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 equipercentile 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	6,111	7,421	6,409	26,735	39,255
			(49.20%)	(15.57%)	(18.90%)	(16.33%)	(68.11%)	
ACT	3.07	21	7,582	2,011	2,592	2,422	10,174	14,607
			(51.91%)	(13.77%)	(17.74%)	(16.58%)	(69.65%)	
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	6,088	7,939	6,125	29,924	42,137
			52.18%)	(14.45%)	(18.84%)	(14.54%)	(71.02%)	
Grade 12 GPA	3.00	2.83	21,968	6,275	8,642	5,530	30,610	42,415
			(51.79%)	(14.79%)	(20.37%)	(13.04%)	(72.17%)	
PARCC ELA 10	3.00	757	20,863	6,584	7,136	6,467	27,999	41,050
			(50.82%)	(16.04%)	(17.38%)	(15.75%)	(68.21%)	
PARCC Algebra I	3.01	751	19,340	6,451	6,995	6,827	26,335	39,613
			(48.82%)	(16.29%)	(17.66%)	(17.23%)	(66.48%)	
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.

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

1. Introduction

Background

College and Career Readiness (CCR) is an essential predictor of whether a student is qualified for and succeeds in entry-level, credit-bearing college courses or career pathway-oriented training programs after graduating from high school (Conley, 2012). The main objective of K-12 education is to make students college and career ready when they graduate from high school. How to measure CCR and assist students in becoming college and career ready is critical for K-12 education in developing a credible and effective accountability system.

CCR measures are often used for accountability and tracking students' progress in K12 education, especially in high school. It often requires both static and dynamic perspectives about the status whether students are ready for college and career as well as their growth along the path towards college and career readiness. Current approaches in K12 education often use multiple measures including college admission test scores (e.g., SAT, ACT, or PSAT), state assessment scores (PARCC scores or state specific tests), or Grade Point Average (GPA). A cut score is commonly set for each measure. A CCR decision is made based on one or multiple measures. Each of these measures may only tap one aspect of the profile of student academic performance towards CCR though high school GPA may provide a more comprehensive evaluation of students' CCR (MARC, 2022).

Some indicators of CCR for postsecondary education have been previously or are presently being used in Maryland such as state test scores. Other indicators might be worthy of consideration for future reporting of CCR. In practice, CCR indicators comprise both test-based and non-test-based metrics (e.g., Dailey, 2019; Meeks & Smith, 2018). Test-based measures include:

- state standardized test scores such as PARCC, MCAP, and other alternative state tests;
- national standardized tests of high school performance such as SAT, ACT, PSAT/NMSQT;
- course-specific standardized tests: Advanced Placement (AP) tests, International Baccalaureate (IB) tests;

On the other hand, non-test-based measures include:

- overall high school GPA (HSGPA)
- subject-specific HSGPA in math, English, or science
- course grades
- school attendance
- need for remedial work
- dual enrollment status
- demographic variables

- career and technical education concentrator status
- career and technical education apprenticeship, credential, or licensure

All of these measures and indicators can be used as solely or combined for quantifying CCR from different perspectives. To serve the purpose of this study, one or multiple measures or indicators may be used longitudinally to determine if a student is "on track" or on the right growth trajectory for college and career readiness while still in high school. In the meantime, these measures can also be used as status indicators to determine whether a student meets high school graduation requirements. Furthermore, the measures can be used by higher education institutions to determine postsecondary admission decisions. In the interim, subject-specific measures can be used to place students in postsecondary courses.

Purpose of the Study

MSDE requested MARC to conduct a study to identify high school academic performance indicators (HSPIs) which can be the best predictors of college and career readiness. Thus, the purpose of this study was to explore the relationship between HSPIs and the actual academic achievements in postsecondary coursework. The HSPIs 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/NMSQT, ACT, PARCC, overall high school GPA (HSGPA), subject-specific HSGPA in math, English, and science, AP/IB test 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 from 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. Specifically, this study answers five research questions as listed below.

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?

2. Methods

Data

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 from 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. Further, Maryland state assessment programs have evolved through different generations from HSA/MSA to PARCC, and recently to MCAP. To avoid the impact from different assessment programs via linking, this study was designed to use data mainly from PARCC assessment programs for Maryland.

The data received included student graduation year, K12 attendance, K12 course grades, K12 assessments, professional training programs, post-secondary attendance and degrees, remedial courses, and employment. More specifically, the following information was provided for this study.

1. The cohort year for students exiting high school in 2017, 2018, or 2019.
2. Attendance records for students included in the three cohorts (including prior to high school records) along with the associated sub-population indicators.
3. K12 courses including course records for students in high school.
4. K12 assessment data including scores on PARCC, SAT, ACT, PSAT/NMSQT, AP and IB tests.
5. Information about high school completion status and technical skill assessment.
6. Industry certifications for Maryland Career and Technology Education (CTE) students.
7. Information on earning diplomas in General Educational Development (GED) and National External Diploma Program (NEDP).
8. Students' college GPA from in-state public institutions.
9. External credit information for students that earned a degree from a Maryland public institution.
10. The end status of a student's need for remediation as assessed and reported by the institution.
11. Completion status for post-secondary education courses.
12. Employment data and wage data.

Before data analysis, data cleaning was conducted. The records for 214,251 students who exited Maryland high schools in 24 school districts in academic years 2017, 2018, and 2019 were available for this study. Among all students, 174,404 (81.40%) students completed high school. 17,962 (8.38%) students withdrew. 21,827 (10.19%) students transferred out of Maryland public high schools. 58 (0.03%) students had missing information and there were no subsequent high school records for these students.

For all 214,251 students, 55,340 (25.83%) students had first-year college GPA (FYGPA) from Maryland postsecondary public institutions. Out of 55,340 students who had

FYGPA, 42,441 were 4-year college students while 12,899 were 2-year college students. Since our study focused on students' college performance, only the records for the students who had FYGPA are used in the 4-year and 2-year data analysis in our study, Namely, the sample sizes were 42,441 for the 4-year college and 12,899 for the 2-year college.

Student Demographic Variables

To better understand the samples used for all analyses for 4-year and 2-year colleges respectively, Table 2.1 summarizes the total number of HS graduates with demographic information related to gender, race/ethnicity, SES in terms of eligibility of receiving free and reduced meals (FARMS), English Language Learners (ELL), and students with disabilities (SPECED). The same information is presented in Table 2.1 about the 2-year college students and the 4-year college students.

Table 2.1
Sample Sizes for the Total and Subgroups of Students Attending the 4-Year and 2-Year Colleges

Groups	Subgroups	Overall (2 and 4 Years)	4-Year	2-Year
Gender	Male	24,090	18,354	5,736
	Female	31,250	24,087	7,163
Race/Ethnicity	Asian	7,183	6,009	1,174
	Black	14,621	11,910	2,711
	Hispanic	5,808	3,639	2,169
	White	25,155	18,929	6,226
SES	Non-FARMS	43,817	34,395	9,422
	FARMS	11,523	8,046	3,477
English Learners	Non-ELL	54,941	42,277	12,664
	ELL	399	164	235
Students with Disabilities	Non-SPECED	53,910	41,734	12,176
	SPECED	1,430	707	723
Total		55,340	42,441	12,899

For 55,340 students who had FYGPA, 24,090 (43.53%) students were male while 31,250 (56.47%) were female. Among the 42,441 students in the 4-year college, 18,354 (43.25%) students were male while 24,087 (56.75%) were female. Among the 12,899 students in the 2-year college, 5,736 (44.47%) students were male while 7,163 (55.53%) were female. In general, the gender distributions were about the same for both types of colleges.

Among the 55,340 students who had FYGPA, 7,183 (13.61%) were Asian, 14,621 (27.71%) were Black, 5,808 (11.01%) were Hispanic, and 25,155 (47.67%) were White students. Among the 42,441 students in the 4-year college, 6,009 (14.84%) were Asian, 11,910 (29.42%) were Black, 3,639 (8.99%) were Hispanic, and 18,929 (46.75%) were White students. Among the 12,899 students in the 2-year college, 1,174 (9.56%) were Asian, 2,711 (22.08%) were Black, 2,169 (17.66%) were Hispanic, and 6,226 (50.70%) were White students. In terms of race/ethnicity distribution, the percentages of Hispanic and White students attending the 2-year colleges were higher than those attending the 4-year colleges.

For the 55,340 students, 43,817 (79.18%) students were not eligible for free and reduced price meals while 11,523 (20.82%) were eligible. Among the 42,441 students in the 4-year college, 34,395 (81.04%) students were not eligible for free and reduced price meals while 8,046 (18.96%) were eligible. Among the 12,899 students in the 2-year college, 9,422 (73.04%) students were not eligible for free and reduced price meals while 3,477 (26.96%) were eligible. More students were eligible for FARMs in the 2-year colleges than in the 4-year colleges.

Across the 55,340 students, 399 (0.72%) students received English Language Learner (ELL) services while 54,941 (99.28%) did not or already exited the ELL program. Among the 42,441 students in the 4-year college, 164 (0.39%) students received English Language Learner (ELL) services while 42,277 (99.61%) did not or already exited the ELL program. Among the 12,899 students in the 2-year college, 235 (1.82%) students received English Language Learner (ELL) services while 12,664 (98.18%) did not or already exited the ELL program. The percentage of students in the 2-year colleges who attended the ELL programs was about 1% more than that of students attending the 4-year colleges.

Lastly, for the 55,340 students who had FYGPA, 1,430 (2.58%) were students with disabilities while 53,910 (97.42%) were students without disabilities. Among the 42,441 students in the 4-year college, 707 (1.67%) were students with disabilities while 41,734 (98.33%) were students without disabilities. Among the 12,899 students in the 2-year college, 723 (5.61%) were students with disabilities while 12,176 (94.39%) were students without disabilities. The percentage of students with disabilities in the 2-year colleges was about 4% more than that of students attending the 4-year colleges.

In general, the available data were similar for the 2-year and 4-year colleges in terms of gender, but differed slightly in terms of attending the ELL programs and receiving FARMs. The major difference was in the percentage of Hispanic students.

High School Academic Performance Indicators

State and National Test Scores. K12 assessment data included scores on PARCC, ACT, PSAT/NMSQT, SAT, AP, and IB test scores. The results related to the AP and IB test scores are not presented in the current report[1]. When multiple records were available, the latest record was retained. If multiple latest records were available, the highest score was retained. If multiple latest records had the same score, one record was randomly chosen.

<u>*State Tests: PARCC and HSA.*</u> Some students took the PARCC tests while others took the High School Assessment (HSA) for high school graduation. The concordance tables developed by MARC were used to convert HSA scores to PARCC test scores. The HSA English and Algebra scores in 2015 and 2016 were transformed to PARCC ELA 10 or Algebra I using concordance tables developed by MARC (Jiao et al., 2016; Zou et al., 2017). A new concordance table that links HSA Algebra I and PARCC Algebra I scores was developed using the HSA Algebra I data before 2015. The PARCC Algebra I scores used in

[1] Refer to the May 2022 MARC report for the impact of AP and IB test scores.

developing the new concordance table were the highest PARCC Algebra I scores for the three cohorts.

Among the 42,441 students in the 4-year analysis, after score transformation, 41,050 (96.72%) students had PARCC ELA 10 scores, among which 11 (0.03%) were converted from HSA English scores. 39,613 (93.34%) students had PARCC Algebra I scores, among which 289 (0.73%) were converted based on the concordance tables between the PARCC and HSA Algebra scores developed in 2015 and 2016 while 25,379 (64.07%) were converted based on the concordance tables between the PARCC and HSA Algebra I scores using HSA scores before 2015.

Among the 12,899 students in the 2-year analysis, after score transformation, 12,364 (95.85%) students had PARCC ELA 10 scores, among which 524 (4.24%) was converted from HSA English scores. 12,103 (93.83%) students had PARCC Algebra I scores, among which 168 (1.36%) were converted from HSA Algebra scores, 4,936 (39.92%) were converted scores based on the concordance table developed using HSA Algebra I scores before 2015.

National Tests: SAT, PSAT/NMSQT, and ACT. Among the 42,441 students who had FYGPA in the 4-year analysis, 39,255 (92.49%) students had SAT scores. 14,607 (34.42%) students had ACT scores. 40,290 (94.93%) students had PSAT/NMSQT scores. The score scale of SAT before 2016 was different from that after 2016. So all the old-scaled SAT scores were converted to the new SAT score scale using the concordance table provided by the College Board (2016a)[2]. 984 (2.51%) students had converted SAT scores from the old scale. The score scale of PSAT/NMSQT in 2014 and earlier was different from that in 2015 and after. Similarly, all the old PSAT scores were converted to the new PSAT score scale using the concordance table provided by the College Board (2016b)[3]. 3,549 (8.81%) students had converted PSAT scores from the old scale.

Among the 12,899 students who had FYGPA in the 2-year analysis, 9,502 (73.66%) students had SAT scores. 2,394 (18.56%) students had ACT scores. 11,237 (87.12%) students had PSAT/NMSQT scores. 83 (0.87%) students had converted SAT scores from the old scale. 1,177 (10.47%) students had converted PSAT scores from the old scale.

High-School GPAs. High school GPA records were retained when the course was marked as completed, passed, or failed and excluded when the completion status was missing. Only the records from grades 9 to 12 were retained. Then, course grades and credits were used to calculate high school GPAs in math, ELA and science. Math GPA was computed based on courses such as algebra, trigonometry, elementary statistics, math analysis, and other math-related courses. ELA GPA was computed based on English and Reading. Science GPA was computed based on courses including General Science, Chemistry, Physics, Biology, Environmental Science and Physical Science. Specifically, Physical Science in the data records refers to the academic disciplines related to the laws of nature. It is a collective term for areas of study on astronomy, chemistry, materials science and physics.

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[2] Please refer to Appendix A for the conversion table between the new and the old SAT scales.
[3] Please refer to Appendix B for the conversion table between the new and the old PSAT/NMSQT scales.

For course grades, letter grades from E/F to A+ and percent grades from below 65 to 100 were converted to 4.0 scale based on College Board converting standards (College Board, 2022). AP scores and most IB scores have letter grades from E/F to A+ and percent grades from below 65 to 100 and thus were converted to the 4.0 GPA scale as well. IB scores ranging from 1 to 7 were also converted to the 4.0 GPA scale following the standard in Gia su' IB (2021). Records with special letters such as AF, CR, CW, HI, I, M, N, NC, NM, P, R, T, U, W, WF, WM, WP, X as course grade were less than 0.1% of the total number of records and were removed.

The GPA scores for Mathematics, ELA and Science were calculated as weighted sums of GPA scores weighted by the credits of the courses in cumulative grades. GPA scores across grades were cumulative, which means grade 9 GPAs were the weighted sums for grade 9 course grades only, and grade 10 GPAs were the weighted sums for both grade 9 and 10 course grades.

GPA overall scores were the weighted sum GPAs for Mathematics, ELA and Science across all related academic courses. For example, consider student A has the records as shown in Table 2.2. An example of grade 10 overall HSGPA for the student is computed as follows.

Table 2.2

An Example of a Student Record for Mathematics on High School Courses

Student	Grade	Subject	Course name	Course grade	Credit
Student A	9	Mathematics	Algebra I	2	1.0
Student A	9	Mathematics	Trigonometry	3	0.5
Student A	9	Mathematics	Geometry	4	0.5
Student A	9	ELA	English	2	1.0
Student A	9	Science	Chemistry	3	0.5
Student A	10	ELA	Reading	2	1.0
Student A	10	Science	Chemistry	3	0.5
Student A	10	Science	Physics	3	0.5

Student A's grade 10 overall HSGPA =(Algebra I grade in grade 9 × Algebra I credit in grade 9 + Trigonometry grade in grade 9 × Trigonometry credit in grade 9 + Geometry grade in grade 9 × Geometry credit in grade 9 + English grade in grade 9 × English credit in grade 9 + Chemistry grade in grade 9 × Chemistry credit in grade 9 + Reading grade in grade 10 × Reading credit in grade 10 + Chemistry grade in grade 10 × Chemistry credit in grade 10 + Physics grade in grade 10 × Physics credit in grade 10)/(Algebra I credit in grade 9 +Trigonometry credit in grade 9 + Geometry credit in grade 9 + English credit in grade 9 + Chemistry credit in grade 9 + Reading credit in grade 10 + Chemistry credit in grade 10 +

Physics credit in grade 10)= $(2 \times 1 + 3 \times 0.5 + 4 \times 0.5 + 2 \times 1 + 3 \times 0.5 + 2 \times 1 + 3 \times 0.5 + 3 \times 0.5) / (1 + 0.5 + 0.5 + 1 + 0.5 + 1 + 0.5 + 0.5) = 2.57$.

The overall HSGPA scores from grade 10 to 12 are used in this study. Table 2.3 shows the missing rates of overall HSGPA scores across these grades in 4-year and 2-year analyses. The highest missing rate came from grade 10 overall HSGPA in 2-year analysis with a rate of 3.55%. The number of missing HSGPA scores decreased for higher grades. This is because the GPAs were calculated cumulatively across grades.

Table 2.3
Missing Rates of Overall HSGPA at Grades 10, 11, and 12

College	HSGPA	Missing Rate	HSGPA	Missing Rate	HSGPA	Missing Rate	Total Number of Students
4-year	Overall 10	2.82%	Overall 11	0.72%	Overall 12	0.06%	42,441
2-year	Overall 10	3.55%	Overall 11	1.30%	Overall 12	0.26%	12,899

College and Career Readiness Measure

The end-of-first-year college cumulative GPA (FYGPA) and college grades in the first math/English course are empirical CCR indicators. Usually, a FYGPA of 3.0 or grades B or higher is often used as college and readiness benchmarks (Allen & Radunzel, 2017). The FYGPA for 4-year college students is a variable related to college readiness while the FYGPA for 2-year college students is an indicator related to career readiness.

For the end-of-first-year college cumulative GPA, we calculated weighted GPA across institutions in each term and selected the earliest record with earned cumulative credits no less than 30[4]. The cumulative GPA was weighted by cumulative credits in each institution. 55,340 (25.83%) out of 214,251 students had first-year college GPA from Maryland postsecondary public institutions. Out of 55,340 students who had FYGPA, 42,441 were 4-year college students while 12,899 were 2-year college students.

Data Analysis

To answer the research questions, the study ran the descriptive statistics of the interested variables at the overall and subgroup levels. Further, correlational analyses were conducted to investigate the association of the high-school academic performance indicators and the college FYGPAs at the overall and the subgroup levels. In addition, equipercentile linking was

[4] 30 credits are computed based on typical total credit hours of 120 for a bachelor's degree based on https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/degree-information/#:~:text=for%20Academic%20Affairs.-,Credit%20Requirements,require%20more%20than%20120%20credits and https://www.coursera.org/articles/how-many-credits-do-you-need-to-graduate-college.

implemented to create concordance tables between high-school academic performance indicators and college FYGPA. In the end, classification consistency was presented in terms of performance levels based on both high-school performance indicators and college FYGPA.

Correlation analyses were conducted to investigate what assessments or other high school measures are the best predictors of actual success in postsecondary coursework (*i.e.*, Research Question 2) and 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) (*i.e.*, Research Question 4). Concordance tables from equipercentile linking intended to explore the level/score on assessments or other high school measures that could be good predictors of actual success in postsecondary coursework or in the workforce (*i.e.*, Research Question 3). Results from the consistency tables were also used to answer the research question about what assessments or other high school measures are the best predictors of actual success in postsecondary coursework (*i.e.*, Research Question 2). Classification consistency provides information about the predictors that can be used in combination to predict CCR (i.e., Research Question 5).

Equipercentile Linking and Concordance Tables

Concordance tables were created to map the scores on SAT, ACT, HSGPA at grades 10, 11, 12, PARCC ELA 10, ELA 11, Algebra I, Algebra II, and Geometry tests to college FYGPA based on equipercentile linking. Linking results for SAT, ACT, and HSGPA at grades 10, 11, 12, and PARCC ELA 10 and Algebra I are more of interest to MSDE. Other linking results for PARCC ELA 11, Algebra II and Geometry were obtained as well.

Equipercentile linking based on the matched samples was carried out using the software program Linking with Equivalent Group or the Single Group Design, abbreviated as LEGS (Kolen & Brennan, 2004). The reported scale scores were used to link the pairwise tests listed above. After specifying the format of the data input which were scores and score frequencies, input data file names, smoothing values, the score range for the old test form and the truncation choice, the program conducts equipercentile linking and outputs the results. Two smoothing values were specified in post-smoothing: 0.3 and 1. The choice of using smoothing values is supported by the results from simulation studies that the smoothed method outperforms the non-smoothed method in reducing linking errors when the population test scores are in fact smooth (Cui & Kolen, 2009; Hanson et al., 1994). The results with a smoothing value of 1 are presented in this report due to the fact that after rounding there was little difference between the results based on the two smoothing values. As some scale scores were not present in the matched samples, a best-fitting prediction equation was developed to interpolate or extrapolate the values. Based on the total variance explained and visual inspections of the scatterplots of scores between two linked tests, a prediction equation was developed using Excel's best fitting line function. Using the prediction equation, values not presented in the matched samples were imputed. The equations for all pairs of linked tests are presented.

Correlational Analyses

Correlational analyses were conducted between HSPIs and the college FYGPA. The

FYGPA variable was a continuous variable ranging from 0 to 4. HSPIs included scores of SAT, ACT, HSGPA at grades 10, 11, 12, PARCC ELA 10, and Algebra I which are all continuous variables. Pearson product-moment correlation coefficients were computed between each HSPI and FYGPA for the overall and subgroups in terms of race/ethnicity and SES. More specifically, three types of correlation coefficients were computed: 1) overall group for the 2-year and 4-year colleges respectively, 2) by race/ethnicity: Asian, Black, Hispanic, vs. White students, and 3) by SES groups: FARMs vs. non-FARMs. For each correlation analysis, the correlation coefficient, sample size, and p-values indicating the significance of the association at different significance levels are provided.

Classification Analyses

The classification analyses intended to present information about students' performance in terms of CCR based on each high school performance indicator as well as the classification of students into different CCR proficiency categories based on multiple high-school performance indicators. Namely, four types of classification analyses were conducted: 1) classification based on each of the high-school performance indicator; 2) classification based on both high school performance indicator and FYGPA; 3) classification based on two state test scores: ELA 10 and Algebra I; and 4) classification based on state test scores (ELA 10 and Algebra I) and HSGPA at grade 12.

The first classification analysis addresses the question that if each of the high-school performance indicators is used, how many students are classified as CCR? The cut-off value for each high school performance indicator was empirically obtained by mapping the score to a FYGPA of 3.0.

The second classification analysis is about the consistency based on the mapped scores between FYGPA and each HSPI for 4-year and 2-year colleges respectively. The mapped scores on HSPIs corresponding to a FYGPA of no lower than 3.0 were empirically obtained. Based on the mapped cut-off scores, four performance categories resulted as: 1) the category in which students were classified as CCR based on a HSPI and had a FYGPA of at least 3.0 (i.e., High-High), 2) the category in which the students were classified as CCR based on a HSPI and had a FYGPA of less than 3.0 (i.e., High-Low), 3) the category in which the students were classified as not-CCR based on a HSPI and had a FYGPA of less than 3.0 (i.e., Low-Low), and 4) the category in which the students were classified as not-CCR based on a HSPI and had a FYGPA of at least 3.0 (i.e., Low-High). Categories 1 and 3 indicate consistent classification decisions based on the two criteria in either the High-High or Low-Low group.

The third classification analysis based on two state test scores on ELA 10 and Algebra I addresses the question that if both state tests are used for CCR classification, what is the mean FYGPA and the percentage of students who were classified as CRR earned a FYGPA above 3.0. In this classification analysis, students are classified into four groups: 1) students met the state's CCR threshold in ELA 10 and Algebra I, 2) students met the state's CCR threshold in ELA 10 but not Algebra I, 3) students met the state's CCR threshold in Algebra I but not ELA 10, and 4) students did not meet the state's CCR threshold in either ELA 10 or Algebra I.

The fourth classification analysis based on two state test scores and HSGPA at grade 12 addresses the question that if students were classified into eight groups based on the three criteria, what are the counts, average FYGPA, and percentage of students with a FYGPA above 3.0 in each group. Students are classified into eight groups in the type of classification analysis: 1) met the state's CCR threshold in ELA 10 and Algebra I and HSGPA, 2) met the state's CCR threshold in ELA 10 and Algebra I but not HSGPA, 3) met the state's CCR threshold in ELA 10 and HSGPA but not Algebra I, 4) met the state's CCR threshold in ELA 10 but not Algebra I or HSGPA, 5) met the state's CCR threshold in Algebra I and HSGPA but not ELA 10, 6) met the state's CCR threshold in Algebra I but not HSPGA or ELA 10, 7) met the state's CCR threshold in HSPGA but not Algebra I or ELA 10, and 8) did not meet the state's CCR threshold in HSPGA, Algebra I or ELA 10. The state’s CCR threshold for ELA 10 and Algebra I are both 750. The HSGPA is the grade 12 HSGPA, the threshold is 2.83 for 4-year colleges and 2.74 for 2-year colleges respectively.

3. Results for 4-Year Colleges

Research Question 1

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

The CCR measures were operationalized using high school academic performance indicators including state test scores in ELA 10, ELA11, Algebra I, Algebra II, and Geometry in addition to national standardized tests including SAT, PSAT, and ACT composite and component scores. Further, GPA was operationalized at the overall GPA at grades 9, 10, 11, and 12 and subject-specific GPA for Math, ELA, and Science content domains at each high school grade. Table 3.1 summarizes the Pearson product-moment correlation coefficients between FYGPA and high school academic performance indicators showing the association between the high school performance indicators and the FYGPA in the 4-year college sample. In general, the association of the composite scores with college FYGPA was higher than the component scores for SAT, PSAT, and ACT. HSGPAs at grades 9, 10, 11, and 12 were more associated with FYGPA than subject-specific GPAs in English, Math, and Science at each grade level. The correlation coefficient increased as the grade level increased. The overall HSGPA at grade 12 had the highest correlation with college FYGPA (0.439).

Table 3.1
Pearson Product-Moment Correlation Coefficients between College FYGPA and High School Academic Performance Indicators for the 4-Year Colleges

HSPI	FYGPA	Sample Size	*p*-value
ACT Composite	**0.429** ***	14,607	< 0.001
ACT English	0.417 ***	14,607	< 0.001
ACT Math	0.396 ***	14,607	< 0.001
ACT Reading	0.370 ***	14,607	< 0.001
ACT Science	0.376 ***	14,607	< 0.001
ACT Writing	0.324 ***	1,505	< 0.001
SAT EBRW	0.417 ***	39,255	< 0.001
SAT Math	0.392 ***	39,255	< 0.001
SAT Composite	**0.428** ***	39,255	< 0.001
PSAT/NMSQT EBRW	0.415 ***	40,290	< 0.001
PSAT/NMSQT Math	0.376 ***	40,290	< 0.001
PSAT/NMSQT Composite	**0.421** ***	40,290	< 0.001
PARCC Algebra I	0.374 ***	39,613	< 0.001
PARCC Algebra II	0.415 ***	21,840	< 0.001
PARCC Geometry	0.367 ***	717	< 0.001
PARCC ELA 10	**0.421** ***	41,050	< 0.001
PARCC ELA 11	0.384 ***	8,732	< 0.001
HSGPA Math 9	0.330 ***	39,694	< 0.001
HSGPA ELA 9	0.336 ***	39,334	< 0.001
HSGPA Science 9	0.326 ***	34,642	< 0.001

HSGPA Overall 9	0.373 ***	39,822	< 0.001
HSGPA Math 10	0.360 ***	41,216	< 0.001
HSGPA ELA 10	0.365 ***	41,102	< 0.001
HSGPA Science 10	0.363 ***	41,087	< 0.001
HSGPA Overall 10	0.398 ***	41,246	< 0.001
HSGPA Math 11	0.374 ***	42,113	< 0.001
HSGPA ELA 11	0.389 ***	42,057	< 0.001
HSGPA Science 11	0.384 ***	41,985	< 0.001
HSGPA Overall 11	0.415 ***	42,137	< 0.001
HSGPA Math 12	0.402 ***	42,397	< 0.001
HSGPA ELA 12	0.411 ***	42,407	< 0.001
HSGPA Science 12	0.404 ***	42,208	< 0.001
HSGPA Overall 12	**0.439** ***	42,415	< 0.001

Note. * means $p < 0.05$, ** means $p < 0.01$, *** means $p < 0.001$

Research Question 2

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

Based on the correlation coefficients presented in Table 3.1 and practical and policy considerations, SAT and ACT composite scores, PARCC ELA 10 and Algebra I scores, and HSGPAs at grades 10, 11, and 12 were further examined to identify the best predictors of actual success in postsecondary coursework. First, a score on each of the seven HSPIs was mapped to a FYGPA of 3.0. Then, the classification based on the FYGPA cut-off score and that based on each HSPI were cross-tabulated. It was expected that the best predictor yielded the highest classification consistency. Table 3.2 summarizes the classification consistency for the seven HSPIs. Each HSPI score was mapped to a FYGPA of 3.0, except for ACT with a mapped HSGPA of 3.07, and SAT with a mapped HSGPA of 3.03. In general, the overall HSGPA at grade 12 yielded the highest classification consistency (72.17%), followed by the overall HSGPA at grades 11 and 10. PARCC Algebra I yielded the lowest classification consistency (66.48%), and with ACT slightly better than SAT.

Table 3.2

Classification Consistency between FYGPA and Each High School Performance Indicator for the 4-Year Colleges

High-School Performance Indicator (HSPI)	FYGPA	Mapped Score on HSPI	**Category1**	**Category 2**	**Category3**	**Category4**	**Category1 + Category3**	Total Sample Size
			High-FYGPA	High-FYGPA	Low-FYGPA	Low-FYGPA		
			High-HSPI	Low-HSPI	Low-HSPI	High-HSPI		
SAT	3.03	1070	19,314	6,111	7,421	6,409	26,735	39,255
			(49.20%)	(15.57%)	(18.90%)	(16.33%)	(68.11%)	
ACT	3.07	21	7,582	2,011	2,592	2,422	10,174	14,607
			(51.91%)	(13.77%)	(17.74%)	(16.58%)	(69.65%)	

PARCC ELA 10	3	757	20,863	6,584	7,136	6,467	27,999	41,050
			(50.82%)	(16.04%)	(17.38%)	(15.75%)	(68.21%)	
PARCC Algebra I	3.01	751	19,340	6,451	6,995	6,827	26,335	39,613
			(48.82%)	(16.29%)	(17.66%)	(17.23%)	(66.48%)	
Grade 10 HSGPA	3	2.81	21,247	6,295	7,695	6,009	28,942	41,246
			(51.51%)	(15.26%)	(18.66%)	(14.57%)	(70.17%)	
Grade 11 HSGPA	3	2.8	21,985	6,088	7,939	6,125	29,924	42,137
			(52.18%)	(14.45%)	(18.84%)	(14.54%)	(71.02%)	
Grade 12 HSGPA	3	2.83	21,968	6,275	8,642	5,530	30,610	42,415
			(51.79%)	(14.79%)	(20.37%)	(13.04%)	(72.17%)	

Research Question 3

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

The scores or the levels on HSPIs were mapped to a FYGPA of 3.0 or higher using equipercentile linking. The mapped scores are presented in Table 3.3. The concordance tables between FYGPA and HSPI scores are presented in Appendix C. The mapping between FYPGA and PARCC ELA 11, Algebra II, and Geometry are presented in Appendix D.

Table 3.3
Mapping of High-School Performance Indicator Scores to a FYGPA Score of 3.0. or Higher for the 4-Year Colleges

High-School Performance Indicator (HSPI)	FYGPA	Mapped Score on HSPI
SAT	3.03	1070
ACT	3.07	21
Grade 10 HSGPA	3.00	2.81
Grade 11 HSGPA	3.00	2.80
Grade 12 HSGPA	3.00	2.83
PARCC ELA 10	3.00	757
PARCC Algebra I	3.01	751
PARCC ELA11	3.00	757
PARCC Algebra II	3.00	723
PARCC Geometry	3.00	730

Using each of the seven HSPIs to classify students as CCR yielded about the similar percentages. The percentages ranged from 64.83% (using HSGPA at grade 12) to 68.49% (Using ACT composite scores). There were no consistent patterns of the percentage of students classified as CCR based on each HSPI.

Table 3.4
Percentage of Students Classified as CCR Using Each of the High School Performance Indicators for the 4-Year Colleges

HSPI	Cut Score	% CCR	CCR N Count	Total N
SAT	1070	65.53	25,723	39,255
ACT	21	68.49	10,004	14,607
Grade 10 HSGPA	2.81	66.08	27,256	41,246
Grade 11 HSGPA	2.80	66.71	28,110	42,137
Grade 12 HSGPA	2.83	64.83	27,498	42,415
PARCC ELA 10	757	66.58	27,330	41,050
PARCC Algebra I	751	66.06	26,167	39,613

Research Question 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)?

To answer this research question, the correlations between the HSPIs and college FYGPA for the overall group as well as different subgroups of race/ethnicity and SES groups were computed and are presented in Table 3.5. For the overall and all subgroups, FYGPA had the highest correlation with HSGPA at grade 12, followed by Grade 11 GPA, Grade 10 GPA, PARCC ELA 10, SAT, ACT. The lowest correlation coefficient for overall as well as all subgroups was observed for PARCC Algebra I.

Among the different race/ethnicity groups, the correlations between Black students' FYGPA and each of the four HSPIs including Grade 10, 11, 12 GPAs and PARCC ELA 10 scores was the highest. On the other hand, white students' SAT and ACT scores correlated the highest with FYGPA. Asian students' PARCC Algebra I scores correlated the highest with FYGPA. Among all race/ethnicity groups, Black students' Grade 12 GPA correlated the highest with FYGPA ($r=0.452$, $N=11{,}900$, $p<0.001$).

For the SES groups (FARMs vs non-FARMS), all the HSPI scores of non-FARMS students correlated higher with FYGPA than that for FARMS student. Across all FARMs and non-FARMS groups, non-FARMS students' Grade 12 GPA correlated the highest with FYGPA ($r=0.445$, $N=34{,}373$, $p<0.001$).

In general, the overall correlations between HSGPA and FYGPA increased from grades 10 to 12. This pattern was also consistent across all the race/ethnicity and SES subgroups.

Table 3.5
Pearson Product-Moment Correlation Coefficients between FYGPA and Each High School Performance Indicator for the Race/Ethnicity and SES Subgroups for the 4-Year Colleges

Content	Groups	Subgroups	FYGPA	Sample Size	P-Value
SAT	Overall		0.428	39,255	<0.001
	Race/ Ethnicity	Asian	0.362	5,650	<0.001
		Black	0.346	11,283	<0.001
		Hispanic	0.310	3,282	<0.001
		White	0.377	17,251	<0.001
	SES	Non-FARMS	0.426	31,745	<0.001
		FARMS	0.359	7,510	<0.001
ACT	Overall		0.429	14,607	<0.001
	Race/ Ethnicity	Asian	0.331	2,127	<0.001
		Black	0.368	3,728	<0.001
		Hispanic	0.307	1,201	<0.001
		White	0.377	6,846	<0.001
	SES	Non-FARMS	0.428	12,369	<0.001
		FARMS	0.343	2,238	<0.001
Grade 10 HSGPA	Overall		0.398	41,246	<0.001
	Race/ Ethnicity	Asian	0.378	5,821	<0.001
		Black	0.399	11,432	<0.001
		Hispanic	0.375	3,514	<0.001
		White	0.333	18,579	<0.001
	SES	Non-FARMS	0.403	33,517	<0.001
		FARMS	0.337	7,729	<0.001
Grade 11 HSGPA	Overall		0.415	42,137	<0.001
	Race/Ethnicity	Asian	0.407	5,966	<0.001
		Black	0.424	11,797	<0.001
		Hispanic	0.389	3,605	<0.001
		White	0.350	18,830	<0.001
	SES	Non-FARMS	0.420	34,168	<0.001
		FARMS	0.356	7,969	<0.001
Grade 12 HSGPA	Overall		0.439	42,415	<0.001
	Race/ Ethnicity	Asian	0.447	6,005	<0.001
		Black	0.452	11,900	<0.001
		Hispanic	0.416	3,638	<0.001
		White	0.374	18,920	<0.001
	SES	Non-FARMS	0.445	34,373	<0.001
		FARMS	0.375	8,042	<0.001
PARCC ELA 10	Overall		0.421	41,050	<0.001
	Race/ Ethnicity	Asian	0.350	5,840	<0.001

		Black	0.386	11,365	<0.001
		Hispanic	0.314	3,489	<0.001
		White	0.380	18,483	<0.001
	SES	Non-FARMS	0.421	33,347	<0.001
		FARMS	0.361	7,703	<0.001
PARCC Algebra I	Overall		0.374	39,613	<0.001
	Race/ Ethnicity	Asian	0.324	5,507	<0.001
		Black	0.278	11,102	<0.001
		Hispanic	0.271	3,403	<0.001
		White	0.306	17,774	<0.001
	SES	Non-FARMS	0.367	32,085	<0.001
		FARMS	0.322	7,528	<0.001

Table 3.6 summarizes the percentage of students that met each standard by race/ethnicity and FARMs eligibility for the 4-year colleges. For all seven HSPIs, Asian students always had the highest passing rate, followed by White, Hispanic, and Black students with the lowest passing rate. For all HSPIs, non-FARMS students always had a much higher passing rate than students receiving FARMS, with the highest difference over 30% based on ACT scores.

Table 3.6.
Percentage of Students Classified as CCR Using Each of the High School Performance Indicators for the Race/Ethnicity and FARMs Subgroups for the 4-Year Colleges

HSPI	Cut Score	Groups	Subgroups	% CCR	N Count	Total N
SAT	1070	Overall		65.53	25,723	39,255
		Race/Ethnicity	Asian	84.99	4,802	5,650
			Black	38.22	4,312	11,283
			Hispanic	58.90	1,933	3,282
			White	77.93	13,443	17,251
		SES	Non-FARMS	70.65	22,428	31,745
			FARMS	43.87	3,295	7,510
ACT	21	Overall		68.49	10,004	14,607
		Race/Ethnicity	Asian	87.35	1,858	2,127
			Black	36.35	1,355	3,728
			Hispanic	62.45	750	1,201
			White	81.17	5,557	6,846
		SES	Non-FARMS	73.19	9,053	12,369
			FARMS	42.49	951	2,238
Grade 10 HSGPA	2.81	Overall		66.08	27,256	41,246
		Race/Ethnicity	Asian	83.61	4,867	5,821
			Black	48.94	5,595	11,432
			Hispanic	61.30	2,154	3,514
			White	72.17	13,408	18,579

		SES	Non-FARMS	68.37	22,915	33,517
			FARMS	56.17	4,341	7,729
Grade 11 HSGPA	2.80	Overall		66.71	28,110	42,137
		Race/Ethnicity	Asian	83.49	4,981	5,966
			Black	50.43	5,949	11,797
			Hispanic	62.16	2,241	3,605
			White	72.64	13,678	18,830
		SES	Non-FARMS	69.02	23,584	34,168
			FARMS	56.80	4,526	7,969
Grade 12 HSGPA	2.83	Overall		64.83	27,498	42,415
		Race/Ethnicity	Asian	80.52	4,835	6,005
			Black	48.20	5,736	11,900
			Hispanic	61.00	2,219	3,638
			White	71.28	13,487	18,920
		SES	Non-FARMS	67.18	23,093	34,373
			FARMS	54.77	4,405	8,042
PARCC ELA10	757	Overall		66.58	27,330	41,050
		Race/Ethnicity	Asian	77.19	4,508	5,840
			Black	48.88	5,555	11,365
			Hispanic	61.74	2,154	3,489
			White	74.77	13,819	18,483
		SES	Non-FARMS	69.49	23,172	33,347
			FARMS	53.98	4,158	7,703
PARCC Algebra I	751	Overall		66.06	26,167	39,613
		Race/Ethnicity	Asian	82.46	4,541	5,507
			Black	40.13	4,455	11,102
			Hispanic	59.89	2,038	3,403
			White	77.95	13,854	17,774
		SES	Non-FARMS	70.40	22,588	32,085
			FARMS	47.54	3,579	7,528

Research Question 5

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

From both the policy and practical perspectives, PARCC ELA 10 and Algebra I scores were combined to make classification decision. Based on these two CCR measures, students were classified into four groups:
Group 1: students who met the state's CCR thresholds in both ELA 10 and Algebra I;
Group 2: students who met the state's CCR thresholds in ELA 10 but did not Algebra I;
Group 3: students who met the state's CCR threshold in Algebra I but did not ELA 10;
Group 4: students who did not meet the state's CCR threshold in either ELA 10 or Algebra I.

Table 3.7
Classification Based on Algebra I and ELA 10 Scores for the 4-Year Colleges

Grouping Criteria		Sample Size	Mean FYGPA	N-Counts for FYGPA>3.0
Group 1	Algebra I>=750 & ELA 10>=750	22,029	3.36	17,086
				(77.56%)
Group 2	ELA 10>=750 & Algebra I<750	6,462	3.10	3,849
				(59.56%)
Group 3	Algebra I >=750 & ELA 10<750	4,306	3.03	2,343
				(54.41%)
Group 4	Algebra I<750 & ELA 10<750	6,220	2.80	2,255
				(36.25%)

The mean FYGPA and the percentages of students whose FYGPA was above 3 are summarized in Table 3.7. Among the 39,017 students with valid PARCC ELA 10 and Algebra I scores, above 56% of the students fell into Group 1 meeting the state CCR thresholds on both ELA 10 and Algebra I with both scores higher than or equal to 750 while about 16% of students fell into Group 4, not meeting the state CCR thresholds on either ELA 10 or Algebra I with ELA 10 and Algebra I scores both lower than 750. The mean FYGPA for the highest performance category was 3.36 with about 78% students in this performance level having a FYGPA above 3.0. The mean FYGPA for the lowest performance category was 2.80 with about 36% students in this performance level having a FYGPA above 3.0.

To further explore other options of combining multiple HSPIs as CCR measures, HSGPA at Grade 12 with a threshold of 2.83 was added as an additional HSPI to the classification of students into different performance levels. These include
Group 1: students who met the state's CCR threshold in ELA 10 and Algebra I and HSGPA;
Group 2: students who met the state's CCR threshold in ELA 10 and Algebra I but not HSGPA;
Group 3: students who met the state's CCR threshold in ELA 10 and HSGPA but not Algebra I;
Group 4: students who met the state's CCR threshold in ELA 10 but not Algebra I or HSGPA;
Group 5: students who met the state's CCR threshold in Algebra I and HSGPA but not ELA 10;
Group 6: students who met the state's CCR threshold in Algebra I but not HSPGA or ELA 10;
Group 7: students who met the state's CCR threshold in HSPGA but not Algebra I or ELA 10;
Group 8: students who did not meet the state's CCR threshold in HSPGA, Algebra I or ELA 10.

Table 3.8
Classification Based on Algebra I, ELA 10 and Grade 12 HSGPA for the 4-Year Colleges

Grouping Criteria		Sample Size	Mean FYGPA	N-Counts for FYGPA>3.0
Group 1	Algebra I>=750 & ELA 10>=750 & HSGPA>=2.83	17,590	3.46	14,776
				(84.00%)
Group 2	Algebra I>=750 & ELA 10>=750 & HSGPA<2. 83	4,438	3.00	2,309
				(52.03%)
Group 3	ELA 10>=750 & Algebra I <750 & HSGPA>=2. 83	3,507	3.26	2,565
				(73.14%)

Group 4	ELA 10>=750 & Algebra I <750 & HSGPA<2. 83	2,955	2.90	1,284 (43.45%)
Group 5	Algebra I >=750 & ELA 10<750 & HSGPA>=2. 83	2,269	3.23	1,589 (70.03%)
Group 6	Algebra I >=750 & ELA 10<750 & HSGPA<2. 83	2,037	2.81	754 (37.02%)
Group 7	Algebra I<750 & ELA 10<750 & HSGPA>=2. 83	1,893	3.04	1,060 (56.00%)
Group 8	Algebra I<750 & ELA 10<750 & HSGPA<2. 83	4,327	2.70	1,195 (27.62%)

The mean FYGPA and the percentages of students whose FYGPA was above 3 was calculated and are summarized in Table 3.8 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 colleges. Among the 39,016 students with valid PARCC ELA 10, Algebra I scores, and HSGPA at Grade 12, about 45% of the students were classified into Group 1 meeting the three state thresholds with both ELA 10 and Algebra I scores not lower than 750 and HSGPA12 not lower than 2.83. On the other hand, about 11% of the students were classified into Group 8 with both ELA 10 and Algebra I scores lower than 750 and HSGPA12 lower than 2.83. The mean FYGPA for the highest performance category (Group 1) was 3.46 with about 84% students in this performance level having a FYGPA above 3.0. On the other hand, the mean FYGPA for the lowest performance category was 2.70 with about 27% students in this performance level having a FYGPA above 3.0. The rank ordering of all 8 performance categories was Group 1 > Group 3 > Group 5 > Group 7 > Group 2 > Group 4 > Group 6 > Group 8 in terms of mean FYGPA with the first four groups meeting the CCR threshold of HSGPA at grade 12. This is consistent with the finding that HSGPA at Grade 12 is the best predictor of college success, PARCC ELA`10 is the second best, and PARCC Algebra I is the last among these three HSPIs.

4. Results for 2-Year Colleges

Research Question 1

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

For the 2-year colleges, the same CCR measures as those for the 4-year colleges were operationalized using high school academic performance indicators including state test scores in ELA 10, ELA11, Algebra I, Algebra II, and Geometry in addition to national standardized tests including SAT, PSAT, and ACT composite and component scores. Further, GPA was operationalized at both the overall GPA and subject-specific GPA for Math, ELA, and Science content domains at grades 9, 10, 11, and 12. Table 4.1 summarizes the Pearson product-moment correlation coefficients between FYGPA and explored high school academic performance indicators showing the association between the high school performance indicators and the FYGPA in the 2-year college sample. In general, the association of the composite scores with college FYGPA was higher than the component scores for SAT, PSAT, and ACT. HSGPAs at grades 9, 10, 11, and 12 were more associated with FYGPA than subject-specific GPAs in English, Math, and Science at each grade level. The correlation coefficient increased as the grade level increased. The overall HSGPA at grade 12 had the highest correlation with college FYGPA (0.360). The magnitudes of the correlation coefficients for the 2-year colleges were smaller than its counterparts for the 4-year colleges.

Table 4.1
Pearson Product-Moment Correlation Coefficients between College FYGPA and High School Academic Performance Indicators for the 2-Year Colleges

HSPI	FYGPA	Sample Size	*p*-value
ACT Composite	**0.252** ***	2,394	< 0.001
ACT English	0.251 ***	2,394	< 0.001
ACT Math	0.203 ***	2,394	< 0.001
ACT Reading	0.213 ***	2,394	< 0.001
ACT Science	0.215 ***	2,394	< 0.001
ACT Writing	0.190	76	0.101
SAT EBRW	0.258 ***	9,502	< 0.001
SAT Math	0.233 ***	9,502	< 0.001
SAT Composite	**0.268** ***	9,502	< 0.001
PSAT/NMSQT EBRW	0.251 ***	11,237	< 0.001
PSAT/NMSQT Math	0.202 ***	11,237	< 0.001
PSAT/NMSQT Composite	**0.251** ***	11,237	< 0.001
PARCC Algebra I	0.203***	12,103	<0.001
PARCC Algebra II	0.278 ***	6,129	< 0.001
PARCC Geometry	0.390 ***	512	< 0.001
PARCC ELA 10	0.321 ***	12,364	< 0.001
PARCC ELA 11	0.265 ***	3,135	< 0.001

HSGPA ELA 9	0.275 ***	11,598	< 0.001
HSGPA Math 9	0.255 ***	11,874	< 0.001
HSGPA Science 9	0.261 ***	9,504	< 0.001
HSGPA Overall 9	**0.296** ***	11,916	< 0.001
HSGPA ELA 10	0.300 ***	12,318	< 0.001
HSGPA Math 10	0.293 ***	12,421	< 0.001
HSGPA Science 10	0.287 ***	12,332	< 0.001
HSGPA Overall 10	**0.324** ***	12,441	< 0.001
HSGPA ELA 11	0.318 ***	12,656	< 0.001
HSGPA Math 11	0.312 ***	12,721	< 0.001
HSGPA Science 11	0.309 ***	12,640	< 0.001
HSGPA Overall 11	**0.342** ***	12,731	< 0.001
HSGPA ELA 12	0.336 ***	12,860	< 0.001
HSGPA Math 12	0.332 ***	12,858	< 0.001
HSGPA Science 12	0.325 ***	12,747	< 0.001
HSGPA Overall 12	**0.360** ***	12,866	< 0.001

Note. * means $p < 0.05$, ** means $p <0 .01$, *** means $p < 0.001$

Research Question 2

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

Similarly, SAT and ACT composite scores, PARCC ELA 10 and Algebra I scores, and HSGPAs at grades 10, 11, and 12 were further examined to identify the best predictors of actual success in postsecondary coursework for the 2-year colleges. First, a score on each of the seven HSPIs was mapped to a FYGPA of 3.0 or above. Then, the classification levels based on the FYGPA cut-off score of at least 3.0 and that based on each HSPI were cross-tabulated. It was expected that the best predictor yielded the highest classification consistency. Table 4.2 summarizes the classification consistency for each of the seven HSPIs with FYGPA. All HSPI scores was mapped to a FYGPA of 3.0, except for ACT with a mapped HSGPA of 3.06. In general, the overall HSGPA at grade 12 yielded the highest classification consistency (65.82%), followed by the overall HSGPA at grades 11 and 10. PARCC Algebra I yielded the lowest classification consistency (57.32%), and with ACT slightly better than SAT. These patterns were similar to those observed for the 4-year colleges but with lower classification consistency rates.

Table 4.2

Classification Consistency between FYGPA and Each High School Performance Indicator for the 2-Year Colleges

High-School Performance Indicator (HSPI)	FYGPA	Mapped Score on HSPI	**Category1**	**Category2**	**Category3**	**Category4**	**Category1 + Category3**	Total Sample Size
			High-FYGPA	High-FYGPA	Low-FYGPA	Low-FYGPA		
			High-HSPI	Low-HSPI	Low-HSPI	High-HSPI		

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 (32.00%)	434 (18.13%)	661 (27.61%)	533 (22.26%)	1,427 (59.61%)	2,394
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
Grade 10 HSGPA	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 HSGPA	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 HSGPA	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

Research Question 3

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

Like what was conducted for the 4-year colleges, the score or the level on each HSPI was mapped to a FYGPA of 3.0 or higher using equipercentile linking for the 2-year colleges. The mapped scores are presented in Table 4.3. The concordance tables between FYGPA and HSPI scores are presented in Appendix E. The mapping between FYPGA and PARCC ELA 11, Algebra II, and Geometry are presented in Appendix F.

Table 4.3
Mapping of High-School Performance Indicator Scores to a FYGPA Score of 3.0. or Higher for the 2-Year Colleges

High-School Performance Indicator (HSPI)	FYGPA	Mapped Score on HSPI
SAT	3.00	1010
ACT	3.06	19
Grade 10 GPA	3.00	2.68
Grade 11 GPA	3.00	2.69
Grade 12 GPA	3.00	2.74
PARCC ELA 10	3.00	756
PARCC Algebra I	3.00	745
PARCC ELA11	3.00	757
PARCC Algebra II	3.00	724
PARCC Geometry	3.01	726

Using each of the seven HSPIs to classify students as CCR yielded about the similar percentages. The percentages ranged from 48.14% (using HSGPA at grade 12) to 54.26% (using ACT composite scores). There were no consistent patterns of the percentage of the students classified as CCR based on each HSPI. SAT and ACT yielded relatively higher percentages of students as CCR. The patterns observed for the 2-year colleges differed from those for the 4-year colleges.

Table 4.4
Percentage of Students Classified as CCR Using Each of the High School Performance Indicators for the 2-Year Colleges

HSPI	Cut Score	% CCR	CCR N Count	Total N
SAT	1010	53.24	5,059	9,502
ACT	19	54.26	1,299	2,394
Grade 10 HSGPA	2.68	49.51	6160	12,441
Grade 11 HSGPA	2.69	50.48	6,427	12,731
Grade 12 HSGPA	2.74	48.14	6,194	12,866
PARCC ELA 10	756	50.72	6,271	12,364
PARCC Algebra I	745	49.98	6,049	12,103

Research Question 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)?

To answer this research question, the correlations between the HSPIs and college FYGPA for the overall group as well as different subgroups of race/ethnicity and SES groups were computed and are presented in Table 4.5. For the overall and all subgroups, FYGPA had the highest correlation with HSGPA at grade 12, followed by Grade 11 GPA, Grade 10 GPA, PARCC ELA 10, SAT, ACT. The lowest correlation coefficient for overall as well as all subgroups was observed for PARCC Algebra I. This is consistent with what was observed for the 4-year colleges.

Among the different race/ethnicity groups, the correlations between Black students' FYGPA and each of the four HSPIs including SAT, ACT, Grade 11 GPA was the highest. On the other hand, Asian students' HSGPA at grade 10 and 12, PARCC ELA 10, and PARCC Algebra I scores correlated the highest with FYGPA. Among all race/ethnicity groups, Asian students' Grade 12 GPA correlated the highest with FYGPA ($r=0.457$, $N=1,172$, $p<0.001$).

For the SES groups (FARMs vs non-FARMS), all the HSPI scores of FARMS students correlated higher with FYGPA than that for non-FARMS students except SAT and PARCC ELA 10. Across all FARMs and non-FARMS groups, FARMS students' Grade 12 GPA correlated the highest with FYGPA ($r=0.363$, $N=3,468$, $p<0.001$).

In general, the overall correlations between HSGPA and FYGPA increased from grades 10 to 12. This pattern was also consistent across all the race/ethnicity and SES subgroups.

Table 4.5
Pearson Product-Moment Correlation Coefficients between FYGPA and Each High School Performance Indicator for the Race/Ethnicity and SES Subgroups for the 2-Year Colleges

HSPI	Groups	Subgroups	FYGPA	Sample Size	P-Value
SAT	Overall		0.268	9,502	<.001
	Race/ Ethnicity	Asian	0.231	961	<.001
		Black	0.236	2,188	<.001
		Hispanic	0.221	1,602	<.001
		White	0.233	4,286	<.001
	SES	Non-FARMS	0.263	6,859	<.001
		FARMS	0.258	2,643	<.001
ACT	Overall		0.252	2,394	<.001
	Race/ Ethnicity	Asian	0.209	210	0.002
		Black	0.235	565	<.001
		Hispanic	0.166	374	0.001
		White	0.203	1,137	<.001
	SES	Non-FARMS	0.237	1,818	<.001
		FARMS	0.281	576	<.001
Grade 10 HSGPA	Overall		0.324	12,441	<.001
	Race/ Ethnicity	Asian	0.407	1,111	<.001
		Black	0.384	2,550	<.001
		Hispanic	0.373	2,093	<.001
		White	0.272	6,090	<.001
	SES	Non-FARMS	0.322	9,129	<.001
		FARMS	0.324	3,312	<.001
Grade 11 HSGPA	Overall		0.342	12,731	<.001
	Race/ Ethnicity	Asian	0.415	1,157	<.001
		Black	0.423	2,657	<.001
		Hispanic	0.379	2,138	<.001
		White	0.292	6,167	<.001
	SES	Non-FARMS	0.339	9,309	<.001
		FARMS	0.346	3,422	<.001
Grade 12 HSGPA	Overall		0.360	12,866	<.001
	Race/ Ethnicity	Asian	0.457	1,172	<.001
		Black	0.446	2,707	<.001
		Hispanic	0.398	2,162	<.001
		White	0.310	6,207	<.001
	SES	Non-FARMS	0.358	9,398	<.001
		FARMS	0.363	3,468	<.001
PARCC ELA 10	Overall		0.321	12,364	<.001
	Race/ Ethnicity	Asian	0.313	1,123	<.001

		Black	0.285	2,550	<.001
		Hispanic	0.310	2,076	<.001
		White	0.298	6,032	<.001
	SES	Non-FARMS	0.325	9,059	<.001
		FARMS	0.292	3,305	<.001
PARCC Algebra I	Overall		0.203	12,103	<.001
	Race/ Ethnicity	Asian	0.213	1,063	<.001
		Black	0.162	2,498	<.001
		Hispanic	0.169	2,039	<.001
		White	0.155	5,926	<.001
	SES	Non-FARMS	0.192	8,856	<.001
		FARMS	0.204	3,247	<.001

Table 4.6 summarizes the percentage of students that met each standard by race/ethnicity and FARMs eligibility for the 2-year colleges. For SAT, ACT, PARCC ELA10, and PARCC Algebra I, White students had the highest passing rate, followed by Asian. Hispanic, and Black students with the lowest passing rate. For the HSGPA at Grade 10, 11, and 12, Asian students had the highest passing rate, followed by White, Hispanic, and Black students with the lowest passing rate. For all HSPIs, non-FARMS students always had a higher passing rate than FARMS students.

Table 4.6.
Percentage of Students Classified as CCR Using Each of the High School Performance Indicators for the Race/Ethnicity and FARMs Subgroups for the 2-Year Colleges

HSPI	Cut Score	Groups	Subgroups	% CCR	N Count	Total N
SAT	1010	Overall		53.24	5,059	9,502
		Race/Ethnicity	Asian	58.58	563	961
			Black	34.51	755	2,188
			Hispanic	44.38	711	1,602
			White	64.26	2,754	4,286
		SES	Non-FARMS	57.98	3,977	6,859
			FARMS	40.94	1,082	2,643
ACT	19	Overall		54.26	1,299	2,394
		Race/Ethnicity	Asian	62.86	132	210
			Black	39.12	221	565
			Hispanic	42.51	159	374
			White	63.32	720	1,137
		SES	Non-FARMS	58.14	1,057	1,818
			FARMS	42.01	242	576
Grade 10 HSGPA	2.68	Overall		49.51	6,160	12,441
		Race/Ethnicity	Asian	63.28	703	1,111
			Black	39.37	1,004	2,550
			Hispanic	47.44	993	2,093

			White	52.09	3,172	6,090
		SES	Non-FARMS	50.42	4,603	9,129
			FARMS	47.01	1,557	3,312
Grade 11 HSGPA	2.69	Overall		50.48	6,427	12,731
		Race/Ethnicity	Asian	64.65	748	1,157
			Black	41.78	1,110	2,657
			Hispanic	49.81	1,065	2,138
			White	52.07	3,211	6,167
		SES	Non-FARMS	51.20	4,766	9,309
			FARMS	48.54	1,661	3,422
Grade 12 HSGPA	2.74	Overall		48.14	6,194	12,866
		Race/Ethnicity	Asian	61.95	726	1,172
			Black	40.41	1,094	2,707
			Hispanic	47.22	1,021	2,162
			White	49.62	3,080	6,207
		SES	Non-FARMS	48.87	4,593	9,398
			FARMS	46.16	1,601	3,468
PARCC ELA10	756	Overall		50.72	6,271	12,364
		Race/Ethnicity	Asian	49.07	551	1,123
			Black	35.29	900	2,550
			Hispanic	44.03	914	2,076
			White	59.37	3,581	6,032
		SES	Non-FARMS	54.49	4,936	9,059
			FARMS	40.39	1,335	3,305
PARCC Algebra I	745	Overall		49.98	6,049	12,103
		Race/Ethnicity	Asian	52.96	563	1,063
			Black	30.50	762	2,498
			Hispanic	41.00	836	2,039
			White	60.48	3,584	5,926
		SES	Non-FARMS	54.14	4,795	8,856
			FARMS	38.62	1,254	3,247

Research Question 5

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

Like what was conducted for the 4-year colleges, PARCC ELA 10 and Algebra I scores were combined to make classification decision. Based on these two CCR measures, students were classified into four groups:
Group 1: students who met the state's CCR thresholds in both ELA0 and Algebra I;
Group 2: students who met the state's CCR thresholds in ELA 10 but did not Algebra I;
Group 3: students who met the state's CCR threshold in Algebra I but did not ELA 10;
Group 4: students who did not meet the state's CCR threshold in either ELA 10 or Algebra I.

Table 4.7

Classification Based on Algebra I and ELA 10 Scores for the 2-Year Colleges

Grouping Criteria		Sample Size	Mean FYGPA	N-Counts for FYGPA>3.0
Group 1	Algebra I>=750 & ELA 10>=750	3,986	3.15	2,454
				(61.57%)
Group 2	ELA 10>=750 & Algebra I<750	2,966	3.04	1,609
				(54.25%)
Group 3	Algebra I >=750 & ELA 10<750	1,331	2.87	565
				(42.45%)
Group 4	Algebra I<750 & ELA 10<750	3,604	2.76	1,195
				(33.16%)

The mean FYGPA and the percentages of students whose FYGPA was above 3 are summarized in Table 4.7. Among the 11,887 students with valid PARCC ELA 10 and Algebra I scores, above 33% of the students fell into Group 1 meeting the state CCR thresholds on both ELA 10 and Algebra I with both scores higher than or equal to 750 while about 30% of students fell into Group 4, not meeting the state CCR thresholds on either ELA 10 or Algebra I with ELA 10 and Algebra I scores both lower than 750. The mean FYGPA for the highest performance category was 3.15 with about 61% students in this performance level having a FYGPA above 3.0. The mean FYGPA for the lowest performance category was 2.76 with about 33% students in this performance level having a FYGPA above 3.0.

To further explore other options of combining multiple HSPIs as CCR measures, HSGPA at Grade 12 with a threshold of 2.74 was added as an additional HSPI to the classification of students into different performance levels. These include
Group 1: students who met the state's CCR threshold in ELA 10 and Algebra I and HSGPA;
Group 2: students who met the state's CCR threshold in ELA 10 and Algebra I but not HSGPA;
Group 3: students who met the state's CCR threshold in ELA 10 and HSGPA but not Algebra I;
Group 4: students who met the state's CCR threshold in ELA 10 but not Algebra I or HSGPA;
Group 5: students who met the state's CCR threshold in Algebra I and HSGPA but not ELA 10;
Group 6: students who met the state's CCR threshold in Algebra I but not HSPGA or ELA 10;
Group 7: students who met the state's CCR threshold in HSPGA but not Algebra I or ELA 10;
Group 8: students who did not meet the state's CCR threshold in HSPGA, Algebra I or ELA 10.

Table 4.8

Classification Based on Algebra I, ELA 10 and Grade 12 HSGPA for the 2-Year Colleges

Grouping Criteria		Sample Size	Mean FYGPA	N-Counts for FYGPA>3.0
Group 1	Algebra I>=750 & ELA 10>=750 & HSGPA>=2.74	2,440	3.34	1,818
				(74.51%)

Group 2	Algebra I>=750 & ELA 10>=750 & HSGPA<2.74	1,544	2.86	636 (41.19%)
Group 3	ELA 10>=750 & Algebra I <750 & HSGPA>=2.74	1,524	3.21	1,036 (67.98%)
Group 4	ELA 10>=750 & Algebra I <750 & HSGPA<2.74	1,442	2.85	573 (39.74%)
Group 5	Algebra I >=750 & ELA 10<750 & HSGPA>=2.74	559	3.08	323 (57.78%)
Group 6	Algebra I >=750 & ELA 10<750 & HSGPA<2.74	772	2.71	242 (31.35%)
Group 7	Algebra I<750 & ELA 10<750 & HSGPA>=2.74	1,097	2.99	538 (49.04%)
Group 8	Algebra I<750 & ELA 10<750 & HSGPA<2.74	2,507	2.67	657 (26.21%)

The mean FYGPA and the percentage of students whose FYGPA was above 3 were calculated and are summarized in Table 4.8 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 2.74 for the 2-year colleges. Among the 11,885 students with valid PARCC ELA 10, Algebra I scores, and HSGPA at Grade 12, about 20% of the students were classified into Group 1 meeting the three state thresholds with both ELA 10 and Algebra I scores not lower than 750 and HSGPA12 not lower than 2.74. On the other hand, about 21% of the students were classified into Group 8 with both ELA 10 and Algebra I scores lower than 750 and HSGPA12 lower than 2.74. The mean FYGPA for the highest performance category (Group 1) was 3.34 with about 74% students in this performance level having a FYGPA above 3.0. On the other hand, the mean FYGPA for the lowest performance category was 2.67 with about 26% students in this performance level having a FYGPA above 3.0. The rank ordering of all 8 performance categories was Group 1 > Group 3 > Group 5 > Group 7 > Group 2 > Group 4 > Group 6 > Group 8 in terms of mean FYGPA with the first four groups meeting the CCR threshold of HSGPA at grade 12. This is consistent with the finding that HSGPA at Grade 12 is the best predictor of college success, PARCC ELA`10 is the second best, and PARCC Algebra I is the last among these three HSPIs. These are consistent with the findings for the 4-year colleges.

Summary and Discussion

This research study investigates the relationship between Maryland students' high school academic performance measures and their college and career readiness as measured by first-year college GPA. To answer the five research questions, data from both 2-year and 4-year colleges were analyzed. The findings gathered through analyzing data from 2-year colleges have implications for students who may choose a career path after graduating from high school while the findings gathered through analyzing 4-year college data have implications for students who may choose a college path. Given the data available for three cohorts of high school graduates from Maryland public high schools, a series of analyses were performed to address the research questions. This section outlines the findings related to each research question.

Research Question 1

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

The high school CCR measures were operationalized in terms of HSGPA, state tests, and national tests. HSGPA were specified as overall and subject-specific HSGPA in English, Math, and Science at grades 9, 10, 11, and 12. State tests were specified in ELA 10, ELA11, Algebra I, Algebra II, and Geometry. National tests include SAT, PSAT/NMSQT, and ACT component and composite scores. Though AP and IB test scores were investigated as well, the profile of AP or IB tests were too diverse to warrantee direct comparability. From the practical and policy consideration, seven high school academic performance indicators were investigated in depth including, SAT and ACT composite scores, PARCC ELA 10 and Algebra I, HSGPAs at grades 10, 11, and 12.

Research Question 2

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

It was found that the 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 better predictor than that at a lower grade level. Among all the operationalized HSGPAs, the overall HSGPA at grade 12 was the best predictor. Further, PARCC ELA 10 was a slightly better predictor than PARCC Algebra I, and SAT/ACT composite scores were better predictors that its respective component scores.

In terms of classification consistency, the overall HSGPA 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 across all HSPI in both types of colleges. PARCC Algebra I had the lowest classification consistency and the lowest correlation with FYGPA. PARCC ELA 10, on the other hand, was a superior HSPI in predicting college performance than PARCC Algebra I. Compared with SAT composite scores, ACT composite scores were a slightly better predictor. Overall, these seven HSPIs yielded higher classification consistency and correlation with FYGPA in 4-year colleges than in 2-year colleges.

Research Question 3

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

Results show that an HSGPA of approximately 2.7 in grades 10, 11, and 12 was mapped to an FYGPA of 3.0 for the 2-year colleges, whereas an HSGPA of around 2.8 in all three grades HSGPAs was mapped to an FYGPA of 3.0 for the 4-year college. For the 2-year college, a PARCC ELA 10 score of 756 and a PARCC Algebra I score of 745 were mapped to an FYGPA of 3, whereas a PARCC ELA 10 score of 757 and a PARCC Algebra I score of 751 were mapped to an FYGPA of 3. Moreover, an ACT score of 19 was mapped to a 2-year college FYGPA of 3.06, while an ACT score of 21 was mapped to a 4-year college FYGPA of 3.07. A SAT score of 1010, on the other hand, was mapped to an FYGPA of 3.0 for the 2-year colleges, while a SAT score of 1070 was mapped to an FYGPA of 3.03 for the 4-year colleges. The classification consistency between each HSPI and FYGPA for the 4-year colleges was larger than that for the 2-year colleges. For both types of colleges, HSGPA at grade 12 yielded the highest prediction consistency whereas PARCC Algebra I turned out to be the worst predictor.

Research Question 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)?

Results suggest that the overall and subgroup correlations between CCR predictor scores and college FYGPA were positive, with the 4-year college having a higher magnitude than the 2-year college. FYGPA showed the strongest association with HSGPA in grade 12, but the lowest correlation with PARCC Algebra I across all subgroups. Among different race/ethnicity groups (Asian, Black, Hispanic, White), Black students' scores on three (2-year colleges) and four (4-year colleges) of the seven HSPIs correlated the most with FYGPA. Asian students' scores on four (2-year colleges) and one (4-year colleges) of the seven HSPIs had the strongest correlation with FYGPA. For the SES (FARMs or non-FARMS) categories, non-FARMS students' HSPIs showed a stronger connection with FYGPA for the 4-year college than FARMS students. For 5 HSPIs for the 2-year colleges, the correlation disparities between SES groups were reduced and even reversed. In general, from grades 10 through 12, the overall correlations between HSGPA and FYGPA increased for both 2-year and 4-year colleges. The same is true for race/ethnicity and socioeconomic status subgroups.

For both 2- and 4-year colleges, Black and Hispanic students were less likely than Asian and White students to meet the cut score and students eligible for FARMs were less likely to meet the cut score on all high school measures examined. White students were 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 were 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 was the only CCR measure that allowed 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 were more likely to meet the high school measure threshold through GPA or state standardized tests than through college entrance exams.

Research Question 5

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

When both PARCC ELA 10 and Algebra I were used to predict college success, approximately 33% and 56% of 2-year and 4-year students met these state interim standards, respectively. When HSGPA at grade 12 was included, around 20% and 45% of the 2-year and 4-year students met these three interim standards concurrently (750 on both ELA 10 and Algebra I scores, and 2.74 HSGPA at Grade 12 for the 2-year college and 2.83 for the 4-year college.) Students who satisfied the interim standards were about twice as likely as those who did not to have FYGPAs of 3.0 or above in both types of colleges.

For the same performance category, the 4-year college's mean FYGPA and the proportion of students with an FYGPA over 3 were higher than those of the 2-year college. When students met the standards set for HSGPA at grade 12, those who met the ELA 10 standard but failed the Algebra I standard performed better in college than those who failed the ELA 10 standard but met the Algebra I threshold. The concurrent use of three standards on PARCC ELA 10, Algebra I, and HSGPA at grade 12 would best predict FYGPA, followed by the use of both ELA 10 and Algebra I standards, and finally ELA 10 for the two-year college. For the 4-year college, there was little difference in predictive power between ELA 10 and Algebra I.

Discussion

All analyses were carried out given the availability and quality of high school academic performance data and college course data for students who attended Maryland public high schools and public postsecondary institutions when they graduated from high school in 2017, 2018, and 2019. The samples only include Maryland high school graduates attending Maryland public higher education institutions, namely 2-year and 4-year colleges. Thus, the sample used in this study may not well represent the student population attending public high schools in Maryland. Some Maryland high school graduates attended out-of-state or private colleges. As a result, we had no access to their college academic performance records to compute FYGPA. Those students may come from higher socioeconomic status households or be higher performing students. This may impair the generalizability of the findings of this study to applying the CCR measures to all students attending Maryland public high schools. As a result, caution should be exercised when the findings from this study about the relationship between high school academic achievement measures and college success are applied in policy decision-making.

The data for a specific cohort generally span five years, from grades 9 through 12 and the first year of post-secondary study, even longer depending on when a specific course or a test was taken. For example, some students may have taken a state Algebra I test when they were in grade 6, 7, or 8 while some others took the test in high school grades, even in grades 11 or 12. Further, the state assessment programs evolved two generations from HSA to PARCC even for the three cohorts of students in this study. Thus, students' HSA Algebra I scores had to be converted to the PARCC Algebra I scores. As no common persons or common items were available for linking HSA Algebra I and PARCC Algebra I scores, PSAT/NMSQT was used as an external linking test to map the scores on these two Algebra I tests. External linking was likely to introduce more linking errors in the mapped scores. To make things even worse, PSAT went through an old scale to new scale conversion in 2016. Further, SAT changed from the old design to the new design in 2015. All these realities increased the complexity of this study and may bring more threats to the generalizability of the findings. Again, it is worthy of note that caution should be exercised when applying the findings of this current study to state assessment policy decisions.

In summary, this study investigates the relationship between high school academic performance and postsecondary success for students who graduated from Maryland public high schools and attended Maryland public colleges. Though there are some limitations of the current study, it is expected the empirical evidence collected in this study helps MSDE make informed decisions about selecting the state CCR measures and their uses in the accountability system.

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Appendix A

Concordance Relationship between the Old and New SAT Scales

Table A

Concordance Table between the Old and New SAT Scales

Old SAT	New SAT		Old SAT	New SAT
600	400		1360	1000
610	410		1370	1010
620	420		1390	1020
630	430		1400	1030
640	440		1420	1040
650	450		1430	1050
660	460		1450	1060
670	470		1460	1070
680	480		1480	1080
690	490		1490	1090
700	500		1510	1100
710	510		1530	1110
720	520		1540	1120
730	530		1560	1130
730	540		1570	1140
740	550		1590	1150
750	560		1610	1160
760	570		1620	1170
770	580		1640	1180
780	590		1650	1190
790	600		1670	1200
800	610		1680	1210
810	620		1700	1220
820	630		1710	1230
830	640		1730	1240
840	650		1750	1250
850	660		1760	1260
860	670		1780	1270
870	680		1790	1280
880	690		1810	1290
900	700		1820	1300

910	710		1840	1310
930	720		1850	1320
950	730		1870	1330
960	740		1880	1340
980	750		1900	1350
990	760		1920	1360
1010	770		1930	1370
1030	780		1950	1380
1040	790		1970	1390
1060	800		1990	1400
1070	810		2000	1410
1090	820		2020	1420
1110	830		2040	1430
1120	840		2060	1440
1140	850		2080	1450
1150	860		2090	1460
1170	870		2110	1470
1180	880		2130	1480
1200	890		2150	1490
1210	900		2170	1500
1220	910		2190	1510
1240	920		2210	1520
1250	930		2230	1530
1270	940		2260	1540
1280	950		2280	1550
1300	960		2300	1560
1310	970		2330	1570
1330	980		2350	1580
1340	990		2370	1590
			2390	1600

Appendix B

Concordance Table between the Old and New PSAT/NMSQT scales

Table B

Concordance Table between the Old and New PSAT/NMSQT Scales

PSAT/NMSQT Math (20-80)	PSAT/NMSQT Math (160-760)		PSAT/NMSQT Math (20-80)	PSAT/NMSQT Math (160-760)
80	760		49	520
79	760		48	510
78	760		47	510
77	760		46	500
76	760		45	490
75	760		44	480
74	760		43	470
73	760		42	460
72	750		41	450
71	740		40	440
70	730		39	430
69	720		38	420
68	710		37	410
67	700		36	400
66	690		35	390
65	670		34	380
64	660		33	370
63	650		32	360
62	640		31	360
61	630		30	350
60	620		29	340
59	610		28	330
58	600		27	310
57	590		26	300
56	580		25	280
55	570		24	260
54	570		23	250
53	560		22	230
52	550		21	220
51	540		20	200
50	530			

Appendix C

Concordance Relationships between Each High School Performance Indicator (SAT, ACT, PARCC ELA 10, PARCC Algebra I, HSGPA10, HSGPA 11, HSGPA12) and FYGPA (4-Year Colleges)

Table C

The Concordance Tables between HSPI and FYGPA for the 4-Year Colleges

SAT	FYGPA	ACT	FYGPA	GPA10	FYGPA	GPA11	FYGPA	GPA12	FYGPA	ALG1	FYGPA	ELA 10	FYGPA
400	0.00	1	0.00	0.00	1.81	0.00	1.83	0.00	0.48	650	0.67	650	0.70
410	0.00	2	0.00	0.01	1.91	0.01	1.91	0.01	0.49	651	0.70	651	0.79
420	0.00	3	0.00	0.02	1.93	0.02	1.91	0.02	0.50	652	0.74	652	0.88
430	0.00	4	0.00	0.03	1.94	0.03	1.91	0.03	0.51	653	0.77	653	0.96
440	0.00	5	0.14	0.04	1.94	0.04	1.92	0.04	0.51	654	0.80	654	1.05
450	0.00	6	0.38	0.05	1.95	0.05	1.92	0.05	0.52	655	0.83	655	1.14
460	0.00	7	0.61	0.06	1.95	0.06	1.92	0.06	0.53	656	0.86	656	1.23
470	0.00	8	0.84	0.07	1.95	0.07	1.92	0.07	0.54	657	0.90	657	1.32
480	0.00	9	1.08	0.08	1.94	0.08	1.92	0.08	0.55	658	0.93	658	1.41
490	0.00	10	1.26	0.09	1.94	0.09	1.92	0.09	0.55	659	0.96	659	1.49
500	0.06	11	1.44	0.10	1.94	0.10	1.92	0.10	0.56	660	0.99	660	1.58
510	0.13	12	1.62	0.11	1.94	0.11	1.92	0.11	0.57	661	1.03	661	1.62
520	0.20	13	1.80	0.12	1.94	0.12	1.92	0.12	0.58	662	1.06	662	1.64
530	0.27	14	2.00	0.13	1.94	0.13	1.92	0.13	0.59	663	1.09	663	1.65
540	0.34	15	2.19	0.14	1.94	0.14	1.92	0.14	0.59	664	1.12	664	1.66
550	0.41	16	2.37	0.15	1.94	0.15	1.92	0.15	0.60	665	1.16	665	1.67
560	0.47	17	2.54	0.16	1.94	0.16	1.92	0.16	0.61	666	1.19	666	1.68
570	0.54	18	2.69	0.17	1.95	0.17	1.92	0.17	0.62	667	1.22	667	1.70
580	0.61	19	2.83	0.18	1.95	0.18	1.92	0.18	0.63	668	1.25	668	1.71
590	0.68	20	2.96	0.19	1.95	0.19	1.92	0.19	0.66	669	1.28	669	1.72
600	0.69	**21**	**3.07**	0.20	1.95	0.20	1.92	0.20	0.67	670	1.32	670	1.73
610	0.75	22	3.18	0.21	1.95	0.21	1.92	0.21	0.68	671	1.35	671	1.75
620	0.81	23	3.28	0.22	1.95	0.22	1.92	0.22	0.68	672	1.38	672	1.76
630	0.88	24	3.38	0.23	1.95	0.23	1.92	0.23	0.69	673	1.41	673	1.77
640	0.94	25	3.47	0.24	1.95	0.24	1.92	0.24	0.70	674	1.45	674	1.78
650	1.00	26	3.55	0.25	1.95	0.25	1.92	0.25	0.71	675	1.48	675	1.79
660	1.06	27	3.62	0.26	1.95	0.26	1.92	0.26	0.72	676	1.51	676	1.81
670	1.13	28	3.69	0.27	1.95	0.27	1.92	0.27	0.72	677	1.54	677	1.82
680	1.19	29	3.76	0.28	1.95	0.28	1.92	0.28	0.73	678	1.57	678	1.83

690	1.25	30	3.82	0.29	1.95	0.29	1.92	0.29	0.74	679	1.61	679	1.84
700	1.32	31	3.87	0.30	1.95	0.30	1.92	0.30	0.75	680	1.62	680	1.86
710	1.38	32	3.93	0.31	1.95	0.31	1.92	0.31	0.76	681	1.64	681	1.87
720	1.44	33	3.97	0.32	1.95	0.32	1.92	0.32	0.76	682	1.65	682	1.88
730	1.51	34	4.00	0.33	1.95	0.33	1.92	0.33	0.77	683	1.66	683	1.90
740	1.57	35	4.00	0.34	1.95	0.34	1.92	0.34	0.78	684	1.68	684	1.91
750	1.63	36	4.00	0.35	1.95	0.35	1.92	0.35	0.79	685	1.69	685	1.92
760	1.68			0.36	1.95	0.36	1.92	0.36	0.80	686	1.71	686	1.93
770	1.74			0.37	1.95	0.37	1.92	0.37	0.80	687	1.73	687	1.95
780	1.79			0.38	1.95	0.38	1.92	0.38	0.81	688	1.75	688	1.96
790	1.84			0.39	1.95	0.39	1.92	0.39	0.82	689	1.76	689	1.97
800	1.89			0.40	1.95	0.40	1.92	0.40	0.83	690	1.78	690	1.98
810	1.95			0.41	1.95	0.41	1.92	0.41	0.84	691	1.80	691	2.00
820	2.00			0.42	1.95	0.42	1.92	0.42	0.84	692	1.81	692	2.01
830	2.04			0.43	1.95	0.43	1.92	0.43	0.85	693	1.83	693	2.02
840	2.09			0.44	1.95	0.44	1.92	0.44	0.86	694	1.85	694	2.03
850	2.14			0.45	1.95	0.45	1.92	0.45	0.87	695	1.87	695	2.05
860	2.18			0.46	1.95	0.46	1.92	0.46	0.88	696	1.89	696	2.06
870	2.23			0.47	1.95	0.47	1.92	0.47	0.88	697	1.91	697	2.07
880	2.27			0.48	1.95	0.48	1.92	0.48	0.89	698	1.93	698	2.08
890	2.32			0.49	1.95	0.49	1.92	0.49	0.90	699	1.95	699	2.09
900	2.36			0.50	1.95	0.50	1.93	0.50	0.91	700	1.97	700	2.11
910	2.40			0.51	1.95	0.51	1.93	0.51	0.92	701	1.99	701	2.12
920	2.45			0.52	1.95	0.52	1.93	0.52	0.92	702	2.01	702	2.13
930	2.49			0.53	1.95	0.53	1.93	0.53	0.93	703	2.03	703	2.14
940	2.53			0.54	1.95	0.54	1.93	0.54	0.94	704	2.04	704	2.16
950	2.57			0.55	1.95	0.55	1.93	0.55	0.95	705	2.06	705	2.17
960	2.61			0.56	1.95	0.56	1.93	0.56	0.96	706	2.08	706	2.18
970	2.65			0.57	1.95	0.57	1.93	0.57	0.96	707	2.10	707	2.19
980	2.69			0.58	1.95	0.58	1.93	0.58	0.97	708	2.12	708	2.21
990	2.73			0.59	1.95	0.59	1.93	0.59	0.98	709	2.13	709	2.22
1000	2.77			0.60	1.95	0.60	1.93	0.60	0.99	710	2.15	710	2.23
1010	2.81			0.61	1.95	0.61	1.93	0.61	1.00	711	2.17	711	2.25
1020	2.84			0.62	1.96	0.62	1.93	0.62	1.00	712	2.19	712	2.26
1030	2.88			0.63	1.96	0.63	1.93	0.63	1.01	713	2.21	713	2.27
1040	2.92			0.64	1.96	0.64	1.93	0.64	1.02	714	2.23	714	2.29
1050	2.96			0.65	1.96	0.65	1.93	0.65	1.03	715	2.25	715	2.30
1060	2.99			0.66	1.96	0.66	1.93	0.66	1.04	716	2.28	716	2.32
1070	**3.03**			0.67	1.96	0.67	1.93	0.67	1.05	717	2.30	717	2.33
1080	3.07			0.68	1.96	0.68	1.93	0.68	1.05	718	2.32	718	2.35
1090	3.10			0.69	1.96	0.69	1.93	0.69	1.06	719	2.35	719	2.36

1100	3.14			0.70	1.96	0.70	1.93	0.70	1.07	720	2.37	720	2.38
1110	3.17			0.71	1.96	0.71	1.93	0.71	1.08	721	2.39	721	2.39
1120	3.20			0.72	1.96	0.72	1.93	0.72	1.09	722	2.42	722	2.41
1130	3.23			0.73	1.96	0.73	1.93	0.73	1.09	723	2.44	723	2.42
1140	3.27			0.74	1.96	0.74	1.93	0.74	1.10	724	2.46	724	2.44
1150	3.30			0.75	1.96	0.75	1.93	0.75	1.11	725	2.49	725	2.45
1160	3.33			0.76	1.96	0.76	1.93	0.76	1.12	726	2.51	726	2.47
1170	3.36			0.77	1.96	0.77	1.93	0.77	1.13	727	2.53	727	2.49
1180	3.39			0.78	1.96	0.78	1.93	0.78	1.13	728	2.56	728	2.50
1190	3.42			0.79	1.96	0.79	1.93	0.79	1.14	729	2.58	729	2.52
1200	3.44			0.80	1.97	0.80	1.93	0.80	1.15	730	2.60	730	2.54
1210	3.47			0.81	1.97	0.81	1.93	0.81	1.16	731	2.62	731	2.55
1220	3.50			0.82	1.97	0.82	1.93	0.82	1.17	732	2.64	732	2.57
1230	3.52			0.83	1.97	0.83	1.93	0.83	1.17	733	2.66	733	2.59
1240	3.55			0.84	1.97	0.84	1.93	0.84	1.18	734	2.68	734	2.60
1250	3.58			0.85	1.97	0.85	1.93	0.85	1.19	735	2.70	735	2.62
1260	3.60			0.86	1.97	0.86	1.93	0.86	1.20	736	2.72	736	2.64
1270	3.63			0.87	1.97	0.87	1.94	0.87	1.21	737	2.74	737	2.65
1280	3.65			0.88	1.97	0.88	1.94	0.88	1.21	738	2.76	738	2.67
1290	3.67			0.89	1.97	0.89	1.94	0.89	1.22	739	2.78	739	2.69
1300	3.69			0.90	1.97	0.90	1.94	0.90	1.23	740	2.80	740	2.70
1310	3.72			0.91	1.97	0.91	1.94	0.91	1.24	741	2.82	741	2.72
1320	3.74			0.92	1.97	0.92	1.94	0.92	1.25	742	2.84	742	2.74
1330	3.76			0.93	1.97	0.93	1.94	0.93	1.25	743	2.86	743	2.75
1340	3.78			0.94	1.97	0.94	1.94	0.94	1.26	744	2.88	744	2.77
1350	3.79			0.95	1.97	0.95	1.94	0.95	1.27	745	2.90	745	2.79
1360	3.81			0.96	1.97	0.96	1.94	0.96	1.28	746	2.92	746	2.81
1370	3.83			0.97	1.97	0.97	1.94	0.97	1.29	747	2.93	747	2.82
1380	3.85			0.98	1.98	0.98	1.94	0.98	1.29	748	2.95	748	2.84
1390	3.86			0.99	1.98	0.99	1.94	0.99	1.30	749	2.97	749	2.86
1400	3.88			1.00	1.98	1.00	1.94	1.00	1.31	750	2.99	750	2.88
1410	3.89			1.01	1.99	1.01	1.94	1.01	1.32	**751**	**3.01**	751	2.89
1420	3.91			1.02	2.00	1.02	1.94	1.02	1.33	752	3.03	752	2.91
1430	3.92			1.03	2.00	1.03	1.94	1.03	1.33	753	3.04	753	2.93
1440	3.94			1.04	2.00	1.04	1.95	1.04	1.34	754	3.06	754	2.95
1450	3.95			1.05	2.00	1.05	1.95	1.05	1.35	755	3.08	755	2.97
1460	3.97			1.06	2.00	1.06	1.95	1.06	1.36	756	3.09	756	2.98
1470	3.98			1.07	2.00	1.07	1.95	1.07	1.37	757	3.11	757	**3.00**
1480	4.00			1.08	2.00	1.08	1.95	1.08	1.37	758	3.13	758	3.02
1490	4.00			1.09	2.00	1.09	1.95	1.09	1.38	759	3.15	759	3.04
1500	4.00			1.10	2.00	1.10	1.95	1.10	1.39	760	3.17	760	3.06

1510	4.00			1.11	2.00	1.11	1.95	1.11	1.40	761	3.19	761	3.07
1520	4.00			1.12	2.00	1.12	1.95	1.12	1.41	762	3.21	762	3.09
1530	4.00			1.13	2.00	1.13	1.95	1.13	1.41	763	3.23	763	3.11
1540	4.00			1.14	2.00	1.14	1.95	1.14	1.42	764	3.25	764	3.13
1550	4.00			1.15	2.01	1.15	1.95	1.15	1.43	765	3.27	765	3.15
1560	4.00			1.16	2.01	1.16	1.96	1.16	1.44	766	3.28	766	3.16
1570	4.00			1.17	2.01	1.17	1.96	1.17	1.45	767	3.30	767	3.18
1580	4.00			1.18	2.01	1.18	1.96	1.18	1.46	768	3.32	768	3.20
1590	4.00			1.19	2.01	1.19	1.96	1.19	1.46	769	3.34	769	3.22
1600	4.00			1.20	2.02	1.20	1.96	1.20	1.47	770	3.36	770	3.23
				1.21	2.02	1.21	1.96	1.21	1.48	771	3.37	771	3.25
				1.22	2.02	1.22	1.96	1.22	1.49	772	3.39	772	3.27
				1.23	2.02	1.23	1.96	1.23	1.50	773	3.41	773	3.29
				1.24	2.02	1.24	1.96	1.24	1.50	774	3.42	774	3.30
				1.25	2.03	1.25	1.97	1.25	1.51	775	3.44	775	3.32
				1.26	2.03	1.26	1.97	1.26	1.52	776	3.46	776	3.34
				1.27	2.03	1.27	1.97	1.27	1.53	777	3.48	777	3.35
				1.28	2.03	1.28	1.97	1.28	1.54	778	3.50	778	3.37
				1.29	2.03	1.29	1.97	1.29	1.54	779	3.52	779	3.38
				1.30	2.03	1.30	1.97	1.30	1.55	780	3.54	780	3.40
				1.31	2.04	1.31	1.98	1.31	1.56	781	3.56	781	3.42
				1.32	2.04	1.32	1.98	1.32	1.57	782	3.58	782	3.43
				1.33	2.05	1.33	1.98	1.33	1.58	783	3.59	783	3.45
				1.34	2.06	1.34	1.98	1.34	1.58	784	3.61	784	3.46
				1.35	2.06	1.35	1.98	1.35	1.59	785	3.63	785	3.48
				1.36	2.06	1.36	1.98	1.36	1.60	786	3.65	786	3.49
				1.37	2.07	1.37	1.99	1.37	1.61	787	3.67	787	3.51
				1.38	2.07	1.38	1.99	1.38	1.62	788	3.68	788	3.53
				1.39	2.07	1.39	1.99	1.39	1.62	789	3.70	789	3.54
				1.40	2.07	1.40	1.99	1.40	1.63	790	3.71	790	3.56
				1.41	2.07	1.41	1.99	1.41	1.64	791	3.72	791	3.57
				1.42	2.08	1.42	2.00	1.42	1.65	792	3.73	792	3.59
				1.43	2.08	1.43	2.01	1.43	1.66	793	3.74	793	3.60
				1.44	2.08	1.44	2.02	1.44	1.67	794	3.75	794	3.62
				1.45	2.08	1.45	2.02	1.45	1.68	795	3.76	795	3.63
				1.46	2.08	1.46	2.03	1.46	1.69	796	3.77	796	3.64
				1.47	2.09	1.47	2.03	1.47	1.69	797	3.78	797	3.66
				1.48	2.09	1.48	2.04	1.48	1.70	798	3.79	798	3.67
				1.49	2.09	1.49	2.04	1.49	1.71	799	3.81	799	3.68
				1.50	2.10	1.50	2.04	1.50	1.72	800	3.82	800	3.70
				1.51	2.11	1.51	2.05	1.51	1.73	801	3.83	801	3.71

				1.52	2.11	1.52	2.05	1.52	1.74	802	3.84	802	3.72
				1.53	2.11	1.53	2.06	1.53	1.75	803	3.85	803	3.73
				1.54	2.12	1.54	2.06	1.54	1.75	804	3.86	804	3.74
				1.55	2.12	1.55	2.06	1.55	1.76	805	3.87	805	3.75
				1.56	2.12	1.56	2.07	1.56	1.77	806	3.88	806	3.76
				1.57	2.12	1.57	2.07	1.57	1.77	807	3.88	807	3.77
				1.58	2.13	1.58	2.07	1.58	1.78	808	3.89	808	3.78
				1.59	2.13	1.59	2.08	1.59	1.79	809	3.89	809	3.79
				1.60	2.14	1.60	2.08	1.60	1.80	810	3.90	810	3.80
				1.61	2.14	1.61	2.08	1.61	1.81	811	3.90	811	3.81
				1.62	2.14	1.62	2.09	1.62	1.81	812	3.90	812	3.82
				1.63	2.14	1.63	2.09	1.63	1.82	813	3.91	813	3.83
				1.64	2.15	1.64	2.09	1.64	1.83	814	3.91	814	3.84
				1.65	2.15	1.65	2.10	1.65	1.84	815	3.91	815	3.85
				1.66	2.15	1.66	2.10	1.66	1.85	816	3.92	816	3.86
				1.67	2.17	1.67	2.11	1.67	1.86	817	3.92	817	3.86
				1.68	2.18	1.68	2.11	1.68	1.86	818	3.93	818	3.87
				1.69	2.18	1.69	2.12	1.69	1.87	819	3.93	819	3.88
				1.70	2.19	1.70	2.12	1.70	1.88	820	3.93	820	3.88
				1.71	2.19	1.71	2.13	1.71	1.89	821	3.94	821	3.89
				1.72	2.19	1.72	2.13	1.72	1.90	822	3.94	822	3.90
				1.73	2.20	1.73	2.14	1.73	1.91	823	3.95	823	3.91
				1.74	2.20	1.74	2.14	1.74	1.92	824	3.95	824	3.91
				1.75	2.20	1.75	2.15	1.75	1.93	825	3.96	825	3.92
				1.76	2.21	1.76	2.15	1.76	1.94	826	3.96	826	3.93
				1.77	2.21	1.77	2.16	1.77	1.95	827	3.96	827	3.93
				1.78	2.21	1.78	2.16	1.78	1.96	828	3.97	828	3.94
				1.79	2.22	1.79	2.17	1.79	1.97	829	3.97	829	3.95
				1.80	2.23	1.80	2.18	1.80	1.98	830	3.98	830	3.95
				1.81	2.23	1.81	2.18	1.81	1.99	831	3.98	831	3.96
				1.82	2.24	1.82	2.19	1.82	2.00	832	3.99	832	3.97
				1.83	2.25	1.83	2.19	1.83	2.01	833	3.99	833	3.97
				1.84	2.26	1.84	2.20	1.84	2.02	834	3.99	834	3.98
				1.85	2.27	1.85	2.20	1.85	2.03	835	3.99	835	3.99
				1.86	2.27	1.86	2.21	1.86	2.04	836	3.99	836	3.99
				1.87	2.28	1.87	2.21	1.87	2.05	837	3.99	837	4.00
				1.88	2.28	1.88	2.22	1.88	2.06	838	4.00	838	4.00
				1.89	2.29	1.89	2.23	1.89	2.07	839	4.00	839	4.00
				1.90	2.29	1.90	2.24	1.90	2.07	840	4.00	840	4.00
				1.91	2.29	1.91	2.24	1.91	2.08	841	4.00	841	4.00
				1.92	2.30	1.92	2.25	1.92	2.09	842	4.00	842	4.00

				1.93	2.30	1.93	2.25	1.93	2.10	843	4.00	843	4.00
				1.94	2.30	1.94	2.25	1.94	2.10	844	4.00	844	4.00
				1.95	2.30	1.95	2.26	1.95	2.11	845	4.00	845	4.00
				1.96	2.30	1.96	2.26	1.96	2.12	846	4.00	846	4.00
				1.97	2.31	1.97	2.27	1.97	2.12	847	4.00	847	4.00
				1.98	2.31	1.98	2.27	1.98	2.13	848	4.00	848	4.00
				1.99	2.32	1.99	2.28	1.99	2.14	849	4.00	849	4.00
				2.00	2.35	2.00	2.30	2.00	2.16	850	4.00	850	4.00
				2.01	2.38	2.01	2.32	2.01	2.18				
				2.02	2.39	2.02	2.32	2.02	2.19				
				2.03	2.40	2.03	2.33	2.03	2.20				
				2.04	2.40	2.04	2.33	2.04	2.20				
				2.05	2.40	2.05	2.34	2.05	2.21				
				2.06	2.41	2.06	2.34	2.06	2.22				
				2.07	2.41	2.07	2.35	2.07	2.22				
				2.08	2.41	2.08	2.35	2.08	2.23				
				2.09	2.41	2.09	2.36	2.09	2.24				
				2.10	2.42	2.10	2.36	2.10	2.25				
				2.11	2.42	2.11	2.38	2.11	2.27				
				2.12	2.43	2.12	2.39	2.12	2.28				
				2.13	2.43	2.13	2.40	2.13	2.28				
				2.14	2.44	2.14	2.41	2.14	2.29				
				2.15	2.45	2.15	2.41	2.15	2.30				
				2.16	2.46	2.16	2.42	2.16	2.31				
				2.17	2.48	2.17	2.42	2.17	2.32				
				2.18	2.50	2.18	2.43	2.18	2.33				
				2.19	2.51	2.19	2.44	2.19	2.35				
				2.20	2.51	2.20	2.45	2.20	2.36				
				2.21	2.52	2.21	2.46	2.21	2.37				
				2.22	2.53	2.22	2.47	2.22	2.38				
				2.23	2.53	2.23	2.48	2.23	2.39				
				2.24	2.54	2.24	2.49	2.24	2.40				
				2.25	2.55	2.25	2.50	2.25	2.41				
				2.26	2.55	2.26	2.51	2.26	2.42				
				2.27	2.56	2.27	2.51	2.27	2.43				
				2.28	2.56	2.28	2.52	2.28	2.44				
				2.29	2.56	2.29	2.53	2.29	2.45				
				2.30	2.57	2.30	2.53	2.30	2.46				
				2.31	2.58	2.31	2.54	2.31	2.47				
				2.32	2.59	2.32	2.55	2.32	2.48				
				2.33	2.61	2.33	2.57	2.33	2.49				

				2.34	2.63	2.34	2.58	2.34	2.50				
				2.35	2.64	2.35	2.59	2.35	2.51				
				2.36	2.65	2.36	2.59	2.36	2.52				
				2.37	2.65	2.37	2.60	2.37	2.53				
				2.38	2.65	2.38	2.61	2.38	2.54				
				2.39	2.66	2.39	2.62	2.39	2.55				
				2.40	2.67	2.40	2.63	2.40	2.56				
				2.41	2.67	2.41	2.64	2.41	2.57				
				2.42	2.68	2.42	2.64	2.42	2.58				
				2.43	2.69	2.43	2.65	2.43	2.60				
				2.44	2.70	2.44	2.66	2.44	2.61				
				2.45	2.70	2.45	2.67	2.45	2.62				
				2.46	2.71	2.46	2.68	2.46	2.63				
				2.47	2.71	2.47	2.69	2.47	2.64				
				2.48	2.71	2.48	2.69	2.48	2.65				
				2.49	2.72	2.49	2.70	2.49	2.66				
				2.50	2.74	2.50	2.71	2.50	2.67				
				2.51	2.77	2.51	2.73	2.51	2.68				
				2.52	2.77	2.52	2.74	2.52	2.69				
				2.53	2.78	2.53	2.74	2.53	2.70				
				2.54	2.78	2.54	2.75	2.54	2.70				
				2.55	2.78	2.55	2.76	2.55	2.71				
				2.56	2.79	2.56	2.77	2.56	2.72				
				2.57	2.80	2.57	2.78	2.57	2.73				
				2.58	2.81	2.58	2.79	2.58	2.74				
				2.59	2.82	2.59	2.80	2.59	2.75				
				2.60	2.83	2.60	2.80	2.60	2.76				
				2.61	2.84	2.61	2.81	2.61	2.77				
				2.62	2.84	2.62	2.82	2.62	2.78				
				2.63	2.85	2.63	2.83	2.63	2.79				
				2.64	2.85	2.64	2.84	2.64	2.80				
				2.65	2.85	2.65	2.85	2.65	2.81				
				2.66	2.86	2.66	2.85	2.66	2.82				
				2.67	2.89	2.67	2.87	2.67	2.83				
				2.68	2.91	2.68	2.88	2.68	2.84				
				2.69	2.92	2.69	2.89	2.69	2.86				
				2.70	2.93	2.70	2.90	2.70	2.87				
				2.71	2.94	2.71	2.91	2.71	2.88				
				2.72	2.94	2.72	2.92	2.72	2.89				
				2.73	2.95	2.73	2.92	2.73	2.90				
				2.74	2.95	2.74	2.93	2.74	2.91				

				2.75	2.96	2.75	2.94	2.75	2.92				
				2.76	2.96	2.76	2.95	2.76	2.93				
				2.77	2.97	2.77	2.96	2.77	2.94				
				2.78	2.97	2.78	2.97	2.78	2.95				
				2.79	2.98	2.79	2.99	2.79	2.96				
				2.80	2.99	**2.80**	**3.00**	2.80	2.97				
				2.81	**3.00**	2.81	3.00	2.81	2.98				
				2.82	3.01	2.82	3.01	2.82	2.99				
				2.83	3.03	2.83	3.01	**2.83**	**3.00**				
				2.84	3.05	2.84	3.02	2.84	3.01				
				2.85	3.06	2.85	3.03	2.85	3.02				
				2.86	3.07	2.86	3.03	2.86	3.02				
				2.87	3.07	2.87	3.04	2.87	3.03				
				2.88	3.08	2.88	3.05	2.88	3.04				
				2.89	3.08	2.89	3.07	2.89	3.05				
				2.90	3.09	2.90	3.09	2.90	3.06				
				2.91	3.09	2.91	3.10	2.91	3.07				
				2.92	3.10	2.92	3.10	2.92	3.08				
				2.93	3.10	2.93	3.11	2.93	3.09				
				2.94	3.10	2.94	3.11	2.94	3.10				
				2.95	3.10	2.95	3.12	2.95	3.11				
				2.96	3.10	2.96	3.12	2.96	3.11				
				2.97	3.10	2.97	3.12	2.97	3.12				
				2.98	3.11	2.98	3.13	2.98	3.13				
				2.99	3.12	2.99	3.14	2.99	3.14				
				3.00	3.16	3.00	3.16	3.00	3.16				
				3.01	3.20	3.01	3.19	3.01	3.18				
				3.02	3.21	3.02	3.20	3.02	3.18				
				3.03	3.22	3.03	3.21	3.03	3.19				
				3.04	3.22	3.04	3.21	3.04	3.20				
				3.05	3.22	3.05	3.21	3.05	3.21				
				3.06	3.22	3.06	3.22	3.06	3.21				
				3.07	3.23	3.07	3.22	3.07	3.22				
				3.08	3.23	3.08	3.23	3.08	3.23				
				3.09	3.23	3.09	3.23	3.09	3.25				
				3.10	3.24	3.10	3.24	3.10	3.26				
				3.11	3.24	3.11	3.26	3.11	3.26				
				3.12	3.25	3.12	3.28	3.12	3.27				
				3.13	3.25	3.13	3.29	3.13	3.28				
				3.14	3.26	3.14	3.29	3.14	3.29				
				3.15	3.27	3.15	3.30	3.15	3.30				

				3.16	3.28	3.16	3.30	3.16	3.31				
				3.17	3.30	3.17	3.31	3.17	3.31				
				3.18	3.32	3.18	3.32	3.18	3.32				
				3.19	3.33	3.19	3.32	3.19	3.33				
				3.20	3.33	3.20	3.33	3.20	3.34				
				3.21	3.34	3.21	3.34	3.21	3.35				
				3.22	3.35	3.22	3.36	3.22	3.36				
				3.23	3.35	3.23	3.37	3.23	3.37				
				3.24	3.36	3.24	3.38	3.24	3.38				
				3.25	3.37	3.25	3.38	3.25	3.39				
				3.26	3.37	3.26	3.39	3.26	3.40				
				3.27	3.38	3.27	3.40	3.27	3.41				
				3.28	3.38	3.28	3.41	3.28	3.42				
				3.29	3.39	3.29	3.41	3.29	3.42				
				3.30	3.39	3.30	3.42	3.30	3.43				
				3.31	3.40	3.31	3.43	3.31	3.44				
				3.32	3.41	3.32	3.43	3.32	3.45				
				3.33	3.43	3.33	3.45	3.33	3.46				
				3.34	3.45	3.34	3.46	3.34	3.47				
				3.35	3.46	3.35	3.47	3.35	3.48				
				3.36	3.46	3.36	3.47	3.36	3.49				
				3.37	3.47	3.37	3.48	3.37	3.49				
				3.38	3.47	3.38	3.48	3.38	3.50				
				3.39	3.47	3.39	3.49	3.39	3.51				
				3.40	3.48	3.40	3.50	3.40	3.52				
				3.41	3.49	3.41	3.51	3.41	3.53				
				3.42	3.50	3.42	3.52	3.42	3.54				
				3.43	3.51	3.43	3.52	3.43	3.55				
				3.44	3.52	3.44	3.53	3.44	3.56				
				3.45	3.52	3.45	3.55	3.45	3.56				
				3.46	3.52	3.46	3.55	3.46	3.57				
				3.47	3.52	3.47	3.56	3.47	3.58				
				3.48	3.53	3.48	3.57	3.48	3.59				
				3.49	3.53	3.49	3.57	3.49	3.60				
				3.50	3.56	3.50	3.58	3.50	3.61				
				3.51	3.58	3.51	3.60	3.51	3.61				
				3.52	3.59	3.52	3.60	3.52	3.62				
				3.53	3.59	3.53	3.61	3.53	3.63				
				3.54	3.59	3.54	3.61	3.54	3.64				
				3.55	3.60	3.55	3.62	3.55	3.65				
				3.56	3.60	3.56	3.63	3.56	3.65				

				3.57	3.61	3.57	3.64	3.57	3.66				
				3.58	3.62	3.58	3.65	3.58	3.67				
				3.59	3.63	3.59	3.66	3.59	3.68				
				3.60	3.64	3.60	3.66	3.60	3.69				
				3.61	3.64	3.61	3.67	3.61	3.70				
				3.62	3.65	3.62	3.68	3.62	3.71				
				3.63	3.65	3.63	3.69	3.63	3.71				
				3.64	3.66	3.64	3.69	3.64	3.72				
				3.65	3.66	3.65	3.70	3.65	3.73				
				3.66	3.67	3.66	3.71	3.66	3.74				
				3.67	3.68	3.67	3.72	3.67	3.74				
				3.68	3.70	3.68	3.73	3.68	3.75				
				3.69	3.71	3.69	3.74	3.69	3.76				
				3.70	3.72	3.70	3.74	3.70	3.77				
				3.71	3.73	3.71	3.75	3.71	3.78				
				3.72	3.73	3.72	3.76	3.72	3.78				
				3.73	3.73	3.73	3.76	3.73	3.79				
				3.74	3.74	3.74	3.77	3.74	3.80				
				3.75	3.74	3.75	3.78	3.75	3.80				
				3.76	3.75	3.76	3.78	3.76	3.81				
				3.77	3.75	3.77	3.79	3.77	3.82				
				3.78	3.76	3.78	3.80	3.78	3.83				
				3.79	3.76	3.79	3.81	3.79	3.83				
				3.80	3.77	3.80	3.81	3.80	3.84				
				3.81	3.77	3.81	3.82	3.81	3.85				
				3.82	3.78	3.82	3.83	3.82	3.86				
				3.83	3.80	3.83	3.84	3.83	3.87				
				3.84	3.81	3.84	3.85	3.84	3.87				
				3.85	3.82	3.85	3.85	3.85	3.88				
				3.86	3.83	3.86	3.86	3.86	3.89				
				3.87	3.84	3.87	3.86	3.87	3.89				
				3.88	3.85	3.88	3.87	3.88	3.90				
				3.89	3.85	3.89	3.88	3.89	3.90				
				3.90	3.86	3.90	3.89	3.90	3.91				
				3.91	3.86	3.91	3.90	3.91	3.92				
				3.92	3.87	3.92	3.91	3.92	3.93				
				3.93	3.87	3.93	3.91	3.93	3.94				
				3.94	3.87	3.94	3.92	3.94	3.95				
				3.95	3.88	3.95	3.92	3.95	3.95				
				3.96	3.88	3.96	3.93	3.96	3.96				
				3.97	3.88	3.97	3.93	3.97	3.97				

				3.98	3.88	3.98	3.94	3.98	3.97				
				3.99	3.89	3.99	3.95	3.99	3.98				
				4.00	3.96	4.00	4.00	4.00	4.00				

Appendix D

Concordance Relationships between PARCC Test (ELA 11, Algebra II, Geometry) and FYGPA (4-Year Colleges)

Table D

The Concordance Table between PARCC Scores and FYGPA

PARCC Score	ALG 02 to FYGPA	ELA 11 to FYGPA	Geometry to FYGPA
650	1.67	0.93	1.16
651	1.74	1.30	1.30
652	1.76	1.40	1.34
653	1.77	1.51	1.39
654	1.78	1.57	1.43
655	1.80	1.58	1.46
656	1.81	1.59	1.48
657	1.82	1.61	1.50
658	1.84	1.62	1.52
659	1.85	1.63	1.54
660	1.86	1.64	1.56
661	1.88	1.65	1.58
662	1.89	1.66	1.60
663	1.91	1.68	1.61
664	1.92	1.69	1.63
665	1.94	1.70	1.65
666	1.95	1.71	1.67
667	1.97	1.72	1.69
668	1.99	1.73	1.71
669	2.00	1.75	1.73
670	2.02	1.76	1.75
671	2.04	1.77	1.77
672	2.06	1.78	1.79
673	2.07	1.79	1.81
674	2.09	1.81	1.83
675	2.11	1.82	1.84
676	2.12	1.83	1.86
677	2.14	1.84	1.88
678	2.16	1.85	1.90
679	2.18	1.87	1.92
680	2.20	1.88	1.94
681	2.21	1.89	1.96
682	2.23	1.90	1.98
683	2.25	1.91	1.99
684	2.27	1.93	2.01
685	2.29	1.94	2.03

686	2.30	1.95	2.05
687	2.32	1.96	2.07
688	2.34	1.98	2.08
689	2.36	1.99	2.10
690	2.38	2.00	2.12
691	2.40	2.01	2.14
692	2.42	2.02	2.16
693	2.44	2.04	2.18
694	2.46	2.05	2.19
695	2.48	2.06	2.21
696	2.50	2.07	2.23
697	2.52	2.08	2.25
698	2.54	2.10	2.27
699	2.56	2.11	2.29
700	2.58	2.12	2.31
701	2.60	2.13	2.33
702	2.62	2.15	2.35
703	2.64	2.16	2.37
704	2.65	2.17	2.39
705	2.67	2.18	2.41
706	2.69	2.20	2.43
707	2.71	2.21	2.45
708	2.73	2.22	2.48
709	2.75	2.23	2.50
710	2.77	2.25	2.52
711	2.78	2.26	2.54
712	2.80	2.27	2.57
713	2.82	2.29	2.59
714	2.84	2.30	2.61
715	2.85	2.31	2.63
716	2.87	2.33	2.66
717	2.89	2.34	2.68
718	2.91	2.35	2.70
719	2.93	2.37	2.73
720	2.94	2.38	2.75
721	2.96	2.40	2.78
722	2.98	2.41	2.80
723	**3.00**	2.43	2.83
724	3.02	2.44	2.85
725	3.03	2.45	2.88
726	3.05	2.47	2.90
727	3.07	2.48	2.93
728	3.09	2.50	2.95
729	3.10	2.51	2.98
730	3.12	2.53	**3.00**
731	3.14	2.55	3.03

732	3.15	2.56	3.05
733	3.17	2.58	3.08
734	3.19	2.59	3.10
735	3.20	2.61	3.12
736	3.22	2.63	3.15
737	3.23	2.64	3.17
738	3.25	2.66	3.20
739	3.27	2.67	3.22
740	3.28	2.69	3.25
741	3.30	2.71	3.27
742	3.32	2.73	3.29
743	3.33	2.74	3.32
744	3.35	2.76	3.34
745	3.37	2.78	3.37
746	3.38	2.79	3.39
747	3.40	2.81	3.41
748	3.41	2.83	3.44
749	3.43	2.85	3.46
750	3.45	2.87	3.48
751	3.46	2.88	3.50
752	3.48	2.90	3.53
753	3.50	2.92	3.55
754	3.51	2.94	3.57
755	3.53	2.96	3.59
756	3.54	2.98	3.62
757	3.56	**3.00**	3.64
758	3.58	3.01	3.66
759	3.59	3.03	3.68
760	3.61	3.05	3.70
761	3.62	3.07	3.73
762	3.64	3.09	3.75
763	3.65	3.11	3.77
764	3.67	3.13	3.79
765	3.68	3.15	3.81
766	3.69	3.17	3.83
767	3.71	3.19	3.85
768	3.72	3.20	3.87
769	3.73	3.22	3.89
770	3.75	3.24	3.91
771	3.76	3.26	3.93
772	3.77	3.28	3.95
773	3.78	3.30	3.96
774	3.79	3.31	3.98
775	3.81	3.33	3.98
776	3.82	3.35	3.99
777	3.83	3.37	3.99

778	3.84	3.38	4.00
779	3.85	3.40	4.00
780	3.86	3.42	4.00
781	3.87	3.43	4.00
782	3.88	3.45	4.00
783	3.89	3.47	4.00
784	3.90	3.48	4.00
785	3.90	3.50	4.00
786	3.91	3.51	4.00
787	3.92	3.53	4.00
788	3.93	3.55	4.00
789	3.94	3.56	4.00
790	3.95	3.58	4.00
791	3.95	3.59	4.00
792	3.96	3.60	4.00
793	3.97	3.62	4.00
794	3.97	3.63	4.00
795	3.98	3.65	4.00
796	3.99	3.66	4.00
797	3.99	3.67	4.00
798	4.00	3.69	4.00
799	4.00	3.70	4.00
800	4.00	3.71	4.00
801	4.00	3.73	4.00
802	4.00	3.74	4.00
803	4.00	3.75	4.00
804	4.00	3.77	4.00
805	4.00	3.78	4.00
806	4.00	3.79	4.00
807	4.00	3.80	4.00
808	4.00	3.82	4.00
809	4.00	3.83	4.00
810	4.00	3.84	4.00
811	4.00	3.85	4.00
812	4.00	3.87	4.00
813	4.00	3.88	4.00
814	4.00	3.89	4.00
815	4.00	3.90	4.00
816	4.00	3.91	4.00
817	4.00	3.92	4.00
818	4.00	3.94	4.00
819	4.00	3.95	4.00
820	4.00	3.96	4.00
821	4.00	3.97	4.00
822	4.00	3.98	4.00
823	4.00	3.99	4.00

824	4.00	3.99	4.00
825	4.00	4.00	4.00
826	4.00	4.00	4.00
827	4.00	4.00	4.00
828	4.00	4.00	4.00
829	4.00	4.00	4.00
830	4.00	4.00	4.00
831	4.00	4.00	4.00
832	4.00	4.00	4.00
833	4.00	4.00	4.00
834	4.00	4.00	4.00
835	4.00	4.00	4.00
836	4.00	4.00	4.00
837	4.00	4.00	4.00
838	4.00	4.00	4.00
839	4.00	4.00	4.00
840	4.00	4.00	4.00
841	4.00	4.00	4.00
842	4.00	4.00	4.00
843	4.00	4.00	4.00
844	4.00	4.00	4.00
845	4.00	4.00	4.00
846	4.00	4.00	4.00
847	4.00	4.00	4.00
848	4.00	4.00	4.00
849	4.00	4.00	4.00
850	4.00	4.00	4.00

Appendix E

Concordance Relationships between Each High School Performance Indicator (SAT, ACT, PARCC ELA 10, PARCC Algebra I, HSGPA10, HSGPA 11, HSGPA12) and FYGPA (2-Year Colleges)

Table E

The Concordance Tables between HSPI and FYGPA

SAT	FYGPA	ACT	FYGPA	GPA10	FYGPA	GPA11	FYGPA	GPA12	FYGPA	ALG1	FYGPA	ELA 10	FYGPA
400	0.00	1	0.00	0.00	1.86	0.00	1.86	0.00	0.00	650	0.49	650	0.52
410	0.00	2	0.00	0.01	1.93	0.01	1.93	0.01	0.05	651	0.55	651	1.56
420	0.00	3	0.00	0.02	1.94	0.02	1.93	0.02	0.08	652	0.61	652	1.57
430	0.00	4	0.00	0.03	1.94	0.03	1.93	0.03	0.11	653	0.68	653	1.58
440	0.00	5	0.00	0.04	1.95	0.04	1.93	0.04	0.14	654	0.74	654	1.59
450	0.00	6	0.00	0.05	1.95	0.05	1.94	0.05	0.16	655	0.8	655	1.61
460	0.00	7	0.00	0.06	1.95	0.06	1.94	0.06	0.19	656	0.87	656	1.62
470	0.00	8	0.19	0.07	1.95	0.07	1.94	0.07	0.21	657	0.93	657	1.63
480	0.00	9	0.23	0.08	1.96	0.08	1.94	0.08	0.23	658	0.99	658	1.64
490	0.00	10	0.71	0.09	1.96	0.09	1.94	0.09	0.25	659	1.06	659	1.65
500	0.00	11	1.19	0.10	1.96	0.10	1.94	0.10	0.27	660	1.12	660	1.66
510	0.00	12	1.67	0.11	1.96	0.11	1.94	0.11	0.29	661	1.18	661	1.67
520	0.00	13	1.89	0.12	1.96	0.12	1.94	0.12	0.31	662	1.25	662	1.68
530	0.03	14	2.12	0.13	1.96	0.13	1.94	0.13	0.33	663	1.31	663	1.69
540	0.05	15	2.34	0.14	1.96	0.14	1.94	0.14	0.34	664	1.37	664	1.70
550	0.15	16	2.55	0.15	1.96	0.15	1.94	0.15	0.36	665	1.44	665	1.71
560	0.25	17	2.74	0.16	1.96	0.16	1.94	0.16	0.38	666	1.50	666	1.72
570	0.35	18	2.91	0.17	1.96	0.17	1.94	0.17	0.4	667	1.56	667	1.73
580	0.45	19	3.06	0.18	1.96	0.18	1.94	0.18	0.41	668	1.58	668	1.74
590	0.55	20	3.20	0.19	1.96	0.19	1.94	0.19	0.43	669	1.59	669	1.75
600	0.65	21	3.33	0.20	1.96	0.20	1.94	0.20	0.46	670	1.60	670	1.76
610	0.75	22	3.46	0.21	1.96	0.21	1.94	0.21	0.48	671	1.61	671	1.77
620	0.85	23	3.57	0.22	1.96	0.22	1.94	0.22	0.49	672	1.62	672	1.78
630	0.95	24	3.67	0.23	1.96	0.23	1.94	0.23	0.50	673	1.63	673	1.79
640	1.05	25	3.76	0.24	1.96	0.24	1.94	0.24	0.52	674	1.64	674	1.80
650	1.15	26	3.84	0.25	1.96	0.25	1.94	0.25	0.53	675	1.65	675	1.81
660	1.25	27	3.92	0.26	1.96	0.26	1.94	0.26	0.54	676	1.67	676	1.82
670	1.35	28	3.96	0.27	1.96	0.27	1.94	0.27	0.56	677	1.68	677	1.83
680	1.46	29	3.98	0.28	1.96	0.28	1.95	0.28	0.57	678	1.69	678	1.84
690	1.56	30	3.99	0.29	1.96	0.29	1.95	0.29	0.58	679	1.70	679	1.85

700	1.60	31	3.99	0.30	1.96	0.30	1.95	0.30	0.60	680	1.71	680	1.86
710	1.64	32	4.00	0.31	1.96	0.31	1.95	0.31	0.61	681	1.72	681	1.87
720	1.69	33	4.00	0.32	1.96	0.32	1.95	0.32	0.62	682	1.74	682	1.88
730	1.73	34	4.00	0.33	1.96	0.33	1.95	0.33	0.64	683	1.75	683	1.89
740	1.78	35	4.00	0.34	1.96	0.34	1.95	0.34	0.65	684	1.76	684	1.90
750	1.82	36	4.00	0.35	1.97	0.35	1.95	0.35	0.66	685	1.77	685	1.91
760	1.87			0.36	1.97	0.36	1.95	0.36	0.68	686	1.79	686	1.92
770	1.91			0.37	1.97	0.37	1.95	0.37	0.69	687	1.80	687	1.93
780	1.96			0.38	1.97	0.38	1.95	0.38	0.70	688	1.81	688	1.95
790	2.01			0.39	1.97	0.39	1.95	0.39	0.72	689	1.83	689	1.96
800	2.05			0.40	1.97	0.40	1.95	0.40	0.73	690	1.84	690	1.97
810	2.10			0.41	1.97	0.41	1.95	0.41	0.74	691	1.86	691	1.98
820	2.15			0.42	1.97	0.42	1.95	0.42	0.76	692	1.87	692	1.99
830	2.20			0.43	1.97	0.43	1.95	0.43	0.77	693	1.89	693	2.00
840	2.24			0.44	1.97	0.44	1.95	0.44	0.79	694	1.91	694	2.01
850	2.29			0.45	1.97	0.45	1.95	0.45	0.80	695	1.92	695	2.02
860	2.34			0.46	1.97	0.46	1.95	0.46	0.81	696	1.94	696	2.03
870	2.38			0.47	1.97	0.47	1.95	0.47	0.83	697	1.96	697	2.05
880	2.43			0.48	1.97	0.48	1.95	0.48	0.84	698	1.97	698	2.06
890	2.47			0.49	1.97	0.49	1.95	0.49	0.85	699	1.99	699	2.07
900	2.52			0.50	1.97	0.50	1.95	0.50	0.87	700	2.01	700	2.08
910	2.56			0.51	1.97	0.51	1.95	0.51	0.88	701	2.03	701	2.09
920	2.61			0.52	1.97	0.52	1.95	0.52	0.89	702	2.05	702	2.11
930	2.65			0.53	1.97	0.53	1.95	0.53	0.91	703	2.07	703	2.12
940	2.69			0.54	1.97	0.54	1.95	0.54	0.92	704	2.08	704	2.13
950	2.74			0.55	1.97	0.55	1.95	0.55	0.93	705	2.10	705	2.15
960	2.78			0.56	1.97	0.56	1.95	0.56	0.95	706	2.12	706	2.16
970	2.83			0.57	1.97	0.57	1.95	0.57	0.96	707	2.14	707	2.17
980	2.87			0.58	1.97	0.58	1.96	0.58	0.97	708	2.16	708	2.19
990	2.91			0.59	1.97	0.59	1.96	0.59	0.99	709	2.18	709	2.20
1000	2.96			0.60	1.97	0.60	1.96	0.60	1.00	710	2.20	710	2.21
1010	3.00			0.61	1.98	0.61	1.96	0.61	1.01	711	2.23	711	2.23
1020	3.05			0.62	1.98	0.62	1.96	0.62	1.03	712	2.25	712	2.24
1030	3.09			0.63	1.98	0.63	1.96	0.63	1.04	713	2.27	713	2.25
1040	3.14			0.64	1.98	0.64	1.96	0.64	1.05	714	2.29	714	2.27
1050	3.18			0.65	1.98	0.65	1.96	0.65	1.07	715	2.31	715	2.28
1060	3.22			0.66	1.98	0.66	1.96	0.66	1.08	716	2.33	716	2.30
1070	3.27			0.67	1.98	0.67	1.96	0.67	1.10	717	2.36	717	2.31
1080	3.31			0.68	1.98	0.68	1.96	0.68	1.11	718	2.38	718	2.33
1090	3.35			0.69	1.98	0.69	1.96	0.69	1.12	719	2.40	719	2.34
1100	3.39			0.70	1.98	0.70	1.96	0.70	1.14	720	2.43	720	2.35

1110	3.43			0.71	1.98	0.71	1.96	0.71	1.15	721	2.45	721	2.37
1120	3.47			0.72	1.98	0.72	1.96	0.72	1.16	722	2.48	722	2.38
1130	3.51			0.73	1.98	0.73	1.97	0.73	1.18	723	2.50	723	2.40
1140	3.54			0.74	1.98	0.74	1.97	0.74	1.19	724	2.52	724	2.42
1150	3.58			0.75	1.99	0.75	1.97	0.75	1.20	725	2.55	725	2.43
1160	3.61			0.76	1.99	0.76	1.97	0.76	1.22	726	2.57	726	2.45
1170	3.64			0.77	1.99	0.77	1.97	0.77	1.23	727	2.60	727	2.46
1180	3.68			0.78	1.99	0.78	1.97	0.78	1.24	728	2.62	728	2.48
1190	3.71			0.79	1.99	0.79	1.97	0.79	1.26	729	2.64	729	2.50
1200	3.74			0.80	1.99	0.80	1.97	0.80	1.27	730	2.66	730	2.51
1210	3.77			0.81	1.99	0.81	1.97	0.81	1.28	731	2.69	731	2.53
1220	3.79			0.82	1.99	0.82	1.97	0.82	1.30	732	2.71	732	2.55
1230	3.82			0.83	1.99	0.83	1.97	0.83	1.31	733	2.73	733	2.57
1240	3.85			0.84	1.99	0.84	1.98	0.84	1.32	734	2.75	734	2.58
1250	3.87			0.85	1.99	0.85	1.98	0.85	1.34	735	2.78	735	2.60
1260	3.89			0.86	1.99	0.86	1.98	0.86	1.35	736	2.80	736	2.62
1270	3.92			0.87	2.00	0.87	1.98	0.87	1.37	737	2.82	737	2.64
1280	3.94			0.88	2.00	0.88	1.98	0.88	1.38	738	2.85	738	2.66
1290	3.97			0.89	2.00	0.89	1.98	0.89	1.39	739	2.87	739	2.67
1300	3.98			0.90	2.00	0.90	1.98	0.90	1.41	740	2.89	740	2.69
1310	3.99			0.91	2.00	0.91	1.98	0.91	1.42	741	2.92	741	2.71
1320	3.99			0.92	2.00	0.92	1.98	0.92	1.43	742	2.94	742	2.73
1330	3.99			0.93	2.00	0.93	1.98	0.93	1.45	743	2.96	743	2.74
1340	3.99			0.94	2.00	0.94	1.99	0.94	1.46	744	2.98	744	2.76
1350	3.99			0.95	2.00	0.95	1.99	0.95	1.47	**745**	**3.00**	745	2.78
1360	4.00			0.96	2.00	0.96	1.99	0.96	1.49	746	3.02	746	2.80
1370	4.00			0.97	2.00	0.97	1.99	0.97	1.50	747	3.04	747	2.82
1380	4.00			0.98	2.00	0.98	1.99	0.98	1.51	748	3.06	748	2.84
1390	4.00			0.99	2.00	0.99	1.99	0.99	1.53	749	3.08	749	2.86
1400	4.00			1.00	2.01	1.00	1.99	1.00	1.54	750	3.10	750	2.88
1410	4.00			1.01	2.01	1.01	2.00	1.01	1.55	751	3.12	751	2.90
1420	4.00			1.02	2.02	1.02	2.00	1.02	1.56	752	3.14	752	2.92
1430	4.00			1.03	2.02	1.03	2.00	1.03	1.56	753	3.16	753	2.94
1440	4.00			1.04	2.03	1.04	2.00	1.04	1.57	754	3.18	754	2.96
1450	4.00			1.05	2.03	1.05	2.00	1.05	1.58	755	3.20	755	2.98
1460	4.00			1.06	2.03	1.06	2.00	1.06	1.58	756	3.22	**756**	**3.00**
1470	4.00			1.07	2.03	1.07	2.00	1.07	1.59	757	3.24	757	3.02
1480	4.00			1.08	2.03	1.08	2.00	1.08	1.59	758	3.26	758	3.04
1490	4.00			1.09	2.04	1.09	2.00	1.09	1.60	759	3.29	759	3.06
1500	4.00			1.10	2.04	1.10	2.00	1.10	1.60	760	3.31	760	3.08
1510	4.00			1.11	2.04	1.11	2.00	1.11	1.61	761	3.33	761	3.10

1520	4.00			1.12	2.04	1.12	2.00	1.12	1.61	762	3.35	762	3.12
1530	4.00			1.13	2.04	1.13	2.00	1.13	1.62	763	3.37	763	3.14
1540	4.00			1.14	2.05	1.14	2.00	1.14	1.63	764	3.39	764	3.16
1550	4.00			1.15	2.05	1.15	2.00	1.15	1.63	765	3.41	765	3.18
1560	4.00			1.16	2.05	1.16	2.01	1.16	1.64	766	3.43	766	3.2
1570	4.00			1.17	2.05	1.17	2.01	1.17	1.64	767	3.45	767	3.22
1580	4.00			1.18	2.06	1.18	2.01	1.18	1.65	768	3.47	768	3.24
1590	4.00			1.19	2.06	1.19	2.01	1.19	1.66	769	3.49	769	3.26
1600	4.00			1.20	2.06	1.20	2.01	1.20	1.66	770	3.50	770	3.28
				1.21	2.06	1.21	2.02	1.21	1.67	771	3.52	771	3.30
				1.22	2.07	1.22	2.02	1.22	1.68	772	3.54	772	3.32
				1.23	2.07	1.23	2.02	1.23	1.68	773	3.56	773	3.34
				1.24	2.07	1.24	2.02	1.24	1.69	774	3.58	774	3.36
				1.25	2.07	1.25	2.03	1.25	1.70	775	3.60	775	3.38
				1.26	2.07	1.26	2.03	1.26	1.70	776	3.62	776	3.4
				1.27	2.08	1.27	2.04	1.27	1.71	777	3.64	777	3.42
				1.28	2.08	1.28	2.04	1.28	1.72	778	3.66	778	3.44
				1.29	2.08	1.29	2.04	1.29	1.73	779	3.68	779	3.46
				1.30	2.08	1.30	2.05	1.30	1.73	780	3.70	780	3.47
				1.31	2.09	1.31	2.05	1.31	1.74	781	3.72	781	3.49
				1.32	2.09	1.32	2.05	1.32	1.75	782	3.74	782	3.51
				1.33	2.09	1.33	2.06	1.33	1.76	783	3.75	783	3.53
				1.34	2.10	1.34	2.06	1.34	1.76	784	3.77	784	3.54
				1.35	2.10	1.35	2.06	1.35	1.77	785	3.79	785	3.56
				1.36	2.11	1.36	2.07	1.36	1.78	786	3.80	786	3.58
				1.37	2.11	1.37	2.07	1.37	1.79	787	3.82	787	3.59
				1.38	2.11	1.38	2.07	1.38	1.79	788	3.83	788	3.61
				1.39	2.12	1.39	2.08	1.39	1.8	789	3.84	789	3.63
				1.40	2.12	1.40	2.08	1.40	1.81	790	3.85	790	3.64
				1.41	2.12	1.41	2.08	1.41	1.82	791	3.86	791	3.66
				1.42	2.13	1.42	2.09	1.42	1.83	792	3.87	792	3.67
				1.43	2.13	1.43	2.09	1.43	1.83	793	3.88	793	3.69
				1.44	2.13	1.44	2.09	1.44	1.84	794	3.89	794	3.71
				1.45	2.14	1.45	2.10	1.45	1.85	795	3.90	795	3.72
				1.46	2.14	1.46	2.10	1.46	1.86	796	3.91	796	3.73
				1.47	2.14	1.47	2.10	1.47	1.87	797	3.92	797	3.75
				1.48	2.15	1.48	2.11	1.48	1.87	798	3.93	798	3.76
				1.49	2.15	1.49	2.11	1.49	1.88	799	3.94	799	3.77
				1.50	2.16	1.50	2.12	1.50	1.89	800	3.95	800	3.79
				1.51	2.17	1.51	2.12	1.51	1.90	801	3.97	801	3.80
				1.52	2.17	1.52	2.13	1.52	1.91	802	3.98	802	3.81

				1.53	2.18	1.53	2.13	1.53	1.91	803	3.99	803	3.83
				1.54	2.18	1.54	2.13	1.54	1.92	804	3.99	804	3.84
				1.55	2.18	1.55	2.14	1.55	1.93	805	4.00	805	3.85
				1.56	2.19	1.56	2.14	1.56	1.94	806	4.00	806	3.86
				1.57	2.19	1.57	2.15	1.57	1.94	807	4.00	807	3.87
				1.58	2.20	1.58	2.15	1.58	1.95	808	4.00	808	3.88
				1.59	2.20	1.59	2.16	1.59	1.96	809	4.00	809	3.89
				1.60	2.21	1.60	2.16	1.60	1.96	810	4.00	810	3.90
				1.61	2.22	1.61	2.17	1.61	1.97	811	4.00	811	3.91
				1.62	2.22	1.62	2.17	1.62	1.98	812	4.00	812	3.92
				1.63	2.23	1.63	2.18	1.63	1.98	813	4.00	813	3.93
				1.64	2.23	1.64	2.18	1.64	1.99	814	4.00	814	3.93
				1.65	2.24	1.65	2.19	1.65	2.00	815	4.00	815	3.95
				1.66	2.24	1.66	2.19	1.66	2.00	816	4.00	816	3.96
				1.67	2.25	1.67	2.20	1.67	2.01	817	4.00	817	3.97
				1.68	2.26	1.68	2.20	1.68	2.02	818	4.00	818	3.98
				1.69	2.27	1.69	2.21	1.69	2.02	819	4.00	819	3.99
				1.70	2.27	1.70	2.22	1.70	2.03	820	4.00	820	4.00
				1.71	2.28	1.71	2.22	1.71	2.04	821	4.00	821	4.00
				1.72	2.28	1.72	2.23	1.72	2.05	822	4.00	822	4.00
				1.73	2.29	1.73	2.23	1.73	2.06	823	4.00	823	4.00
				1.74	2.29	1.74	2.24	1.74	2.06	824	4.00	824	4.00
				1.75	2.29	1.75	2.25	1.75	2.07	825	4.00	825	4.00
				1.76	2.30	1.76	2.25	1.76	2.08	826	4.00	826	4.00
				1.77	2.30	1.77	2.26	1.77	2.09	827	4.00	827	4.00
				1.78	2.31	1.78	2.27	1.78	2.10	828	4.00	828	4.00
				1.79	2.31	1.79	2.27	1.79	2.11	829	4.00	829	4.00
				1.80	2.32	1.80	2.28	1.80	2.11	830	4.00	830	4.00
				1.81	2.32	1.81	2.29	1.81	2.12	831	4.00	831	4.00
				1.82	2.33	1.82	2.29	1.82	2.13	832	4.00	832	4.00
				1.83	2.34	1.83	2.30	1.83	2.14	833	4.00	833	4.00
				1.84	2.35	1.84	2.30	1.84	2.15	834	4.00	834	4.00
				1.85	2.36	1.85	2.31	1.85	2.16	835	4.00	835	4.00
				1.86	2.36	1.86	2.31	1.86	2.17	836	4.00	836	4.00
				1.87	2.36	1.87	2.32	1.87	2.18	837	4.00	837	4.00
				1.88	2.37	1.88	2.33	1.88	2.18	838	4.00	838	4.00
				1.89	2.37	1.89	2.33	1.89	2.19	839	4.00	839	4.00
				1.90	2.38	1.90	2.34	1.90	2.20	840	4.00	840	4.00
				1.91	2.38	1.91	2.34	1.91	2.21	841	4.00	841	4.00
				1.92	2.38	1.92	2.35	1.92	2.22	842	4.00	842	4.00
				1.93	2.39	1.93	2.35	1.93	2.23	843	4.00	843	4.00

				1.94	2.39	1.94	2.36	1.94	2.23	844	4.00	844	4.00
				1.95	2.39	1.95	2.36	1.95	2.24	845	4.00	845	4.00
				1.96	2.40	1.96	2.37	1.96	2.25	846	4.00	846	4.00
				1.97	2.40	1.97	2.38	1.97	2.26	847	4.00	847	4.00
				1.98	2.41	1.98	2.38	1.98	2.26	848	4.00	848	4.00
				1.99	2.41	1.99	2.39	1.99	2.27	849	4.00	849	4.00
				2.00	2.44	2.00	2.41	2.00	2.29	850	4.00	850	4.00
				2.01	2.47	2.01	2.43	2.01	2.30				
				2.02	2.48	2.02	2.43	2.02	2.31				
				2.03	2.48	2.03	2.44	2.03	2.32				
				2.04	2.49	2.04	2.44	2.04	2.33				
				2.05	2.49	2.05	2.45	2.05	2.33				
				2.06	2.50	2.06	2.45	2.06	2.34				
				2.07	2.50	2.07	2.46	2.07	2.35				
				2.08	2.50	2.08	2.47	2.08	2.36				
				2.09	2.51	2.09	2.47	2.09	2.37				
				2.10	2.51	2.10	2.48	2.10	2.37				
				2.11	2.51	2.11	2.49	2.11	2.38				
				2.12	2.52	2.12	2.50	2.12	2.39				
				2.13	2.52	2.13	2.51	2.13	2.40				
				2.14	2.53	2.14	2.52	2.14	2.41				
				2.15	2.53	2.15	2.52	2.15	2.42				
				2.16	2.54	2.16	2.53	2.16	2.43				
				2.17	2.56	2.17	2.54	2.17	2.44				
				2.18	2.57	2.18	2.54	2.18	2.45				
				2.19	2.58	2.19	2.55	2.19	2.46				
				2.20	2.59	2.20	2.56	2.20	2.47				
				2.21	2.60	2.21	2.56	2.21	2.47				
				2.22	2.61	2.22	2.57	2.22	2.48				
				2.23	2.62	2.23	2.58	2.23	2.49				
				2.24	2.63	2.24	2.59	2.24	2.5				
				2.25	2.63	2.25	2.6	2.25	2.51				
				2.26	2.64	2.26	2.6	2.26	2.52				
				2.27	2.65	2.27	2.61	2.27	2.53				
				2.28	2.65	2.28	2.62	2.28	2.54				
				2.29	2.66	2.29	2.63	2.29	2.55				
				2.30	2.66	2.30	2.64	2.30	2.56				
				2.31	2.67	2.31	2.64	2.31	2.57				
				2.32	2.68	2.32	2.65	2.32	2.58				
				2.33	2.70	2.33	2.67	2.33	2.59				
				2.34	2.71	2.34	2.68	2.34	2.60				

				2.35	2.72	2.35	2.69	2.35	2.61				
				2.36	2.73	2.36	2.69	2.36	2.62				
				2.37	2.73	2.37	2.70	2.37	2.63				
				2.38	2.74	2.38	2.71	2.38	2.64				
				2.39	2.74	2.39	2.72	2.39	2.65				
				2.40	2.75	2.4	2.73	2.4	2.66				
				2.41	2.76	2.41	2.74	2.41	2.67				
				2.42	2.77	2.42	2.75	2.42	2.68				
				2.43	2.78	2.43	2.75	2.43	2.69				
				2.44	2.78	2.44	2.76	2.44	2.7				
				2.45	2.79	2.45	2.78	2.45	2.71				
				2.46	2.80	2.46	2.78	2.46	2.72				
				2.47	2.80	2.47	2.79	2.47	2.73				
				2.48	2.81	2.48	2.80	2.48	2.74				
				2.49	2.82	2.49	2.81	2.49	2.75				
				2.50	2.83	2.50	2.82	2.50	2.76				
				2.51	2.85	2.51	2.83	2.51	2.77				
				2.52	2.86	2.52	2.84	2.52	2.78				
				2.53	2.87	2.53	2.85	2.53	2.79				
				2.54	2.87	2.54	2.85	2.54	2.8				
				2.55	2.88	2.55	2.86	2.55	2.81				
				2.56	2.89	2.56	2.87	2.56	2.82				
				2.57	2.89	2.57	2.89	2.57	2.83				
				2.58	2.90	2.58	2.90	2.58	2.84				
				2.59	2.91	2.59	2.90	2.59	2.85				
				2.60	2.92	2.60	2.91	2.60	2.86				
				2.61	2.93	2.61	2.92	2.61	2.87				
				2.62	2.94	2.62	2.93	2.62	2.88				
				2.63	2.95	2.63	2.94	2.63	2.89				
				2.64	2.95	2.64	2.95	2.64	2.90				
				2.65	2.96	2.65	2.96	2.65	2.91				
				2.66	2.97	2.66	2.96	2.66	2.92				
				2.67	2.99	2.67	2.98	2.67	2.93				
				2.68	**3.00**	2.68	2.99	2.68	2.94				
				2.69	3.01	**2.69**	**3.00**	2.69	2.95				
				2.70	3.02	2.70	3.01	2.70	2.96				
				2.71	3.02	2.71	3.01	2.71	2.97				
				2.72	3.03	2.72	3.02	2.72	2.98				
				2.73	3.04	2.73	3.03	2.73	2.99				
				2.74	3.04	2.74	3.03	**2.74**	**3.00**				
				2.75	3.05	2.75	3.04	2.75	3.01				

				2.76	3.06	2.76	3.05	2.76	3.02				
				2.77	3.06	2.77	3.06	2.77	3.03				
				2.78	3.07	2.78	3.07	2.78	3.04				
				2.79	3.08	2.79	3.08	2.79	3.05				
				2.80	3.08	2.80	3.09	2.80	3.06				
				2.81	3.09	2.81	3.10	2.81	3.07				
				2.82	3.10	2.82	3.11	2.82	3.08				
				2.83	3.11	2.83	3.11	2.83	3.09				
				2.84	3.13	2.84	3.12	2.84	3.10				
				2.85	3.14	2.85	3.13	2.85	3.11				
				2.86	3.15	2.86	3.13	2.86	3.12				
				2.87	3.16	2.87	3.14	2.87	3.13				
				2.88	3.16	2.88	3.15	2.88	3.14				
				2.89	3.17	2.89	3.17	2.89	3.15				
				2.90	3.18	2.90	3.18	2.90	3.15				
				2.91	3.18	2.91	3.19	2.91	3.16				
				2.92	3.18	2.92	3.20	2.92	3.17				
				2.93	3.19	2.93	3.21	2.93	3.18				
				2.94	3.19	2.94	3.21	2.94	3.19				
				2.95	3.20	2.95	3.22	2.95	3.20				
				2.96	3.20	2.96	3.23	2.96	3.21				
				2.97	3.21	2.97	3.23	2.97	3.21				
				2.98	3.22	2.98	3.24	2.98	3.22				
				2.99	3.23	2.99	3.25	2.99	3.23				
				3.00	3.26	3.00	3.27	3.00	3.26				
				3.01	3.29	3.01	3.29	3.01	3.28				
				3.02	3.30	3.02	3.30	3.02	3.28				
				3.03	3.31	3.03	3.30	3.03	3.29				
				3.04	3.32	3.04	3.31	3.04	3.30				
				3.05	3.32	3.05	3.32	3.05	3.31				
				3.06	3.33	3.06	3.32	3.06	3.31				
				3.07	3.33	3.07	3.33	3.07	3.32				
				3.08	3.33	3.08	3.33	3.08	3.33				
				3.09	3.34	3.09	3.34	3.09	3.34				
				3.10	3.34	3.10	3.35	3.10	3.35				
				3.11	3.35	3.11	3.37	3.11	3.36				
				3.12	3.35	3.12	3.38	3.12	3.37				
				3.13	3.36	3.13	3.39	3.13	3.38				
				3.14	3.37	3.14	3.40	3.14	3.39				
				3.15	3.38	3.15	3.41	3.15	3.40				
				3.16	3.38	3.16	3.41	3.16	3.41				

				3.17	3.40	3.17	3.42	3.17	3.42				
				3.18	3.42	3.18	3.43	3.18	3.43				
				3.19	3.43	3.19	3.44	3.19	3.44				
				3.20	3.44	3.20	3.45	3.20	3.45				
				3.21	3.45	3.21	3.46	3.21	3.46				
				3.22	3.46	3.22	3.47	3.22	3.47				
				3.23	3.46	3.23	3.48	3.23	3.48				
				3.24	3.47	3.24	3.49	3.24	3.49				
				3.25	3.47	3.25	3.49	3.25	3.50				
				3.26	3.48	3.26	3.50	3.26	3.51				
				3.27	3.48	3.27	3.51	3.27	3.51				
				3.28	3.49	3.28	3.52	3.28	3.52				
				3.29	3.50	3.29	3.53	3.29	3.53				
				3.30	3.50	3.30	3.53	3.30	3.54				
				3.31	3.51	3.31	3.54	3.31	3.55				
				3.32	3.51	3.32	3.55	3.32	3.56				
				3.33	3.53	3.33	3.56	3.33	3.56				
				3.34	3.55	3.34	3.57	3.34	3.57				
				3.35	3.55	3.35	3.58	3.35	3.58				
				3.36	3.56	3.36	3.59	3.36	3.59				
				3.37	3.57	3.37	3.59	3.37	3.60				
				3.38	3.57	3.38	3.60	3.38	3.61				
				3.39	3.58	3.39	3.61	3.39	3.61				
				3.40	3.59	3.40	3.61	3.40	3.62				
				3.41	3.60	3.41	3.62	3.41	3.63				
				3.42	3.60	3.42	3.63	3.42	3.64				
				3.43	3.61	3.43	3.64	3.43	3.65				
				3.44	3.62	3.44	3.65	3.44	3.66				
				3.45	3.62	3.45	3.65	3.45	3.67				
				3.46	3.63	3.46	3.66	3.46	3.68				
				3.47	3.64	3.47	3.67	3.47	3.69				
				3.48	3.64	3.48	3.68	3.48	3.70				
				3.49	3.65	3.49	3.68	3.49	3.71				
				3.50	3.67	3.50	3.70	3.50	3.71				
				3.51	3.69	3.51	3.71	3.51	3.72				
				3.52	3.70	3.52	3.71	3.52	3.73				
				3.53	3.70	3.53	3.72	3.53	3.74				
				3.54	3.71	3.54	3.73	3.54	3.75				
				3.55	3.71	3.55	3.73	3.55	3.75				
				3.56	3.72	3.56	3.74	3.56	3.76				
				3.57	3.72	3.57	3.75	3.57	3.77				

				3.58	3.73	3.58	3.75	3.58	3.78				
				3.59	3.73	3.59	3.76	3.59	3.78				
				3.60	3.74	3.60	3.77	3.60	3.79				
				3.61	3.75	3.61	3.78	3.61	3.80				
				3.62	3.75	3.62	3.78	3.62	3.80				
				3.63	3.76	3.63	3.79	3.63	3.81				
				3.64	3.76	3.64	3.80	3.64	3.82				
				3.65	3.77	3.65	3.80	3.65	3.82				
				3.66	3.77	3.66	3.81	3.66	3.83				
				3.67	3.79	3.67	3.81	3.67	3.84				
				3.68	3.80	3.68	3.82	3.68	3.84				
				3.69	3.81	3.69	3.83	3.69	3.85				
				3.70	3.81	3.70	3.84	3.70	3.86				
				3.71	3.82	3.71	3.84	3.71	3.87				
				3.72	3.82	3.72	3.85	3.72	3.88				
				3.73	3.82	3.73	3.86	3.73	3.88				
				3.74	3.83	3.74	3.87	3.74	3.89				
				3.75	3.84	3.75	3.88	3.75	3.89				
				3.76	3.84	3.76	3.88	3.76	3.90				
				3.77	3.85	3.77	3.89	3.77	3.90				
				3.78	3.86	3.78	3.89	3.78	3.91				
				3.79	3.86	3.79	3.90	3.79	3.91				
				3.80	3.87	3.80	3.90	3.80	3.91				
				3.81	3.88	3.81	3.90	3.81	3.92				
				3.82	3.88	3.82	3.90	3.82	3.93				
				3.83	3.90	3.83	3.91	3.83	3.94				
				3.84	3.90	3.84	3.91	3.84	3.95				
				3.85	3.91	3.85	3.92	3.85	3.96				
				3.86	3.91	3.86	3.92	3.86	3.97				
				3.87	3.91	3.87	3.93	3.87	3.98				
				3.88	3.91	3.88	3.94	3.88	3.99				
				3.89	3.92	3.89	3.96	3.89	4.00				
				3.90	3.92	3.90	3.99	3.90	4.00				
				3.91	3.92	3.91	3.99	3.91	4.00				
				3.92	3.92	3.92	3.99	3.92	4.00				
				3.93	3.92	3.93	3.99	3.93	4.00				
				3.94	3.93	3.94	4.00	3.94	4.00				
				3.95	3.93	3.95	4.00	3.95	4.00				
				3.96	3.94	3.96	4.00	3.96	4.00				
				3.97	3.94	3.97	4.00	3.97	4.00				
				3.98	3.95	3.98	4.00	3.98	4.00				

				3.99	3.96	3.99	4.00	3.99	4.00				
				4.00	4.00	4.00	4.00	4.00	4.00				

Appendix F

Concordance Relationships between PARCC (ELA11, Algebra II, and Geometry) and FYGPA (2-Year Colleges)

Table F

The Concordance Table between PARCC Scores and FYGPA

PARCC Score	ALG 02 to FYGPA	ELA 11 to FYGPA	Geometry to FYGPA
650	1.70	0.49	1.59
651	1.76	1.48	1.60
652	1.77	1.50	1.62
653	1.78	1.51	1.63
654	1.79	1.52	1.64
655	1.80	1.53	1.65
656	1.81	1.55	1.66
657	1.82	1.56	1.67
658	1.84	1.57	1.68
659	1.85	1.58	1.69
660	1.86	1.60	1.70
661	1.87	1.61	1.71
662	1.88	1.62	1.72
663	1.89	1.63	1.73
664	1.90	1.65	1.74
665	1.91	1.66	1.75
666	1.92	1.67	1.76
667	1.93	1.68	1.77
668	1.95	1.70	1.78
669	1.96	1.71	1.79
670	1.97	1.72	1.80
671	1.99	1.73	1.81
672	2.00	1.75	1.82
673	2.02	1.76	1.83
674	2.03	1.77	1.84
675	2.05	1.78	1.85
676	2.06	1.80	1.86
677	2.08	1.81	1.87
678	2.10	1.82	1.88
679	2.12	1.83	1.89
680	2.13	1.85	1.91
681	2.15	1.86	1.92
682	2.17	1.87	1.93
683	2.19	1.88	1.95
684	2.21	1.89	1.96
685	2.23	1.91	1.98

686	2.25	1.92	2.00
687	2.27	1.93	2.02
688	2.29	1.94	2.03
689	2.31	1.96	2.05
690	2.33	1.97	2.07
691	2.35	1.98	2.10
692	2.37	1.99	2.12
693	2.39	2.00	2.14
694	2.41	2.02	2.16
695	2.43	2.03	2.19
696	2.45	2.04	2.21
697	2.47	2.05	2.23
698	2.49	2.06	2.26
699	2.51	2.08	2.28
700	2.53	2.09	2.30
701	2.55	2.10	2.33
702	2.57	2.11	2.35
703	2.59	2.13	2.37
704	2.61	2.14	2.39
705	2.63	2.15	2.42
706	2.66	2.16	2.44
707	2.68	2.18	2.47
708	2.70	2.19	2.49
709	2.72	2.20	2.52
710	2.74	2.21	2.55
711	2.76	2.23	2.58
712	2.78	2.24	2.60
713	2.80	2.25	2.63
714	2.82	2.27	2.66
715	2.84	2.28	2.68
716	2.86	2.29	2.71
717	2.88	2.30	2.74
718	2.90	2.32	2.77
719	2.92	2.33	2.79
720	2.94	2.35	2.82
721	2.95	2.36	2.85
722	2.97	2.37	2.88
723	2.99	2.39	2.91
724	**3.00**	2.40	2.94
725	3.02	2.42	2.97
726	3.04	2.43	**3.01**
727	3.06	2.45	3.04
728	3.07	2.46	3.07
729	3.09	2.48	3.10
730	3.11	2.49	3.12
731	3.13	2.51	3.15

732	3.15	2.53	3.18
733	3.17	2.54	3.20
734	3.19	2.56	3.23
735	3.21	2.58	3.25
736	3.23	2.60	3.28
737	3.25	2.61	3.30
738	3.27	2.63	3.33
739	3.29	2.65	3.35
740	3.31	2.67	3.38
741	3.33	2.69	3.40
742	3.35	2.71	3.43
743	3.36	2.73	3.46
744	3.38	2.75	3.48
745	3.40	2.77	3.50
746	3.42	2.78	3.53
747	3.44	2.80	3.55
748	3.46	2.82	3.57
749	3.48	2.84	3.59
750	3.49	2.86	3.61
751	3.51	2.88	3.63
752	3.53	2.90	3.65
753	3.55	2.92	3.67
754	3.57	2.94	3.69
755	3.59	2.96	3.71
756	3.61	2.98	3.73
757	3.63	**3.00**	3.75
758	3.65	3.02	3.76
759	3.67	3.04	3.78
760	3.69	3.07	3.80
761	3.70	3.09	3.81
762	3.72	3.11	3.83
763	3.73	3.13	3.85
764	3.75	3.15	3.86
765	3.76	3.17	3.88
766	3.78	3.19	3.89
767	3.79	3.21	3.91
768	3.80	3.23	3.92
769	3.81	3.25	3.93
770	3.83	3.27	3.95
771	3.84	3.29	3.96
772	3.85	3.31	3.97
773	3.86	3.33	3.99
774	3.87	3.35	4.00
775	3.88	3.37	4.00
776	3.89	3.39	4.00
777	3.90	3.41	4.00

778	3.91	3.43	4.00
779	3.93	3.44	4.00
780	3.94	3.46	4.00
781	3.95	3.48	4.00
782	3.97	3.50	4.00
783	3.98	3.52	4.00
784	3.99	3.53	4.00
785	3.99	3.55	4.00
786	4.00	3.57	4.00
787	4.00	3.59	4.00
788	4.00	3.60	4.00
789	4.00	3.62	4.00
790	4.00	3.63	4.00
791	4.00	3.65	4.00
792	4.00	3.67	4.00
793	4.00	3.68	4.00
794	4.00	3.70	4.00
795	4.00	3.71	4.00
796	4.00	3.72	4.00
797	4.00	3.74	4.00
798	4.00	3.75	4.00
799	4.00	3.77	4.00
800	4.00	3.78	4.00
801	4.00	3.79	4.00
802	4.00	3.80	4.00
803	4.00	3.82	4.00
804	4.00	3.83	4.00
805	4.00	3.84	4.00
806	4.00	3.85	4.00
807	4.00	3.86	4.00
808	4.00	3.88	4.00
809	4.00	3.89	4.00
810	4.00	3.90	4.00
811	4.00	3.91	4.00
812	4.00	3.92	4.00
813	4.00	3.93	4.00
814	4.00	3.94	4.00
815	4.00	3.95	4.00
816	4.00	3.97	4.00
817	4.00	3.98	4.00
818	4.00	3.99	4.00
819	4.00	3.99	4.00
820	4.00	3.99	4.00
821	4.00	4.00	4.00
822	4.00	4.00	4.00
823	4.00	4.00	4.00

824	4.00	4.00	4.00
825	4.00	4.00	4.00
826	4.00	4.00	4.00
827	4.00	4.00	4.00
828	4.00	4.00	4.00
829	4.00	4.00	4.00
830	4.00	4.00	4.00
831	4.00	4.00	4.00
832	4.00	4.00	4.00
833	4.00	4.00	4.00
834	4.00	4.00	4.00
835	4.00	4.00	4.00
836	4.00	4.00	4.00
837	4.00	4.00	4.00
838	4.00	4.00	4.00
839	4.00	4.00	4.00
840	4.00	4.00	4.00
841	4.00	4.00	4.00
842	4.00	4.00	4.00
843	4.00	4.00	4.00
844	4.00	4.00	4.00
845	4.00	4.00	4.00
846	4.00	4.00	4.00
847	4.00	4.00	4.00
848	4.00	4.00	4.00
849	4.00	4.00	4.00
850	4.00	4.00	4.00