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Digital SAT® Pilot Predictive Validity Study – A First Look

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This study represents the first opportunity to examine digital SAT score relationships with college performance. Results show that digital SAT scores are as predictive of college performance as paper and pencil SAT scores, and they continue to meaningfully improve the prediction of college performance above high school GPA alone.

Introduction

The digital SAT launched internationally in March 2023 and will be available to students in the U.S. in March 2024. It continues to measure the skills and knowledge that students are learning in school and that matter most for college and career readiness and is delivered in a digital format that is shorter while allowing for more time, on average, to answer each question. The digital SAT continues to be scored on the same score scale, 400 to 1600, as the paper and pencil test it is replacing (College Board, 2022).

When modifications are made to an exam, it is important to analyze how the new scores relate to the outcomes they are intended to predict. For the digital SAT, this includes the prediction of college performance – to inform our understanding of the utility of digital SAT scores in college admission, placement, scholarship, and advising decisions and processes on campus.

The current study represents an early first look at these predictive relationships. We partnered with a small but diverse sample of higher education institutions to pilot the digital SAT with first-time, first-year students on campus. We are following these students through the first year of college to examine how their digital SAT scores relate to first semester performance (the current study) and first-year performance (in a study that will be published later this year) when these outcomes are available.

Methodology

Study Design

The goal for this study was to recruit 10 to 15 diverse four-year institutions so that students (75-250 per campus) could then be recruited to participate in an administration of the digital SAT very early in their first year of college. Students were offered $150 gift cards for participating in the exam, and an additional $50 if they met or exceeded their PSAT/NMSQT or SAT scores on record at College Board, to promote motivated performance on the exam. Student participants also agreed to have their institutions share their first-year college performance information with College Board.

Institutional Sample

The desired sample of institutional participants was intended to reflect the population of four-year higher education institutions as well as possible while also facilitating a successful study (e.g., larger institutions would be more likely to recruit enough student participants). See Appendix A1 for more information on the institutional population. As the requirements for study participation were considered too burdensome for some higher education institutions, similar institutions were identified as alternate participants to maintain as diverse and representative a sample as possible. Ultimately, 12 four-year institutions were recruited for the study and their characteristics are included in Table 1 below. The institutions in the study varied by admittance rate and geographic area of the U.S. and included one historically black college and university (HBCU) and two

Hispanic Serving Institutions (HSIs). Institutional participants were also more likely to be public and very large institutions.

Table 1: Institutional Characteristics of the Study Sample

Institutional Characteristic		Total Sample (k=12)
U. S. Region	Midwest	8%
	Mid-Atlantic	8%
	New England	17%
	South	33%
	Southwest	17%
	West	17%
Control	Public	67%
	Private	33%
Admittance Rate	Under 25%	25%
	25% to 50%	8%
	51% to 75%	50%
	Over 75%	17%
Undergraduate Enrollment	Small	0%
	Medium	8%
	Large	8%
	Very Large	83%

Note. 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.

Student Sample

There were 1,990 first-year, first-time college students who participated in the digital SAT pilot exam administrations across the 12 institutions in the study, meeting our recruitment criteria. All students graduated from high school in spring 2022 and needed to have a prior SAT score or PSAT/NMSQT score on record at College Board to be in the study. Students without a self-reported HSGPA or a first semester college GPA (FSGPA) were then excluded, as were 39 students who had a 200-point or more section score decrease from the paper and pencil SAT to the digital SAT (indicating questionable motivation), resulting in a final sample of 1,926 students. Demographic information regarding the study sample is presented in Table 2. The sample tended to be more female than male, and included about one-third underrepresented minority students, one-third Asian students, and one-third white students. About a quarter of the sample reported that English and Another or Another language was their best language, and most students had parents with a bachelor's or graduate degree.[1] See Appendix A2 for demographic information for the

2022 college-bound seniors cohort of SAT takers and the most recent National SAT Validity Study sample that, like this study sample, includes only enrolled college students (from the entering class of fall 2020).

Table 2: Student Characteristics of the Current Study Sample

Student Characteristic		Total Sample (n=1,926)
Gender	Male	41%
	Female	58%
	Another/Omitted	<1%
Ethnicity	American Indian/Alaska Native	<1%
	Asian	32%
	Black/African American	7%
	Hispanic/Latino	21%
	Native Hawaiian/Other Pacific Islander	<1%
	White	33%
	Two or More Races	4%
	No Response	3%
Best Language	English Only	74%
	English and Another	24%
	Another	2%
	No Response	<1%
Highest Parental Education Level	No High School	4%
	High School Diploma	15%
	Associate Degree	4%
	Bachelor's Degree	35%
	Graduate Degree	39%
	No Response	3%

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

Measures

Paper and Pencil SAT scores. Official paper and pencil SAT scores were obtained from College Board's database and matched to each student that participated in the special administrations of the digital SAT. The paper and pencil SAT scores included in this study are:

> **SAT Total Score (400 to 1600 scale)**—increments of 10, sample mean of 1327 (SD=162).
>
> **SAT Evidence-Based Reading and Writing (ERW) Section Score (200 to 800 scale)**—increments of 10, sample mean of 660 (SD=78).
>
> **SAT Math Section Score (200 to 800 scale)**—increments of 10, sample mean of 667 (SD=96).

Digital SAT Scores. Special administrations of the digital SAT took place at the 12 participating college campuses over four

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[1] As a check, we reweighted the sample to more closely resemble typical validity study populations in terms of institutional and student characteristics. We found that correlations were all within the 95% confidence intervals of the sample correlations calculated and therefore analyses were conducted on the original sample.

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weekends in September and October 2022. The Digital SAT scores included in this study are:

> **SAT Total Score (400 to 1600 scale)—**increments of 10, sample mean of 1292 (SD=167).

> **SAT Reading and Writing Section Score (200 to 800 scale)—**increments of 10, sample mean of 641 (SD=86).

> **SAT Math Section Score (200 to 800 scale)—** increments of 10, sample mean of 651 (SD=97).

High School GPA (HSGPA). Students' self-reported HSGPA was obtained from the SAT Questionnaire when they registered for the SAT (or PSAT/NMSQT) and is reported on a 12-point scale, ranging from 0.00 (F) to 4.33 (A+). The HSGPA measure in the current study had a sample mean of 3.96 (SD=0.35)

First Semester GPA (FSGPA). First semester GPA and grades in all courses in the first semester of college were obtained from the participating institutions. FSGPAs were reported on a 0.00 to 4.00 scale. The sample mean FSGPA was 3.59 (SD=0.53).

Domain-specific GPAs. All courses were coded for content area so that analyses could be conducted on course-specific grade point averages. The three domain-specific GPAs in the current study were English (n=675, Mean=3.73, SD=0.54), math (n=1,177, Mean=3.35, SD=0.90), and STEM (science, technology, engineering, and math; n=1,763, Mean=3.53, SD=0.63). Domain-specific grade point averages were calculated within student, across all relevant course grades received in a particular area during the first semester of college (excluding remedial course work). For example, if a student took only one math course in the first semester, then their average course grade in math is based on the grade earned in that one course. If a student took three math courses, the average course grade is based on the average of the three course grades earned (taking into account the grades earned and the number of credits associated with each grade).

Table 3 shows the descriptive statistics for the measures included in the study. As is typical in predictive validity research involving enrolled college students (e.g., Shaw, Marini, Beard, Shmueli, Young, & Ng, 2016; Westrick, Marini, Young, Ng, Shmueli, & Shaw, 2019), the sample in this study was academically quite strong.

Table 3. Descriptive Statistics

Variable	N	Mean	SD	Min	Max
HSGPA	1,926	3.96	0.35	1.67	4.33
First Semester GPA	1,926	3.59	0.53	0.00	4.00
First Semester English GPA	675	3.73	0.54	0.00	4.00
First Semester Math GPA	1,177	3.35	0.90	0.00	4.00
First Semester STEM GPA	1,763	3.53	0.63	0.00	4.00
Paper and Pencil SAT ERW Section Score	1,926	660	78	400	800
Digital SAT Reading Section Score	1,926	641	86	330	800
Paper and Pencil SAT Math Section Score	1,926	667	96	330	800
Digital SAT Math Section Score	1,926	651	97	330	800
Paper and Pencil SAT Total Score	1,926	1327	162	750	1600
Digital SAT Total Score[2]	1,926	1292	167	680	1600

Analysis

Study analyses included the examination and graphical depiction of mean differences in FSGPA or domain-specific GPA by SAT score bands and correlational analysis to arrive at the incremental utility (Schmidt & Hunter, 1998) gained with the inclusion of SAT scores above HSGPA to predict college grades.

Results

Figure 1 below demonstrates the relationship between digital SAT scores and FSGPA. **This graph depicts a clear and strong relationship between SAT scores and FSGPA, whereby as digital SAT score bands increase, the mean FSGPA also increases.** For example, students earning digital SAT total scores of less than 1000 have a mean FYGPA of 3.11 in this study, while students earning SAT scores between 1400-1490 had, on average, a FSGPA of 3.78.

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[2] In this study, digital SAT scores were expected to be slightly lower than paper and pencil SAT scores as students' paper and pencil scores were taken for higher stakes purposes such as college admission while the digital SAT was taken for a lower stakes research study.

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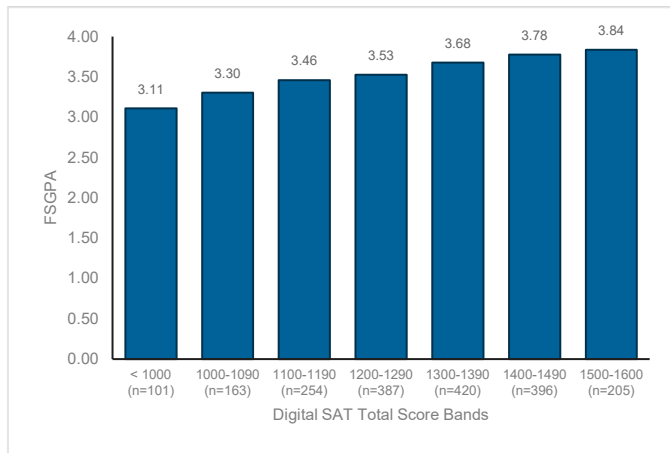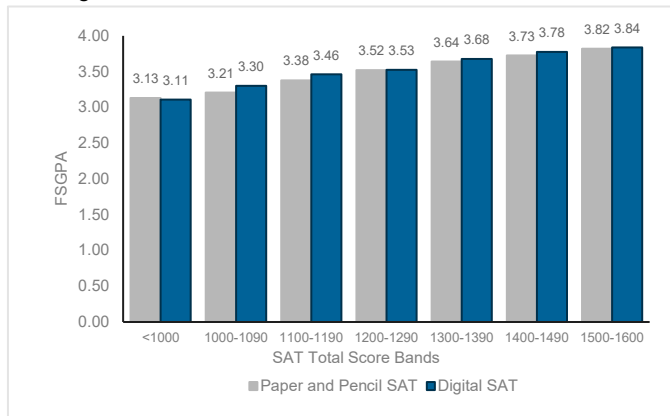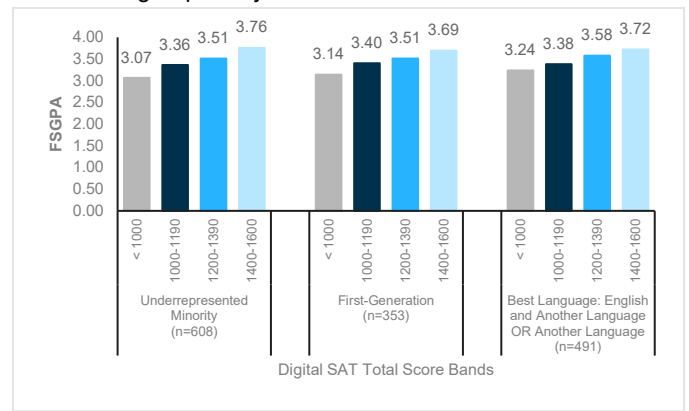Figure 1. Mean First Semester GPA by Digital SAT Score Bands

While this pilot study sample is not as large as most operational validity studies (e.g., Westrick et al., 2019), we were able to conduct some subgroup analyses. Results for three key subgroups of interest can be found in Figure 3 below —underrepresented minority students, first-generation students, and students whose best language was either another language or English and another language. **As observed in the overall sample, as SAT score bands increase, so do students' mean FSGPAs, providing clear evidence of the value of digital SAT scores in understanding the college performance of these student subgroups.**

Figure 3. Mean First Semester GPA by Digital SAT Score Bands: Subgroup Analyses

Figure 2 presents mean FSGPAs across both the paper and pencil and digital SAT total score bands. For both the paper and pencil SAT and the digital SAT, students' mean FSGPA increased in tandem with their SAT scores. It's also clear in this graph that **the relationship between digital SAT scores and FSGPA closely mirrors that of paper and pencil SAT scores with FSGPA, indicating that current SAT score users should feel confident in the value of digital SAT scores for understanding student readiness for college and for use in admission, course placement decisions, scholarship decisions, and identifying students needing academic support.**

Figure 2. Mean First Semester GPA by Paper and Pencil SAT and Digital SAT Score Bands

Next, Figure 4 allows us to see how digital SAT total scores differentiate students' academic performance among groups of students with the same HSGPA – essentially controlling for HSGPA. For example, for students with an A HSGPA, those with digital SAT scores between 1000 and 1090 had a mean FSGPA of 3.36, while those same A HSGPA students with an SAT score between 1400-1490 had a mean FSGPA of 3.80. Similar patterns are seen for students with HSGPAs of A- and A+. **Figure 4 also represents the 25% improvement in predictive utility of digital SAT scores above HSGPA alone to understand students' first semester college performance.[3]**

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[3] This value was calculated by subtracting the HSGPA-FSGPA correlation (.53) from the multiple correlation of HSGPA and SAT with FSGPA (.66) to arrive at the SAT incremental validity coefficient (.13). This coefficient is then divided by the HSGPA-FSGPA correlation (.53) and multiplied by 100 to arrive at the increment in predictive utility value of 25%.

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Figure 4. Mean First Semester GPA by Digital SAT Score Bands within HSGPA
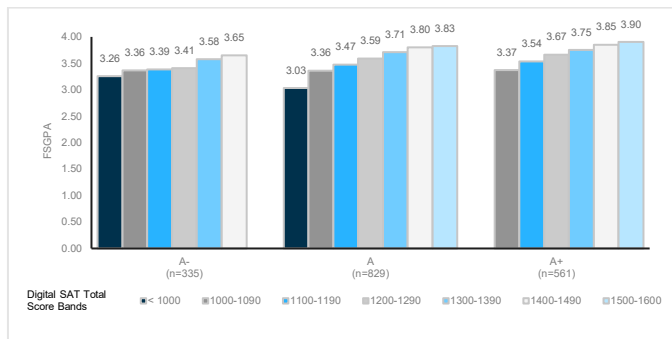
Figures 5 through 7 show the positive relationships between digital SAT section scores and domain-specific FSGPAs. Figures 5 and 6 show digital SAT Math section score relationships with first semester math GPA and first semester STEM GPA, respectively. Across the four Math section score bands—400 to 490, 500 to 590, 600 to 690, and 700 to 800—students' mean math and STEM GPAs increase in stairstep fashion, from 2.56 to 3.64 for first semester math GPA, and from 2.97 to 3.74 for first semester STEM GPA. Similarly, first semester English GPAs rose in tandem with digital SAT Reading section score bands, from 3.50 to 3.83. Taken together **these graphs show the useful information that SAT section scores provide about first semester college performance in the matching academic domain.**

Figure 5. Mean First Semester Math GPA by Digital SAT Math Section Score Bands
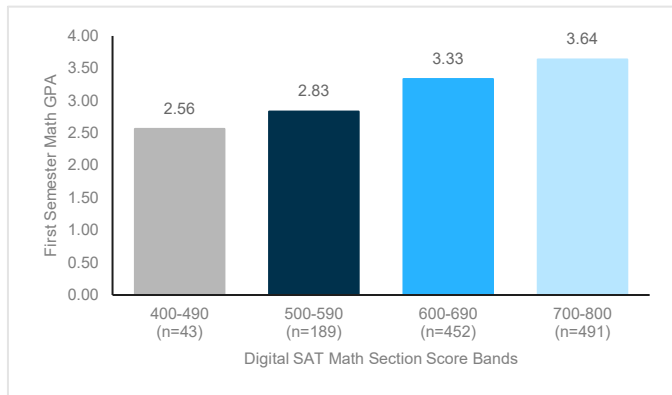
Figure 6. Mean First Semester STEM GPA by Digital SAT Math Section Score Bands
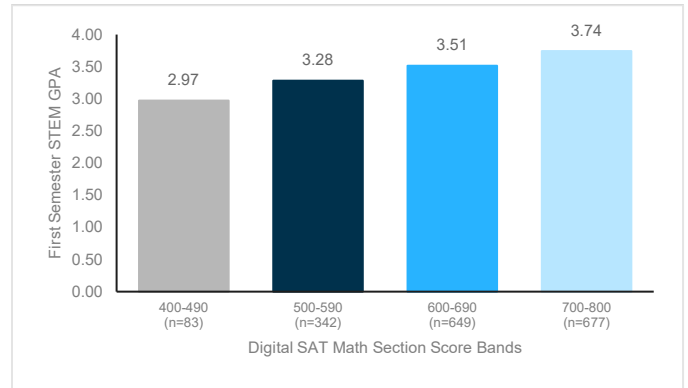
Figure 7. Mean First Semester English GPA by Digital SAT Reading Section Score Bands
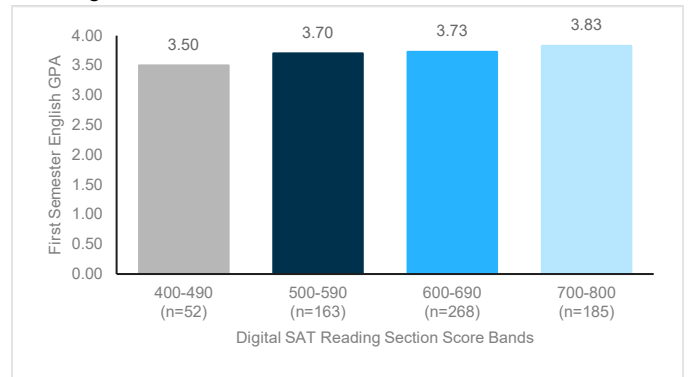
In addition to examining digital SAT score relationships with domain-specific GPAs, we examined SAT score relationships with FSGPA for students majoring in the STEM fields in their first year of college. We examined the added value of digital SAT scores above and beyond HSGPA to understand students' first semester performance. Not only is the strong, positive relationship between digital SAT scores and FSGPA for STEM majors evident in Figure 8, but the SAT incremental utility in prediction of FSGPA above HSGPA represented an improvement of 37%.[4] **This demonstrates the very large contribution of SAT score information to our understanding of how STEM majors will perform in the first semester of college.**

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[4] This value was calculated by subtracting the HSGPA-FSGPA correlation (.52) from the multiple correlation of HSGPA and SAT with FSGPA (.71) to arrive at the SAT incremental validity coefficient (.19). This coefficient is then divided by the HSGPA-FSGPA correlation (.52) and multiplied by 100 to arrive at the increment in predictive utility value of 37%.

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Figure 8. Mean First Semester GPA by Digital SAT Score Bands within HSGPA, for STEM Majors
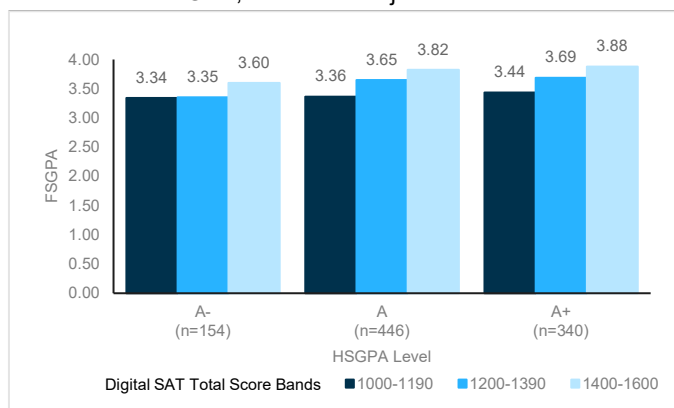
Conclusion

This is the first study to analyze relationships between digital SAT scores and early college outcomes. Results show that digital SAT scores are as predictive of college performance as paper and pencil SAT scores, and they continue to meaningfully improve our ability to predict college performance above high school GPA alone. In this study, there was a 25% improvement in prediction of college performance when the SAT and HSGPA were used together, instead of using the HSGPA alone. We also saw strong positive digital SAT score relationships with FSGPA for subgroups such as underrepresented minority students, first-generation college students, and students whose best language was Another language or English and Another language. When performance in specific first-semester coursework domains was examined, we saw strong relationships between SAT Math scores with both math and STEM course grades. Even with 95% of students earning As and Bs in first semester English coursework, the digital SAT Reading section scores were able to differentiate English course performance. When digital SAT scores were examined for students majoring in STEM fields, there were even stronger relationships observed than for the overall sample, with a 37% improvement in prediction of college performance by the SAT above the use of HSGPA alone.

Taken together, these findings give institutions using paper and pencil SAT scores confidence that digital SAT scores will provide valuable insights for understanding students' readiness for college, course placement and major field decisions, scholarship and honors program decisions, and identifying students who may need academic support.

Additional research will follow from this pilot study sample to examine how students' digital SAT scores relate to full first-year college performance when those grades are available. After the digital SAT launches in the U.S. in 2024, we will also study the first entering college cohort with digital SAT scores to longitudinally examine digital SAT score relationships with college outcomes, across a large national sample of institutions.

References

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Schmidt, F.L., & Hunter, J.C. (1998). The validity and utility of selection methods in personnel psychology: Practical and theoretical implications of 85 years of research findings. *Psychological Bulletin*, 124, 262-274.

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Westrick, P.A., Marini, J. P., Young, L., Ng, H., Shmueli, D., & Shaw, E. J. (2019). *Validity of the SAT for Predicting First-Year Grades and Retention to the Second Year* (College Board Research Report). New York: The College Board.

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Appendices

Appendix A

Table A 1: Institutional Characteristics of the Study Population for Sample Recruitment

	Variable	Sample (k=12)	Population (k=788)
U. S. Region	Midwest	8%	21%
	Mid-Atlantic	8%	26%
	New England	17%	11%
	South	33%	22%
	Southwest	17%	9%
	West	17%	10%
Control	Public	67%	40%
	Private	33%	60%
Admittance rate	Under 25%	25%	6%
	25% to 50%	8%	9%
	51% to 75%	50%	37%
	Over 75%	17%	48%
Undergraduate Enrollment	Small	0%	52%
	Medium	8%	20%
	Large	8%	14%
	Very Large	83%	14%

Note. Percentages may not sum to 100 due to rounding. In order to be included in the study population used to develop a representative sampling plan for U.S. four-year institutional participation, institutions had to have at least 250 first-year students, of which at least 75 had SAT scores, at least 15% of first-year students had to have SAT scores, and the institution had to have published admittance rates. Institutions in the U.S. Virgin Islands and Puerto Rico were excluded. 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.

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Table A 2: Student Characteristics of the Current Study Sample, 2020 SAT Validity Study Sample, and the 2022 College-Bound Seniors Population

	Category	Sample (N=1,926)	2020 Validity Study Sample (N=181,718)	2022 College-Bound Seniors (N=1,737,678)
Gender	Male	41%	44%	48%
	Female	58%	56%	51%
	Another/Omitted	<1%	0%	<1%
Ethnicity	American Indian/Alaska Native	<1%	<1%	1%
	Asian	32%	12%	10%
	Black/African American	7%	7%	12%
	Hispanic/Latino	21%	16%	23%
	Native Hawaiian/Other Pacific Islander	<1%	<1%	<1%
	White	33%	58%	42%
	Two or More Races	4%	5%	4%
	No Response	3%	2%	8%
Best Language	English Only	74%	86%	71%
	English and Another	24%	13%	17%
	Another	2%	2%	3%
	No Response	<1%	<1%	9%
Highest Parental Education	No High School	4%	4%	6%
	High School Diploma	15%	16%	21%
	Associate Degree	4%	6%	5%
	Bachelor's Degree	35%	39%	28%
	Graduate Degree	39%	35%	23%
	No Response	3%	1%	17%

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