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Digital SAT® Validity Study: Focus on International Students Attending U.S. Institutions of Higher Education

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Abstract

This study, the first study of digital SAT scores for international students, examines SAT score relationships with first-year college performance for international students studying at U.S. colleges and universities. Results show that SAT scores strongly predict college performance for international students and meaningfully improve our understanding of international students' readiness for college above the use of high school grade point average (HSGPA) alone. This was also true for students majoring in STEM fields. In this study, there was an 86% improvement in the prediction of overall college performance when the SAT and HSGPA were used together, instead of using HSGPA alone. SAT section scores also provided substantial added predictive utility for first-year course performance in both Math and English/writing courses. These large SAT incremental predictive utility values are in part due to the lower correlation between HSGPA and first-year outcomes for international students, which may stem from attending secondary schools with widely varying curricula and grading systems as well as limited HSGPA variability. Findings from this study show that the digital SAT remains, as the paper and pencil SAT was, a highly powerful tool for understanding international students' readiness for college, course placement, scholarship and honors program decisions, as well as identifying students who may need academic support.

Introduction

In March 2023, College Board launched the digital SAT internationally, and in March 2024, it became available to all students in the U.S. The digital SAT, just as the prior paper and pencil SAT, measures the skills and knowledge that students are learning in high school that matter most for college and career readiness. The change to digital delivery has many benefits that include less overall testing time while allowing more time, on average, to answer each question. The scale remains the same as the paper and pencil version; this was accomplished through a straight-line concordance study (College Board, 2022; College Board, 2023). Early convergent validity evidence confirmed the consistent meaning of digital and paper and pencil SAT scores with digital and paper and pencil SAT Total scores correlated at .92, Reading and Writing section scores at .86, and Math section scores at .90, with these relationships closely paralleling the test-retest reliability observed for the paper and pencil SAT itself (Marini, Westrick, Young, & Shaw, 2022). This evidence supports the use of the digital SAT for the same enrollment-related decisions the paper and pencil version of the SAT was used for.

Research on the validity of the SAT has consistently shown that students earning higher SAT scores are more likely to earn higher grades in college, both in terms of overall GPA (e.g., Westrick, Marini, Young, Ng, Shmueli, & Shaw, 2019; Westrick, Marini, Young, Ng, & Shaw, 2023) and domain-specific outcomes such as English or Math grades (Westrick, Marini, Shmueli, Young, Shaw, & Ng, 2020). This predictive relationship has also been shown to be stable across cohorts and over time (Marini, Westrick, & Shaw, 2021), providing a foundation for expecting the SAT's validity to hold as the test transitioned to a digital format.

Research focused specifically on international students attending U.S. higher education institutions has found that SAT scores are strongly predictive of first-year GPA (FYGPA) and add substantial predictive power above high school GPA (HSGPA) alone (44% in one study of the paper and pencil SAT; Marini, Westrick, Young, & Shaw, 2020), and that the SAT Reading and Writing section, in particular, is a powerful predictor of performance in coursework delivered in English, adding 36% to 59% incremental predictive utility above HSGPA depending on the outcome and time frame examined (Marini, Young, & Shaw, 2024). This body of work suggests that HSGPA, while typically a useful predictor of college performance in general, is a less consistent and less informative measure for international students than for domestic students, likely because of the wide variation in grading standards and curricula across the secondary school systems international students come from. Another reason is due to limited HSGPA variability for international students in these studies.

This current study focuses on international students who entered college in fall 2024, the first cohort for whom the digital SAT was available internationally, allowing us to examine how their digital SAT scores relate to first-year outcomes in this new testing format. Understanding how well the digital SAT predicts international student success remains important, as international students continue to represent a substantial and valued part of U.S. higher education. Evaluating their readiness for coursework taught in English, accurately and efficiently, remains a priority for admissions and enrollment professionals.

Methodology

Sample

College Board 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 2024 entering cohort. Ultimately, 90 institutions provided complete student-level information. Inclusion in this study sample required students to have digital SAT scores (from here on referred to just as SAT scores), a valid self-reported high school GPA (HSGPA), a valid FYGPA, and identification as an international student. For the purposes of the current study, an international student was defined as a student who reported attending a high school located outside of the U.S.[1] This resulted in a sample size of 2,308 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. This resulted in a study sample of 2,042 students across 29 institutions. There were slightly more males (51%) than females (49%) in the sample. In terms of best language, much of the sample (54%) said that English and Another Language was their best language. See Table 1 for more information about student characteristics of the sample.

Table 1: Distribution of Student Characteristics

Variable		International Students at U.S. Institutions (n=2,042)
Gender	Male	1,038 (51%)
	Female	1,004 (49%)
Best Language	English Only	495 (24%)
	English and Another Language	1,112 (54%)
	Another Language	386 (19%)
	Not Stated	49 (2%)

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

Table 2 includes information about the institutions in the sample. There were more private (69%) institutions than public (31%). Admittance rate varied, with the largest share of institutions falling under a 25% admittance rate (34%). In terms of size, most of the institutions in the sample were very large (52%).

[1] Students attending DoWEA schools were not considered international students and were not included in the sample for this study.

Table 2: Distribution of Institutional Characteristics

	Variable	U.S. Institutions with at least 15 International Students in the Sample (*k*=29)
Control	Private	20 (69%)
	Public	9 (31%)
Admittance Rate	Under 25%	10 (34%)
	25% to 50%	7 (24%)
	51% to 75%	8 (28%)
	Over 75%	4 (14%)
Undergraduate Enrollment	Small	6 (21%)
	Medium	2 (7%)
	Large	6 (21%)
	Very Large	15 (52%)

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.

Table 3 summarizes information about the 112 countries where students in the sample are from. About a third of the students in our sample came from countries in East Asia, including China, Hong Kong, Japan, and South Korea. South Asian countries including India, Pakistan, and Sri Lanka made up 20% of the sample. The roughly 50% remainder span all different regions including the Middle East, Europe, Latin America, and others. For more detail on the countries included in each region, please see the Appendix.

Table 3: Distribution of Students in the Sample by Geographic Region

Region	% of Sample
East Asia	31%
South Asia	20%
Southeast Asia	10%
Middle East & North Africa	10%
Europe	9%
Latin America & Caribbean	8%
Sub-Saharan Africa	4%
North America	4%
Central Asia & Caucasus	1%
Oceania/Pacific	1%

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

Measures

High School GPA (HSGPA). Students' self-reported HSGPA[2] was obtained from the SAT Questionnaire[3] 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 3.80 (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 1343 (SD=156).
>
> **SAT Reading and Writing (RW) Section Score (200 to 800 scale)** —increments of 10, sample mean of 648 (SD=84).
>
> **SAT Math Section Score (200 to 800 scale)** —increments of 10, sample mean of 695 (SD=93).

First-Year GPA (FYGPA). Each higher education institution provided FYGPA values for their 2024 first-time, first-year students. The FYGPAs, representing the first year of college, across the 29 institutions in this sample ranged from 0.00 to 4.17. FYGPA had a sample mean of 3.47 (SD=0.61).

Domain-specific GPAs. All college courses were coded for content area so that analyses could be conducted on domain-specific grade point averages. The two domain-specific college GPAs in the current study were first-year math GPA (FYMGPA, n=1,507, Mean=3.26, SD=0.90) which included all math coursework taken in the first year and first-year English or Writing GPA (FYEWGPA, n=1,564, Mean=3.66, SD=0.71) which included all first-year English courses and first-year Writing-intense courses.

SAT Questionnaire Responses. Self-reported gender and language the student knows best were obtained from the SAT Questionnaire, completed during registration for the SAT.

Descriptive Statistics

Table 4 shows descriptive statistics for all study variables for the students in the sample. The international students in this study are high achieving students and have a mean SAT Total score of 1343 (SD=156), mean SAT RW section score of 648 (SD=84), mean SAT Math section score of 695 (SD=93), and mean HSGPA of 3.80 (SD=0.48). In terms of first-year outcomes, the sample mean FYGPA was 3.47 (SD=0.61), mean FYMGPA was 3.26 (SD=0.90), and mean FYEWGPA was 3.66 (SD=0.71).

[2] Prior research has shown that students' self-reported HSGPA and institutional provided HSGPA are strongly correlated (.74) with each other (Marini, Young, & Shaw, 2021). This means that students' ability to report their academic grade performance in high school is strongly related to their actual performance.

[3] Students select their HSGPA from a drop-down menu that provides letter grades with corresponding number grades on a 100-point scale. For example, A+ (97-100).

Table 4: Descriptive Statistics

	n	M	SD	Min	Max
HSGPA	2,042	3.80	0.48	1.00	4.33
SAT Total	2,042	1343	156	730	1590
SAT RW	2,042	648	84	200	800
SAT Math	2,042	695	93	350	800
FYGPA	2,042	3.47	0.61	0.00	4.17
FYMGPA	1,507	3.26	0.90	0.00	4.33
FYEWGPA	1,564	3.66	0.71	0.00	4.30

Methods

Analyses were conducted on overall first-year grades, domain-specific first-year grades, and for STEM majors. They included examining mean grades by SAT score bands and HSGPA bands, correlations between predictors of SAT scores and HSGPA with first-year grades (including overall FYGPA and math and English or writing domain-specific grades), and logistic regression to predict a student's probability of earning a 3.00 FYGPA or higher. This level of FYGPA criterion was selected as a reasonable threshold 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). For analyses at the institution level, both overall and by subgroup, we required at least 15 students to be at an institution and within a subgroup. Consequently, the number of institutions included in the subgroup analyses was sometimes less than the number of institutions included in the overall analyses. Further, no logistic regression results were reported for a subgroup at an institution if every student had the same outcome (e.g., earned a 3.00 or higher), leaving no variation to model, or if the model did not converge, most typically occurring when nearly every student in the subgroup had the same outcome.

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 adjust or 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, & 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 2024 graduating seniors who took the SAT as the reference population.

Results

FYGPA

Table 5 shows the correlations for individual predictors and combinations of predictors with FYGPA. The adjusted correlations of the different predictors with FYGPA ranged from .29 (HSGPA) to .54 (SAT and HSGPA). The correlations between HSGPA with FYGPA and the SAT with FYGPA are .29 and .51, respectively. When HSGPA and SAT are used together, that correlation with FYGPA is .54, an increase of .25 and an 86%[4] boost in the incremental utility (Schmidt & Hunter, 1998) in the correlation over using HSGPA as the sole predictor.

Table 5: Corrected (Raw) Correlations of Predictors with FYGPA

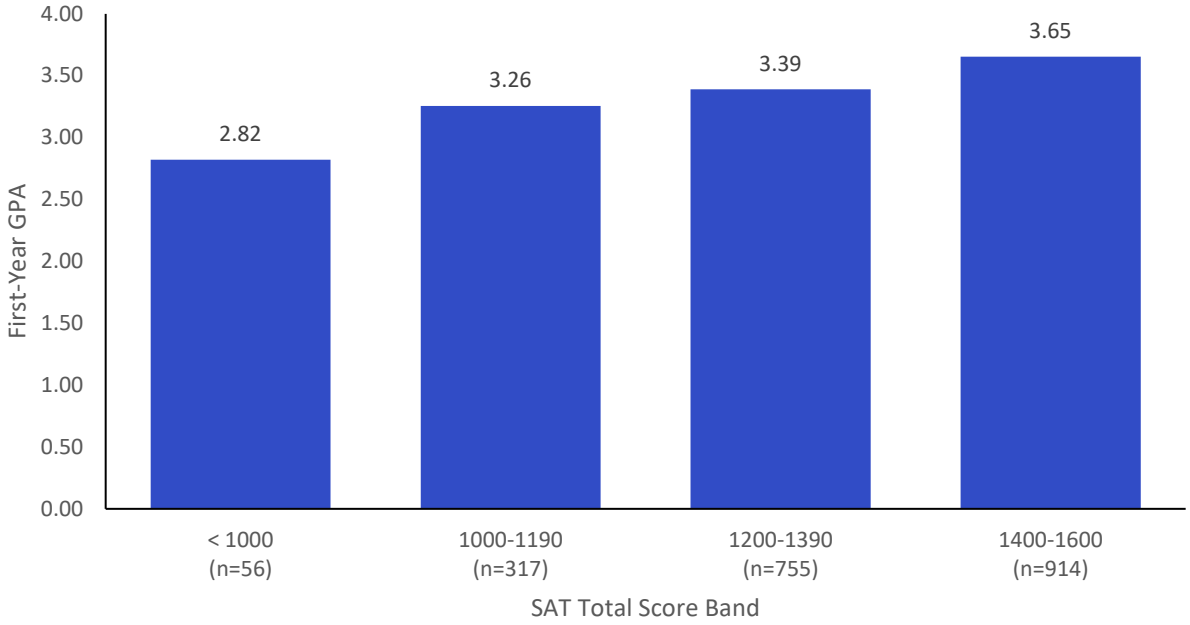
Predictor(s)	Correlation
SAT, HSGPA	.54 (.34)
SAT	.51 (.31)
SAT Math	.44 (.24)
SAT RW	.43 (.24)
HSGPA	.29 (.13)

Note. *n*=2,042. References to "SAT" on its own include SAT RW and SAT Math sections.

Figure 1 graphically depicts the mean FYGPA earned by SAT Total 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 less than 1000 had a mean FYGPA of 2.82. In contrast, students with SAT Total scores between 1400 to 1600 had a mean FYGPA of 3.65, almost a full letter grade higher than the previously mentioned group of students.

[4] This value was calculated by subtracting the HSGPA-FYGPA correlation (.29) from the multiple correlation of HSGPA and SAT with FYGPA (.54) to arrive at the SAT incremental validity coefficient (.25). This coefficient is then divided by the HSGPA-FYGPA correlation (.29) and multiplied by 100 to arrive at the increment in predictive utility value of 86%.

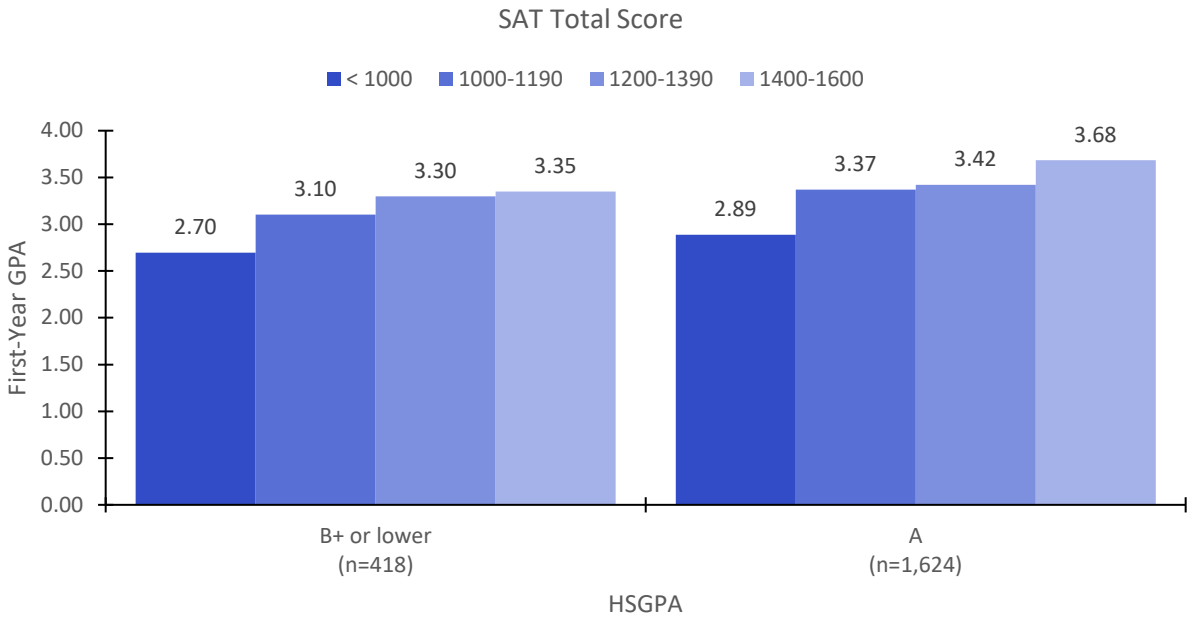
Figure 1: Mean FYGPA by SAT Total Score Bands



Note. Bars are only shown when a score band has at least 15 or more students. The bottom SAT Total score band includes 3 students with scores between 600 to 790 and 53 students with scores between 800 to 990.

Figure 2 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 FYGPA. This figure shows that this is not the case. For example, among students with an "A" HSGPA, students with SAT Total scores less than 1000 had a mean FYGPA of 2.89, while students with SAT Total scores between 1400 and 1600 had a mean FYGPA of 3.68.

Figure 2: Mean FYGPA by HSGPA and SAT Total Score Bands



Note. Bars are only shown when a score band has at least 15 or more students. The bottom SAT Total score band includes 3 students with scores between 600 to 790 and 53 students with scores between 800 to 990.

Figure 3 shows students' probability of earning a FYGPA of 3.00 or higher by SAT Total score. Based on this figure, for example, an international student with an SAT Total score of 1000 has a 63% chance of earning a FYGPA of 3.00 or higher, whereas an international student with an SAT Total score of 1400 has a 90% chance of earning a FYGPA of 3.00 or higher.

Figure 3: Probability of a 3.00 or Higher FYGPA, Given SAT Total Score

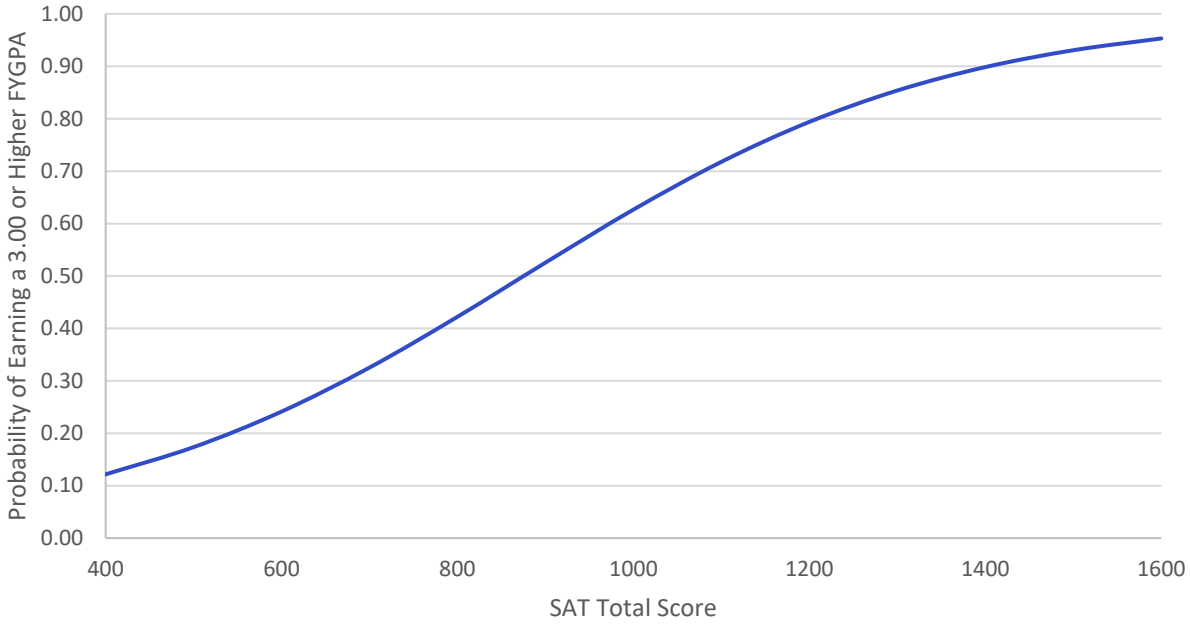
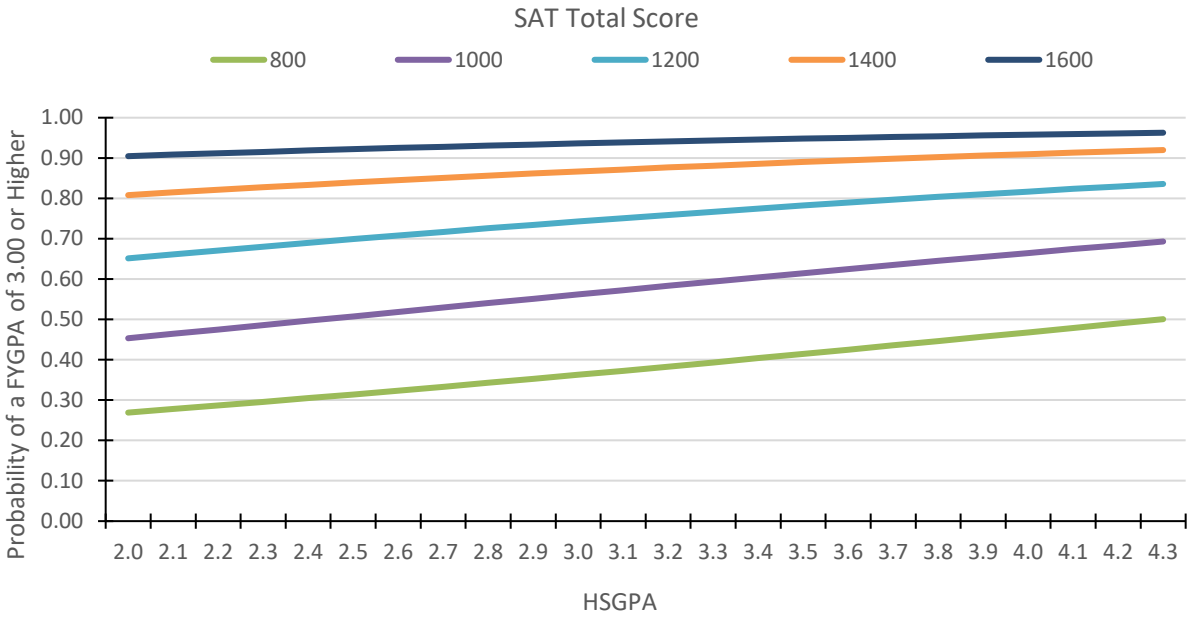


Figure 4 shows students' probability of earning a FYGPA of 3.00 or higher in college given their HSGPA and SAT Total score. For example, a student with HSGPA of 3.50 and SAT Total score of 1000, has an approximately 61% chance of earning a FYGPA of 3.00 or higher, while a student with the same HSGPA (3.50) and SAT Total score of 1400 has approximately an 89% 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, shown by the variability between the lines at a constant HSGPA.

Figure 4: Probability of a 3.00 or Higher FYGPA, Given HSGPA and SAT Total Score



Domain-Specific GPAs

Table 6 shows the correlations for individual predictors and combinations of predictors with domain-specific GPAs, first-year Math GPA (FYMGPA) and first-year English or writing GPA (FYEWGPA). Domain-specific GPAs are calculated using all associated courses a student took in the first year within that domain. Because this could be a single course or many, domain-specific GPAs rest on fewer observations than overall FYGPA and are correspondingly less reliable. Therefore, correlations with less reliable GPAs could be smaller than correlations with more reliable GPA measures like FYGPA (Beatty et al., 2015; Westrick, 2017). The adjusted correlations of the different predictors with FYMGPA ranged from .38 (HSGPA) to .67 (SAT and HSGPA). The correlations between HSGPA with FYMGPA and the SAT with FYMGPA are .38 and .62, respectively. When HSGPA and SAT are used together, that correlation with FYMGPA is .67, an increase of .29 and a 76%[5] boost in the correlation over HSGPA alone.

Turning to FYEWGPA, the adjusted correlations of the different predictors with FYEWGPA ranged from .19 (HSGPA) to .44 (SAT and HSGPA). The correlations between HSGPA with FYEWGPA and the SAT with FYEWGPA are .19 and .37, respectively. When HSGPA and SAT are used together, that correlation with FYEWGPA is .44, an increase of .25 and a 132%[6] boost in the correlation over HSGPA alone.

[5] This value was calculated by subtracting the HSGPA-FYMGPA correlation (.38) from the multiple correlation of HSGPA and SAT with FYMGPA (.67) to arrive at the SAT incremental validity coefficient (.29). This coefficient is then divided by the HSGPA-FYMGPA correlation (.38) and multiplied by 100 to arrive at the increment in predictive utility value of 76%.

[6] This value was calculated by subtracting the HSGPA-FYEWGPA correlation (.19) from the multiple correlation of HSGPA and SAT with FYEWGPA (.44) to arrive at the SAT incremental validity coefficient (.25). This coefficient is then divided by the HSGPA-FYEWGPA correlation (.19) and multiplied by 100 to arrive at the increment in predictive utility value of 132%.

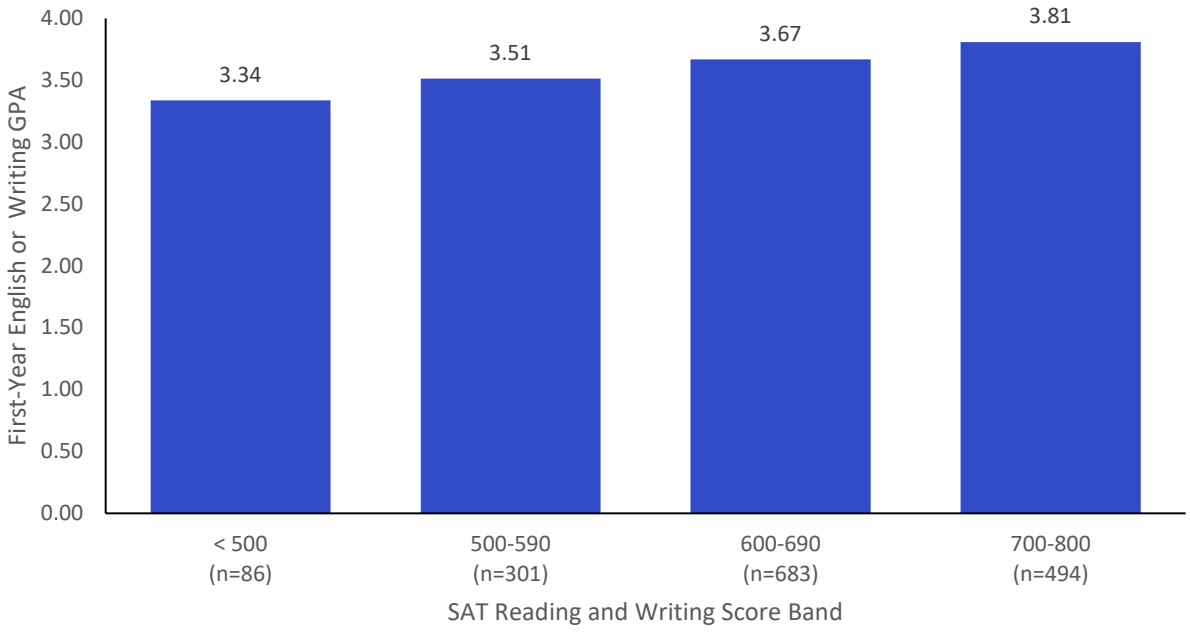
Table 6: Corrected (Raw) Correlations of Predictors with Domain-Specific GPAs

Predictor(s)	FYMGPA	FYEWGPA
SAT, HSGPA	.67 (.44)	.44 (.30)
SAT	.62 (.40)	.37 (.23)
SAT Math	.59 (.35)	.25 (.11)
SAT RW	.50 (.25)	.28 (.16)
HSGPA	.38 (.17)	.19 (.10)

First-Year English or Writing GPA

Figure 5 graphically depicts the mean FYEWGPA earned by SAT Reading and Writing Section score bands. This figure shows that as SAT Reading and Writing scores increase, so do average FYEWGPAs. For example, students with SAT Reading and Writing scores less than 500 had a mean FYEWGPA of 3.34. In contrast, students with SAT Reading and Writing scores between 700 to 800 had a mean FYEWGPA of 3.81. This is similar to the relationship we saw in Figure 1 between SAT Total score and mean FYGPA.

Figure 5: Mean FYEWGPA by SAT Reading and Writing Score Band

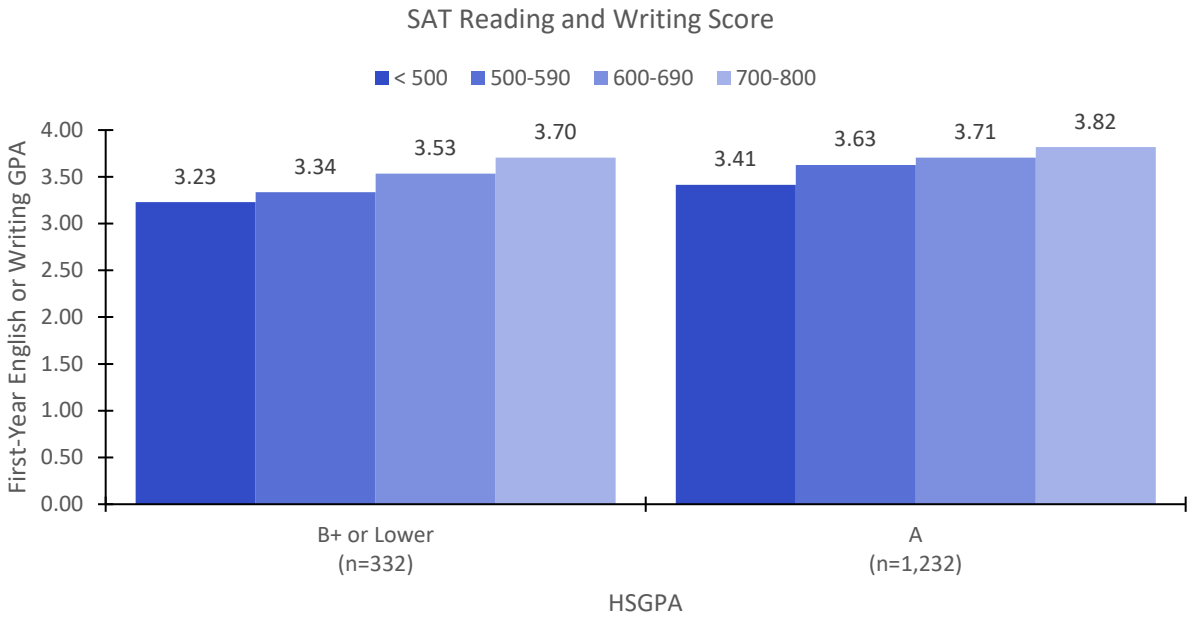


Note. Bars are only shown when a score band has at least 15 or more students. The bottom SAT Reading and Writing score band includes 1 student with scores between 200 to 290, 6 students with scores between 300 to 390, and 79 students with scores between 400 to 490.

Figure 6 graphically communicates the validity of the SAT Reading and Writing section for predicting FYEWGPA above and beyond HSGPA (after controlling for HSGPA). It is evident that the relationship between SAT Reading and Writing scores and FYEWGPA for international students remains positive and increasing and adds information beyond HSGPA alone. As in Figure 2, if SAT Reading and Writing scores did not add additional information, each SAT score band within a HSGPA category would have the same

or very similar mean FYEWGPAs. This figure shows that this is not the case. For example, among students with an "A" HSGPA, students with SAT Reading and Writing scores less than 500 had a mean FYEWGPA of 3.41, while students with SAT Reading and Writing scores between 700 and 800 had a mean FYEWGPA of 3.82.

Figure 6: Mean FYEWGPA by HSGPA and SAT Reading and Writing Score Bands



Note. Bars are only shown when a score band has at least 15 or more students. The bottom SAT Reading and Writing score band includes 1 student with scores between 200 to 290, 6 students with scores between 300 to 390, and 79 students with scores between 400 to 490.

The next two figures demonstrate the value of using SAT Reading and Writing scores with or without HSGPA to predict academic success in English and writing coursework for international students in the first year of college. Figure 7 shows students' probability of earning a FYEWGPA of 3.00 or higher by SAT Reading and Writing score. For example, an international student with an SAT Reading and Writing score of 400 has an 81% chance of earning a FYEWGPA of 3.00 or higher, whereas an international student with an SAT Reading and Writing score of 700 has a 96% chance of earning a FYEWGPA of 3.00 or higher.

Figure 7: Probability of a 3.00 or Higher FYEWGPA, Given SAT Reading and Writing Section Score

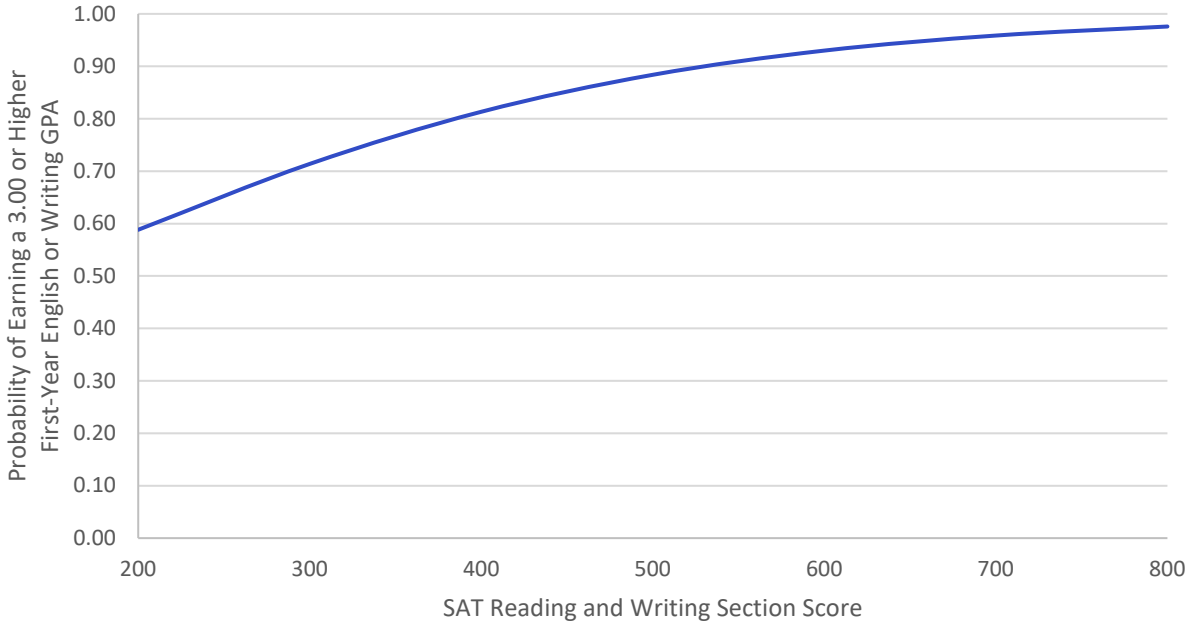
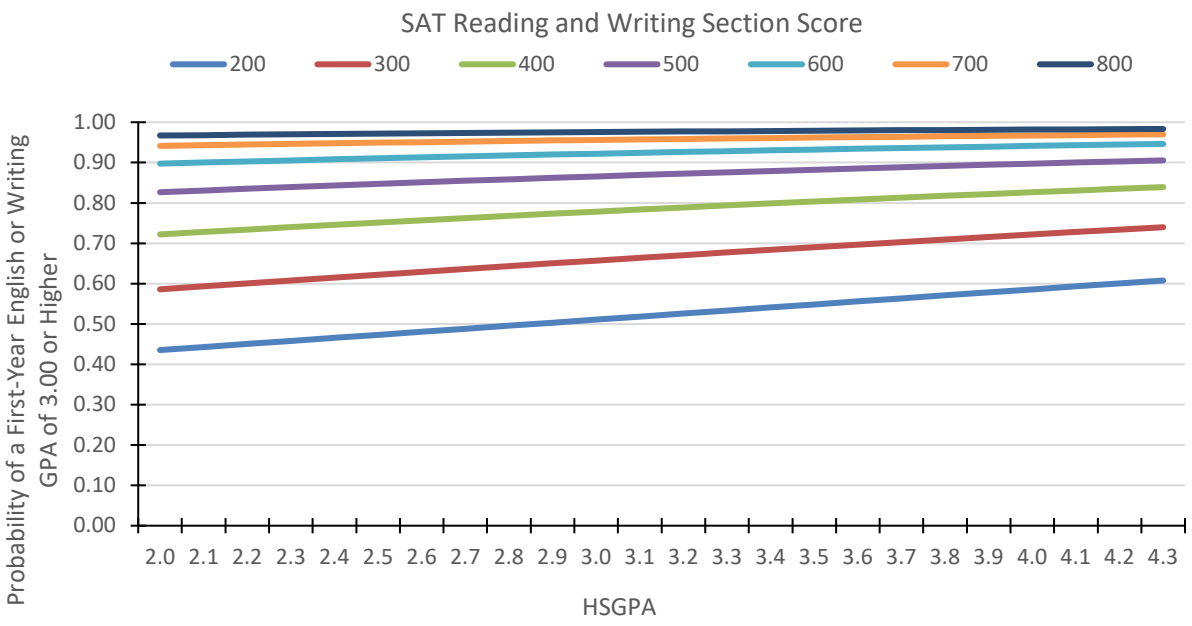


Figure 8 shows students' probability of earning a FYEWGPA of 3.00 or higher given their HSGPA and SAT Reading and Writing score. For example, a student with HSGPA of 3.50 and SAT Reading and Writing score of 400, has an approximately 80% chance of earning a FYEWGPA of 3.00 or higher, while a student with the same HSGPA (3.50) and SAT Reading and Writing score of 700 has approximately a 96% chance of earning a FYEWGPA 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 FYEWGPA in college at every point on the HSGPA scale.

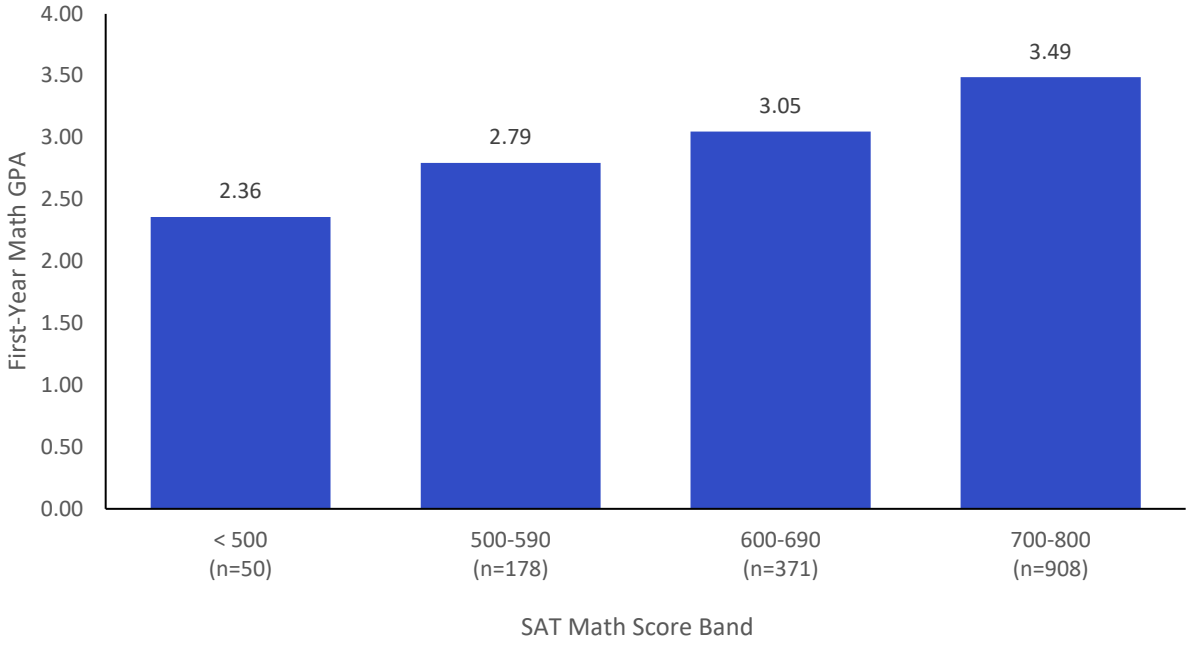
Figure 8: Probability of a 3.00 or Higher FYEWGPA, Given HSGPA and SAT Reading and Writing Section Score



First-Year Math GPA

Figure 9 graphically depicts the mean FYMGPA earned by SAT Math Section score bands. This figure shows that as SAT Math scores increase, so do average FYMGPAs. For example, students with SAT Math scores less than 500 had a mean FYMGPA of 2.36. In contrast, students with SAT Math scores between 700 to 800 had a mean FYMGPA of 3.49. This is similar to the relationship we saw in Figure 1 between SAT Total score and mean FYGPA and Figure 5 between SAT Reading and Writing scores and mean FYEWGPA.

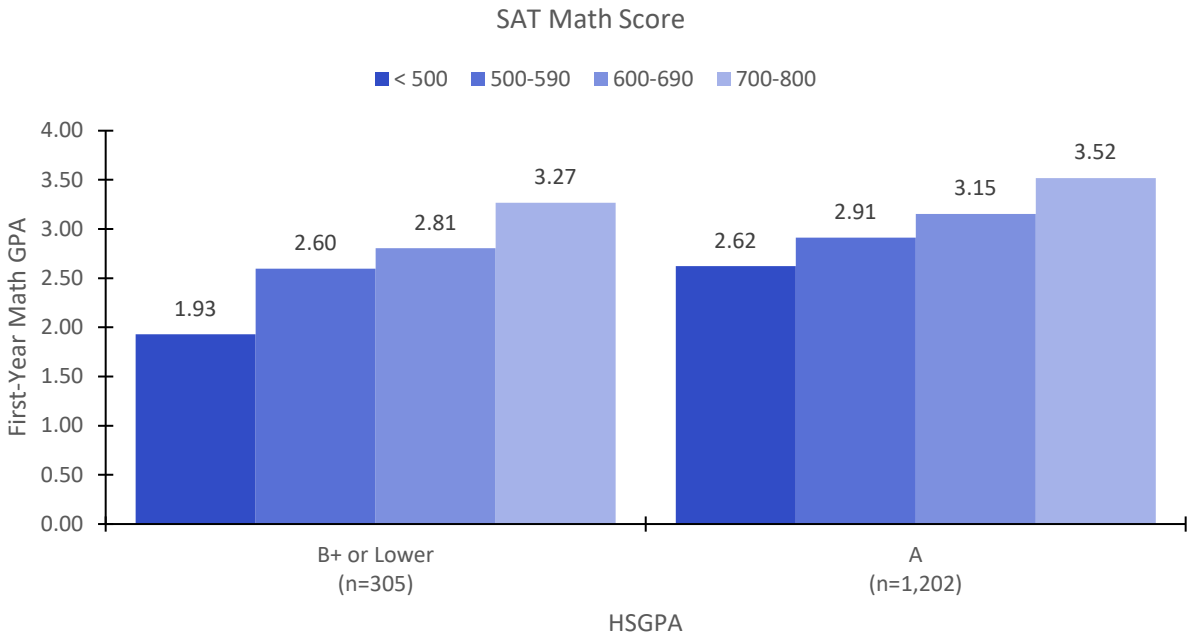
Figure 9: Mean FYMGPA by SAT Math Score Band



Note. Bars are only shown when a score band has at least 15 or more students. The bottom SAT Math score band includes 7 students with scores between 300 to 390 and 43 students with scores between 400 to 490.

Figure 10 graphically communicates the validity of the SAT Math section for predicting FYMGPA above and beyond HSGPA (after controlling for HSGPA). It is evident that the relationship between SAT Math scores and FYMGPA for international students remains positive and increasing and adds information beyond HSGPA alone. As in Figure 2 and Figure 6, if SAT Math scores did not add additional information, each SAT score band within a HSGPA category would have the same or very similar mean FYMGPAs. This figure shows that this is not the case. For example, among students with an "A" HSGPA, students with SAT Math scores less than 500 had a mean FYMGPA of 2.62, while students with SAT Math scores between 700 and 800 had a mean FYMGPA of 3.52.

Figure 10: Mean FYMGPA by HSGPA and SAT Math Score Bands



Note. Bars are only shown when a score band has at least 15 or more students. The bottom SAT Math score band includes 7 students with scores between 300 to 390 and 43 students with scores between 400 to 490.

The next two figures demonstrate the value of using SAT Math scores with or without HSGPA to predict academic success in Math coursework for international students in the first year of college. Figure 11 shows students' probability of earning a FYMGPA of 3.00 or higher by SAT Math score. For example, an international student with an SAT Math score of 400 has a 14% chance of earning a FYMGPA of 3.00 or higher, whereas an international student with an SAT Math score of 700 has a 78% chance of earning a FYMGPA of 3.00 or higher.

Figure 11: Probability of a 3.00 or Higher FYMGPA, Given SAT Math Section Score

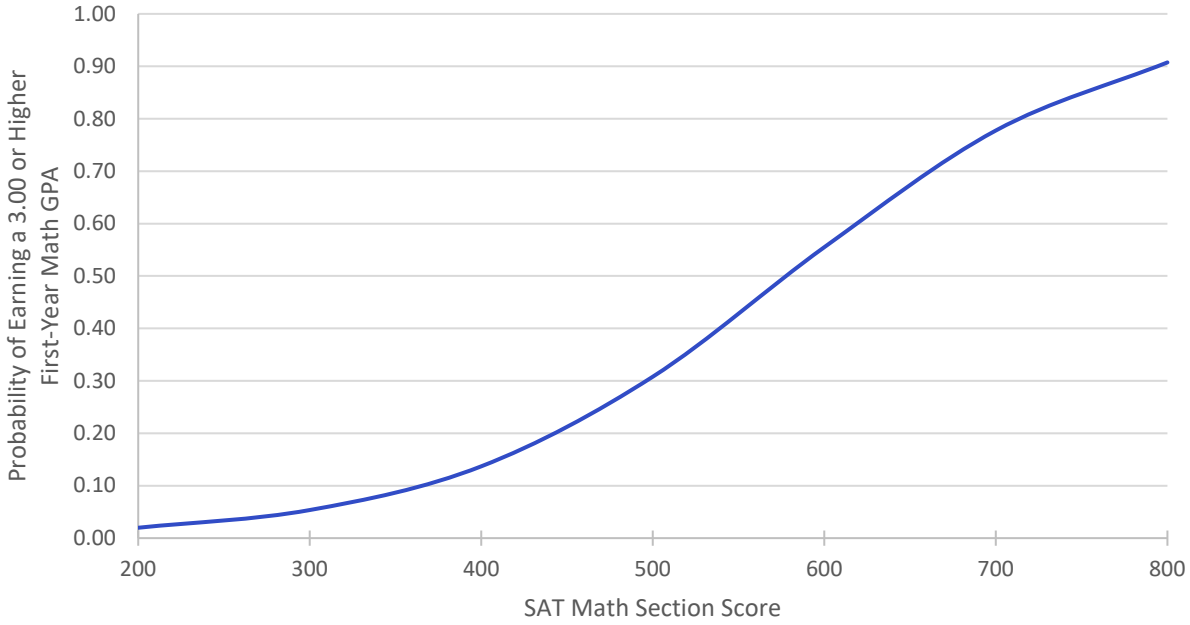
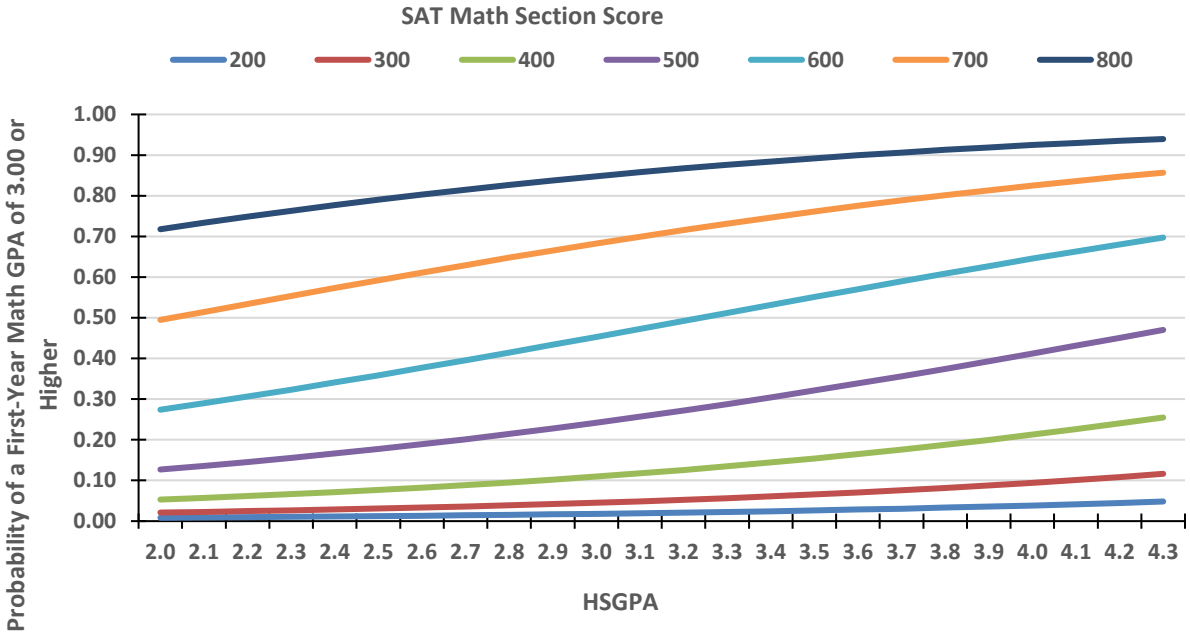


Figure 12 shows students' probability of earning a FYMGPA of 3.00 or higher given their HSGPA and SAT Math score. For example, a student with a HSGPA of 3.50 and SAT Math score of 400, has an approximately 15% chance of earning a FYMGPA of 3.00 or higher, while a student with the same HSGPA (3.50) and SAT Math score of 700 has approximately a 76% chance of earning a FYMGPA of 3.00 or higher. Even among students with higher HSGPAs, we see added SAT value in understanding student success in college math. The SAT provides meaningful information for predicting an international student's probability of earning a 3.00 or higher FYMGPA in college at every point on the HSGPA scale.

Figure 12: Probability of a 3.00 or Higher FYMGPA, Given HSGPA and SAT Math Section Score



STEM Majors

In addition to examining SAT score relationships for international students with FYGPA and first-year domain-specific GPAs, we examined SAT score relationships with FYGPA for students majoring in STEM fields (n=560) in their first year of college.

Table 7 shows the correlations for individual predictors and combinations of predictors with FYGPA for STEM majors. The adjusted correlations of the different predictors with FYGPA ranged from .43 (HSGPA) to .71 (SAT and HSGPA). The correlations between HSGPA with FYGPA and the SAT with FYGPA are .43 and .63, respectively. When HSGPA and SAT are used together, that correlation with FYGPA is .71, an increase of .28 and a 65%[7] boost in the correlation over HSGPA alone.

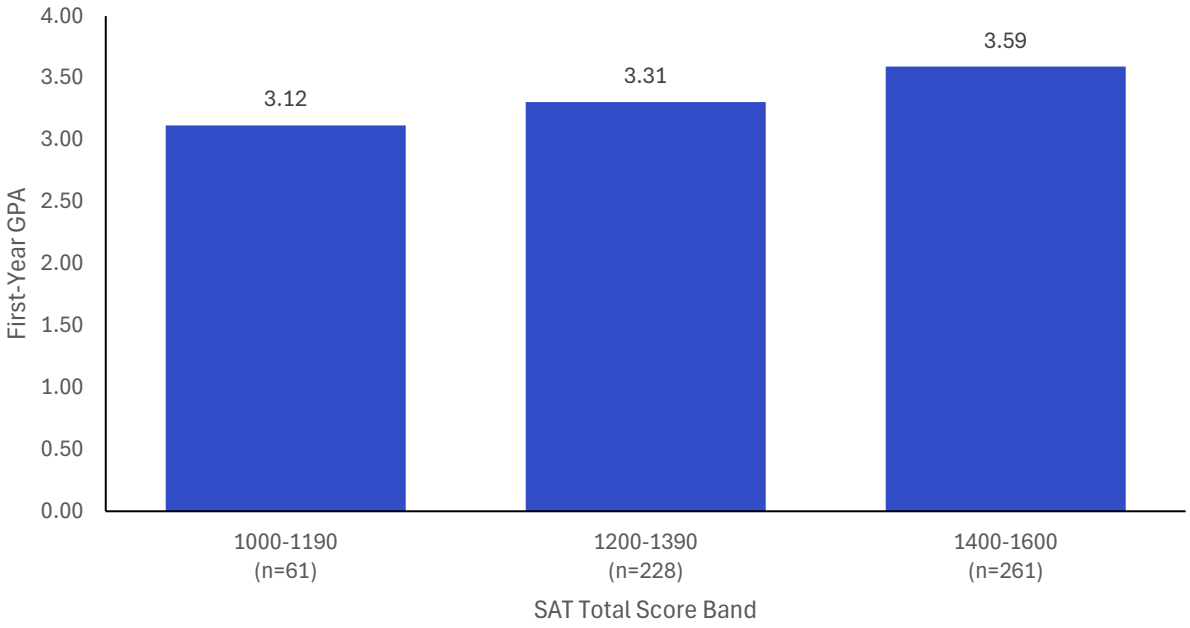
Table 7: Corrected (Raw) Correlations of Predictors with FYGPA for STEM Majors

Predictor(s)	Correlation
SAT, HSGPA	.71 (.46)
SAT	.63 (.40)
SAT Math	.60 (.33)
SAT RW	.50 (.21)
HSGPA	.43 (.18)

[7] This value was calculated by subtracting the HSGPA-FYGPA correlation (.43) from the multiple correlation of HSGPA and SAT with FYGPA (.71) to arrive at the SAT incremental validity coefficient (.28). This coefficient is then divided by the HSGPA-FYGPA correlation (.43) and multiplied by 100 to arrive at the increment in predictive utility value of 65%.

Figure 13 shows FYGPA by SAT Total score bands for STEM majors. There is an increasing relationship between the two where mean FYGPA increased as SAT Total score increases. For example, STEM majors with SAT Total scores between 1000 and 1190 had a mean FYGPA of 3.12. In contrast, STEM majors with SAT Total scores between 1400 to 1600 had a mean FYGPA of 3.59.

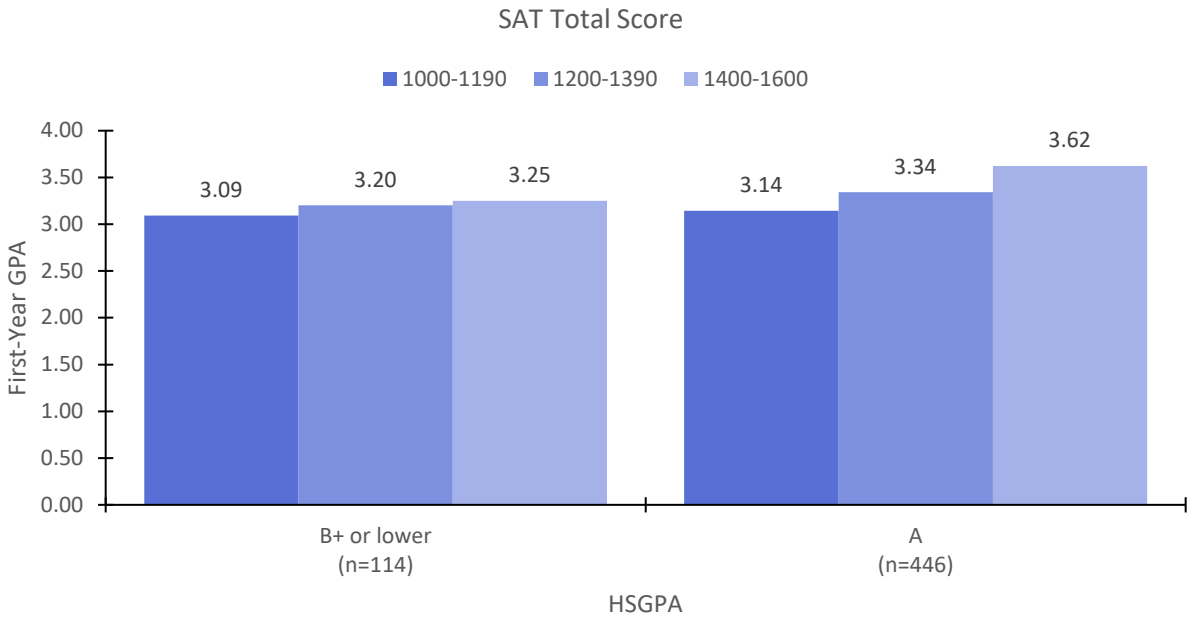
Figure 13: Mean FYGPA by SAT Total Score Bands for STEM Majors



Note. Bars are only shown when a score band has at least 15 or more students. SAT Total scores < 1000 only had 10 students.

Figure 14 shows that this positive and increasing relationship holds when comparing students with the same HSGPA. For example, for students with an A HSGPA, as SAT Total score increases, so does mean FYGPA. For example, among STEM majors with an "A" HSGPA, those with SAT Total scores between 1000 and 1190 had a mean FYGPA of 3.14, while those with SAT Total scores between 1400 and 1600 had a mean FYGPA of 3.62.

Figure 14: Mean FYGPA by HSGPA and SAT Total Score Bands for STEM Majors



Note. Bars are only shown when a score band has at least 15 or more students. SAT Total scores < 1000 only had 10 students.

The next two figures demonstrate the value of using SAT Total scores with or without HSGPA to predict academic success in coursework for international students that are STEM majors in the first year of college. Figure 15 shows students' probability of earning a FYGPA of 3.00 or higher by SAT Total score. For example, an international student with an SAT Total score of 1000 has a 53% chance of earning a FYGPA of 3.00 or higher, whereas an international student with an SAT Total score of 1400 has an 87% chance of earning a FYGPA of 3.00 or higher.

Figure 15: Probability of a 3.00 or Higher FYGPA, Given SAT Total Score for STEM Majors

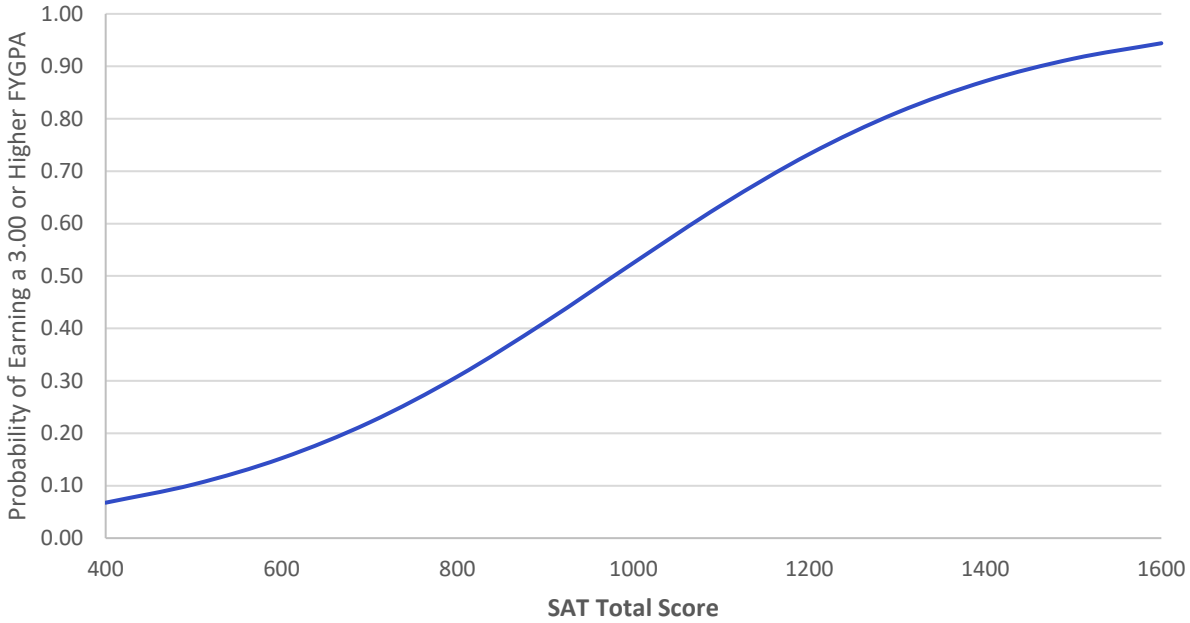
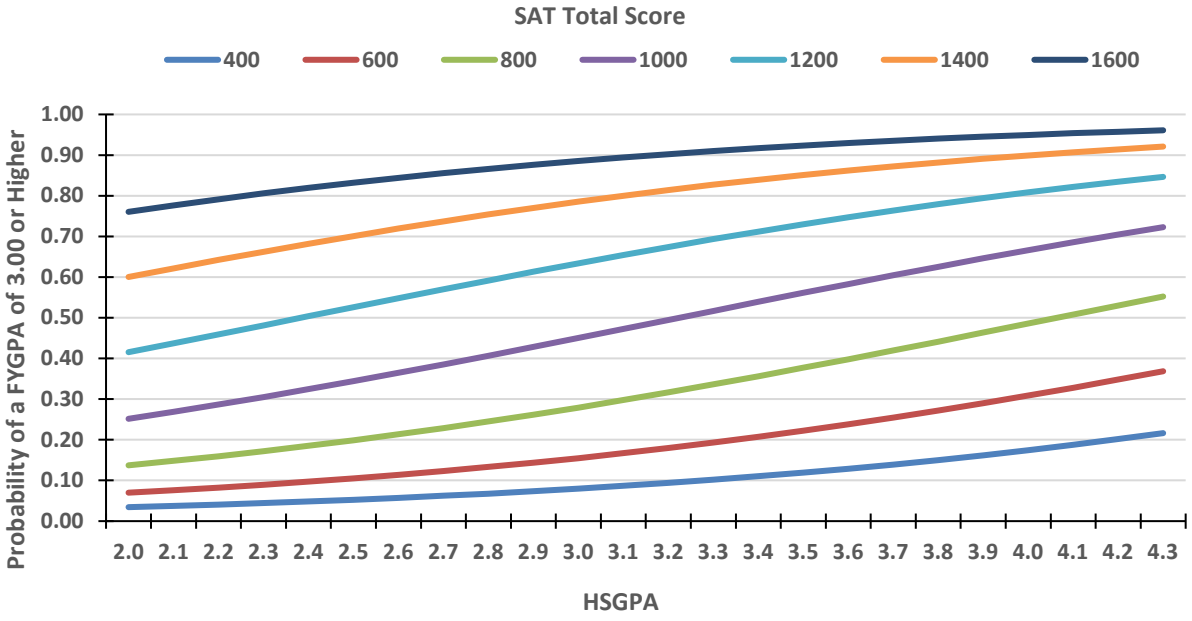


Figure 16 shows a STEM major's probability of earning a FYGPA of 3.00 or higher given their HSGPA and SAT Total score. For example, a student with a HSGPA of 3.50 and SAT Total score of 1000, has an approximately 56% chance of earning a FYGPA of 3.00 or higher, while a student with the same HSGPA (3.50) and SAT Total score of 1400 has approximately an 85% chance of earning a FYGPA of 3.00 or higher. Even among STEM majors with higher HSGPAs, we see added SAT value in understanding student success in first-year college courses. The SAT provides meaningful information for predicting an international student majoring in STEM's probability of earning a 3.00 or higher FYGPA in college at every point on the HSGPA scale.

Figure 16: Probability of a 3.00 or Higher FYGPA, Given HSGPA and SAT Total Score for STEM Majors



Discussion

The results of this study provide important information about how well digital SAT scores predict first-year college performance for international students studying in the U.S. As in prior research with international students studying in the U.S. (Marini, Westrick, Young, & Shaw, 2020), this study showed that digital SAT scores demonstrated strong positive relationships with first-year outcomes of FYGPA, FYEWGPA, FYMGPA, and FYGPA for STEM majors.

The SAT showed a strong positive relationship with FYGPA (.51), and the joint use of the SAT and HSGPA produced the strongest relationship with FYGPA with a correlation of .54. This represented an 86% improvement over using HSGPA alone, which is nearly double the 44% utility seen in the previous international student study (Marini, Westrick, Young, & Shaw, 2020). This large increase in utility is, in part, due to the small correlation for this sample between HSGPA and FYGPA. This is consistent with prior findings that the added value of the SAT score information for international students tends to be considerably larger than for typical U.S. samples (Marini, Young, & Shaw, 2024), likely because HSGPA is a less consistent and less informative measure across the wide range of secondary systems international students attend.

This pattern held, and in fact in some cases strengthened, when examining domain-specific outcomes. For FYMGPA, the SAT-HSGPA correlation of .67 offered a 76% increase in utility over using HSGPA alone. For FYEWGPA, the multiple correlation of SAT and HSGPA was .44, which is a 132% boost in utility over HSGPA alone. This builds on prior work examining the SAT Reading and Writing section specifically as a predictor of coursework taught in English for international students studying in the U.S. (Marini, Young, & Shaw, 2024). That prior study found that SAT Reading and Writing scores added a 44% incremental predictive utility above HSGPA for FYEWGPA. While the two figures are not directly comparable because

the 132% is based on both SAT sections and the 44% on the SAT Reading and Writing section alone, both suggest that the SAT is still an important predictor in understanding how international students studying in the U.S. will perform in college coursework delivered in English. Taken together, these results from correlations with FYGPA and domain-specific GPAs reinforce the same underlying explanation: HSGPA carries comparatively less information about an international student's readiness for coursework delivered in English, specifically, since a foreign secondary-school GPA reflects a grading system, curriculum, and language of instruction that may have little bearing on U.S. English-medium academic demands. The SAT Reading and Writing section, by contrast, directly measures the reading and writing skills those courses require, which likely explains why its incremental value is consistently highest in the English/Writing domain in SAT studies of international students.

The probability analyses of earning a 3.00 or higher FYGPA, FYEWGPA, or FYMGPA reinforce these correlational findings in practical terms. An international student scoring 1000 on the SAT Total score had a 63% probability of earning a 3.00 FYGPA or higher, compared to 90% for a student scoring 1400. This SAT-related difference persisted even after accounting for HSGPA: among students with an identical 3.50 HSGPA, the probability of a 3.00 or higher FYGPA still rose from 61% to 89% across that same SAT score range. Similar patterns emerged for Math and English/Writing outcomes prior to controlling for HSGPA and after controlling for students' HSGPA. This echoes the earlier finding that international students meeting or exceeding a given SAT Reading and Writing threshold consistently earned higher English/Writing and broader coursework GPAs than those who did not (Marini, Young, & Shaw, 2024). Further, SAT scores are strongly predictive of student first-year success for students majoring in rigorous STEM fields. An international student majoring in a STEM field scoring 1000 on the SAT Total score had a 53% probability of earning a 3.00 FYGPA or higher, compared to 87% for a student scoring 1400. This SAT-related difference persisted even after accounting for HSGPA: among STEM majors with an identical 3.50 HSGPA, the probability of a 3.00 or higher FYGPA still rose from 56% to 85% across that same SAT score range.

As has long been argued, one limitation of HSGPA is that its meaning varies with differences in course content and grading standards, even within a single country (Willingham, Pollack, & Lewis, 2002). These inconsistencies are magnified substantially when comparing HSGPAs earned across the many different educational systems and grading conventions represented by an international applicant pool. This highlights the important role that a standardized measure like the SAT can play in understanding how an international student will perform in the first year of college and that this information about international student performance has remained strong as the SAT transitioned to digital testing.

Conclusion

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

- For international students attending four-year U.S. institutions, SAT scores are strongly predictive of first-year academic performance and are considerably more predictive than HSGPA, both overall and within Math and English/Writing coursework specifically.
- Across the HSGPA scale, SAT scores meaningfully differentiate students' probabilities of academic success, helping institutions identify students who are likely to thrive as well as those who may benefit from additional academic support.
- For international students majoring in a STEM field, strong, positive relationships were evident between first-year performance and SAT scores, consistent with the overall sample.

The digital SAT continues the SAT's long track record as a strong predictor of student success, and the findings from this study clearly suggest that this predictive value holds in the digital testing era, including across English coursework, Math coursework, and general first-year grades for STEM majors. As international students continue to represent a meaningful share of the U.S. college student population, these results reinforce the value of using multiple measures, including SAT scores to support sound enrollment, placement, and academic support decisions.

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Appendix

Table A 1: Countries and Territories in the Sample by Geographic Region

Region	Countries in Sample
East Asia	China, Hong Kong, Japan, Mongolia, South Korea, Taiwan
South Asia	Bangladesh, India, Nepal, Pakistan, Sri Lanka
Southeast Asia	Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam
Middle East & North Africa	Bahrain, Egypt, Israel, Jordan, Kuwait, Lebanon, Morocco, Oman, Palestinian Territories, Qatar, Saudi Arabia, Tunisia, Turkey, United Arab Emirates
Europe	Aland Islands, Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, France, Germany, Greece, Hungary, Italy, Netherlands, North Macedonia, Poland, Portugal, Romania, Russia, Slovenia, Spain, Sweden, Switzerland, United Kingdom
Latin America & Caribbean	Anguilla, Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Cayman Islands, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Panama, Paraguay, Peru, Trinidad and Tobago, Venezuela
Sub-Saharan Africa	Botswana, Burundi, Cameroon, Cote d'Ivoire, DR Congo, Eswatini, Ethiopia, Gambia, Ghana, Kenya, Nigeria, Rwanda, South Africa, Tanzania, Uganda
North America	Canada
Central Asia & Caucasus	Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
Oceania/Pacific	Australia, Micronesia, New Zealand, Palau