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Validity of the SAT[®] for Enrollment-Related Decisions

Focus on International Students Attending College in the U.S.

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Abstract

Recent national research on the validity of the SAT shows that students with higher SAT scores are more likely to earn higher grades in college, and that SAT scores add about 15% more predictive power above high school grade point average (HSGPA) to estimate students' college performance (Westrick, Marini, Young, Ng, Shmueli, & Shaw, 2019). While this large sample included international students attending U.S. higher education institutions, it did not allow for an understanding of how well the SAT predicts college outcomes *specifically* for international students. The current study is the first analysis of the validity of the redesigned SAT and HSGPA to predict first year college performance for international students attending U.S. institutions. Results showed that SAT scores are strongly predictive of first-year GPA for international students. Also, on average, SAT scores add 44% more predictive power above HSGPA alone to understand how a student will perform in the first year, compared to 15% in the full sample. This is likely because the HSGPA holds a less clear and consistent meaning across students coming from different countries and educational systems outside the U.S., which elevates the utility and value of SAT scores, and the college readiness information conveyed within, to inform enrollment-related decisions for international students.

Introduction

The SAT is a college and career readiness assessment that is used worldwide to assess and predict student preparedness and success in higher education (College Board, 2017). In 2016, College Board launched the redesigned SAT to better reflect the work that students do in high school, focusing on the skills and knowledge that have been shown to be necessary for students to be college and career ready.

Research on the validity of the SAT across 171 four-year institutions in the U.S. and more than 220,000 first-year students shows that students with higher SAT scores are more likely to earn higher grades in college and that using SAT scores along with HSGPA is the most powerful way to predict future academic success (Westrick, Marini, Young, Ng, Shmueli, & Shaw, 2019). In fact, SAT scores tend to add, on average, 15% more predictive power above HSGPA alone, to our understanding of student performance in the first year of college. Further, in a small-scale case study of three higher education institutions outside of the U.S., the SAT was shown to be a strong predictor of student performance in the first year of college. Most notably, the boost in predictive utility by the SAT above HSGPA ranged from 26% to 37%, even more robust than what was seen in the full national validity study of institutions in the U.S. (Marini, Westrick, Young, Ng, & Shaw, in press).

With regard to college admissions, the SAT serves to contextualize and strengthen information provided by a student's high school course-taking experiences and grades in those courses, as it can be difficult to interpret the meaning of a HSGPA across multiple high schools. Studies have shown that issues related to grade inflation (to varying degrees by high school characteristics) and differences in general grading standards and equivalency of meaning can introduce error and noise impacting the utility of the HSGPA as a measure on its own (Gershenson, 2018; Godfrey, 2011; Shaw, 2018).

For international students attending U.S. institutions of higher education (the sample in focus for the current study), it is reasonable to believe that the HSGPA would include additional interpretational complexities with regard to consistency in meaning from not only high school to high school, but from country to country, and from region to region, which would likely impact its predictive value (AACRAO, 2020; ECE, 2020; WES, 2020). For the purposes of the current study, an international student is defined as a student who reported attending a high school located outside the U.S. (excluding U.S. Department of Defense Dependents' Schools (DoDDS), which are part of the U.S. Department of Defense Education Activity [DoDEA].) In addition, students reporting a home address outside the U.S. (and not reporting their high school information) are considered international students for this study. If neither a high school nor home address were reported, students who took the SAT at a test center outside the U.S. were also included within the sample. Based on prior studies, it was not clear whether the SAT scores of international students would be similarly predictive of college success as they are for U.S. domestic students. A deeper focus on examining these predictive questions seems timely and warranted.

Currently, the United States is the destination for the highest number of international students in the world (OECD, 2019). The number of international students enrolling at U.S. institutions has seen significant growth in the past decade, though more recently (as of Fall 2018) that growth has stalled (Institute of International Education, 2019; NAFSA, 2019). International students are an incredible asset to higher education in the United States. They bring unique experiences and diverse perspectives that

enrich the campus community and surrounding communities that in turn help American students think globally and expand their own horizons. The U.S. Department of State actively promotes the United States as the leading destination for international students and has made maintaining that position a strategic priority (EducationUSA, 2020). Since attracting international students is a top priority, keeping those students enrolled and ensuring they make sound progress towards degree completion is important by association.

Thus, understanding the role that HSGPA and SAT play in predicting the college success of international students, independently and in combination, is an important question for admissions and enrollment professionals. Previous research has shown that for students who report their best language as “English and Another Language”, there is a predictive boost of 19% when using the SAT in conjunction with HSGPA, as opposed to HSGPA alone, to predict first year GPA (FYGPA) (compared to 15% for the full national sample and 13% for students who self-reported “English Only” as their best language). Further, students who report their best language as “Another Language” there is a 36% boost in prediction of FYGPA using the SAT over just HSGPA alone (Marini, Westrick, Young, Ng, Shmueli, & Shaw, 2019). This suggests that international students may also see a large boost in prediction accuracy when SAT is used in tandem with HSGPA to predict FYGPA. The current study will investigate this with recent data from four-year institutions in the U.S.

Methodology

Sample

College Board broadly recruited four-year institutions with at least 250 first-year undergraduate students (at least 75 of those students had to have SAT scores) to participate in the national SAT validity study of the fall 2017 entering cohort. Ultimately, 169 institutions provided the complete student-level information. Inclusion in this study sample required students to have new SAT scores, a valid self-reported high school GPA (HSGPA), a valid FYGPA, and self-reported attending a school or residing outside of the U.S. based on their College Board school code, home address, or test center location. This resulted in a sample size of 3,619 students. However, since many analyses in this study are performed at the institution level, only institutions with 15 or more international students meeting the above criteria were included to aid in model stability and generalizability of results. This resulted in a sample size of 3,217 students across 58 institutions to be used in the analyses in this paper. There were slightly more males (52%) than females (48%) in the sample. In terms of best language, much of the sample (53%) said that English and Another Language was their best language. See Table 1 for more information about student characteristics of the sample. Table 2 includes information about the institutions in the sample. There were more private (57%) institutions than public (43%). Admittance rate varied, with most institutions falling within 25% to 50% admittance rate (33%). In terms of size, most of the institutions in the sample were either very large (41%) or large (28%).

Table 1: Distribution of Student Characteristics

	Variable	International Students at U.S. Institutions (n=3,217)
Gender	Male	1,659 (52%)
	Female	1,558 (48%)
Best Language	English Only	721 (22%)
	English and Another Language	1,715 (53%)
	Another Language	732 (23%)
	Not Stated	49 (2%)

Note: Percentages may not sum to 100 due to rounding.

Table 2: Distribution of Institutional Characteristics

	Variable	U.S. Institutions with at least 15 International Students in the Sample (k=58)
Control	Private	33 (57%)
	Public	25 (43%)
Admittance Rate	Under 25%	15 (26%)
	25% to 50%	19 (33%)
	51 % to 75%	16 (28%)
	Over 75%	8 (14%)
Undergraduate Enrollment	Small	12 (21%)
	Medium	6 (10%)
	Large	16 (28%)
	Very Large	24 (41%)

Note: *k* = number of institutions. Percentages may not sum to 100 due to rounding. Undergraduate enrollment size as categories 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.

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+). The HSGPA measure in this study had a sample mean of 3.69 (SD=0.50).

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 1319 (SD=141).

SAT Evidence-based Reading and Writing (ERW) Section Score (200 to 800 scale) —increments of 10, sample mean of 628 (SD=75).

SAT Math Section Score (200 to 800 scale) —increments of 10, sample mean of 690 (SD=86).

First Year GPA (FYGPA). Each higher education institution provided FYGPA values for their 2017 first-time, first-year students. The FYGPAs, representing the first year of college, across the 58 institutions in this sample ranged from 0.00 to 4.27. FYGPA had a sample mean of 3.24 (SD=0.67).

SAT Questionnaire Responses. Self-reported gender and language they know best were obtained from the SAT Questionnaire that each student completed during registration for the SAT.

Descriptive Statistics

Table 3 shows descriptive statistics for all study variables for the students in the sample. Compared to students in the overall, full sample (Westrick et al., 2019) international students have higher SAT scores and higher FYGPAs. International students have a mean SAT total score of 1319 (SD=141), mean SAT ERW section score of 628 (SD=75) and mean SAT Math section score of 690 (SD=86) compared to the means in the full sample of SAT total score of 1187 (SD=163), SAT ERW section score of 596 (SD=83) and SAT Math section score mean of 591 (SD=93). The HSGPA mean for international students (M=3.69, SD=0.50) is similar to that of the full sample (M=3.67, SD=0.47).

Table 3: Descriptive Statistics

International Students at U.S. Institutions (n=3,217)				
	M	SD	Min	Max
HSGPA	3.69	0.50	0.00	4.33
SAT Total	1319	141	770	1590
SAT ERW	628	75	350	800
SAT Math	690	86	320	800
FYGPA	3.24	0.67	0.00	4.27

Methods

Analyses consisted of correlations between the predictors—SAT scores and HSGPA—with FYGPA, the examination of mean FYGPAs by SAT scores and HSGPA, and logistic regression analyses for predicting students' probabilities of earning various thresholds of FYGPA (2.50 or higher, 2.75 or higher, and 3.00 and higher). These levels of the FYGPA criterion were selected as reasonable thresholds for indicating a student was successfully navigating college-level work and progressing through the first year and also to reflect minimum GPAs needed for graduate study in some fields (Burton & Wang, 2005).

Raw and adjusted correlations were calculated between predictors and FYGPA at the institution-level and weighted by the number of students at each institution. The weighted correlations were summed and then divided by the total number of students across institutions. Correlations were adjusted to account for the selectivity of the student sample. It is a widely accepted practice to statistically correct correlation coefficients in admission validity research for restriction of range because the raw correlation tends to underestimate the true relationship between the test scores and the college outcome (American Educational Research Association, American Psychological Association, and National Council on Measurement in Education, 2014). Without information on how students who were not

admitted or those who did not enroll would have performed at an institution, there is only a small glimpse into how the tests work for selection. This restricts the variability or range in test scores available for analysis since the test scores available tend to be the higher scores of students who were admitted, minimizing the test score-criterion relationship. Correlations in this study were corrected for multivariate range restriction (Lawley, 1943) using the 2017 graduating seniors who took the SAT as the reference population.

Results

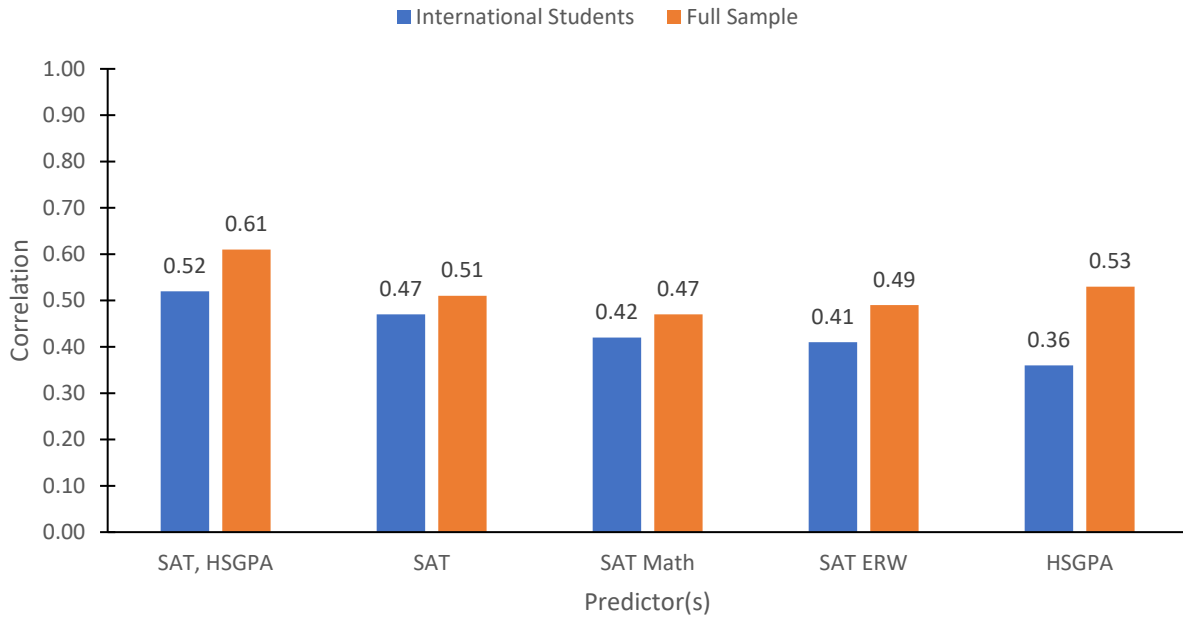
Table 4 shows the correlations for individual predictors and combinations of predictors with FYGPA. The adjusted correlations of the different predictors with FYGPA ranged from .36 (HSGPA) to .52 (SAT and HSGPA). The correlations between HSGPA with FYGPA and the SAT with FYGPA are .36 and .47, respectively. When HSGPA and SAT are used together, that correlation with FYGPA is .52, an increase of .16 and a 44% boost in the correlation over HSGPA alone. Figure 1 visually compares the correlations for international students to those in the full sample. The incremental validity and predictive boost of SAT above HSGPA to predict FYGPA are notably larger for international students than for the full sample (.08 and 15%, respectively) as referenced in Figure 2 and Figure 3 (Westrick, et. al, 2019).

Table 4: Corrected (Raw) Correlations of Predictors with FYGPA

Predictor(s)	Correlation
SAT, HSGPA	.52 (.35)
SAT	.47 (.30)
SAT Math	.42 (.22)
SAT ERW	.41 (.20)
HSGPA	.36 (.19)

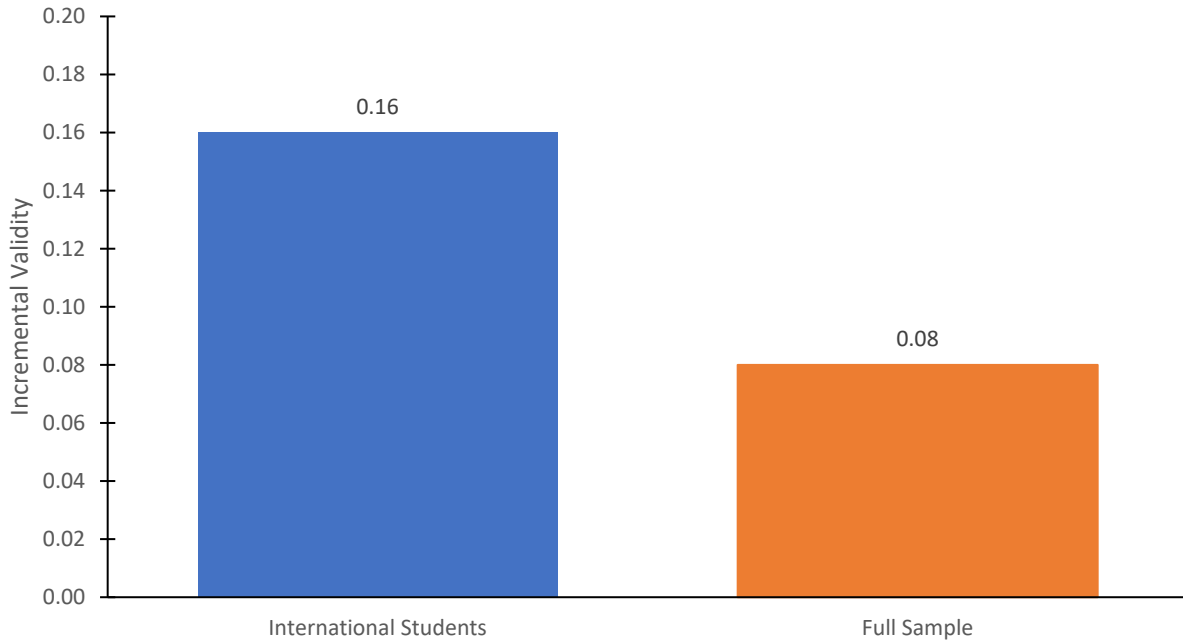
Note. $n=3,217$. References to "SAT" on its own include SAT ERW and SAT Math sections.

Figure 1: Comparison of Correlations for International Students versus the Full Sample



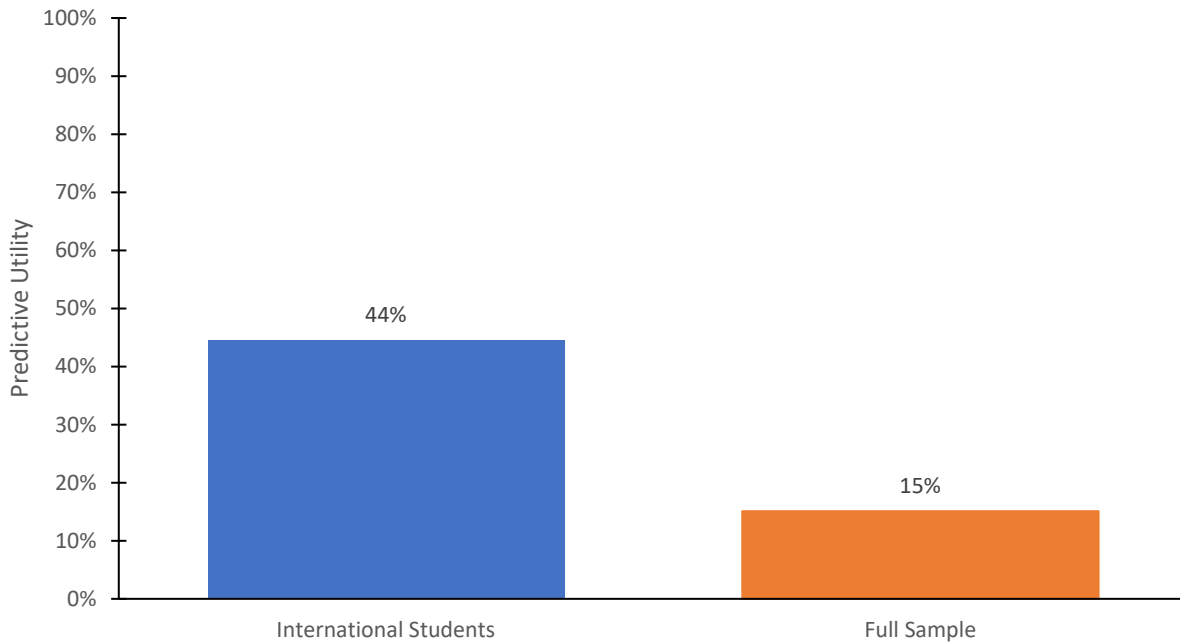
Note. $n=3,217$. References to "SAT" on its own include SAT ERW and SAT Math sections. The full sample is from the Westrick et al. (2019) study and included all students at the 171 institutions examined.

Figure 2: Incremental Validity of the SAT above HSGPA for Predicting FYGPA for International Students and the Full Sample



Note. The full sample is from the Westrick et al. (2019) study and included all students at the 171 institutions examined.

Figure 3: Increase in Predictive Utility of the SAT above HSGPA to Predict FYGPA for International Students and the Full Sample



Note. The full sample is from the Westrick et al. (2019) study and included all students at the 171 institutions examined.

Figure 4 graphically depicts the mean FYGPA earned by SAT score bands. This is another way of depicting the validity of the SAT for predicting FYGPA. This figure shows that as SAT scores increase, so do average FYGPAs. For example, students with SAT Total scores between 800 and 990 had a mean FYGPA of 2.78. In contrast, students with SAT Total scores between 1400 to 1600 had a mean FYGPA of 3.49, almost a full letter grade higher than the previously mentioned group of students.

Figure 4: Mean FYGPA by SAT Total Score Bands

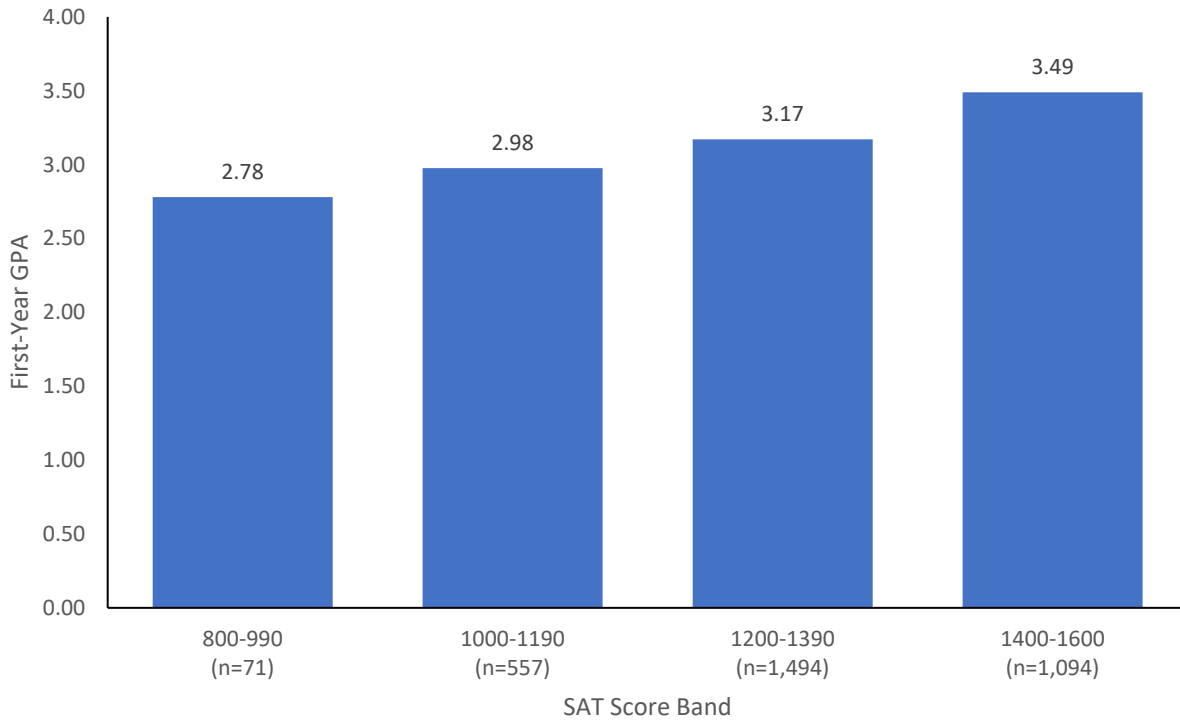
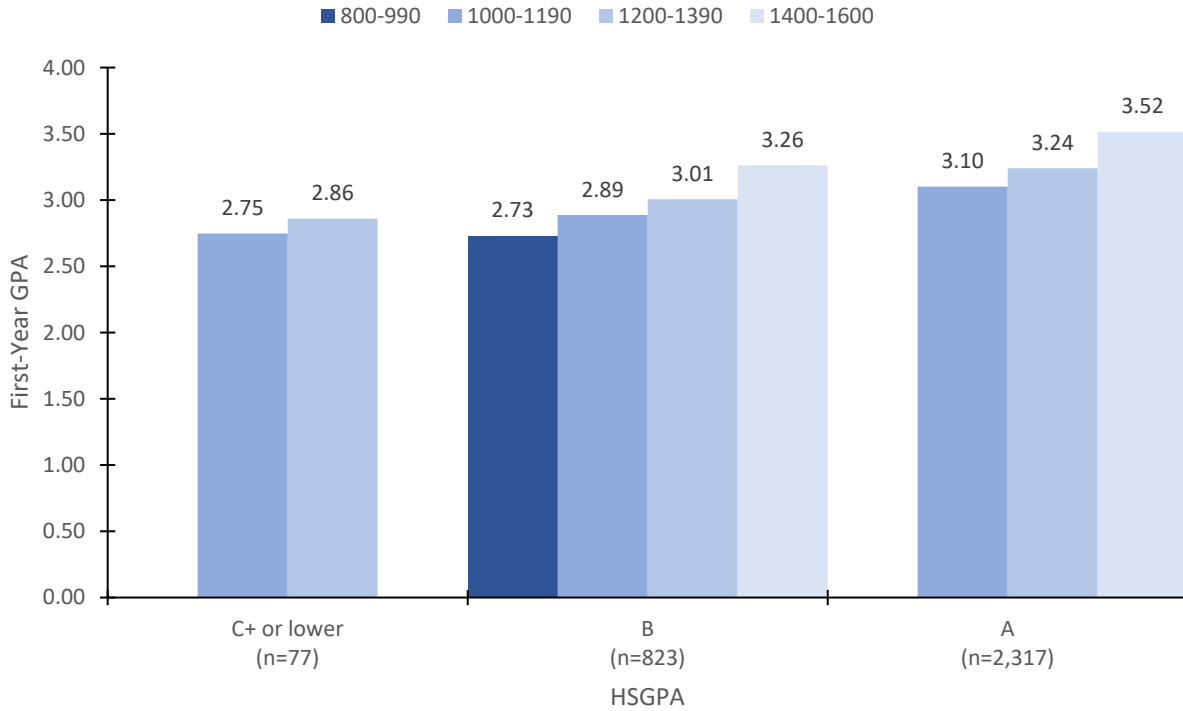


Figure 5 graphically communicates the validity of the SAT for predicting FYGPA above and beyond HSGPA (after controlling for HSGPA). It is evident that the relationship between SAT scores and FYGPA for international students remains positive and increasing and adds information beyond HSGPA alone. If SAT scores did not add additional information, each SAT score band within a HSGPA category would have the same or very similar mean FYGPAs. This figure shows that this is not the case. For example, among students with a “B” HSGPA, students with SAT total scores between 800 and 990 had a mean FYGPA of 2.73, while students with SAT Total scores between 1400 and 1600 had a mean FYGPA of 3.26.

Figure 5: Mean FYGPA by HSGPA and SAT Total Score Bands



Note. Bars are only shown for 15 or more students.

The next three figures demonstrate the value of using SAT scores with HSGPA to predict academic success in the first year of college. Figure 6 shows students' probability of earning a FYGPA of 2.50 or higher in college given their HSGPA and SAT Total score. For example, a student with HSGPA of 3.00 and SAT Total score of 1000, has approximately a 73% chance of earning a FYGPA of 2.50 or higher, while a student with the same HSGPA (3.00), but with an SAT Total score of 1400 has an approximately 87% chance of earning a FYGPA of 2.50 or higher. Even among students with higher HSGPAs, we see added SAT value in understanding student success in college. The SAT provides meaningful information for predicting an international student's probability of earning a 2.50 or higher FYGPA in college at every point on the HSGPA scale.

Figure 6: Probability of a 2.50 FYGPA Given HSGPA and SAT Total Score

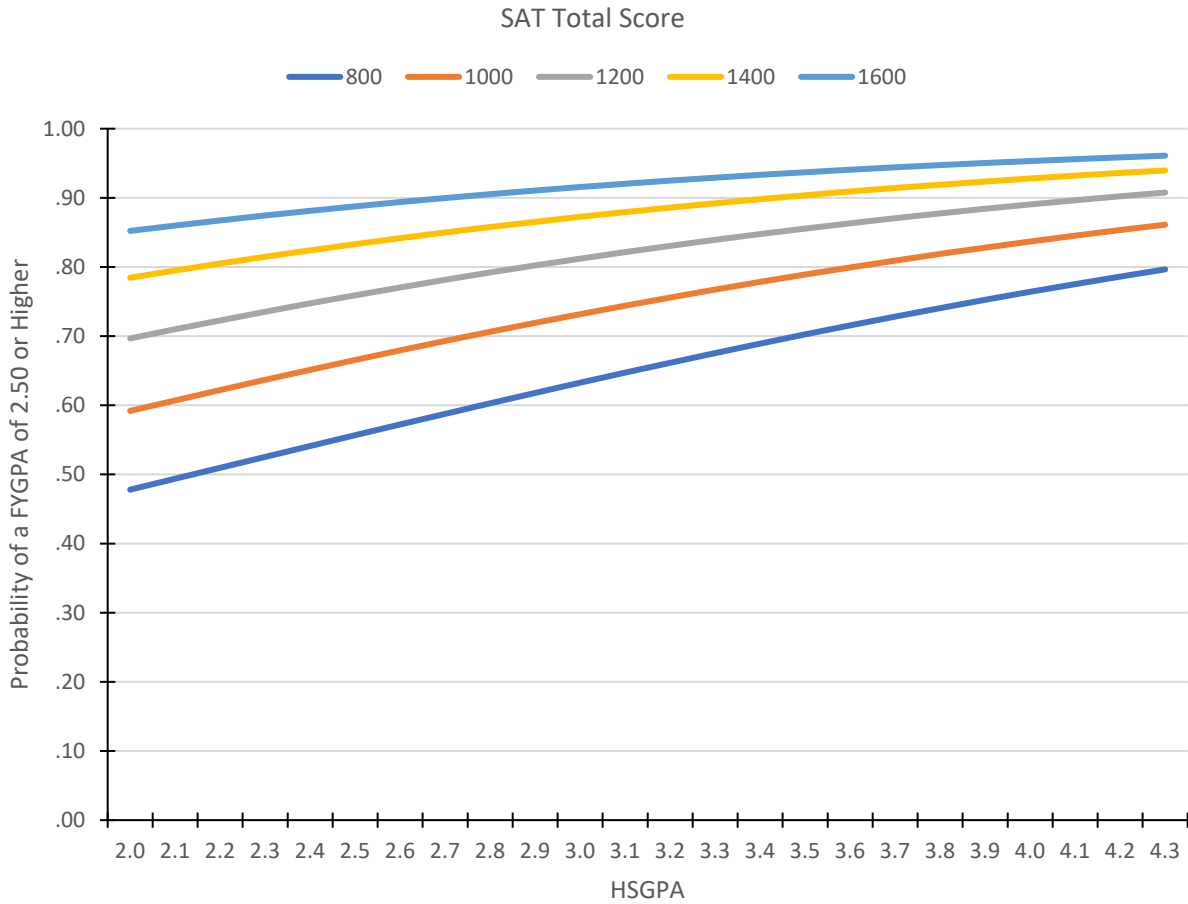


Figure 7 shows students' probability of earning a FYGPA of 2.75 or higher in college given their HSGPA and SAT Total score. For example, a student with HSGPA of 3.00 and SAT Total score of 1000, has an approximately 57% chance of earning a FYGPA of 2.75 or higher, while a student with the same HSGPA (3.00) and SAT Total score of 1400 has an approximately 82% chance of earning a FYGPA of 2.75 or higher. Even among students with higher HSGPAs, we see added SAT value in understanding student success in college. The SAT provides meaningful information for predicting an international student's probability of earning a 2.75 or higher FYGPA in college at every point on the HSGPA scale.

Figure 7: Probability of a 2.75 FYGPA Given HSGPA and SAT Total Score

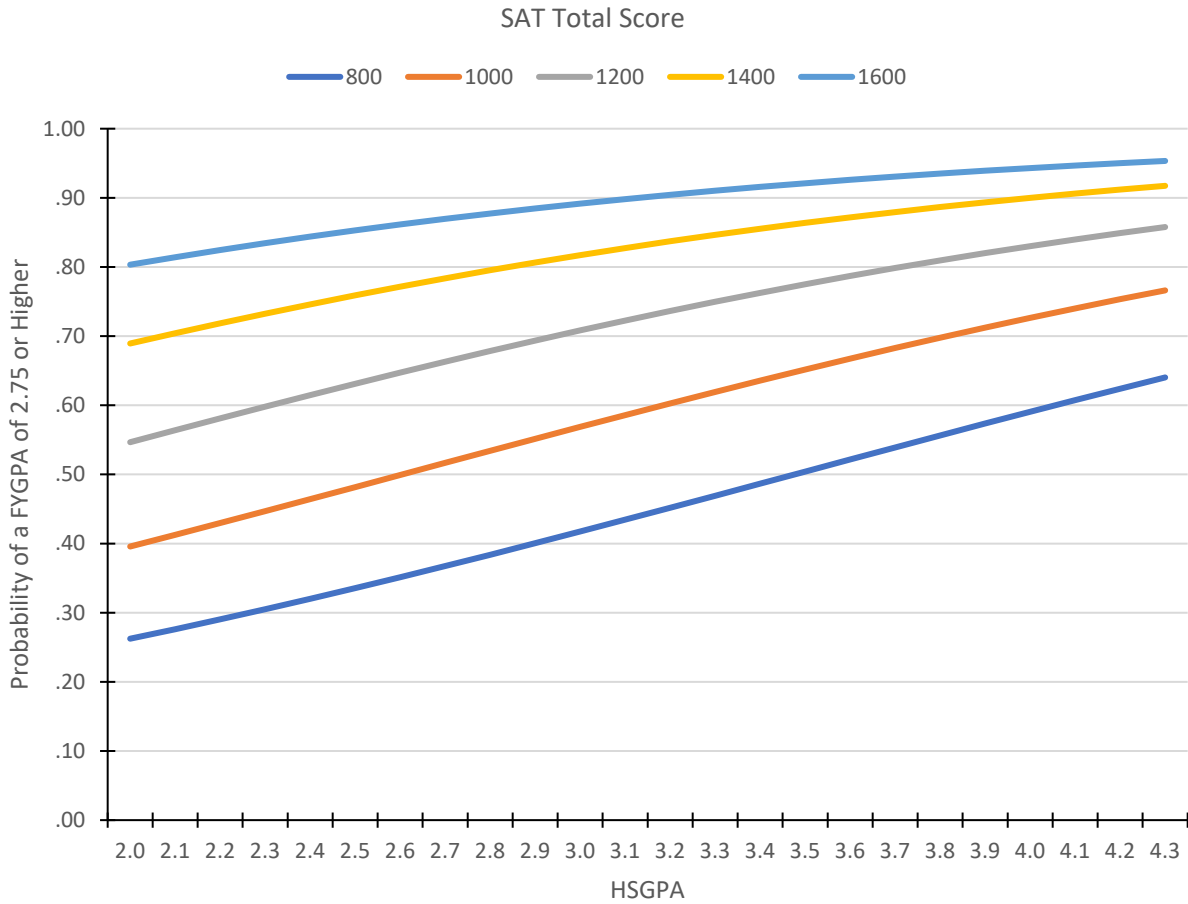
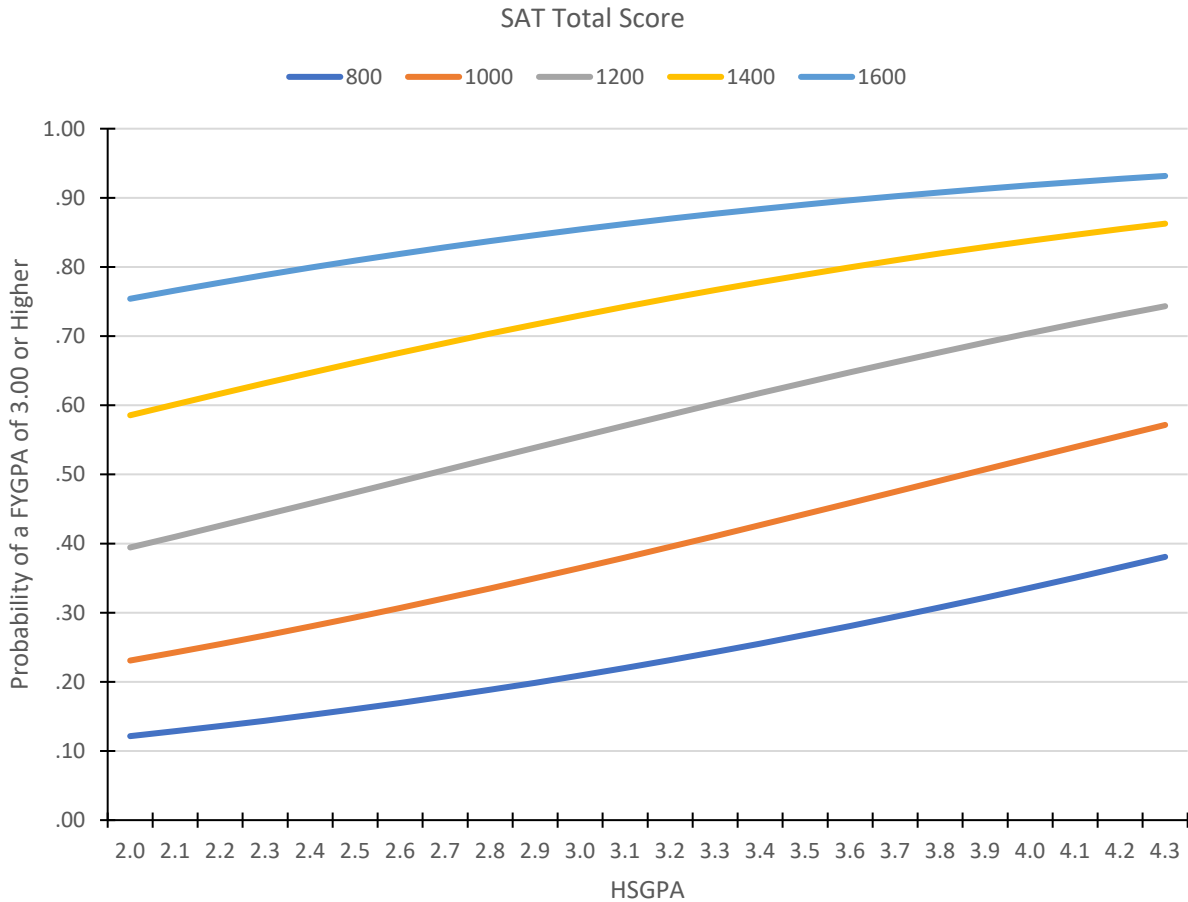


Figure 8 shows students' probability of earning a FYGPA of 3.00 or higher in college given their HSGPA and SAT Total score. For example, a student with HSGPA of 3.00 and SAT Total score of 1000, has an approximately 37% chance of earning a FYGPA of 3.00 or higher, while a student with the same HSGPA (3.00) and SAT Total score of 1400 has approximately a 73% chance of earning a FYGPA of 3.00 or higher. Even among students with higher HSGPAs, we see added SAT value in understanding student success in college. The SAT provides meaningful information for predicting an international student's probability of earning a 3.00 or higher FYGPA in college at every point on the HSGPA scale.

Figure 8: Probability of a 3.00 FYGPA Given HSGPA and SAT Total Score



Discussion

The results of this study parallel the findings of the full SAT validity study, but the results of this study also make an important contribution to our understanding of how well the SAT and HSGPA predict the future academic performance of international students. As in the SAT validity study based on the full sample, both the SAT and HSGPA had positive relationships with FYGPA for international students, though the strength of the predictive relationships were slightly weaker for the SAT and much weaker for HSGPA in the international sample. However, within the international sample, the SAT-FYGPA correlation of .47 exceeded the HSGPA-FYGPA correlation of .36. This contrasts with the results from the overall SAT validity study where HSGPA had a slightly stronger correlation (.53) with FYGPA than did the SAT (.51). Moreover, even the SAT ERW and Math section scores had stronger correlations with FYGPA (.41 and .42, respectively) than did HSGPA (.36). **As in previous research, however, the joint use of the SAT and HSGPA produced the highest correlation with FYGPA, a multiple correlation of .52, a 44% improvement over using HSGPA alone, compared to 15% improvement in the overall SAT validity study.**

The probability of earning a FYGPA of 2.50 or higher, a FYGPA of 2.75 or higher, and a FYGPA of 3.00 or higher further demonstrated the strength of the SAT as a predictor of international students' academic performance at U.S. four-year institutions. In Figure 6, Figure 7, and Figure 8, the differences in students' chances increased quite noticeably for students with the same HSGPA, especially when the FYGPA standard of success rose. This was true across the entire HSGPA scale.

While it has long been argued that one weakness of HSGPA as a measure is that its meaning varies due to differences in course content and grading standards across high schools in the United States (Willingham, Pollack, & Lewis, 2002), these differences are magnified when comparing HSGPAs from schools in different countries. **Much as admission tests have been considered a common metric for domestic students in the U.S. (Willingham, et al., 2002), the results of this study make it clear that this is especially true for international students in the U.S.** The differences in the predictive validities of SAT scores and HSGPAs for international students deserves attention at a time when institutions face a shrinking pool of domestic students after 2023 (Snyder, de Bray, & Dillow, 2019), struggle to meet their enrollment targets (Carlson, 2020), and look to international students to fill the gaps (Krislov, 2019). Though the number of international students studying in the United States rises and falls (Fischer, 2020), their presence on campus will continue for the foreseeable future. Including their SAT scores in the admission decision making process will continue to provide valuable information.

Conclusion

The results of this study show that not only is the SAT an independently useful measure to assist with understanding how an international student is likely to perform in colleges and universities in the U.S., but it provides tremendous additional value beyond HSGPA for this student population. This study finds that:

- For international students attending four-year institutions in the U.S., SAT scores are strongly predictive of FYGPA and tend to be more predictive of FYGPA than HSGPA.
- On average, SAT scores add 44% more predictive power above grades alone to understand how a student will perform in the first year, compared to 15% in the full national sample.
- Across all HSGPA grade points, the SAT proves critical for predicting various levels of student academic performance, thus helping institutions understand which students have the highest probability of being successful and which students may need additional support to succeed on campus.

The SAT has consistently shown to be an excellent predictor of student success across the United States. The findings in this study show that this holds true for international students, and the SAT appears to be even more impactful as HSGPA is a much weaker predictor of college performance for international students in this study. As international students make up a larger proportion of the college student population, the value of using multiple measures, including SAT scores and HSGPA, to make sound enrollment decisions in order position all students for success is quite clear and compelling.

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