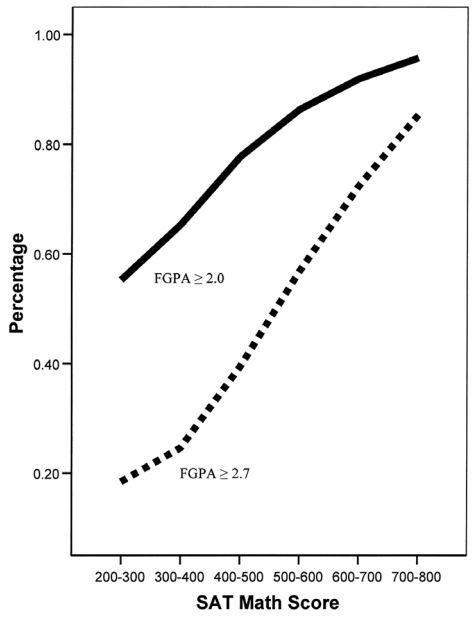

Figure 3. Percentage of students earning FGPAs of 2.7 or higher and 2.0 or higher by SAT mathematics score.

Table 3

Percentage of Students in Study Sample and College-Bound Seniors Achieving SAT Benchmark Scores

	Benchmark	*Study Sample*	*1995 CB Seniors*	*2005 CB Seniors*
SAT Verbal				
Benchmark 1	590	41%	24%	25%
Benchmark 2	360	99%	92%	92%
SAT Mathematics				
Benchmark 1	610	39%	20%	24%
Benchmark 2	370	99%	91%	91%
SAT Total				
Benchmark 1	1180	42%	22%	25%
Benchmark 2	800	98%	85%	86%

Note: Using the total benchmark across institutions, Benchmark 1 = 65% probability of FGPA ≥ 2.7 and Benchmark 2 = 65% probability of FGPA ≥ 2.0

Table 4

Benchmark Scores Determined by Logistic Regression Analyses: By Quartile of High School Rank Across 41 Institutions

	FGPA ≥ 2.7				*FGPA ≥ 2.0*			
	HSRANK 4th (Lowest) Quartile	*HSRANK 3rd Quartile*	*HSRANK 2nd Quartile*	*HSRANK 1st (Highest) Quartile*	*HSRANK 4th (Lowest) Quartile*	*HSRANK 3rd Quartile*	*HSRANK 2nd Quartile*	*HSRANK 1st (Highest) Quartile*
N	12,496	13,274	13,711	12,782	12,496	13,274	13,711	12,782
SAT Verbal	740	620	620	500	500	360	290	280
SAT Mathematics	750	630	640	530	500	370	290	330
SAT Total	1400	1220	1230	1070	1000	790	690	720

Because SAT scores are not the only indicator of college readiness, it is useful to examine how the benchmark SAT scores vary according to other measures of college readiness, such as high school rank (HSRANK). Table 4 shows the benchmark scores by quartile of HSRANK. As expected, students in the higher quartiles of HSRANK require lower SAT scores for college success. For example, for students in the highest quartile of HSRANK, the SAT total benchmark for achieving an FGPA ≥ 2.7 is 1070, compared to 1400 for students in the lowest quartile of HSRANK. The pattern is slightly different for predicting an FGPA ≥ 2.0; the benchmark SAT scores for the highest quartile are slightly higher than those for the second quartile for SAT mathematics and SAT total.

The next section of this report examines how much the SAT benchmark scores vary across colleges, and what characteristics of colleges are associated with the benchmarks. Table 5 shows how the SAT benchmarks (for an FGPA ≥ 2.7) varied by the number of full-time undergraduates, control, and selectivity of the institution. The highest benchmarks were for the institutions with 7,001 to 15,000 undergraduates, public universities, and institutions that were moderately selective (i.e., accepted between 50 and 75 percent of applicants). Note that information on selectivity was only available for 32 out of the 41 institutions.

Table 5

Mean SAT Benchmarks (for FGPA ≥ 2.7) by Institution's Number of Full-Time Undergraduates, Control, and Selectivity

	N	*SAT Total*	*SAT Verbal*	*SAT Mathematics*
Number of Full-Time Undergraduates				
Up to 3,000	11	1068	527	519
3,001–7,000	11	1196	614	619
7,001–15,000	10	1224	636	640
More than 15,000	9	1164	583	596
Control				
Public	24	1200	620	628
Private	17	1108	546	542
Selectivity				
Very Selective (< .5)	4	1143	545	558
Moderate (.5–.75)	16	1176	598	605
Not Selective (> .75)	12	1120	568	562

Summary and Discussion

The SAT benchmark scores reported in this paper can be a useful resource for college admissions staff to gauge the college readiness of their entering class of students. Since the benchmarks presented here are based on students from the 1995 entering class at only 41 institutions, they should be interpreted with caution. The students at these 41 institutions scored higher than the general College-Bound Seniors population, therefore a higher percentage of students in the study sample achieved the benchmark scores compared to College-Bound Seniors in both 1995 and 2005. Because the students in the study sample were all admitted to college, they constitute a restricted sample. It will be necessary to repeat these analyses once data from the SAT Reasoning Test Validity Study are available, which will include SAT scores on the revised test (including the writing section) and college grades for the entering class of 2006 at 75 to 100 institutions. In addition, a weighting scheme can be applied to the data in the event that the institutions participating in the new validity study are not completely representative of the population.

There are myriad ways to determine college readiness benchmarks, with each method producing different results. The disparity in the estimates of the percentage of students ready for college cited in the literature and in the press demonstrates that the method and variables chosen markedly affect the results. Therefore, colleges are encouraged to determine their own benchmark scores based on their individual needs, both for admissions and placement into first-year courses, and to periodically validate these benchmark scores with current data (see Morgan and Michaelides, 2005).

Jennifer L. Kobrin is a research scientist at the College Board. *The author would like to thank Kristen Huff, Paul Sackett, and Amy Schmidt for their helpful comments on earlier versions of this research note.*

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Appendix

Table A1

Percentage of Students in Capabilities and College-Bound (CB) Seniors Achieving SAT Benchmark (FGPA ≥ 2.7) by Gender and Racial/Ethnic Subgroup

	SAT Total (1180)			*SAT Verbal (590)*			*SAT Mathematics (610)*		
Subgroup	*Capabilities*	*1995 CB Seniors*	*2005 CB Seniors*	*Capabilities*	*1995 CB Seniors*	*2005 CB Seniors*	*Capabilities*	*1995 CB Seniors*	*2005 CB Seniors*
Gender									
Females	36	19	22	40	24	24	30	15	19
Males	49	26	29	43	25	26	49	25	29
Race/Ethnicity									
No Response		20	32		22	31		19	29
American Indian		13	17		17	19		11	15
Asian American		30	37		25	27		36	45
African American		5	6		8	7		4	5
Hispanic		10	10		12	11		9	9
White		26	28		29	29		22	25
Other		25	22		28	22		21	22

Table A2

Percentage of Students in Capabilities and College-Bound (CB) Seniors Achieving SAT Benchmark (FGPA ≥ 2.0) by Gender and Racial/Ethnic Subgroup

	SAT Total (800)			*SAT Verbal (360)*			*SAT Mathematics (370)*		
Subgroup	*Capabilities*	*1995 CB Seniors*	*2005 CB Seniors*	*Capabilities*	*1995 CB Seniors*	*2005 CB Seniors*	*Capabilities*	*1995 CB Seniors*	*2005 CB Seniors*
Gender									
Females	98	84	85	99	92	91	98	89	90
Males	99	87	88	99	92	92	99	93	93
Race/Ethnicity									
No Response		78	81		86	86		86	88
American Indian		80	83		90	90		87	89
Asian American		86	90		86	90		95	96
African American		61	63		79	79		74	75
Hispanic		73	74		84	85		84	84
White		91	93		96	97		95	96
Other		84	84		90	89		90	91

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