High School GPA as a Success Indicator

The number of institutions of higher education using Test Optional Policies (TOPs) in admissions decisions has increased significantly in recent years, including a growing number of 4-year Colorado institutions (Colorado College, University of Denver, Colorado Christian University, and Metropolitan State University). Recent national research indicates that institutions that adopt a test-optional admissions policy experience an increase in applications as well as an increase in the proportion of structurally underserved populations, including racially-minoritized students.[1] Admissions policies that require standardized tests (specifically SAT and ACT) can unnecessarily disadvantage otherwise well-qualified students and perpetuate systemic inequities. According to the Colorado Department of Higher Education, high school GPA is the most powerful predictor of first year retention among Colorado IHEs and overall postsecondary completion.[2] Institutional data from IRP&E indicates that this holds true for CSU as well. In addition, due to the COVID-19 pandemic during the spring and summer of 2020, many students did not have an opportunity to take (or re-take) the SAT or ACT. Moving to a test-optional admissions policy is consistent with CSU's land grant mission and commitment to equitable access to higher education. This study explores the validity of high-school GPA (HS GPA) as a stand-alone predictor of future collegiate success, compared to the combination of HS GPA and test scores.

Key Findings

High school GPA is strongly associated with student success outcomes, independent of SAT or ACT test scores. Consistent with previous IRP&E findings as well as national research, HS GPA can serve as a reliable predictor for first fall GPA as well as second and third fall persistence. These associations hold for structurally underserved populations, including those with multiple intersecting identities (racially minoritized, first generation, and/or limited income) as well as students with lower levels of pre-college academic preparation (defined in this report as students recommended for support).

Methodology

The intent of this analysis is to explore the validity of HS GPA as a stand-alone indicator of pre-college academic preparation as it relates to student success outcomes, rather than the standard practice of including both HS GPA and SAT and/or ACT test scores. In this study, success outcomes are defined as first fall end of term GPA, and persistence to second and third fall.

All first-time, full-time students from the FA15-FA19 cohorts were selected for these analyses (N=25,014); about 99% have a HS GPA and/or test scores. The three most recent cohorts are used, depending on the proximity of the outcome. For example, the FA17-FA19 cohorts are used to model first fall GPA, as these are the most recent cohorts to have the opportunity to earn a GPA during their first fall on campus, but the analysis with third fall persistence is among the FA15-FA17 cohorts.

Outcomes are modeled for three groups to investigate validity across populations of interest: students overall; students with two or more structurally underserved identities (racially minoritized, limited income, and/or first generation); and students recommended for support (SRS).

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[1] Syverson, T., Franks, V., & Hiss. W. (2018). *Defining Access: How Test-Optional Works.* The National Association for College Admission Counseling: https://www.nacacnet.org/globalassets/documents/publications/research/defining-access-report-2018.pdf

[2] Saboe, N. (2018). *Postsecondary and Workforce Readiness Endorsed Diploma.* Colorado Department of Higher Education: https://www.cde.state.co.us/node/41002

Each outcome is modeled using regression analysis; linear regression is used for first fall GPA, while binary logistic regression is used for persistence outcomes. Any ACT composite scores are converted to the equivalent SAT composite score based on the College Board's 2018 concordance guidelines. For all outcomes, model 1 (as noted in Tables 3-5) uses HS GPA as a predictor, while model 2 uses both HS GPA and SAT as predictors. Both models are run for each population of interest.

Observed Student Success

Table 1 displays demographics for students overall, by 2+ attributes, and by SRS status for the FA15-FA19 first-time, full-time cohorts.

Table 1: Student Demographics (FA15-FA19 FTFT Cohorts)

	Hdct	Percent	% STEM	% RM	% First Gen	% Female	% Pell	% Nonres	Avg HS GPA	Avg SAT Score
Overall	25,014	100.0%	40.3%	26.4%	23.5%	54.8%	21.1%	33.7%	3.64	1202
2+ Attributes	4,725	18.9%	36.5%	79.6%	81.8%	61.0%	76.0%	18.3%	3.59	1129
Students Recommended for Support	2,678	10.7%	23.2%	41.7%	37.0%	53.6%	33.0%	26.0%	3.24	1065

Overall, approximately 1 in 4 students are racially minoritized or first gen, about 1 in 5 are Pell recipients, and one-third are nonresidents. Nearly 55% are female-identified and about 40% are STEM majors during their first term. The average HS GPA is 3.64, and the average SAT composite score is 1202.

Among students with two or more structurally underserved attributes, 8 in 10 are first generation or racially minoritized, and 3 in 4 are Pell recipients. They are more likely to be female (61% vs. 55%) and Colorado residents compared to students overall (~82% vs. 66%). They also have a slightly smaller representation of STEM majors and their average HS GPA / test scores are lower than the overall population.

Among SRS, one-third are Pell recipients, 37% are first gen, and about 42% are racially minoritized. They are more likely to be residents compared to students overall (7 PP difference), and less likely to be STEM majors (17 PP difference), with roughly the same proportion of females. Their average HS GPA and test scores are lower than students overall and those with 2+ attributes.

Table 2 displays first fall GPA and second and third fall persistence rates by group.

Table 2: Observed First Fall GPA and Persistence (FA15-FA19 FTFT Cohorts)

	Headcount	Percent	Avg 1st Fall GPA	% 2nd Fall Persist	% 3rd Fall Persist
Overall	25,014	100.0%	2.94	84.6%	75.9%
2+ Attributes	4,725	18.9%	2.68	79.1%	68.9%
Students Recommended for Support	2,678	10.7%	2.47	78.6%	65.0%

The average first fall GPA for all five cohorts is 2.94, persistence to second fall is 84.6%, and persistence to third fall is 75.9%. Among students with 2+ attributes, first fall GPA is about one-quarter of a grade point lower than the overall average, second fall persistence is about 5 PP lower at 79%, and third fall persistence is about 69%, which is 7 PP lower than the overall average. Students recommended for support have the lowest average GPA at 2.47, a similar persistence rate to students with 2+ attributes (~79%), and a lower third fall persistence rate at 65%.

Predicted Student Success

In general, HS GPA serves as a strong stand-alone predictor of student success across populations.

1st Fall GPA

Table 3 displays the unstandardized beta values, the upper and lower bounds for the 95% confidence interval (CI) for beta, and the adjusted R^2 values for both models across all three populations. The adjusted R^2 value estimates the proportion of variance that can be explained by each model.

Table 3: Predicted 1st Fall GPA (FA17-FA19 FTFT Cohorts)

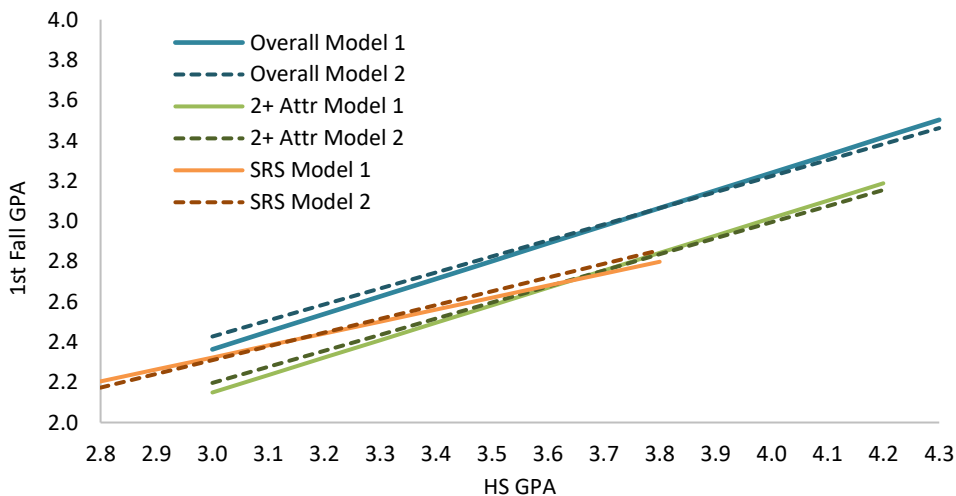|		Overall		2+ Attributes[1]		SRS	
	Predictor(s)	B (95% CI)	Adj. R^2	B (95% CI)	Adj. R^2	B (95% CI)	Adj. R^2
Model 1	HS GPA	.877 (.851,.902)	.226*	.865 (.797, .934)	.171*	.594 (.493, .695)	.064*
Model 2	HS GPA	.796 (.768, .824)		.798 (.727, .869)		.682 (.574, .791)	
	SAT	.001 (.001, .001)	.235*	.001 (.001, .001)	.182*	.001 (.000, .001)	.073*
R^2 Percent Change		-4.0%		-6.4%		-14.1%	

[1]Includes students with any two or more structurally underserved attributes: first gen, limited income, and racially minoritized.
*Model is statistically significant ($p<.05$).

No substantial difference is observed in the model R^2 when model 1 is compared to model 2 across each population; however, the percent of variance explained by the model increases at a larger percent for structurally underserved students and for students recommended for support. For instance, the R^2 value for the overall model increases by 4% when test scores are added; it increases by 6% for the 2+ attribute group, and by 14% for the SRS group. It is important to note that HS GPA, with or without test scores, generally predicts much less of the variance in first fall GPA for students with two or more structurally underserved identities or those recommended for support. This indicates the importance of the holistic review process when reviewing applications of students who do not have the credentials to be automatically admitted.

Figure 1 displays predicted first fall GPA, comparing model 1 and model 2 for each population at different HS GPA values. The range of values for HS GPA represents the range between the observed 10th and 90th percentiles for each population.

Figure 1: Model Comparison, Predicted 1st Fall GPA by HS GPA for Populations of Interest

As displayed by the closely plotted lines for each model across all three populations, predicted first fall GPA differs minimally when test scores are used in addition to GPA compared to just using GPA.

2nd Fall Persistence

Table 4 displays odds ratios (OR), 95% CIs for each OR, and the percent correctly predicted for each model across populations. Model differences are expressed using '% Correctly Predicted', which is the appropriate metric when interpreting logistic regression results, and serves a similar purpose as the adjusted R^2 statistic displayed in Table 3.

Table 4: Predicted 2nd Fall Persistence (FA16-FA18 FTFT Cohorts)

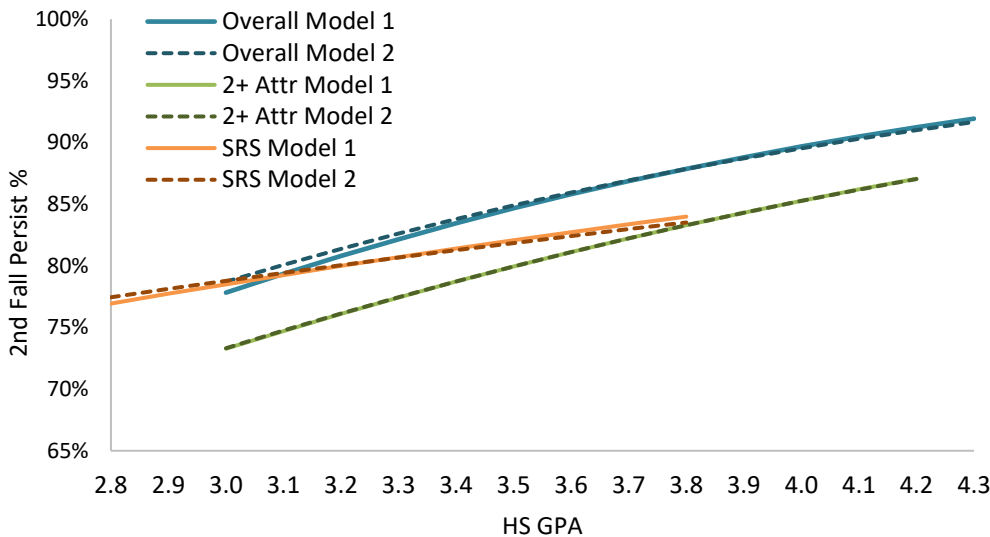|		Overall		2+ Attributes[1]		SRS	
	Predictor(s)	OR (95% CI)	% Correctly Predicted	OR (95% CI)	% Correctly Predicted	OR (95% CI)	% Correctly Predicted
Model 1	HS GPA	2.47 (2.24, 2.73)	84.1%*	2.11 (1.72, 2.60)	77.9%*	1.27 (1.18, 2.10)	78.9%*
Model 2	HS GPA	2.31 (2.08, 2.57)		2.11 (1.70, 2.61)		1.48 (1.08, 2.01)	
	SAT	1.00 (1.00, 1.00)	84.1%*	1.00 (0.99, 1.00)	77.9%*	1.00 (1.00, 1.00)	78.9%*
PP Difference		0.00		0.00		0.00	

[1]Includes students with any two or more structurally underserved attributes: first gen, limited income, and racially minoritized.
*Model is statistically significant (p<.05).

Similar to first fall GPA, both models were roughly equivalent in their ability to correctly predict second fall persistence across all populations of interest. In addition, the percent correctly predicted for models 1 and 2 is about 6 PP lower for the 2+ attribute group compared to students overall, and about 5 PP lower for SRS students. Like first fall GPA, these results demonstrate the importance of the holistic review process when reviewing applications of students who do not meet the criteria to be automatically admitted.

Figure 2 displays predicted 2nd fall persistence, comparing models 1 and 2 for each population at different HS GPA values.

Figure 2: Model Comparison, Predicted 2nd Fall Persistence by HS GPA for Populations of Interest

Similar to first fall GPA, predicted second fall persistence differs minimally when test scores are used in addition to GPA compared to just using GPA, as evidenced by nearly identical trajectories for each population.

3rd Fall Persistence

Table 5 displays odds ratios (OR) and corresponding 95% CIs, and the percent correctly predicted for each model across populations.

Table 5: Predicted 3rd Fall Persistence (FA15-FA17 FTFT Cohorts)

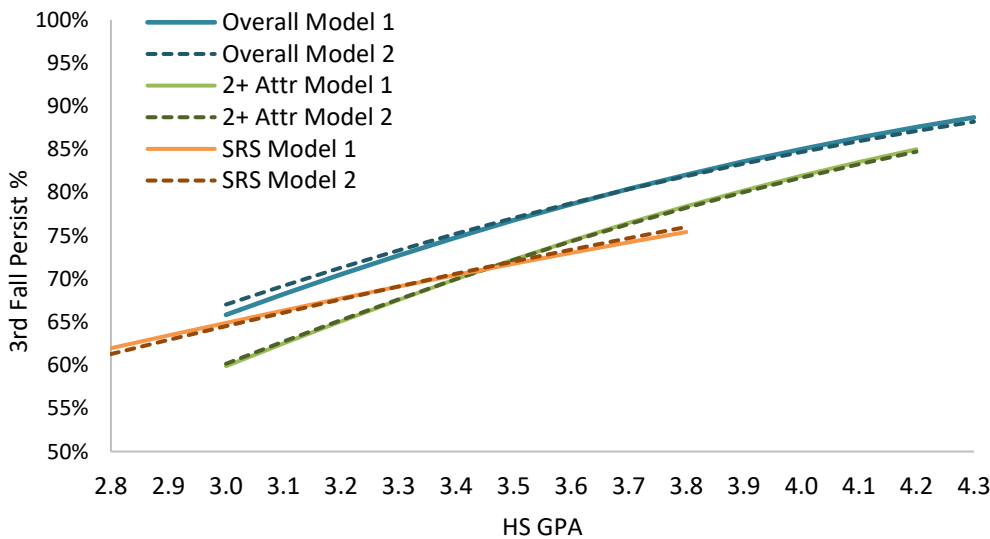|		Overall		2+ Attributes[1]		SRS	
	Predictor(s)	OR (95% CI)	% Correctly Predicted	OR (95% CI)	% Correctly Predicted	OR (95% CI)	% Correctly Predicted
Model 1	HS GPA	2.95 (2.70, 3.22)	76.0%*	3.04 (2.48, 3.72)	69.9%*	1.88 (1.38, 2.58)	64.6%*
Model 2	HS GPA	2.72 (2.48, 2.99)		2.96 (2.40, 3.64)		2.00 (1.41, 2.83)	
	SAT	1.00 (1.00, 1.00)	75.9%*	1.00 (1.00, 1.00)	69.7%*	1.00 (1.00, 1.00)	64.9%*
PP Difference		+ 0.10		+ 0.20		- 0.30	

[1]Includes students with any two or more structurally underserved attributes: first gen, limited income, and racially minoritized.

*Model is statistically significant (p<.05).

Both models are roughly equivalent in their ability to correctly predict third fall persistence across populations of interest. Like previous success indicators, students with 2 or more structurally underserved attributes and those recommended for support are better served by the holistic review process, as evidenced by lower values for percent correctly predicted by each model compared to students overall.

Figure 3 displays predicted 3rd fall persistence, comparing model 1 and model 2 results by population of interest.

Figure 3: Model Comparison, Predicted 3rd Fall Persistence by HS GPA for Populations of Interest

Like second fall, predicted third fall persistence rates are nearly identical across models 1 and 2 for each population.

Conclusions

Across populations, high school GPA serves as an equally strong predictor of student success compared to the combination of HS GPA and SAT scores. Results also highlight the importance of the holistic review process for those students who may not meet CSU's automatic admission criteria due to lower HS GPA and test scores since these metrics generally have weaker predictive power for these populations compared to the CSU population overall.