CollegeBoard

March 2026

Using SAT Math Scores to Identify Risk of Low Performance in First-Year College Math

JESSICA P. MARINI, EMILY J. SHAW & DAVID GUZMAN

Table of Contents

Abstract

This study examines whether SAT Math scores provide meaningful information for identifying students at risk of earning a D, F, or withdrawing (DFW) from a first-year college math course, and whether that informational value shifted from a pre-pandemic (2018) to a post-pandemic (2023) cohort. Using data from the same 57 diverse four-year institutions, we estimate standardized mean differences and logistic regression models predicting DFW outcomes from SAT Math scores and high school GPA (HSGPA). Across both cohorts, SAT Math scores consistently differentiated students at risk of very poor performance, providing substantial incremental information beyond HSGPA. Moreover, the magnitude of this differentiation increased in 2023, particularly at more selective institutions. While HSGPA remains an important indicator of academic preparation, these findings suggest that SAT Math scores offer distinct and, in many contexts, increasingly valuable information for identifying students who may benefit from early academic support in math coursework.

Introduction

Colleges and universities invest substantial resources to assess applicants' math readiness and help newly enrolled students succeed in early mathematics coursework, recognizing that this often shapes overall persistence and degree completion, particularly in the STEM fields (e.g. Palakal & White, 2024; Xu, 2018). Despite these efforts, many students earn grades that signal serious academic struggle (Ds, Fs, or course withdrawals or Ws) that can slow progress or result in major field changes. Identifying students at risk *before* they encounter these challenges is essential for effective admission, placement, advising, and early intervention.

Close attention to students' incoming math skills and preparation is increasingly crucial. A recent report by the University of California San Diego Senate-Administration Working Group on Admissions (2025) illustrated a meaningful decline in students' math preparedness since 2020, with a nearly thirtyfold increase in students arriving on campus with math skills falling below high school level. Relatedly, there is ample evidence that the COVID-19 pandemic disrupted student learning, particularly in math (National Science Board & National Science Foundation, 2023). During this same period of decreased math learning and preparation, many higher education institutions shifted away from the use of admission tests to evaluate students' readiness for college level work, including math (e.g. College Board, 2022; Lovell & Mallinson, 2024). With diminished institutional insight into this weakness, colleges and universities have been admitting more students who are less equipped to handle the typical rigors of their first-year math coursework (Westrick, Angehr, Shaw, & Marini, 2024).

While many institutions have chosen to remain test optional for admission decisions, a number are now requesting or requiring scores for use in enrollment -- to inform advising and placement-related decisions (e.g. College Board, 2024). There is a substantial body of research that shows that standardized academic measures can provide useful, comparable signals of performance in specific first-year coursework, including the use of SAT Math scores as predictors of first-year math or STEM courses (e.g. Westrick, Marini, & Shaw, 2025). In other words, SAT Math scores not only hold value as a general readiness indicator for admission, but also as a tool for understanding risk for course-specific adverse outcomes (Ds, Fs, Ws) in early math sequences which may have only been evident after experiencing poor college performance or even withdrawal.

The accurate identification of students who may struggle in early math and STEM coursework is often a priority for institutional placement and early support services because there tends to be a higher rate of poor performance in these domains (Flaherty, 2024), which ultimately negatively impacts retention and completion outcomes. This study examines the relationship between SAT Math scores and poor performance outcomes in first-year college math coursework, providing actionable information to guide placement policies and early targeted support strategies to promote

student success. Another aspect of this study aims to understand how SAT Math score informational value compares to HSGPA informational value in predicting college math performance – and whether the informational value of these measures has changed over time with the increase in test optional policies and since the COVID-19 pandemic. The study will also explore whether there is variability by key institutional characteristics, such as admission selectivity. These findings can inform whether SAT Math scores may play an increasingly useful role in enrollment management processes (e.g. admission, advising, placement, and student support services) including in test optional admission environments.

Methodology

Sample

Data in the study sample came from two entering college cohorts, fall 2018 and fall 2023 first-year students. This allowed for the analysis of students from the same institutions pre- and post-pandemic, and therefore largely pre- and post-test optional admission policies. For comparability, we examined 57 institutions with data available on both cohorts and students were included in our sample if they had at least one math course in the first year, including remedial coursework, an SAT Math score on record in the College Board database, and a self-reported HSGPA on the SAT Questionnaire. In 2018 there were 69,608 students in our sample and in 2023 there were 60,121 students in our sample[1]. Student characteristics for both cohorts are shown in Table 1. In terms of gender and best languages, both cohorts are nearly identical being mostly female (55% both years) and most with English only as their best language (85% in 2018 and 84% in 2023). Race/ethnicity remained relatively stable between the two cohorts, except for a slight shift in fewer White students and slightly more Asian, Hispanic or Latino, and no response students in 2023. Parental education level varied slightly between years but was largely stable.

[1] The decrease in sample size is related to a combination of fewer students taking math courses in 2023 versus 2018, as well as fewer students with SAT scores and fewer reporting their HSGPA.

Table 1: Student Characteristics for the 2018 and 2023 Cohort Samples

		2018 (n = 69,608)	2023 (n = 60,121)
Gender	Female	55%	55%
	Male	45%	45%
Best Language	English Only	85%	84%
	English and Another	13%	13%
	Another	2%	1%
	No Response	< 1%	1%
Race/Ethnicity	American Indian or Alaska Native	< 1%	< 1%
	Asian	11%	13%
	Black or African American	8%	8%
	Hispanic or Latino	16%	18%
	Native Hawaiian or Other Pacific Islander	< 1%	< 1%
	White	60%	54%
	Two or More Races	4%	4%
	No Response	1%	3%
Highest Level of Parental Education	No High School	4%	4%
	High School Diploma	19%	16%
	Associate Degree	7%	5%
	Bachelor's Degree	38%	37%
	Graduate Degree	32%	34%
	No Response	1%	5%

Table 2 displays the institutional characteristics for our sample. The sample was almost evenly split between public and private institutions. The majority of the sample was less selective, with 68% of the sample admitting over 51% of applicants. Institutions were also primarily small (39%) or very large (32%).

Table 2: Institutional Characteristics for the Study Sample

		% (*k* = 57)
Control	Public	49%
	Private	51%
Admit Rate	Under 25%	11%
	25% to 50%	21%
	51% to 75%	33%
	Over 75%	35%
Undergraduate Enrollment	Small (n<5,000)	39%
	Medium (5,000 < n < 9,999)	11%
	Large (10,000 < n < 19,999)	19%
	Very Large (n ≥ 20,000)	32%

Measures

SAT Math score (200 to 800 scale). Increments of 10. In 2018, sample mean was 603 (SD=96). In 2023, sample mean was 581 (SD=104).

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 scale, ranging from 0.00 (F) to 4.33 (A+). The 2018 HSGPA sample mean was 3.68 (SD=0.46) and 2023 sample mean was 3.78 (SD=0.46).

First-Year GPA (FYGPA). First-year GPAs were also obtained from the institutions in the study sample. FYGPAs were reported on a 0.00 to 4.00 scale. The 2018 FYGPA sample mean was 3.10 (SD=0.76) and 2023 FYGPA sample mean was 3.22 (SD=0.78).

First-Year math course grades. First-year coursework information including grades were obtained from institutions in the study sample. Courses were coded for content area domain. All first-year math courses, including remedial courses, were included in our study. We categorized the grades that students earned in a first-year math course as a DFW if they earned a D, F, or withdrew from a first-year math course (or not). Once this category was assigned for each student's first-year math courses, the student was placed into one of two groups. If a student had at least one course where a D, F, or withdrawal was earned, they were placed in the DFW group. If they had none, they were placed in the no DFW group. To simplify the text in the remainder of the paper these groups will be called *DFW* and *no DFW*, respectively. Descriptive statistics for each cohort for the overall group and each DFW category are shown in Table 3 below. There is a shift in the means and standard deviations between the two cohorts. Mean HSGPA and mean FYGPA increased for the overall sample from 2018 to 2023 while the standard deviation remained the same or relatively the same. SAT Math score decreased from 2018 to 2023 and the standard deviation increased, showing greater score variability in 2023.[2]Finally, fewer students had at least one D,F, or W grade in a first-year math course in 2023 (15%) compared to 2018 (17%).[3]

[2] These trends are also observed in a national College Board sample. For students with a self-reported HSGPA and SAT score, SAT Math score means decreased while standard deviations increased from 2018 (M=536, SD=112) to 2023 (M=522, SD=120), while mean HSGPA increased from 2018 (M=3.34, SD=0.66) to 2023 (M=3.49, SD=0.68). This study sample is also higher achieving than our national sample of all SAT takers, as the sample is based on students enrolled at four-year institutions.

[3] Note that these increases in HSGPA and FYGPA and decrease in SAT Math score over this time period are consistent with prior research that showed readiness declines in standardized test scores (and declining faculty sentiment in their assessment of student performance) but increases or inflation in human-assigned grades (HSGPA and FYGPA) post-pandemic (e.g. Westrick et al., 2024).

Table 3: Descriptive Statistics for Variables of Interest in the 2018 and 2023 Cohorts

		Overall			DFW			No DFW		
		N	Mean	SD	N	Mean	SD	N	Mean	SD
2018	HSGPA	69,608	3.68	0.46	11,597	3.40	0.51	58,011	3.74	0.43
	SAT Math	69,608	603	96	11,597	555	91	58,011	613	94
	FYGPA	69608	3.10	0.76	11,597	2.06	0.86	58,011	3.31	0.53
2023	HSGPA	60,121	3.78	0.46	9,309	3.48	0.54	50,812	3.83	0.42
	SAT Math	60,121	581	104	9,309	510	94	50,812	594	101
	FYGPA	60,120	3.22	0.78	9,308	2.06	0.94	50,812	3.43	0.52

Analyses

To assess observed mean differences in HSGPA and SAT Math scores across DFW groups, we calculated standardized mean differences, or a *d* value (Cohen, 1988), between the DFW and no DFW groups within each institution and aggregated by weighting by institution sample size to arrive at an overall measure. This analysis can demonstrate how well SAT Math scores and HSGPA distinguish students at risk for DFW outcomes within an institution. As the number of students varied within each group and cohort, we used the pooled standard deviation to calculate each *d* value (Schmidt & Hunter, 2015). Standardized mean differences can be either positive or negative. Using Cohen's (1988) guidelines, standardized mean differences between |0.20| and |0.49| are considered small effect sizes; standardized mean differences between |0.50| and |0.79| are considered medium effect sizes; and standardized mean differences greater than |0.80| are considered large effect sizes. Any effect size less than |0.20| is not considered a difference of practical significance. Standardized mean differences were calculated as the difference between the DFW minus no DFW group.

To understand the risk of a student having a D, F, or W in a first-year math course, logistic regression was used to predict a student's probability of having at least one D, F, or W in a first-year math course using their HSGPA and SAT Math score. This was calculated for the overall sample, and by different institutional segments based on admission selectivity. These regressions were calculated within an institution and then weighted by institutional sample size.

Results

Standardized Mean Differences (d)

Standardized mean differences (*d*) place measures on a common metric, allowing us to compare, for example, whether a change in HSGPA of 0.30 is more substantial than a 90-point increase on SAT Math score. Figure 1 shows standardized mean differences (*d*) for HSGPA and SAT Math in the overall sample of students in 2018 and 2023, with negative values indicating that the means in the no DFW group are higher than those in the DFW group. Larger differences indicate that there is greater differentiation on that measure for the DFW and no DFW groups, which can signal the utility of that measure in considering which students may be at risk for DFWs in math. Both HSGPA and SAT Math score differences are practically significant between the DFW and no DFW groups. For HSGPA, the standardized mean difference between the DFW and no DFW groups in 2018 is essentially the same as in 2023. However, the SAT Math standardized mean difference in 2023 is 0.24 larger than in 2018. In 2023, SAT Math differentiated successful students from less successful math students more clearly than HSGPA, with a *d* value of -0.68. Table A1 in the Appendix presents more detail for Figure 1 and the overall sample.

Figure 1: Standardized Mean Differences in HSGPA and SAT Math (for DFW and no DFW Groups), 2018 and 2023

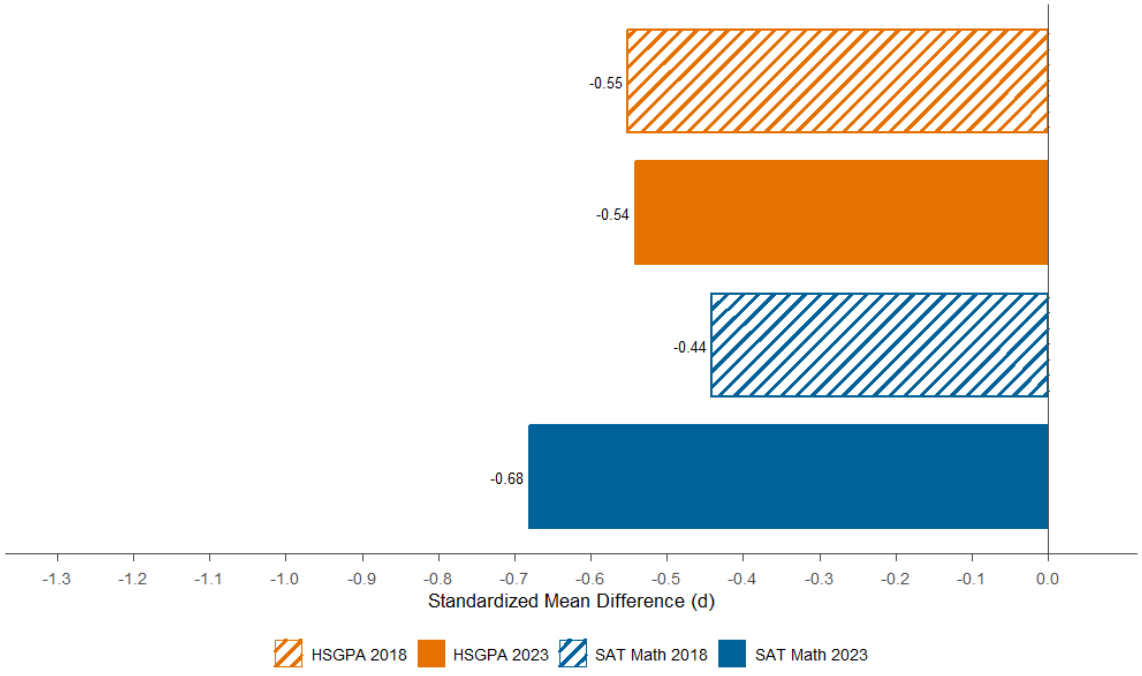
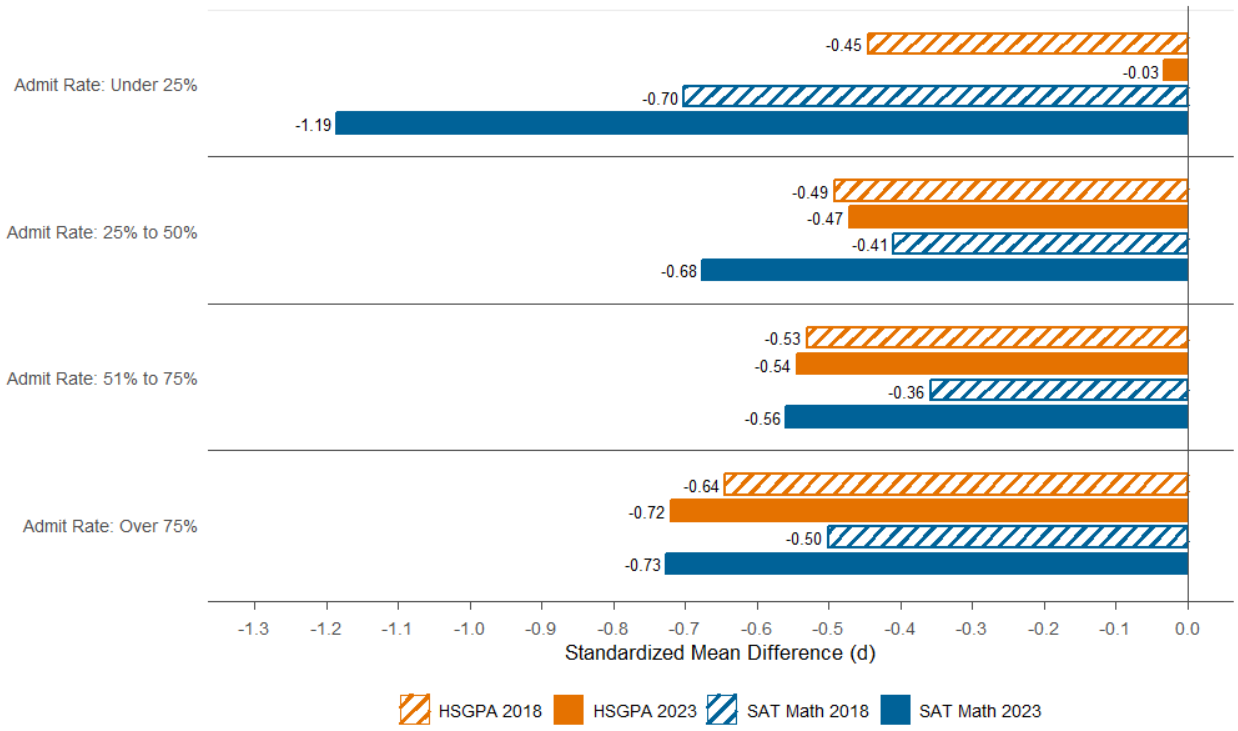


Figure 2 illustrates the changes in HSGPA and SAT Math standardized mean differences for the DFW and no DFW groups, pre- and post-pandemic by admission selectivity. Across nearly every selectivity subgroup and year, most *d* values are in the

0.40 to 0.70 range which suggests that both SAT Math scores and HSGPA are capturing meaningful performance differences associated with DFW outcomes. Notably, in 2018, SAT Math outperformed HSGPA in differentiating DFW groups at highly selective institutions, and by 2023, the SAT Math difference widened substantially (d = -1.19), while HSGPA showed little to no differentiation (d = -0.03). For the 25% to 50% admission selectivity institutions, HSGPA is relatively stable across years, but SAT Math group differences widen, by .27. For the 51% to 75% and over 75% selectivity groups, the trends are similar for both measures. In 2018, HSGPA had a larger standardized mean difference, meaning that HSGPA was better at distinguishing which students would be more or less successful in first year math courses. However, in 2023, SAT Math becomes slightly more discriminating for both selectivity groups. Table A2 in the Appendix presents more detail for Figure 2. For analyses by institutional control and size see Appendix Figures A1 and A2 and Appendix Tables A3 and A4.

Figure 2: Standardized Mean Differences in HSGPA and SAT Math (for DFW and no DFW Groups), 2018 and 2023 by Admit Rate



Logistic Regression

Using logistic regression, we estimated statistical models to predict the probability of earning a D, F, or W in a first-year math course, based on students' HSGPA and SAT Math scores. Figure 3 shows the predicted probability of receiving at least one DFW in a first-year math course by HSGPA and SAT Math score for students in 2018 and 2023. In both years, students with higher HSGPAs are less likely to earn a DFW in math. This

is reflected in the downward slope of all lines. As HSGPA increases, the predicted risk of earning a DFW decreases. The figure also shows that SAT Math scores provide additional information beyond HSGPA. At every level of HSGPA, students with higher SAT Math scores have lower predicted risk of earning a DFW. Two students with the same HSGPA can have meaningfully different predicted risks of struggling in college math depending on their SAT Math score. The clear separation between the SAT Math score lines across the HSGPA range indicates that SAT Math adds useful information beyond what HSGPA alone tells us. Comparing 2018 and 2023 graphs, the separation between SAT score bands by HSGPA appears somewhat larger in 2023 at most HSGPA levels.This suggests that SAT Math scores may be more strongly related to first-year math outcomes in 2023 than in 2018, which echoes the findings based on the SAT Math standardized mean differences above.

To make this more concrete, consider a student with a 3.0 HSGPA. In 2018, a student with that HSGPA and an SAT Math score of 400 had a 47% predicted probability of earning at least one D, F, or W in a first-year math course. If that same student instead had an SAT Math score of 600, the predicted probability drops to 25%. For a comparable student enrolled post-pandemic (2023), the predicted probabilities are 49% and 19%, respectively. These examples illustrate how SAT Math scores provide meaningful additional information about the likelihood of earning a DFW in first-year math, beyond what HSGPA alone can indicate.

Figure 3: Probability of Having at Least One Math DFW by HSGPA and SAT Math Score

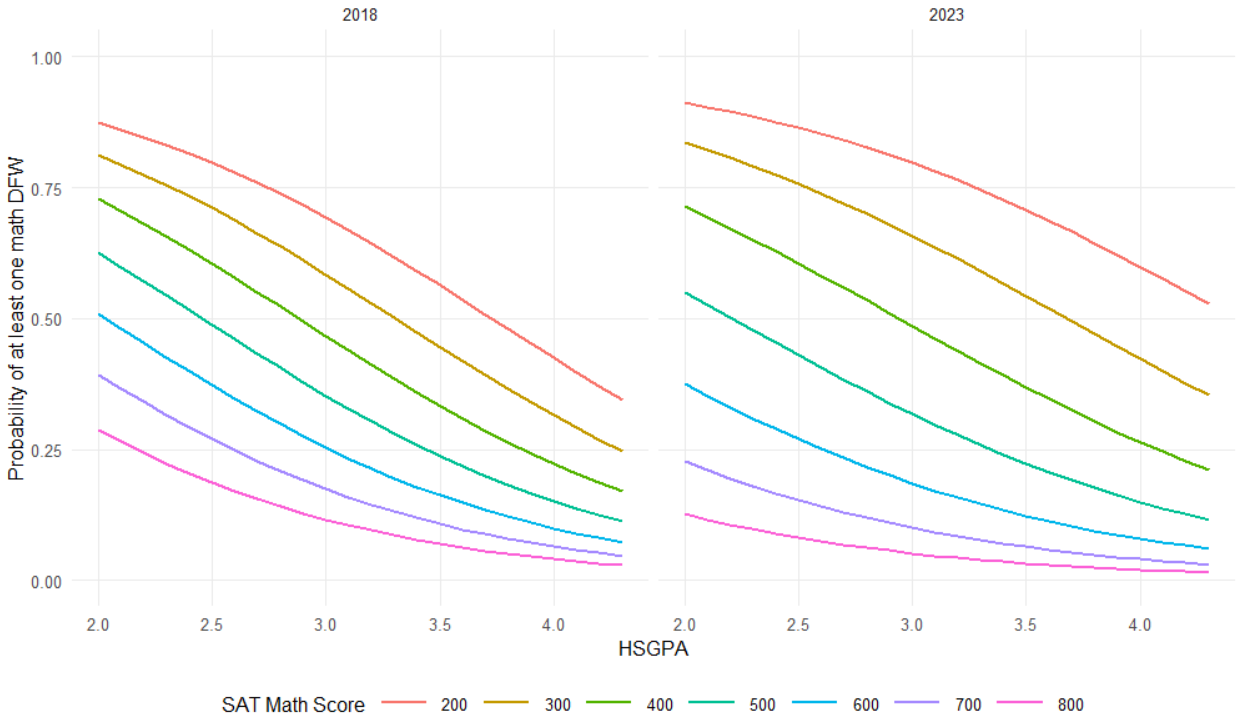
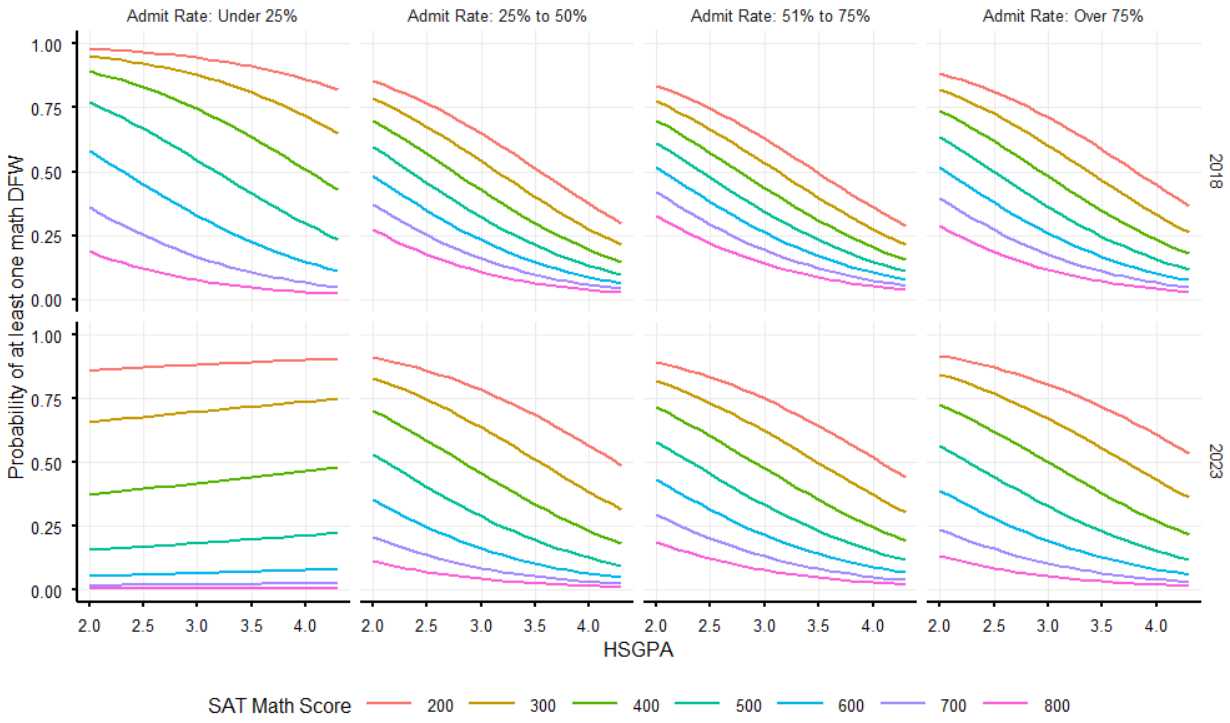


Figure 4 shows the predicted probability of a student earning at least one D, F, or W in a first-year math course by HSGPA and SAT Math scores, by institutions of similar admissions selectivity (for 2018 and 2023). For institutions in the 51% to 75% and over 75% selectivity ranges, the overall patterns are similar across years. In both 2018 and 2023, higher SAT Math scores are associated with lower predicted probabilities of a DFW at every level of HSGPA. Within each SAT score band, a higher HSGPA is associated with lower risk. Although overall probability levels differ somewhat across years, the shape and ordering of the curves remain consistent.

For moderately selective institutions, defined as the 25% to 50% group, the separation between SAT Math score bands is more pronounced in 2023 than in 2018. At a given HSGPA, the predicted probability gaps between lower and higher SAT Math scores are larger in 2023, suggesting that SAT Math scores provide even stronger differentiation of student risk in these institutions, post-pandemic.

The most selective institutions, those in the under 25% admitted range, show the most substantial change. In 2018, the pattern resembles that of other selectivity groups whereby higher HSGPA and higher SAT Math scores are both associated with lower predicted DFW risk. In 2023, however, the relationship between HSGPA and DFW risk changes direction within SAT score bands. For a given SAT Math score, the predicted probability of a DFW increases as HSGPA increases. At the same time, SAT Math remains strongly associated with DFW risk, with lower SAT scores corresponding to substantially higher probabilities. In these very selective institutions, HSGPA is highly restricted in range, with most students clustered at the very upper end of the HSGPA distribution. When a predictor has limited variability, model estimates can become unstable and small differences at the extreme upper end of the scale can produce counterintuitive patterns in predicted probabilities. The observed pattern here most likely reflects range restriction rather than a substantive reversal in the relationship between academic performance in high school and first-year college math outcomes.

Figure 4: Probability of Having at Least One DFW in a First-Year Math Course by Admit Rate and Year



Discussion

This study examined whether SAT Math scores provide meaningful information for identifying students at risk of earning a D, F, or withdrawing from a first-year math course, and whether that informational value shifted from a pre-pandemic (2018) to a post-pandemic (2023) cohort. Several patterns emerged from the analyses. Descriptive statistics revealed notable cohort differences. From 2018 to 2023, mean HSGPA increased while mean SAT Math scores declined and became more variable. Nationally, we saw a similar trend for HSGPA and SAT Math scores. At the same time, FYGPA increased modestly and the percentage of students earning at least one math DFW decreased slightly (17% to 15%). These shifts suggest that academic indicators and grading patterns changed over this period in ways that are consistent with broader discussions of pandemic-related learning disruptions and potential grade inflation in secondary education (e.g. Westrick et al., 2024). The simultaneous increase in HSGPA and decrease in SAT Math scores may reflect multiple forces, including shifts in grading standards during and after the pandemic, changes in student preparation, and changes in testing participation patterns in a test-optional admissions context. Importantly, these shifts provide context for interpreting the relative informational and predictive utility of these measures.

Across both cohorts, students who earned at least one DFW in a first-year math course had lower mean HSGPAs and lower mean SAT Math scores than students who did not.

Effect size analyses using Cohen's *d* demonstrated that these differences were substantial in both years. In 2018, the magnitude of mean differences was somewhat larger for HSGPA than for SAT Math in the overall sample. By 2023, however, effect sizes for SAT Math increased and became comparable to or larger than those for HSGPA. This pattern indicates that the gap in SAT Math performance between students with and without a math DFW widened post-pandemic, while the HSGPA gap remained relatively stable. Cohen's *d* is particularly useful here because it allows direct comparison of magnitude of differences across measures with different scales. The results suggest that SAT Math scores increasingly differentiate students at risk of very poor math outcomes, especially in the 2023 cohort.

Logistic regression analyses further clarified how SAT Math and HSGPA jointly related to DFW risk. Across both years, lower HSGPAs and lower SAT Math scores were associated with higher probabilities of earning at least one math DFW. However, the spacing of predicted probability curves indicated that SAT Math scores contribute substantial incremental information beyond HSGPA alone. The pattern was more pronounced in 2023 than in 2018. For example, among students with the same HSGPA (e.g., 3.0), predicted DFW probabilities varied substantially depending on SAT Math score, and this separation between score bands was greater in 2023. In practical terms, this means that knowing a student's SAT Math score meaningfully refines risk estimates even when HSGPA is held constant. The relatively parallel slopes of the curves across SAT score bands suggest that HSGPA exerts a consistent association with DFW risk, but that SAT Math differentiates risk levels within HSGPA bands. In a test-optional context where HSGPA distributions have shifted upward, this differentiation may become especially important.

Logistic regression analyses by institutional selectivity revealed some of the most striking patterns. At the most selective institutions, HSGPA differences between students in the at least one DFW group and no DFW group were minimal in 2023, with an effect size near zero. In contrast, SAT Math effect sizes in this segment nearly doubled from 2018 to 2023 and were very large in magnitude. This suggests that, at highly selective institutions in 2023, HSGPA provided little discrimination between students who did and did not experience serious difficulty in first-year math, whereas SAT Math scores continued to meaningfully differentiate risk. One plausible explanation for this finding is compression at the top of the HSGPA distribution in a highly selective context, particularly if pandemic-era grading practices elevated GPAs (Sanchez, 2024). When most students cluster near the upper bound of HSGPA, its capacity to distinguish levels of math readiness may be attenuated. For students in 2023 at the most selective institutions, we do see this occurring with mean HSGPAs of 4.02 in both the DFW and no DFW groups. In moderately selective institutions, SAT Math score effect sizes also increased notably, while HSGPA effect sizes remained relatively stable. In less selective institutions, both measures showed similar shifts, suggesting that the relative informational value of SAT Math may vary by institutional context. It is also important to note that sample sizes in the most selective DFW subgroup were smaller in 2023 than

in 2018, which may introduce some instability in model estimates. Nonetheless, the magnitude and consistency of the SAT Math score effect sizes across segments suggest that the observed patterns are unlikely to be due solely to sampling fluctuations.

These findings have direct implications for enrollment management professionals implementing math placement and readiness policies and early intervention/student success strategies. First, SAT Math scores provide meaningful information about risk of poor performance in first-year college math courses, even after accounting for HSGPA. Second, the informational value in SAT Math scores appears to have increased in the post-pandemic cohort, and particularly so at more selective institutions. Institutions seeking to identify students at risk of early math difficulty would likely benefit from incorporating SAT Math scores into placement and advising decisions, especially when HSGPA distributions are highly compressed or potentially inflated. Rather than using scores as rigid cutoffs, institutions could use them probabilistically to flag students for additional diagnostic assessment, co-requisite support, or proactive advising. At a broader level, the results speak to ongoing questions about the role of standardized testing in a test-optional environment. In contexts where high school grading practices vary and may shift over time, standardized measures like SAT Math scores can provide stable, comparable information about specific domains of academic readiness.

Conclusion

Across two cohorts spanning pre- and post-pandemic contexts, SAT Math scores consistently differentiated students at risk of poor performance in first-year college math. Moreover, the magnitude of this differentiation increased in 2023, particularly in more selective institutional contexts. While HSGPA remains an important indicator of academic preparation, these findings suggest that SAT Math scores provide distinct and, in some settings, increasingly valuable information for identifying students who may benefit from early academic support in mathematics.

References

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed). Hillsdale, NJ: Erlbaum.

College Board. (2024). Beyond the Admission Decision: New Trends in Test Score Use (case study report). New York: College Board. https://research.collegeboard.org/media/pdf/Enrollment%20Leaders%20Insights%20on%20Admission.pdf

College Board. (2022). *Research Survey Brief: Enrollment Leaders' Insights on Admissions Policy and Practice*. New York: College Board. https://research.collegeboard.org/media/pdf/Enrollment%20Leaders%20Insights%20on%20Admission.pdf

Flaherty, C. (2024, March 14). *Scaling Up: Shrinking the DFW Rate. Inside Higher Ed.* https://www.insidehighered.com/news/student-success/academic-life/2024/03/14/scaling-student-success-solving-higher-eds-dfw

Lovell, D., & Mallinson, D. J. (2024). Pencils down… for good? The expansion of test-optional policy after COVID-19. *Innovative Higher Education, 49*, 177–199. https://doi.org/10.1007/s10755-023-09677-2

National Science Board & National Science Foundation. (2023). *Elementary and secondary STEM education*. In *Science and engineering indicators 2024* (NSB-2023-31). https://ncses.nsf.gov/pubs/nsb202331/

Palakal, M. J., & White, L. (2024). The importance of STEM sense of belonging and academic hope in enhancing persistence to degree completion. *Journal for STEM Education Research*, 7, 155–180.

Sanchez, E.I. (2024). *Changes in predictive validity of high school grade point average and ACT® Composite score after the COVID-19 pandemic* (ACT Research Report). Iowa City: ACT. https://files.eric.ed.gov/fulltext/ED673779.pdf

Schmidt, F. L., & Hunter, J. E. (2015). *Methods of meta-analysis: Correcting for error and bias in research findings*. Los Angeles, CA: Sage.

University of California San Diego Senate-Administration Workgroup on Admissions. (2025). Final report: SAWG on admissions review (Updated January 8, 2026). UC San Diego https://senate.ucsd.edu/media/740347/sawg-report-on-admissions-review-docs.pdf

Westrick, P. A., Angehr, E. L, Shaw, E. J., & Marini, J. P. (2024). *Recent Trends in College Readiness and Subsequent College Performance: With Faculty Perspectives on Stud Readiness.* New York: College Board.

Westrick, P. A., Marini, J. P., and Shaw, E. J. (2025). *An In-Depth Exploration of SAT Math Scores for use in College Course Placement.* New York: College Board.

Xu, Y. J. (2018). The experience and persistence of college students in STEM majors. *Journal of College Student Retention: Research, Theory & Practice*, 19(4), 413–432.

Appendices

Table A 1: Means, Standard Deviations, and Standardized Mean Differences (d) for the Overall Sample

		DFW			No DFW			
Year	Measure	N	Mean	Std Dev	N	Mean	Std Dev	*d*
2018	HSGPA	11,597	3.40	0.51	58,011	3.74	0.43	-0.55
	SAT Math	11,597	555	91	58,011	613	94	-0.44
2023	HSGPA	9,309	3.48	0.54	50,812	3.83	0.42	-0.54
	SAT Math	9,309	510	94	50,812	594	101	-0.68

Table A 2: Means, Standard Deviations, and Standardized Mean Differences (d) by Institutional Admit Rate

			DFW			No DFW			
Year	Admit Rate	Measure	N	Mean	Std Dev	N	Mean	Std Dev	*d*
2018	0-25%	HSGPA	285	3.84	0.37	3,538	3.94	0.32	-0.45
		SAT Math	285	690	71	3,538	726	64	-0.70
	25%-50%	HSGPA	2,321	3.69	0.40	20,096	3.87	0.34	-0.49
		SAT Math	2,321	615	79	20,096	644	79	-0.41
	50%-75%	HSGPA	3,844	3.42	0.51	16,223	3.72	0.42	-0.53
		SAT Math	3,844	551	86	16,223	599	88	-0.36
	75%-100%	HSGPA	5,147	3.24	0.50	18,154	3.57	0.49	-0.64
		SAT Math	5,147	524	79	18,154	568	88	-0.50
2023	0-25%	HSGPA	173	4.02	0.29	3,165	4.02	0.28	-0.03
		SAT Math	173	598	101	3,165	690	86	-1.19
	25%-50%	HSGPA	1,775	3.80	0.36	19,174	3.96	0.32	-0.47
		SAT Math	1,775	563	91	19,174	626	86	-0.68
	50%-75%	HSGPA	3,509	3.46	0.51	15,154	3.76	0.44	-0.54
		SAT Math	3,509	507	92	15,154	571	97	-0.56
	75%-100%	HSGPA	3,852	3.32	0.57	13,319	3.70	0.49	-0.72
		SAT Math	3,852	484	84	13,319	550	97	-0.73

Table A 3: Means, Standard Deviations, and Standardized Mean Differences (d) by Institutional Control

			DFW			No DFW			
Year	Control	Measure	N	Mean	Std Dev	N	Mean	Std Dev	*d*
2018	Private	HSGPA	1,431	3.56	0.49	12,994	3.81	0.40	-0.57
		SAT Math	1,431	601	96	12,994	658	92	-0.55
	Public	HSGPA	10,166	3.38	0.51	45,017	3.72	0.44	-0.55
		SAT Math	10,166	549	88	45,017	600	90	-0.41
2023	Private	HSGPA	1,080	3.69	0.45	11,089	3.91	0.36	-0.40
		SAT Math	1,080	541	98	11,089	632	101	-0.84
	Public	HSGPA	8,229	3.45	0.55	39,723	3.81	0.43	-0.58
		SAT Math	8,229	506	92	39,723	583	98	-0.64

Table A 4: Means, Standard Deviations, and Standardized Mean Differences (d) by Institutional Size

			DFW			No DFW			
Year	Size	Measure	N	Mean	Std Dev	N	Mean	Std Dev	*d*
2018	Small <5,000	HSGPA	823	3.13	0.57	3,503	3.59	0.53	-0.73
		SAT Math	823	512	82	3,503	578	105	-0.54
	Medium 5,000 - 9999	HSGPA	829	3.17	0.56	2,942	3.58	0.50	-0.54
		SAT Math	829	523	81	2,942	584	84	-0.38
	Large 10,000 - 19,999	HSGPA	2,292	3.37	0.51	12,613	3.70	0.44	-0.59
		SAT Math	2,292	537	90	12,613	601	98	-0.48
	Very Large 20,000 and above	HSGPA	7,653	3.47	0.48	38,953	3.77	0.41	-0.52
		SAT Math	7,653	569	89	38,953	622	90	-0.43
2023	Small <5,000	HSGPA	498	3.36	0.62	2,679	3.74	0.50	-0.46
		SAT Math	498	473	82	2,679	566	112	-0.71
	Medium 5,000 - 9999	HSGPA	433	3.34	0.63	1,894	3.70	0.50	-0.63
		SAT Math	433	498	87	1,894	561	94	-0.56
	Large 10,000 - 19,999	HSGPA	1,827	3.44	0.53	10,645	3.79	0.43	-0.54
		SAT Math	1,827	502	91	10,645	585	103	-0.65
	Very Large 20,000 and above	HSGPA	6,551	3.51	0.53	35,594	3.86	0.40	-0.54
		SAT Math	6,551	516	95	35,594	600	98	-0.70

Figure A 1: Standardized Mean Differences in HSGPA and SAT Math (for DFW and no DFW Groups), 2018 and 2023 by Institutional Control

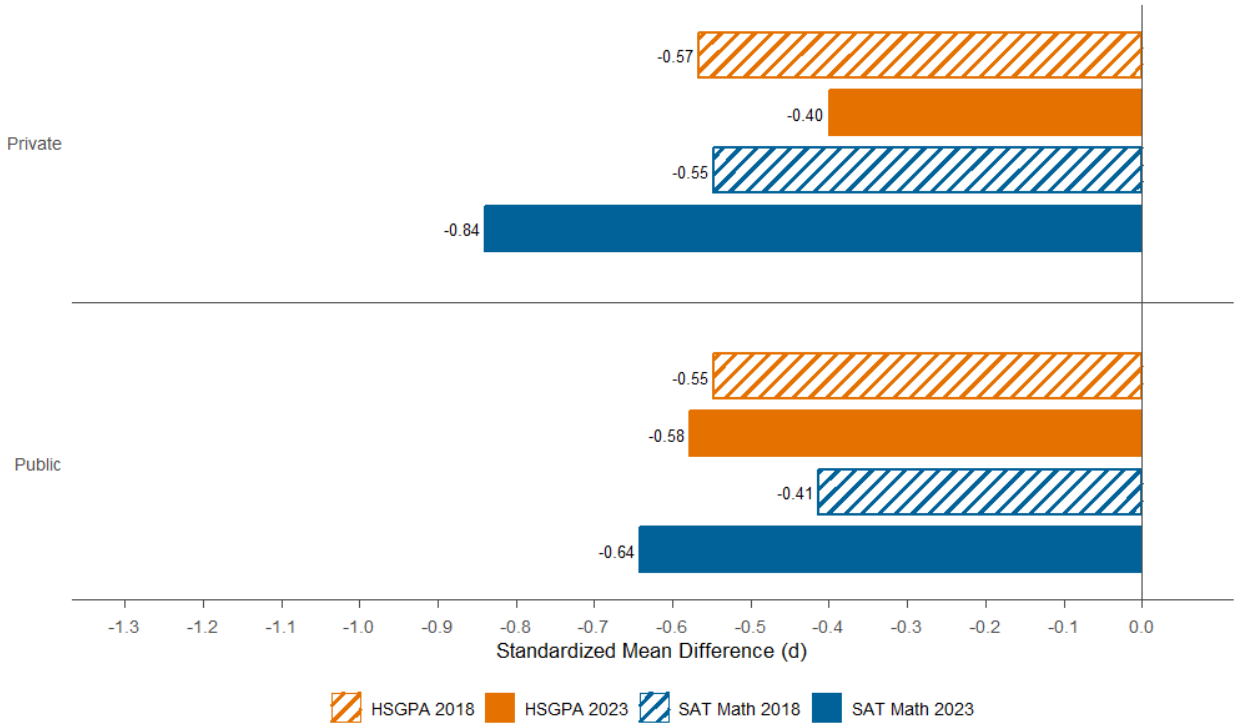


Figure A 2: Standardized Mean Differences in HSGPA and SAT Math (for DFW and no DFW Groups), 2018 and 2023 by Institutional Size