

**Empirical Investigation of Maryland Student High School Academic Performance
Indicators as College and Career Readiness Measures**

Submitted to
Maryland State Department of Education (MSDE)

by

Maryland Assessment Research Center (MARC)

Executive Summary

Purpose of the Study

MSDE requested MARC to conduct a study to identify high school academic performance indicators which can be the best predictors of college and career success. Thus, the purpose of this study was to explore the relationship between high school academic performance measures and actual success in postsecondary coursework. The high school academic performance indicators include state and national standardized tests and other measures of academic achievement in high school. The results are intended to inform the adoption of college and career readiness standards during the course of high school education in the state of Maryland.

More specifically, this study investigated the relationships between Maryland student high school academic performance and college and career readiness (CCR) which is mainly quantified in terms of the end-of-first-year college cumulative GPA (FYGPA). The high school academic performance includes assessment scores on SAT, PSAT, ACT, PARCC, overall high school GPA (HSGPA), subject-specific HSGPA in math, English, and science, AP/IB scores, and other academic performance-related variables such as school attendance, need of remedial work, dual enrollment status in addition to demographic variables. The data used in this investigation spanned high school grades 9 to 12 and the college semesters when the first 30 credits were earned. To avoid the impact of COVID, Maryland high school graduation cohorts attending a 2-year or a 4-year Maryland public colleges/universities in 2017, 2018, and 2019 were included in the analyses.

Research Questions

This study included the following research questions:

1. How should certain conceptual variables be operationalized (e.g., “GPA”) such that they are the best predictors of actual success in postsecondary coursework?
2. What assessments or other high school measures are the best predictors of actual success in postsecondary coursework?
3. What level/score on assessments or other high school measures are the best predictors of actual success in postsecondary coursework?
4. Are there any predictors (whether alone or in combination), that, if used as an indicator of college and career readiness, would have a positive or negative disproportionate impact on any particular group of students (by overall, race, SES)?
5. Are there certain predictors that can be used in combination to predict college success?

Major Findings

RQ1. How should certain conceptual variables be operationalized (e.g., “GPA”) such that they are the best predictors of actual success in postsecondary coursework?

Analysis methods: To address this research question, different high school performance indicators were first operationalized in terms of overall GPA at the end of grades 10, 11, and 12 and subject-specific GPA in English, Math, and Science at each grade in addition to the state (i.e., PARCC ELA 10 and Algebra I) and the national standardized test (i.e., ACT and SAT) scores. The actual success in postsecondary coursework was measured by the college first-year GPA (i.e., FYGPA). The FYGPA was calculated as a weighted GPA across institutions in each term using the earliest record with earned cumulative credits no less than 30. The cumulative GPA was weighted by cumulative credits in each institution. A FYGPA of 3.0 or higher was considered as success in postsecondary coursework. The relationships between these high school performance indicators and the FYGPA were investigated via correlational analyses, concordance mapping and the classification consistency in academic performance in high school and college.

Major Findings:

- Overall HSGPAs at grades 10, 11, and 12 were better predictors than subject-specific GPAs in English, Math, and Science at each grade level.
- The HSGPA at a higher grade level was generally a better predictor than that at a lower grade level.
- PARCC ELA 10 was a slightly better predictor than PARCC Algebra I.
- SAT/ACT composite scores were better predictors than its respective component scores.

RQ2. What assessments or other high school measures are the best predictors of actual success in postsecondary coursework?

Analysis methods: Each of the seven high school performance indicators (HSPI) were mapped to FYGPAs and cutoff scores that aligned with a FYGPA of 3.0 were obtained. The cutoff scores for FYGPA and a HSPI were used to examine the consistency in classifying students in the high-performing group or the low-performing group based on either a HSPI or FYGPA. Further, the correlation between FYGPA and each of the seven HSPIs were analyzed to examine the strength of the overall relationship.

Major Findings:

- In general, the overall GPA at grade 12 led to the highest classification consistency

and correlated the highest with FYGPA, followed by the overall GPA at grades 11 and 10 among all HSPI in both types of colleges in terms of classification consistency.

- PARCC Algebra I led to the lowest classification consistency and correlated the lowest with FYGPA. On the other hand, PARCC ELA 10 was a better HSPI in predicting college success than PARCC Algebra I. In the 4-year college, PARCC ELA 10 ranked as the 5th best HSPI while in the 2-year college, it ranked as the 4th best HSPI.
- ACT was a slightly better HSPI than SAT, but the differences were not large, around 1%.
- These seven HSPIs yielded higher classification consistency and correlated higher with FYGPA in the 4-year college than that in the 2-year college.

RQ3. What level/score on assessments or other high school measures are the best predictors of actual success in postsecondary coursework?

Analysis methods: To address the research question, concordance tables were created to map the CCR predictor scores to college FYGPA based on equipercntile linking. The mapping of each CCR predictor score and college FYGPA was demonstrated in the conversion tables.

Major Findings:

Table 1. Mapped Scores between College FYGPA and High School Performance Indicators

High-School Performance Indicator (HSPI)	College FYGPA	Mapped Score on HSPI	Category 1 High-FYGPA High-HSPI	Category 2 High-FYGPA Low-HSPI	Category 3 Low-FYGPA Low-HSPI	Category 4 Low-FYGPA High-HSPI	Category 1 + Category 3	Total Sample Size
4-Year Colleges								
SAT	3.03	1070	19,314 (49.20%)	6,111 (15.57%)	7,421 (18.90%)	6,409 (16.33%)	26,735 (68.11%)	39,255
ACT	3.07	21	7,582 (51.91%)	2,011 (13.77%)	2,592 (17.74%)	2,422 (16.58%)	10,174 (69.65%)	14,607
Grade 10 GPA	3.00	2.81	21,247 (51.51%)	6,295 (15.26%)	7,695 (18.66%)	6,009 (14.57%)	28,942 (70.17%)	41,246
Grade 11 GPA	3.00	2.80	21,985 (52.18%)	6,088 (14.45%)	7,939 (18.84%)	6,125 (14.54%)	29,924 (71.02%)	42,137
Grade 12 GPA	3.00	2.83	21,968 (51.79%)	6,275 (14.79%)	8,642 (20.37%)	5,530 (13.04%)	30,610 (72.17%)	42,415
PARCC ELA 10	3.00	757	20,863 (50.82%)	6,584 (16.04%)	7,136 (17.38%)	6,467 (15.75%)	27,999 (68.21%)	41,050
PARCC Algebra I	3.01	751	19,340 (48.82%)	6,451 (16.29%)	6,995 (17.66%)	6,827 (17.23%)	26,335 (66.48%)	39,613
2-Year Colleges								
SAT	3.00	1010	3,101 (32.64%)	1,961 (20.64%)	2,482 (26.12%)	1,958 (20.60%)	5,583 (58.76%)	9,502
ACT	3.06	19	766	434	661	533	1,427	2,394

			(32.00%)	(18.13%)	(27.61%)	(22.26%)	(59.61%)	
Grade 10 GPA	3.00	2.68	4,037 (32.45%)	2,371 (19.06%)	3,910 (31.43%)	2,123 (17.06%)	7,947 (63.88%)	12,441
Grade 11 GPA	3.00	2.69	4,241 (33.31%)	2,325 (18.26%)	3,979 (31.25%)	2,186 (17.17%)	8,220 (64.57%)	12,731
Grade 12 GPA	3.00	2.74	4,215 (32.76%)	2,419 (18.80%)	4,253 (33.06%)	1,979 (15.38%)	8,468 (65.82%)	12,866
PARCC ELA 10	3.00	756	3,955 (31.99)	2,417 (19.55%)	3,676 (29.73%)	2,316 (18.73%)	7,631 (61.72%)	12,364
PARCC Algebra I	3.00	745	3,539 (29.24%)	2,656 (21.94%)	3,398 (28.08%)	2,510 (20.74%)	6,937 (57.32%)	12,103

RQ4. Are there any predictors (whether alone or in combination), that, if used as an indicator of college and career readiness, would have a positive or negative disproportionate impact on any particular group of students (by overall, race, SES)?

Analysis methods: To address this research question, correlations between CCR predictor scores and college FYGPA were calculated to quantify the positive or negative disproportionate impact of CCR predictor scores on actual success in postsecondary coursework. The correlational analyses were conducted for the overall group and the subgroups of students by race/ethnicity and SES. Further, the percent of students who are considered as CCR based on each HSPI was computed for the overall and subgroups.

Major Findings:

- For both 2- and 4-year colleges,
 - Black and Hispanic students are less likely than Asian and White students to meet the cut score and students eligible for free and reduced-price meals (FARMs) are less likely to meet the cut score on all high school measures examined.
 - White students are more likely to meet the high school measure threshold through the college entrance exams or state standardized tests than through GPA.
 - Students eligible for FARMs are more likely to meet the high school measure threshold through GPA than the college entrance exams or state standardized tests.
- For 2-year colleges, GPA is the only CCR measure that allows for similar percentages of students to meet the threshold, regardless of FARMs eligibility status.
- For 4-year colleges, Black students and students eligible for free and reduced-price more likely to meet the high school measure threshold through GPA or state standardized tests than through college entrance exams.

RQ5. Are there certain predictors that can be used in combination to predict college success?

Analysis methods: To address this research question, the mean FYGPA and the percentages of students whose FYGPA was above 3 was calculated for different performance categories

based on PARCC ELA 10 and Algebra I with a cut score of 750 for both tests. Further, HSGPA at Grade 12 was added to the classification of students into performance levels. The mean FYGPA and the percentage of students whose FYGPA was above 3 were calculated for different performance categories based on PARCC ELA 10 and Algebra I with a cut score of 750 for both tests and a mapped HSGPA at Grade 12 of 2.83 for the 4-year college and 2.74 for the 2-year college respectively.

Major Findings

- In both types of colleges, students who met the interim standard (750 on both ELA 10 and Algebra I) were about twice as likely to have FYGPAs at or above 3.0 than those who did not meet the standard.
- Students who met the study's high school GPA threshold were nearly twice as likely to earn a first-year college GPA of 3.0 or greater in both two- and four-year colleges.
- For both two- and four-year college students, a high school GPA threshold is always a stronger predictor of postsecondary success than the interim, test-based CCR standard. More students met the GPA threshold than met the test-based CCR standard.
- Allowing for an option to meet a CCR standard through either GPA or through assessments increases the number of students meeting the standard while the average first-year college GPA for these students still exceeds the "postsecondary success" definition of 3.0.