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Using the SAT® in Merit-Based Scholarship Decisions and Selection for Competitive Academic Programs

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Contents

Abstract 3

Introduction 4

Methodology 4

Sample 4

Table 1: Institutional Characteristics of the Study Sample and Population of Four-Year Institutions 5

Table 2: Student Characteristics of the Study Sample and 2017 Graduating Seniors with SAT Scores 6

Measures 6

Descriptive Statistics 7

Table 3: Descriptive Statistics for Measures of Interest 7

Figure 1: Distribution of Students by HSGPA and SAT Total Score 8

Figure 2: Mean FYGPAs for Students with an A+ HSGPA, by SAT Total Score Bands 9

Figure 3: Mean FYGPA given Mean HSGPA, Within 101 Feeder High Schools at a Single University 10

Figure 4: Mean FYGPA given Mean SAT, Within101 Feeder High Schools at a Single University 10

Methods 11

Results 11

Figure 5: Probability of a 3.00 or Higher FYGPA and 3.50 or Higher FYGPA Given HSGPA 12

Figure 6: Probability of a 3.00 or Higher FYGPA and 3.50 or Higher FYGPA Given SAT Total Score 12

Figure 7: Probability of a 3.00 or Higher FYGPA Given SAT Total Score and HSGPA 13

Figure 8: Probability of a 3.50 or Higher FYGPA Given SAT Total Score and HSGPA 14

Discussion 15

Conclusion 15

References 16

Abstract

This report examines the value of SAT scores for determining merit-based scholarship decisions as well as admission to highly selective academic programs such as honors programs or colleges. Results show that the SAT is a highly effective tool for predicting students' chances of earning a first-year grade point average (FYGPA) of 3.00 or higher and 3.50 or higher, common performance thresholds for retaining scholarships beyond the first year and for participation in honors programs. In particular, findings show that SAT scores and HSGPA are both related to academic performance in college, but with more than two-thirds of incoming college students being "A" students in high school, the SAT provides critical, additive information about which students will be among the very highest performers in college. Colleges can use SAT scores to confidently identify admitted students who have the highest probabilities of earning the grades required to retain scholarships and participate in honors programs. Colleges can also use SAT scores to identify students who may benefit from additional academic support and mentoring to ensure that they retain their scholarship funding and participation in honors programs beyond the first year. Having a more accurate understanding of students' future performance helps colleges and universities to most appropriately allocate precious financial and staff resources to support successful outcomes for the student body and the entire campus community.

In the current year, a pandemic has disrupted education at all levels, and it has added to the difficulties that enrollment managers face when making decisions regarding admissions and financial aid. Not all students will have SAT scores. However, when scores are available, the results of this study show that an SAT score can be a highly valuable input that helps institutions make these important decisions.

Introduction

Merit-based scholarships can be an important strategic enrollment management tool that institutions use to attract particular students to attend their college or university. There are a number of reasons why institutions may offer merit-based aid to students, including to shape their class in a particular way or aim to raise the academic profile of the institution or a specific program offered (Doyle, 2010). States have also implemented merit-based aid programs to positively influence in-state college enrollment rates and increase student effort in high school (Domina, 2014; Long, 2002; Rogers & Heller, 2003; Zhang & Ness, 2010). In both institutional and state-based merit-aid programs it is common for admission test scores to play a role in student selection.

As another strategic enrollment management tool, institutions may offer applicants enrollment in their honors program or college, which can provide students with enriched in-class and extracurricular activities and broader and deeper opportunities for faculty and peer interactions (Bowman & Culver, 2018). Students in these programs also tend to have stronger college outcomes, even after controlling for student background characteristics, though results can vary by institutional selectivity (Bowman & Culver, 2018; Shushok, 2006). The administration of such programs requires sizeable financial and human resource investments by the institution, and therefore honors program selection decisions require comprehensive student data, thoughtful processes, and a high degree of confidence in those processes.

Beyond initial selection for a merit-based scholarship or institutional honors programs, there are typically maintenance requirements associated with securing the funding or position after the first year of college, often by achieving a minimum college GPA (Cornwell, Lee, & Mustard, 2005; Dee & Jackson, 1999). While the standards for maintaining scholarship funding or honors program enrollment varies, minimum GPA requirements tend to be much more stringent than what is minimally required to avoid academic probation.

With increasingly scarce financial resources available in higher education, having fair, valid, and reliable tools to confidently implement in merit-based selection decisions has never been more important. In an admissions environment that has been almost completely upended due to the pandemic, enrollment managers need as much flexibility using as many inputs as possible to make informed decisions. An SAT score, when available, is one such input. This study provides an opportunity to examine the unique contributions of the SAT for making the most informed merit-based scholarship decisions and honors program enrollment decisions.

Methodology

Sample

College Board broadly recruited four-year institutions with at least 250 first-year students (at least 75 of those students had to have SAT scores) to participate in this SAT validity study. These institutions provided data through College Board's secure online Admitted Class Evaluation Service (ACES™) system.

Ultimately, 169 institutions provided the complete student-level information needed for the analyses that follow in this section of the report.

Table 1 includes the characteristics of the 169 institutions in the sample and shows that the sample is quite diverse with regard to region of the U.S., control (public/private), selectivity, and size. Compared to the population[1] of four-year institutions for this study, the institutional study sample included more public institutions, more selective institutions, and more "large" and "very large" institutions than the reference population. This is to be expected as there was a sample size minimum to participate in the study and more selective institutions rather than less selective institutions would be more apt to use the SAT and examine the relationship between the SAT and college outcomes.

Table 1: Institutional Characteristics of the Study Sample and Population of Four-Year Institutions

	Variable	FYGPA Sample (*k*=169)	Reference Population of Institutions (*k*=1,230)
U. S. Region	Midwest	35 (21%)	343 (28%)
	Mid-Atlantic	31 (18%)	246 (20%)
	New England	22 (13%)	119 (10%)
	South	28 (17%)	277 (23%)
	Southwest	19 (11%)	90 (7%)
	West	34 (20%)	155 (13%)
Control	Public	81 (48%)	417 (34%)
	Private	88 (52%)	813 (66%)
Admittance Rate	Under 25%	20 (12%)	57 (5%)
	25% to 50%	30 (18%)	211 (17%)
	51% to 75%	71 (42%)	651 (53%)
	Over 75%	48 (28%)	311 (25%)
Undergraduate Enrollment	Small	67 (40%)	761 (62%)
	Medium	29 (17%)	202 (16%)
	Large	30 (18%)	136 (11%)
	Very Large	43 (25%)	131 (11%)

Note. *k* = number of institutions. Percentages may not sum to 100 due to rounding. Undergraduate enrollment was categorized as follows: small: 4,999 or less; medium: 5,000 to 9,999; large: 10,000 to 19,999; and very large: 20,000 or more.

Inclusion in the study sample required students to have redesigned SAT scores, a valid self-reported HSGPA, and a valid FYGPA supplied by the institution. This resulted in a sample size of 221,300 students. See Table 2 for more information about the characteristics of the student sample and the population of 2017 graduating seniors who took the redesigned SAT. Compared to the population, the study sample,

[1] The population included four-year public or private nonprofit institutions that accepted 90% or fewer applicants for admission.

which included students who were enrolled in college, tended to have slightly more female students, slightly more White students and fewer Black or African American students, and more students whose highest parental education level was a bachelor's degree or higher than the overall SAT-taking population.

Table 2: Student Characteristics of the Study Sample and 2017 Graduating Seniors with SAT Scores

	Variable	FYGPA Sample (*n* = 221,300)	2017 Graduating Seniors who took the SAT (*N* = 1,715,481)
Gender	Male	95,798 (43%)	809,462 (47%)
	Female	125,502 (57%)	906,019 (53%)
Race/Ethnicity	American Indian or Alaska Native	656 (<1%)	7,782 (<1%)
	Asian	24,645 (11%)	158,031 (9%)
	Black or African American	15,719 (7%)	225,860 (13%)
	Hispanic or Latino	46,397 (21%)	408,067 (24%)
	Native Hawaiian or Other Pacific Islander	317 (<1%)	4,131 (<1%)
	White	121,961 (55%)	760,362 (44%)
	Two or More Races	8,446 (4%)	57,049 (3%)
	Not Stated	3,159 (1%)	94,199 (5%)
Highest Parental Education Level	No High School Diploma	12,653 (6%)	137,437 (8%)
	High School Diploma	47,514 (21%)	482,194 (28%)
	Associate Degree	15,493 (7%)	134,451 (8%)
	Bachelor's Degree	79,543 (36%)	473,103 (28%)
	Graduate Degree	62,910 (28%)	339,743 (20%)
	Not Stated	3,196 (1%)	148,553 (9%)

Measures

High School GPA (HSGPA). Students' self-reported HSGPA was obtained from the SAT Questionnaire when they registered for the SAT and is reported on a 12-point interval scale, ranging from 0.00 (F) to 4.33 (A+). Institutional HSGPA could not be used in this national study because it is reported on so many different scales across institutions. Note that the inclusion of self-reported HSGPA is consistent with previous admission test validity studies (e.g. Mattern and Patterson, 2014; Sawyer, 2013) and studies have found self-reported HSGPA to be highly correlated with actual HSGPA (Kuncel, Credé, & Thomas, 2005; Shaw & Mattern, 2009). In the class of 2017, 93% of the SAT-taking population reported their HSGPA. The HSGPA measure in this study had a sample mean of 3.67 (SD=0.48).

SAT Scores. SAT scores were obtained from College Board's database and matched to each student provided in the institution files. The SAT scores included in this study are:

SAT Total Score (400 to 1600 scale)—increments of 10, sample mean of 1187 (SD=163).

SAT Evidence-based Reading and Writing (ERW) Section Score (200 to 800 scale) —increments of 10, sample mean of 596 (SD=83).

SAT Math Section Score (200 to 800 scale) —increments of 10, sample mean of 591 (SD=93).

College Grades. Each institution provided FYGPA values for their 2017 first-time, first-year students. The FYGPAs across the 169 institutions in this sample ranged from 0.00 to 4.30. FYGPA had a sample mean of 3.03 (SD=0.81).

Descriptive Statistics

Table 3 includes descriptive statistics for all measures of interest in the sample and for the 2017 SAT-tested graduating seniors. As the sample includes students enrolled in college, it is not surprising that these students are academically stronger than the total SAT test-taking population across all measures. Descriptive statistics are reported for all SAT scores utilized in the study analyses: SAT ERW section, SAT Math section, SAT Total scores, as well as HSGPA and FYGPA.

Table 3: Descriptive Statistics for Measures of Interest

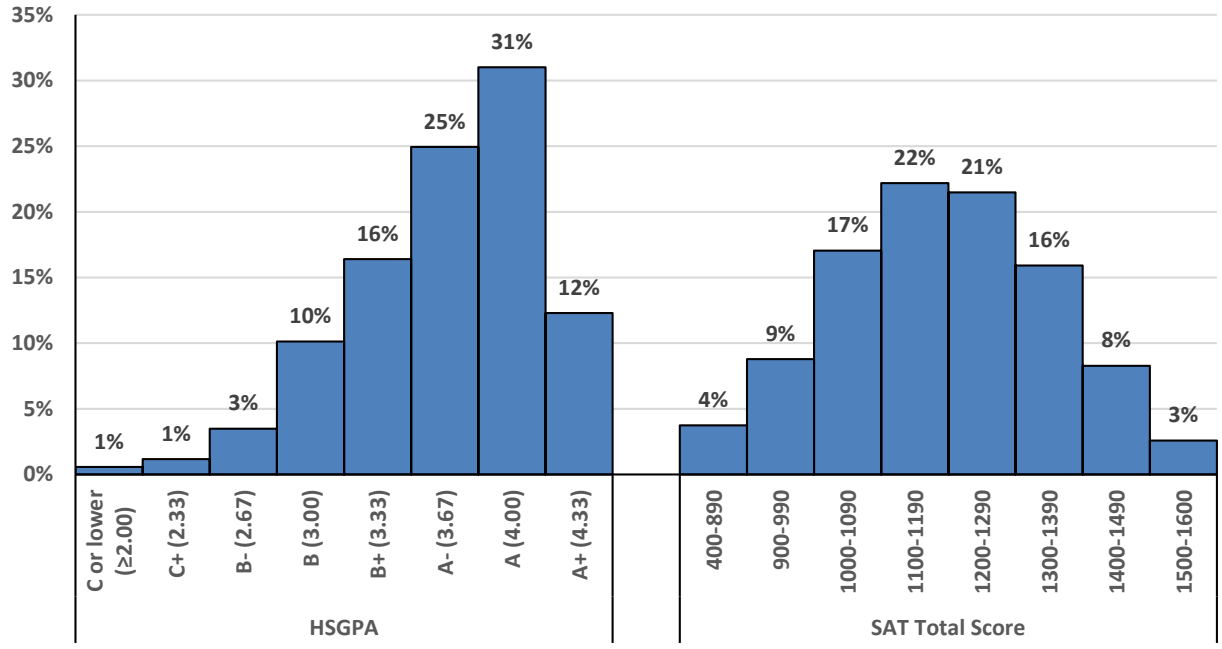
	FYGPA Sample (*n* = 221,300)				**2017 Graduating Seniors who took the SAT (*N* = 1,715,481)**			
	M	***SD***	***Min***	***Max***	***M***	***SD***	***Min***	***Max***
HSGPA	3.67	0.48	0.00	4.33	3.33	0.65	0.00	4.33
SAT Total	1187	163	400	1600	1060	195	400	1600
SAT ERW	596	83	200	800	533	100	200	800
SAT Math	591	93	200	800	527	107	200	800
FYGPA	3.03	0.81	0.00	4.30				

Note. Not all 2017 graduating seniors who took the SAT reported their HSGPA (*n* = 1,594,136).

Though it may not be apparent from the descriptive statistics presented in Table 3, the shape of the distributions of students' HSGPAs and SAT scores differ. Figure 1 illustrates this difference by presenting the distribution of students in the study sample across HSGPA letter grades and SAT Total score bands. As noted above, the sample consists of students who enrolled in four-year post-secondary institutions, these students tend to be more heavily represented on the right side of both the HSGPA and SAT Total score scale, hence very few students had HSGPAs of C or lower or SAT Total scores below 900. Although both distributions are truncated at the low ends of the scales, the distributions in Figure 1 clearly differ, with the majority of students bunched up at the high end of the HSGPA scale whereas students are more equally distributed across the SAT Total score scale. In fact, 68% of the students had HSGPAs

between A- (3.67) and A+ (4.33), or "A" students. In contrast, only 27% of students had SAT scores within the top three score bands, from 1300 to 1600.[2]

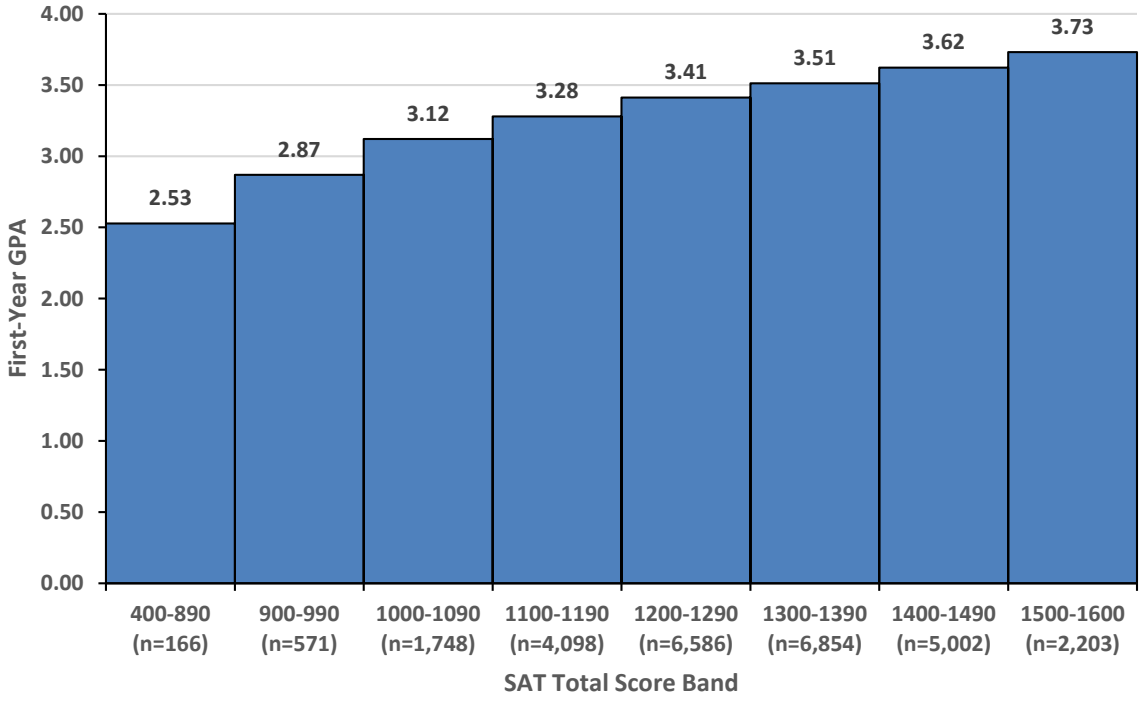
Figure 1: Distribution of Students by HSGPA and SAT Total Score



The clustering of students with HSGPAs at the high end of the HSGPA scale makes it difficult to differentiate incoming students under consideration for merit-based scholarships and honors programs. And even when we examine just those A+ HSGPA students by their SAT score bands (see Figure 2) we see that there is meaningful variability in SAT performance and college performance across those A+ students. Despite strong high school performance as represented by HSGPA, we still see substantial variation in college performance, which calls into question the advisability of using a single measure to award merit scholarships or place students in honors programs. In other words, HSGPA can hold varied meaning, likely depending on a student's high school quality and rigor.

[2] Contrary to what some may believe, the SAT is not "graded on a curve". This notion of grading on a curve would entail a student's score changing depending on how other students performed on the test. However, an SAT score is only based on how a particular student performed and is not affected by other students' performance. Notably, test form difficulty is taken into account for the calculation and reporting of SAT scale scores using statistical procedures, referred to as equating (AERA/APA/NCME, 2014). More information can be found in the *SAT Suite of Assessments Technical Manual: Characteristics of the New SAT* (College Board, 2017).

Figure 2: Mean FYGPAs for Students with an A+ HSGPA, by SAT Total Score Bands



To further illustrate the difficulty of identifying high potential students based on HSGPA, we examined data from one university with 101 feeder high schools that sent at least 15 students (total, *n*=2,462) to the university in one year. For these feeder high schools, we calculated their students' mean HSGPA, SAT Total score, and FYGPA at the institution. We then plotted the mean HSGPA for each high school against the mean FYGPA for its students at the university, as shown in Figure 3. Figure 4 contains the mean SAT Total score at each high school plotted against the mean FYGPA for its students at the university. The general trendline across the distribution of mean HSGPAs in Figure 3 indicates that there was almost no relationship between mean HSGPA and mean FYGPA at the university. In contrast, the trendline in Figure 4 shows that there was a clear, positive relationship between the high schools' mean SAT scores and their students' mean FYGPAs at the institution. High schools with lower mean SAT scores generally had lower mean FYGPAs, and high schools with higher mean SAT scores generally had higher mean FYGPAs.

Figure 3: Mean FYGPA given Mean HSGPA, Within 101 Feeder High Schools at a Single University

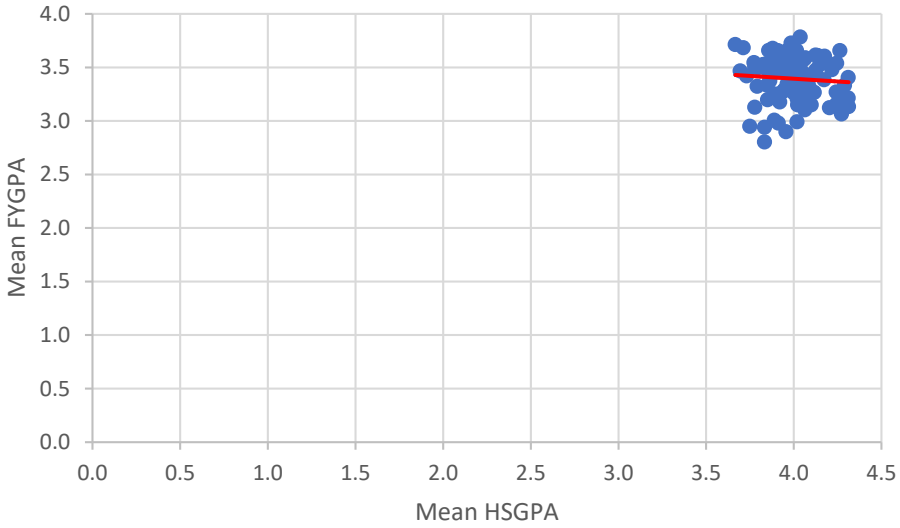
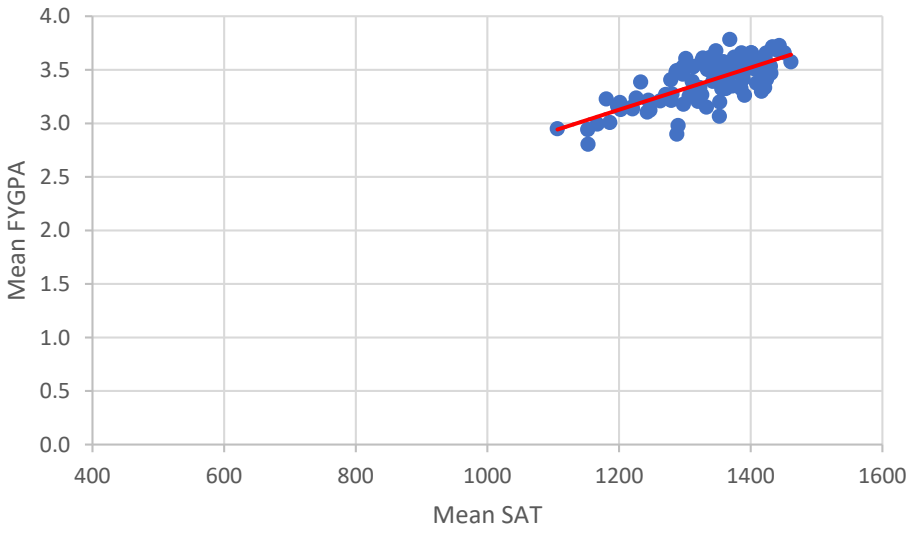


Figure 4: Mean FYGPA given Mean SAT, Within101 Feeder High Schools at a Single University



We share this example, not because we expect or suggest that institutions make decisions about students based on their high school's mean HSGPA or high school's mean SAT score but to illustrate that the baseline meaning of a HSGPA and its relationship with FYGPA is quite localized and best understood within the context of a student's own high school and peers within that same school. The SAT, however, holds consistent meaning across high schools, which is particularly useful when a measure is needed to select students across many different high schools for the scarce resources or select few seats for academically competitive scholarships or programs at an institution. At the very least, the SAT provides

critical global context for the useful local information provided by the HSGPA. In other words, two students with a 4.00 HSGPA may be expected to perform very differently in college depending on which high school that 4.00 HSGPA was assigned by. In contrast, two students with a 1320 SAT score, regardless of high school attended, will be expected to perform similarly in college. Both HSGPA and SAT scores are positively related to academic performance in college, but they also measure slightly different aspects of college preparation. These differences, however, are complimentary as research has shown that the joint use of SAT scores and HSGPA is the best way to predict FYGPA (Westrick, Marini, Young, Ng, Shmueli, & Shaw, 2019). Using both in combination provides institutions with a greater degree of confidence in their scholarship and honors program selections.

The plots in Figures 3 and 4 represent findings from only one university, and results vary across postsecondary institutions, but these figures underscore the difference between HSGPA, a local measure where grades vary more within schools than across schools (Zwick & Greif Green, 2007), and the SAT, which is a standardized measure, a common metric for all students regardless of which high school they attended. Institutions undoubtably consider where incoming students went to high school in addition to the students' HSGPAs, but when institutions are not familiar with a student's high school, the student's SAT score adds context to the student's HSGPA.

Methods

Logistic regression analyses were employed for predicting students' probabilities of earning a FYGPA of 3.00 or higher and 3.50 or higher. These FYGPA criteria were selected as reasonable thresholds for indicating that a student is managing to successfully navigate college-level work and can remain eligible for merit-based scholarship funding and/or honors program participation. In the study sample, 61% of students earned a FYGPA of 3.00 or higher, and 33% earned a FYGPA of 3.50 or higher (mean FYGPA=3.03, Table 3).To estimate the probability of earning a FYGPA of 3.00 or higher and 3.50 or higher, logistic regression analyses were conducted at each institution, the institution-level coefficients were weighted by the number of students in the institutional study, and then mean coefficients from the aggregated weights were calculated.

Results

Figure 5 shows the mean probabilities of earning FYGPAs of 3.00 or higher and 3.50 or higher given students' HSGPAs. As HSGPA increases, so does the probability of success. For students with HSGPAs of 3.7, 4.0, and 4.3, their chances of earning a FYGPA of 3.00 or higher were 65%, 75%, and 83%, respectively, and their chances of earning a FYGPA of 3.50 or higher were 31%, 45%, and 59%, respectively.

Figure 5: Probability of a 3.00 or Higher FYGPA and 3.50 or Higher FYGPA Given HSGPA

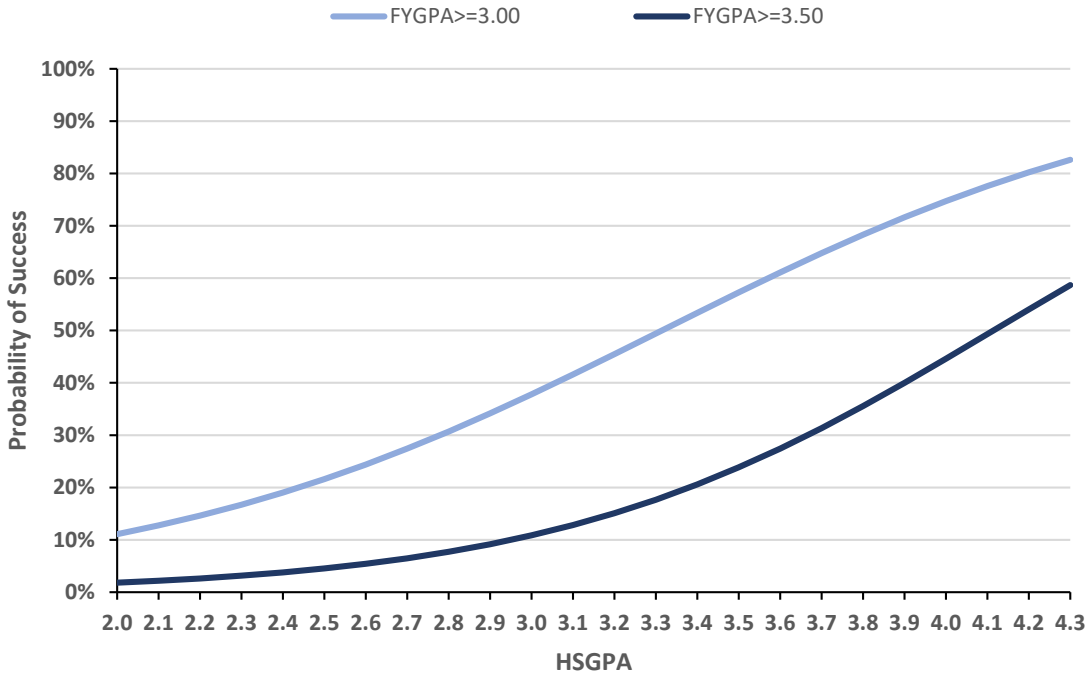


Figure 6: Probability of a 3.00 or Higher FYGPA and 3.50 or Higher FYGPA Given SAT Total Score

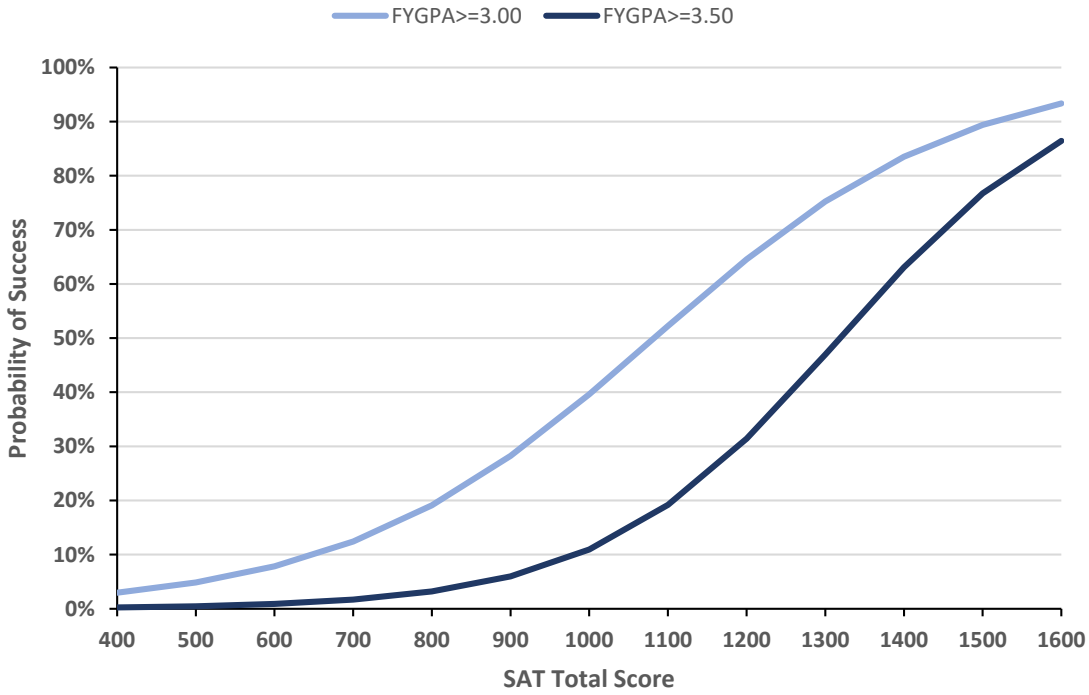


Figure 6 shows the mean probabilities of earning FYGPAs of 3.00 or higher and 3.50 or higher given students' SAT Total scores. As with HSGPA, as SAT scores increase, so does the probability of success. However, note that the probability curves for SAT scores are steeper than those for HSGPA. For students with SAT scores of 1200, 1400, and 1600, their chances of earning a FYGPA of 3.00 or higher were 65%, 83%, and 93%, respectively, and their chances of earning a FYGPA of 3.50 or higher were 31%, 63%, and 86%, respectively. This graph provides clear and compelling evidence that SAT scores are signaling to institutions how students will be expected to perform in college and how SAT scores can be involved in the recruitment, admission, and enrollment process to help institutions identify the academically strongest students for merit-based scholarships and honors programs.

Figure 7 demonstrates the value of using SAT scores with HSGPA to predict very strong academic success in college. This graph shows students' probability of earning a FYGPA of 3.00 or higher in college given their HSGPA and selected SAT Total score. For example, a student with a HSGPA of 3.70 and SAT Total score of 1000, has approximately a 46% chance of earning a FYGPA of 3.00 or higher, while a student with the same HSGPA (3.70) and SAT Total score of 1400 has approximately a 82% chance of earning a FYGPA of 3.00 or higher, which is a 36 percentage point difference. Even among students with higher HSGPAs, we see the added SAT value in understanding student success in college. Students with a HSGPA of 4.00 and an SAT score of 1000 have a 56% chance of earning a FYGPA of 3.00 or higher, but students with the same HSGPA (4.00) and an SAT score of 1400 have an 87% chance of earning a FYGPA of 3.00 or higher. In sum, SAT scores provide meaningful information in predicting a student's probability of earning a 3.00 or higher FYGPA in college at every point on the HSGPA scale.

Figure 7: Probability of a 3.00 or Higher FYGPA Given SAT Total Score and HSGPA

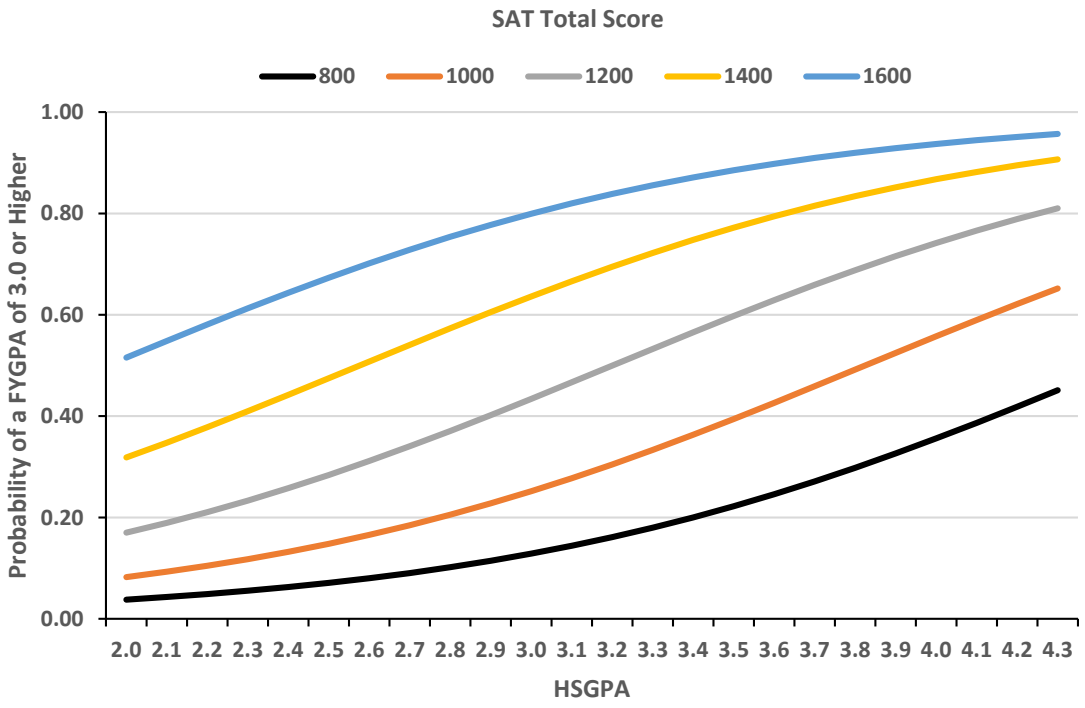
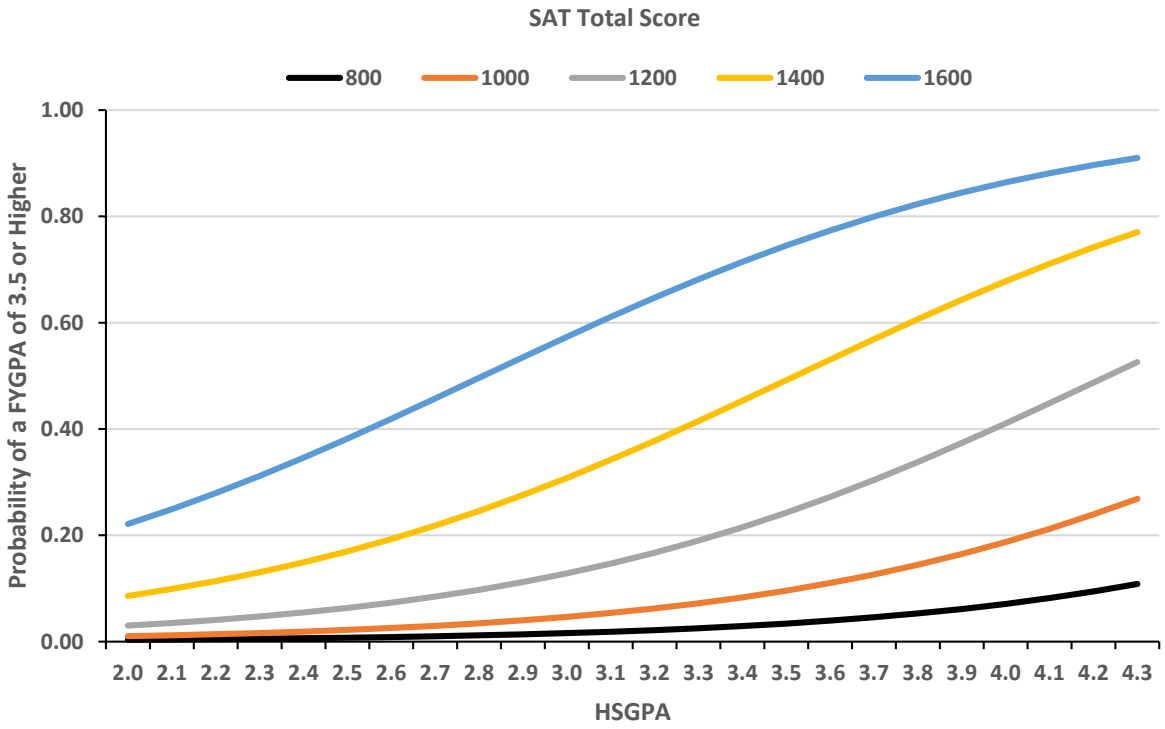


Figure 8 illustrates students' probabilities of earning a FYGPA of 3.50 or higher given SAT scores and HSGPA. While a FYGPA of 3.50 is high threshold for thinking about college success, when the selection decision is for more than admission but for competitive academic programs, this is a reasonable bar to examine. At the high end of the HSGPA scale in this figure, it is clear that students' chances of earning a FYGPA of 3.50 or higher varies greatly depending on the students' SAT scores. Among students with perfect HSGPAs of 4.33, a student with an SAT score of 1400 has a 78% chance of earning a FYGPA of 3.50 or higher, but a student with an SAT score of 1000 has only a 28% chance. This is a non-trivial difference for students with the same HSGPA. When solely using HSGPA to predict students' chances of earning a FYGPA of 3.50 or higher, as in Figure 5, a student with a HSGPA of 4.33 has a 60% chance of success. What Figure 8 demonstrates is that the SAT puts students' HSGPAs in context. While most students with 4.33 also have high SAT scores, this is not always the case, and students' probabilities of success vary considerably depending on their SAT scores even when they have identical HSGPAs.

Figure 8: Probability of a 3.50 or Higher FYGPA Given SAT Total Score and HSGPA



Using SAT scores in conjunction with HSGPA in a compensatory model, as illustrated in Figures 7 and 8, helps institutions better predict a student's likelihood of succeeding in college and is critical for making fair and informed selection decisions for competitive academic programs and merit-based scholarships.

Discussion

While both SAT scores and HSGPA are related to academic performance in college, with more than two-thirds of incoming college students arriving with an "A" HSGPA, the current study has shown that the SAT provides more information about which of these strong students will be among the highest performers in college. Using SAT scores, when available, in conjunction with HSGPA is the most powerful way to predict future academic performance. At every HSGPA point, SAT scores provide more accurate estimates of students' probabilities of earning FYGPAs of 3.00 or higher and 3.50 or higher than does using HSGPA alone.

What this means is that colleges can use SAT scores and HSGPA to identify students who have the highest probabilities of earning the grades required to retain scholarships and participation in honors programs before they start college. Colleges can also use SAT scores and HSGPA to identify students who, although they have the same HSGPAs or SAT scores that other students have, may benefit from academic support and mentoring to ensure that they retain their scholarship funding and participation in honors programs beyond the first year. For example, among students with perfect HSGPAs of 4.33, a student with an SAT score of 1400 had a 78% chance of earning a FYGPA of 3.50 or higher, but a student with that same HSGPA but an SAT score of 1000 had only a 28% chance -- a 50 percentage point difference. The added SAT information can differentiate which students will be most likely to maintain their scholarships or honors program placements through college, as well as those who may struggle to do so and need extra support.

Conclusion

SAT scores are particularly useful for recruiting students specifically for honors programs or for high performing students that institutions are trying to attract, yield, and retain for various reasons. This study examined the specific purpose of understanding SAT and HSGPA relationships with the very strongest performers in college and found solid evidence for this use case. SAT scores are strongly predictive of college performance—students with higher SAT scores are more likely to have higher grades in college. And when SAT scores are available to enrollment managers, this study clearly shows that the joint use of the SAT and HSGPA provides a more accurate prediction of high-level academic performance than does HSGPA alone. While we have an extensive body of validity evidence to support the use of the SAT for various enrollment management related activities and considerations, findings from the current study affirm the value and effectiveness of the SAT as a tool for institutions, states, and other educational entities to use to inform decisions related to merit-based scholarships and admission to honors or other selective academic programs.

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