The Relationship between the

Smarter Balanced Grade 8 Assessments

and the

PSAT 8/9 Assessments

CONNECTICUT STATE
DEPARTMENT OF EDUCATION

Contents

Background

Connecticut adopted the Common Core State Standards in July 2010. The Connecticut State Department of Education (CSDE) began a partnership with other states, as part of the Smarter Balanced Assessment Consortium, to develop a new assessment system that is aligned to those standards. In 2014-15, the CSDE administered the first operational version of the Smarter Balanced assessments as its accountability assessment in Grades 3 through 8 and 11.

In 2012, the Connecticut General Assembly passed legislation (Public Act 12-40) which required Connecticut's public universities to utilize multiple measures for determining whether incoming students need academic remediation. The CSDE partnered with the Connecticut State University system to get the Smarter Balanced assessment accepted as one of the multiple measures. In the meantime, however, many educators, students, and parents began expressing concerns about the 11th grade Smarter Balanced assessment because it added another assessment to an already crowded field for high school juniors. After extensive stakeholder feedback and negotiations, Connecticut discontinued the 11th grade Smarter Balanced assessment and began administering the College Board's redesigned SAT as its accountability assessment in 11th grade.

The College Board redesigned the SAT from being more of a general reasoning test to one that "measures the knowledge, skills, and understandings that the best available research evidence indicates are essential for college and career readiness and success… that students must undertake in the best high school courses being taught today" (College Board, 2015). It also revamped its PSAT (grades 10/11) and Readistep (grades 8/9) assessments in a similar manner. The Readistep 8/9 assessment was rebranded as the PSAT 8/9 starting with the fall 2015 administration. An independent standards alignment review (CSDE, 2016a) confirmed that the redesigned SAT was reasonably aligned to the new standards.

The CSDE has been unequivocal in its message that standards and not assessments should guide curriculum development and instruction. However, in many informal conversations, educators reveal that in light of the change away from Smarter Balanced as the Grade 11 assessment, they felt a need to administer the PSAT 8/9 assessments in the fall of the freshman year in order to get a baseline of student achievement in English language arts and mathematics so as to identify students who might need additional support before taking the SAT in Grade 11. Though the College Board assessments were

aligned to a similar knowledge base as the Common Core State Standards, these educators were not sure about the connection, if any, between the Grade 8 Smarter Balanced assessment and the PSAT 8/9.

Therefore, the CSDE conducted this study to analyze the relationship between students' Smarter Balanced results in Grade 8 and their subsequent performance on the PSAT 8/9 in the fall.

Data

The sample data for this study was extracted from administrative data. The CSDE utilized its data warehouse that had already matched the Smarter Balanced results for students in grade 8 from the spring of 2015 (administered between March 17 and June 12, 2015) with their PSAT results from September 28, 2015. This means that the longest time period for a student between the two assessments was six months. Furthermore, given the 2-3 month summer vacation between the assessments, we can be reasonably confident that the achievement estimates from these two assessments are comparable and not unduly distorted by any substantial instruction.

A total of 10,398 records of 8th graders with Smarter Balanced results in both ELA and Mathematics from spring 2015 were matched with their PSAT records from September 2015. Since over 39,600 students took the Smarter Balanced assessment in Grade 8 in 2015, the 10,398 students in this sample represent about 26.3 percent of the total tested population.

The table below presents the demographic breakdown of the student records in this study and compare them to the statewide demographics from the October 2016 snapshot of student enrollment.

Table 1: Race/Ethnicity by Free/Reduced Price Meal Eligibility for All Matched Records

Race/Ethnicity	Study Records			State, October 2016		
	Free	Not Eligible	Reduced	Free	Not Eligible	Reduced
American Indian or Alaska Native	0.1%	0.1%	0.0%	0.1%	0.2%	0.0%
Asian	1.4%	2.8%	0.4%	1.0%	3.9%	0.2%
Black or African American	12.9%	6.4%	1.4%	7.4%	4.8%	0.7%
Hispanic/Latino of any race	21.0%	6.9%	2.2%	14.5%	8.0%	1.5%
Native Hawaiian or Other Pacific Islander	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Two or More Races	1.0%	1.4%	0.2%	1.0%	1.8%	0.2%
White	7.6%	32.3%	1.9%	7.4%	45.5%	1.8%
Total	**44.0%**	**50.0%**	**6.1%**	**31.4%**	**64.1%**	**4.5%**

Overall, a greater percentage of students in the study were black (20.7 percent) or Hispanic (30.1 percent) as compared to the statewide population (12.9 percent black and 24.0 percent Hispanic). The same is true for low socioeconomic status as evidenced by a student's eligibility for free/reduced price meals (50.1 percent in the study as compared to 35.9 percent statewide).

In 2015, Connecticut reimbursed the expenses relative to PSAT assessments for all students in Connecticut's thirty lowest performing districts i.e., the Alliance Districts. The demographics of the current sample are reflective of that decision.

Additionally, when reviewing the data, it was obvious that some students did not exhibit the motivation to perform well on one or both assessments. These were identified as students with the lowest obtainable scale score in either assessment. A total of 155 student records with the lowest scale score in either assessment were excluded. The resulting sample size was 10,243 records.

In order to derive a dataset for analysis purposes that was more representative of the statewide student population, a stratified random sample (N=3000) was extracted from the 10,243 records. The strata were a combination of race/ethnicity and free and reduced price meal eligibility status. Given that there are seven race/ethnicity and three meal eligibility categories, 21 strata were created, each with a weight that corresponded to their relative proportion in the most recent statewide enrollment (i.e., 2016-17).

The demographics of the resulting sample are provided below.

Table 2: Race/Ethnicity by Free/Reduced Price Meal Eligibility for Stratified Random Sample

Race/Ethnicity	Stratified Random Sample			State, October 2016		
	Free	**Not Eligible**	**Reduced**	**Free**	**Not Eligible**	**Reduced**
American Indian or Alaska Native	0.1%	0.2%	0.0%	0.1%	0.2%	0.0%
Asian	1.0%	3.9%	0.2%	1.0%	3.9%	0.2%
Black or African American	7.4%	4.8%	0.7%	7.4%	4.8%	0.7%
Hispanic/Latino of any race	14.5%	8.0%	1.5%	14.5%	8.0%	1.5%
Native Hawaiian or Other Pacific Islander	0.0%	0.1%	0.0%	0.0%	0.1%	0.0%
Two or More Races	1.0%	1.8%	0.2%	1.0%	1.8%	0.2%
White	7.4%	45.5%	1.8%	7.4%	45.5%	1.8%
Total	**31.4%**	**64.2%**	**4.4%**	**31.4%**	**64.1%**	**4.5%**

The Assessments

The Smarter Balanced assessments are created by the Smarter Balanced Assessment Consortium. First, the consortium developed content specifications which were designed to extract performance expectations or assessment targets from the Common Core State Standards. Then, the consortium developed item and task specifications for ELA and mathematics which *"provide guidance on how to translate the content specifications into actual assessment items… The item specifications describe the evidence to be elicited and provide sample task models to guide the development of items that measure student performance relative to the target" (Smarter Balanced, 2016).*

The summative assessment blueprint ensures coverage of the breadth and depth of the standards. The assessments are delivered entirely on the computer and utilize a computer adaptive methodology for the majority of the assessment. The assessments include a variety of item types including technology-enhanced items, as well as items that require both selected and constructed responses.

The tests are not strictly timed; students may take as much time as needed to complete the test. In addition, a wide array of universal tools, accommodations, and supports are available to ensure that all students have access to demonstrate their full potential on the assessment.

"Unidimensional Item Response Theory (IRT) models were used to calibrate items and create the Smarter Balanced test scale…. Smarter Balanced utilizes the two-parameter logistic (2PL) model and the generalized partial credit model (GPCM) to calibrate selected-response and polytomous items, respectively" (Smarter Balanced, 2016). Overall student performance in ELA and Mathematics is reported in vertical scale scores. Independent technical reviews of the assessment have determined that student test scores on the Smarter Balanced assessments are valid and reliable measures of overall achievement on the Common Core State Standards.

The CSDE discontinued the performance task portion of its ELA assessment in February 2016 because of the limited test information derived from that component (CSDE, 2016b) given the additional administration time; therefore, the ELA test was rescored based on student responses to the computer-adaptive test portion only and used for this study.

According to the College Board's informational materials for the PSAT 8/9, *"The SAT® Suite of Assessments is a group of assessments beginning with PSAT™ 8/9 (grades 8 and 9), continuing through PSAT™ 10 and PSAT/NMSQT® (grades 10 and 11), and culminating in the SAT (grades 11 and 12)… The*

assessment includes the Reading Test, the Writing and Language Test, and the Math Test. A student's scores on the Reading Test and the Writing and Language Test are combined to arrive at a section score for Evidence-Based Reading and Writing. The Math Test score is also reported as a second section score." September 2015 was the first administration of the redesigned PSAT.

The PSAT 8/9 is a paper-pencil, fixed form assessment. All questions on the Reading and Writing tests are multiple choice; in the Mathematics test, almost all questions are multiple choice except for a few that require a grid-in response. The ELA portion of the test has a total of 82 items (42 in Reading and 40 in Writing) while the Mathematics test has a total of 38 items. The test is timed; 85 minutes are allotted to the ELA portion (Reading and Writing combined) while 60 minutes are allotted to the Mathematics test. Raw scores (number correct) are converted to scale scores. The overall scale for each subject (ELA and Mathematics) ranges from 120 to 720. The 9th grade PSAT benchmark score for the ELA is 410 and Mathematics is 450 (College Board, 2016).

Results

Descriptive statistics are presented to explore the relationship between student scores on the two assessments.

Within each subject, students were grouped based on their 8th grade Smarter Balanced vertical scale scores into one of four Smarter Balanced achievement levels. For each group, the mean PSAT scores were calculated (Table 3). As expected, in both subjects, the mean PSAT scores are progressively higher for each higher Smarter Balanced achievement level.

Table 3: Mean PSAT Scores by Smarter Balanced Achievement Level

Smarter Balanced Achievement Level	English Language Arts (ELA)			Mathematics		
	N	Mean PSAT Score	Standard Deviation of PSAT Score	N	Mean PSAT Score	Standard Deviation of PSAT Score
1	626	344	47	1123	358	58
2	804	403	53	842	415	50
3	1119	470	62	572	465	48
4	451	557	63	463	535	56

Each achievement level was further divided into two categories: low and high. These categories were established during the development of Connecticut's growth model for the Smarter Balanced assessment (CSDE, 2016c). Students were grouped into these eight categories based on their 8th grade Smarter Balanced vertical scale scores (Table 4). As with the achievement levels, the mean PSAT scores and the percentage of students meeting the PSAT benchmark (410 for ELA and 450 for Mathematics) increase monotonically for each higher achievement category.

Table 4: Mean PSAT Scores by CSDE Smarter Balanced Achievement Categories

CSDE Smarter Balanced Achievement Category	English Language Arts (ELA)				Mathematics			
	N	Mean PSAT Score	Std. Dev. of PSAT Score	Percent Meeting PSAT ELA Benchmark (>=410)	N	Mean PSAT Score	Std. Dev. of PSAT Score	Percent Meeting PSAT Math Benchmark (>=450)
1	327	334	45	4.6%	673	347	58	2.5%
2	299	354	48	14.4%	450	376	53	6.9%
3	404	390	51	34.7%	439	402	50	15.9%
4	400	417	53	59.5%	403	428	46	35.5%
5	585	447	56	78.8%	317	452	46	60.6%
6	534	495	58	93.4%	255	481	47	80.0%
7	239	534	55	97.9%	208	508	42	92.3%
8	212	583	61	99.5%	255	557	57	98.4%

Of those students performing at low Level 3 in ELA (i.e., category 5) and high Level 3 in Mathematics (i.e., category 6), nearly 80 percent attained the PSAT benchmark score of 410 in ELA and 450 in Mathematics. This aligns with the minimum expected performance on the Smarter Balanced which is achievement level 3 (or categories 5 and 6). In tables 3 and 4, the mean PSAT scores in one achievement level are significantly different ($p<.01$) from the scores in the adjacent level.

Table 5 presents the percentage of students meeting the benchmark score on both PSAT ELA *and* Mathematics assessments based on their Smarter Balanced achievement category in both subjects. Students functioning in achievement categories 6, 7, or 8 in both Smarter Balanced subject areas (i.e., the nine cells in the bottom right) evidence the highest benchmark attainment rates; of the 576 students in those areas, 530 (or 92.0 percent) attain the PSAT benchmark in both subjects. By contrast, of the students functioning in achievement categories 1, 2, or 3 in both Smarter Balanced subject areas (i.e., 9 cells in the top left), only two percent attain the PSAT benchmark in both subjects.

Table 5: Percentage of Students Meeting PSAT Benchmark in Both Subjects Based on CSDE Smarter Balanced Achievement Category

		Smarter Balanced Mathematics Category (scale score range)							
		1 (2265-2455)	2 (2457-2503)	3 (2504-2544)	4 (2545-2585)	5 (2586-2619)	6 (2620-2652)	7 (2653-2685)	8 (2686+)
Smarter Balanced ELA Category (scale score range)	1 (2288-2446)	0.0%	0.0%	0.0%	N<20	N<20	N<20	N<20	N<20
	2 (2447-2486)	1.1%	2.7%	3.0%	N<20	N<20	N<20	N<20	N<20
	3 (2487-2526)	1.8%	3.4%	8.4%	21.1%	46.2%	N<20	N<20	N<20
	4 (2527-2566)	4.1%	2.2%	10.4%	28.2%	50.0%	N<20	N<20	N<20
	5 (2567-2617)	4.8%	10.2%	16.4%	26.4%	57.8%	67.8%	81.3%	N<20
	6 (2618-2667)	N<20	12.5%	26.2%	33.7%	60.4%	77.0%	95.7%	98.3%
	7 (2668-2703)	N<20	N<20	N<20	40.0%	69.2%	82.2%	96.1%	98.3%
	8 (2704+)	N<20	N<20	N<20	N<20	N<20	88.5%	91.5%	99.2%

Moderate correlations are noted in both subjects between student scores on the 8th grade Smarter Balanced and their scores on the PSAT 8/9 assessment. The correlation in ELA (r = 0.796) was slightly stronger than the one for Mathematics (r = 0.778,).

Figure 1: Smarter Balanced vs PSAT Scatter Plots: ELA (left) and Mathematics (right)
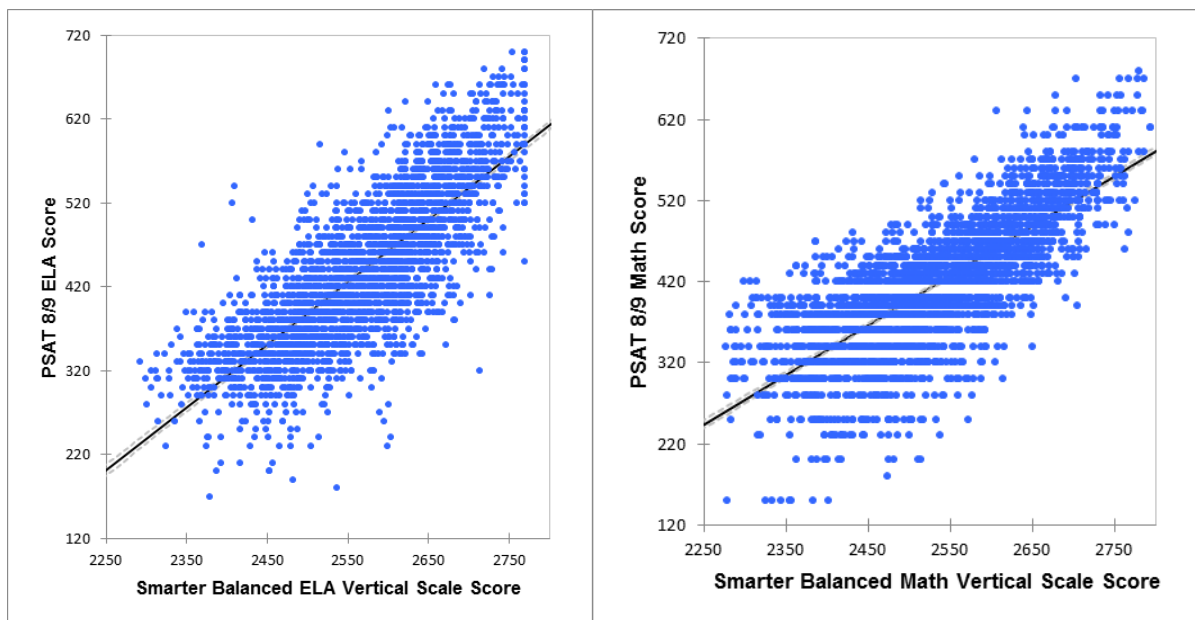
Discussion

Though there are significant differences in the design and delivery of the two assessments, the findings from this study indicate that there is a moderate relationship between student performance on the Smarter Balanced assessments in ELA and Mathematics in 8th grade and performance on the PSAT 8/9 – the first assessment in the College Board's new "SAT Suite of Assessments." Students with strong skills on the Smarter Balanced assessments in both subjects (i.e., high Level 3 or better) are the ones who are also attaining the PSAT benchmark in both subjects at high rates (i.e., 75% or better).

Therefore, high school educators in 9th grade who are looking for a solid measure of overall student achievement on the Common Core State Standards for their incoming freshmen, can confidently rely on the 8th grade results from the highly-aligned Smarter Balanced assessment. If educators desire greater information about a student's knowledge in a particular skill or topic area (e.g., simultaneous linear equations, determine central idea from textual evidence), then it may be more useful to administer a block of test items in that skill or topic area, instead of administering another measure of overall achievement like the PSAT 8/9. Educators should also be extremely careful about not drawing inferences of student abilities in specific skills from just a few items within an overall assessment. Strategic use of different assessments for appropriate purposes (CSDE, 2016d) can greatly reduce testing time and give instructional time back to teachers. Ultimately, the standards should guide curriculum and instruction, not the results from a single test.

Conclusion

This study illustrates that there is a moderate relationship between student performance on the 8th grade Smarter Balanced and the fall 9th grade PSAT 8/9 assessments. The Smarter Balanced assessments provide a valid and reliable measure of overall student achievement on the Common Core State Standards. They can be used by high school educators to identify freshmen students who may need academic support so that they can get back on track for success on the PSAT NMSQT® and the SAT®. Utilizing the Smarter Balanced results can lessen the need for additional assessments at the start of high school, thus reducing testing time while increasing instructional time. Future studies can replicate this analysis for other cohorts and compare the prediction of SAT scores based on these two assessments.

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