Exact Path

Exact Path Diagnostic and Pennsylvania System of School Assessment Correlational Study

Summary

This research study investigated the correlation between scores on the Exact Path Diagnostic Assessment and scores on the Pennsylvania System of School Assessment (PSSA). The findings in this study show strong correlations between the Exact Path diagnostic and PSSA scores across content areas and grades, providing evidence that the assessments tend to measure the same skills and knowledge.

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Background

The Exact Path Diagnostic Assessment is a computer-adaptive test that can be administered up to four times a year in language arts, reading, and/or mathematics and which results in a scale score that ranges from 500 to 1500 regardless of grade level. Four districts in Pennsylvania who administered the Exact Path diagnostic provided student scores on the PSSA, the Pennsylvania accountability assessment for students in grades three through eight, totaling 4,212 students in mathematics, 3,324 students in reading, and 588 students in language arts. This study investigates the strength of the relationship between scores on the Exact Path diagnostic and the PSSA by investigating correlations between student scores on both tests. Correlations between two tests offer a source of validity evidence, with strong correlations providing evidence that the assessments tend to measure the same skills and knowledge.

Sample Description

Four Pennsylvania school districts participated in this study by providing Edmentum with student demographic and performance data from the spring 2019 PSSA. These data were then joined with Exact Path diagnostic data using a unique student identification number. The districts vary in size and location and include a smaller rural district and three suburban districts.

Table 1 shows the demographic composition of students in the sample compared to the overall state population of students. No student demographic data was missing from the study sample. The students in the study sample are similar to the overall state population, with two exceptions: they are somewhat less likely to qualify for free or reduced price lunch, and are also more likely to be White and less likely to be Black than the overall student composition in the state.

Table 1. Student Characteristics

Student Characteristic	Sample Percent (%)	State Percent (%)	Difference (%)
American Indian / Alaskan Native	0.24	0.16	-0.08
Asian	3.13	4.14	1.00
Black	6.74	14.74	8.00
Hispanic (any race)	12.94	12.08	-0.86
Multi-Racial	5.56	4.16	-1.40
White	71.39	64.73	-6.66
Female	47.98	48.62	0.64
Male	52.02	51.38	-0.64
English Language Learner	3.58	3.96	0.37
Free/Reduced Lunch	41.48	53.28	11.80
Special Education	14.79	17.27	2.48

State data source: Pennsylvania Department of Education, 2019a, 2019b, 2019c, 2019d

Table 2 compares the mean mathematics and ELA 2019 PSSA scale scores from the students participating in the study to the overall state population. Results show that the study participants scored higher on average than the state population in all grades for mathematics and in almost all grades for ELA. Sixth and eighth grade students in the study scored slightly below the state population on average on the ELA PSSA.

Table 2. Mean PSSA Scores for Study Sample and State

	ELA		Mathematics	
Grade	Sample	State	Sample	State
3	1047.0	1039.0	1053.1	1026.4
4	1053.5	1035.0	1055.5	994.2
5	1035.1	1027.2	1021.7	991.8
6	1031.7	1034.4	1029.7	979.6
7	1028.7	1026.3	1036.8	965.6
8	1012.8	1024.2	1004.9	950.3

PSSA data source: Data Recognition Corporation, 2019

Data and Methods

In this study, student academic performance within a subject is measured through two assessments: the Exact Path diagnostic and the PSSA. The Exact Path diagnostic assessments in mathematics, language arts, and reading result in scores on a vertical scale so that performance within a subject can be compared across grades. However, the vertical scale for each subject is distinct, so scores cannot be compared between subjects. The PSSA assesses academic performance in mathematics and English language arts. Because the PSSA scaled scores are not vertically scaled, student scores are only interpretable within grade and subject (Data Recognition Corporation, 2019). While Exact Path assesses reading and language arts separately resulting in two separate scores, the PSSA ELA assessment includes both reading and language arts content for one aggregated score.

To perform correlational studies, students must typically take both tests (e.g., the Exact Path diagnostic and the PSSA) within the same time frame. Ideally, both tests would be administered within two weeks of each other and then student scores from both tests would be correlated. Practically, however, administering multiple tests within a short time span can be unreasonable.

Students in three of the four districts in this study completed the Exact Path diagnostic in mathematics, reading, and language arts between March and May 2019 and completed the PSSA in mathematics and reading in April 2019. For these three districts, this study investigated the correlations between PSSA spring 2019 scores and Exact Path diagnostic scores from the spring of 2019.

The fourth district did not administer the Exact Path diagnostic in the spring of 2019 when the PSSA was also administered, but instead in the fall of 2019. For this district, we examine the correlations between spring 2019 PSSA scores and fall 2019 Exact Path diagnostic scores. For example, third-grade students' spring 2019 PSSA scores were correlated with their fall 2019 Exact Path diagnostic scores as fourth-grade students. Students who were in eighth grade during spring of 2019 in this district were not included in this study because these students did not take the Exact Path diagnostic in the fall as ninth graders.

PSSA mathematics scores were merged with Exact Path diagnostic scores in mathematics, and PSSA ELA scores were merged two ways: with Exact Path diagnostic scores in reading and again with Exact Path diagnostic scores in language arts.

Table 3 shows the number of students in the merged sample by grade and content area; these were the students that had test scores from both the spring 2019 PSSA and the spring or fall 2019 Exact Path diagnostic and had student identification numbers to facilitate merging. Dashes are included in the table where there is either no data or insufficient data. These cases occurred because not all participating districts served all grades or used Exact Path in all grades, or when there were just a few students using Exact Path in those grades and content areas. The grade levels reported in Table 3 are the grade level the student was at the time they took the PSSA during spring of 2019, including in the case of the district who administered the Exact Path diagnostic in fall of 2019. For this district, student grade level when the PSSA and Exact Path diagnostic was administered is not the same since students advanced a grade between the two assessments.

Table 3. Sample Size (Number of Students)

	Spring			Fall		
Grade	Language Arts	Reading	Mathematics	Language Arts	Reading	Mathematics
3	–	151	129	–	307	274
4	–	213	171	–	334	336
5	101	305	279	–	342	341
6	128	513	555	–	358	360
7	93	477	176	171	344	343
8	95	868	360	–	–	–
Total	417	2527	1670	171	1685	1654

Results

The analysis begins by considering the relationship between Exact Path diagnostic scores and PSSA proficiency levels, with the expectation that median Exact Path scores will increase with each proficiency level. The distribution of Exact Path diagnostic scores by PSSA proficiency category (Pennsylvania Department of Education, n.d.) and by subject area are displayed in the box plots in Figures 1-3. The boxes represent the distribution of Exact Path scores from the first quartile to the third quartile, with a horizontal line intersecting the box at the median. Exact Path scores from the spring 2019 time period are separated from those in fall 2019. Based on the vertical progression of the box plots across performance levels, these figures show that within each subject, there is a clear relationship between the PSSA proficiency levels and Exact Path diagnostic scores. Within each grade and subject area, median Exact Path diagnostic scores are consistently greater with increasingly higher proficiency levels. This suggests a strong relationship between PSSA performance levels and Exact Path diagnostic scores. Median and mean scale scores by PSSA performance level should not be interpreted as proficiency level predications or cut scores but rather provide evidence that students that scored higher on the Exact Path diagnostic also received PSSA scores corresponding to higher performance levels and vice versa. Tables with descriptive statistics reporting this data are included in Tables A1-A3 in the appendix.

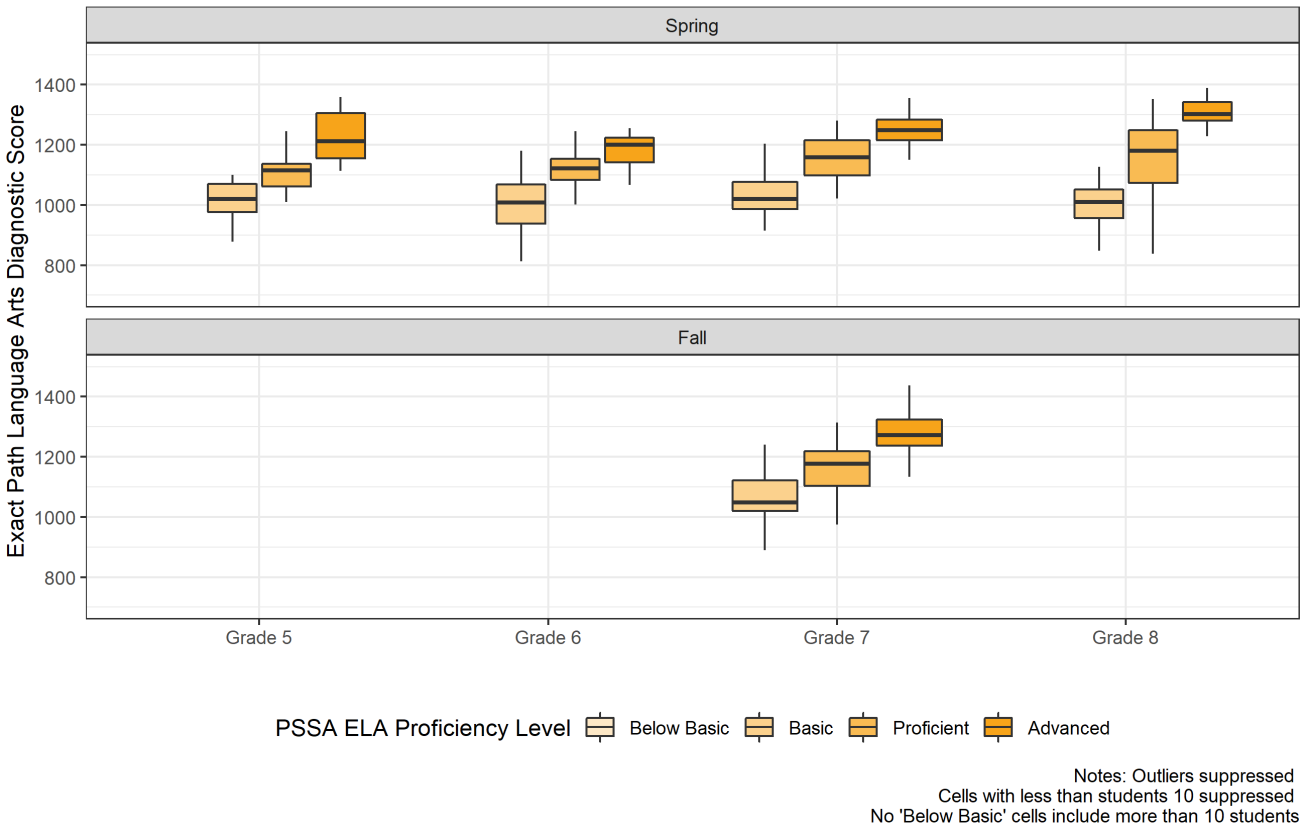

Figure 1. Exact Path Language Arts Diagnostic Score Distribution by PSSA ELA Proficiency Level

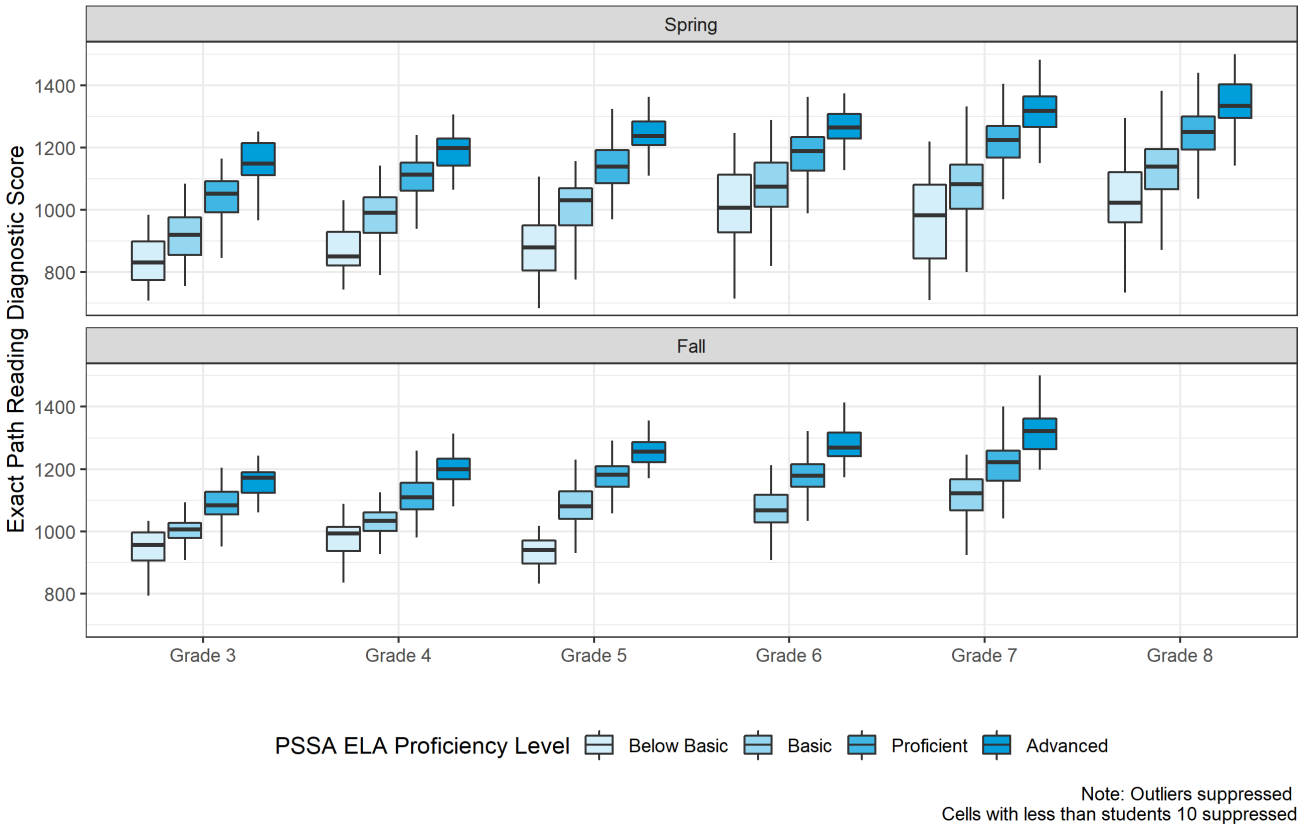

Figure 2. Exact Path Reading Diagnostic Score Distribution by PSSA ELA Proficiency Level

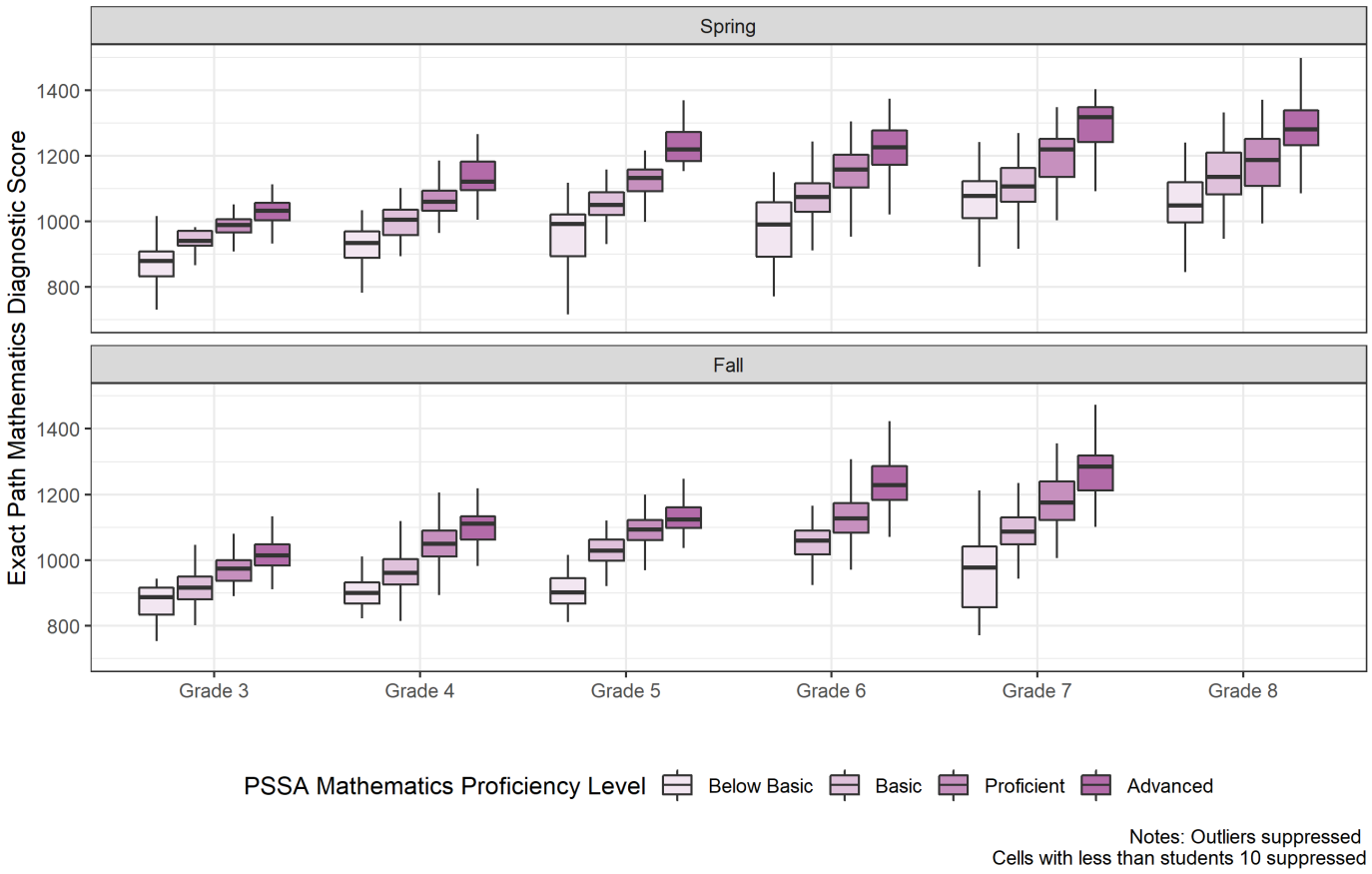

Figure 3. Exact Path Mathematics Diagnostic Score Distribution by PSSA Mathematics Proficiency Level

Table 4 shows correlation coefficients between spring 2019 PSSA scale scores and both spring and fall 2019 Exact Path diagnostic scores, by grade level and content area. The correlation coefficient measures the linear relationship between two variables, and ranges from 0 to +/-1, where the larger the absolute value of the correlation coefficient, the stronger the association between the two measures.

All correlations show a strong positive relationship between the Exact Path diagnostic and the PSSA. To understand the magnitude of the association Cohen, Cohen, West, & Aiken (2003) provided a standard or rule of thumb for interpreting the strength of the relationship.

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Correlation coefficients between 0.10 and 0.29 represent a small association, coefficients between 0.30 and 0.49 represent a medium association, and coefficients of 0.50 and above represent a large association or

relationship. All of the correlation coefficients reported in Table 4 fall within the band for a large association.

Scatter plots by grade in Figures A1-A6 in the appendix also show the relationship between student performance on each test, again by grade and content area. These figures and correlations demonstrate that students who score high on the Exact Path diagnostic tend to score higher on the PSSA and vice versa.

Table 4. Correlation Coefficients Between Spring 2019 PSSA Scores and Spring and Fall 2019 Exact Path Scores

	Spring			Fall		
Grade	Language Arts	Reading	Mathematics	Language Arts	Reading	Mathematics
3	–	–	0.812	–	0.810	0.712
4	–	–	0.799	–	0.801	0.762
5	0.828	0.799	0.790	–	0.833	0.709
6	0.703	0.628	0.733	–	0.833	0.763
7	0.778	0.745	0.677	0.720	0.811	0.741
8	0.809	0.734	0.650	–	–	–

Conclusion

Results indicated that performance on the Exact Path diagnostic is highly correlated with performance on the PSSA. In other words, students that score high on the PSSA also score high on the Exact Path diagnostic and vice versa. These results suggest that both the PSSA and the Exact Path diagnostic measure similar constructs and provide predictive validity evidence for the Exact Path diagnostic.

References

Cohen, J., Cohen, P., West, S., & Aiken, L. (2003). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Data Recognition Corporation. (2019). *2019 Pennsylvania Department of Education Technical Report for the Pennsylvania System of School Assessment (PSSA)*. Retrieved from https://www.education.pa.gov/Documents/K-12/Assessment and Accountability/PSSA/Technical Reports/2019 PSSA Technical Report.pdf

Pennsylvania Department of Education. (n.d.). *PSSA Cut Scores*. Retrieved from https://www.stateboard.education.pa.gov/Documents/About the Board/Board Actions/2015/PSSA Cut Scores.pdf

Pennsylvania Department of Education. (2019a). *English Learners: 2018-19 EL Counts by LEA and School*. Retrieved from https://www.education.pa.gov/DataAndReporting/EnglishLearners/Pages/default.aspx

Pennsylvania Department of Education. (2019b). *National School Lunch Program Report: 2018 Building Data Report*. Retrieved from https://www.education.pa.gov/Teachers - Administrators/Food-Nutrition/reports/Pages/National-School-Lunch-Program-Reports.aspx

Pennsylvania Department of Education. (2019c). *Public School Enrollments 2018-2019*. Retrieved from https://www.education.pa.gov/DataAndReporting/Enrollment/Pages/PublicSchEnrReports.aspx

Pennsylvania Department of Education. (2019d). *Special Education Data Report School Year 2018-2019*. Retrieved from https://penndata.hbg.psu.edu/penndata/documents/BSEReports/Data Preview/2018-2019/Speced_Quick_Report_State_Final.pdf

Appendix

Table A1. Mean and Standard Deviation of Exact Path Language Arts Score by PSSA ELA Proficiency Level

		Grade 5		Grade 6		Grade 7		Grade 8	
	PSSA Level	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N
Spring	Below Basic	–	9	–	7	–	0	–	8
	Basic	1015.2 (59)	39	989.1 (120.5)	44	1022.8 (82.1)	25	998.7 (111.8)	26
	Proficient	1109.8 (61.9)	39	1108.7 (94.6)	52	1158.5 (74.8)	55	1162.3 (113.3)	48
	Advanced	1225.4 (85.9)	14	1193 (64.2)	25	1254.6 (55.8)	13	1295.1 (93.6)	13
Fall	Below Basic	–	–	–	–	–	0	–	–
	Basic	–	–	–	–	1064.5 (85)	30	–	–
	Proficient	–	–	–	–	1159.7 (90.8)	98	–	–
	Advanced	–	–	–	–	1274.4 (67.8)	43	–	–

Note: Data suppressed in cells with less than 10 students

Table A2. Mean and Standard Deviation of Exact Path Reading Score by PSSA ELA Proficiency Level

		Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 8	
	PSSA Level	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N
Spring	Below Basic	836.7 (83.3)	22	875.5 (82.5)	23	879.1 (106.7)	30	1012.1 (141.1)	37	963.1 (141.3)	26	1030.6 (121.5)	115
	Basic	916.4 (80.6)	46	981.1 (86.1)	54	1002.3 (92.7)	115	1070.6 (107.6)	201	1068.8 (105.7)	188	1126.5 (111)	272
	Proficient	1037.2 (85.3)	60	1101 (81)	67	1132 (85)	119	1174.9 (85.4)	196	1213.5 (97)	204	1244.1 (82.7)	371
	Advanced	1152.5 (71.2)	23	1174.5 (94.2)	69	1241.4 (63.2)	41	1262.6 (62.8)	79	1314.4 (88.9)	59	1343.2 (78.8)	110
Fall	Below Basic	944.2 (66.9)	17	974 (62.1)	21	933.4 (56.7)	16	–	4	–	8	–	–
	Basic	997.1 (49.8)	85	1023.2 (69.9)	67	1075.7 (77.1)	85	1070.1 (63.1)	83	1110.5 (77.8)	86	–	–
	Proficient	1085.4 (55.9)	149	1113.7 (59.1)	131	1175.9 (51.5)	178	1180.4 (57.2)	176	1208 (72.1)	176	–	–
	Advanced	1158.8 (55)	56	1196.6 (58.4)	115	1256.3 (42)	63	1281.2 (65.6)	95	1321.5 (65.9)	74	–	–

Note: Data suppressed in cells with less than 10 students

Table A3. Mean and Standard Deviation of Exact Path Mathematics Score by PSSA Mathematics Proficiency Level

		Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 8	
	PSSA Level	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N
Spring	Below Basic	871 (73.4)	28	924 (79.1)	20	962.2 (86.2)	54	968.8 (106.8)	76	1030 (144.3)	45	1042.7 (116.2)	99
	Basic	933.8 (51.3)	17	999.2 (50.2)	48	1047.2 (57.4)	121	1075.6 (70.8)	179	1098.7 (118.1)	40	1140.8 (88.8)	76
	Proficient	988.5 (32.7)	36	1065.8 (47.3)	49	1123.9 (57.9)	66	1150.8 (69.9)	191	1190.1 (94.6)	53	1184.2 (86.7)	107
	Advanced	1033.8 (43.7)	48	1138.4 (67.8)	54	1232.4 (55.7)	38	1222.2 (72.5)	109	1292.2 (73.8)	38	1275.9 (92.9)	78
Fall	Below Basic	872 (56.5)	20	909.4 (63.1)	30	913.9 (69.8)	20	–	9	963.9 (122.1)	21	–	–
	Basic	916.3 (53)	75	965.5 (68.2)	60	1025.8 (54.9)	81	1046.7 (77.7)	78	1084.1 (86.1)	71	–	–
	Proficient	970.8 (44.5)	91	1045.8 (62.1)	128	1088.9 (52.5)	160	1128.9 (66.5)	152	1177.1 (80.5)	155	–	–
	Advanced	1020.8 (51.8)	88	1107.3 (61.4)	118	1138.7 (60.4)	80	1231.1 (76.1)	121	1281.5 (89.6)	96	–	–

Note: Data suppressed in cells with less than 10 students

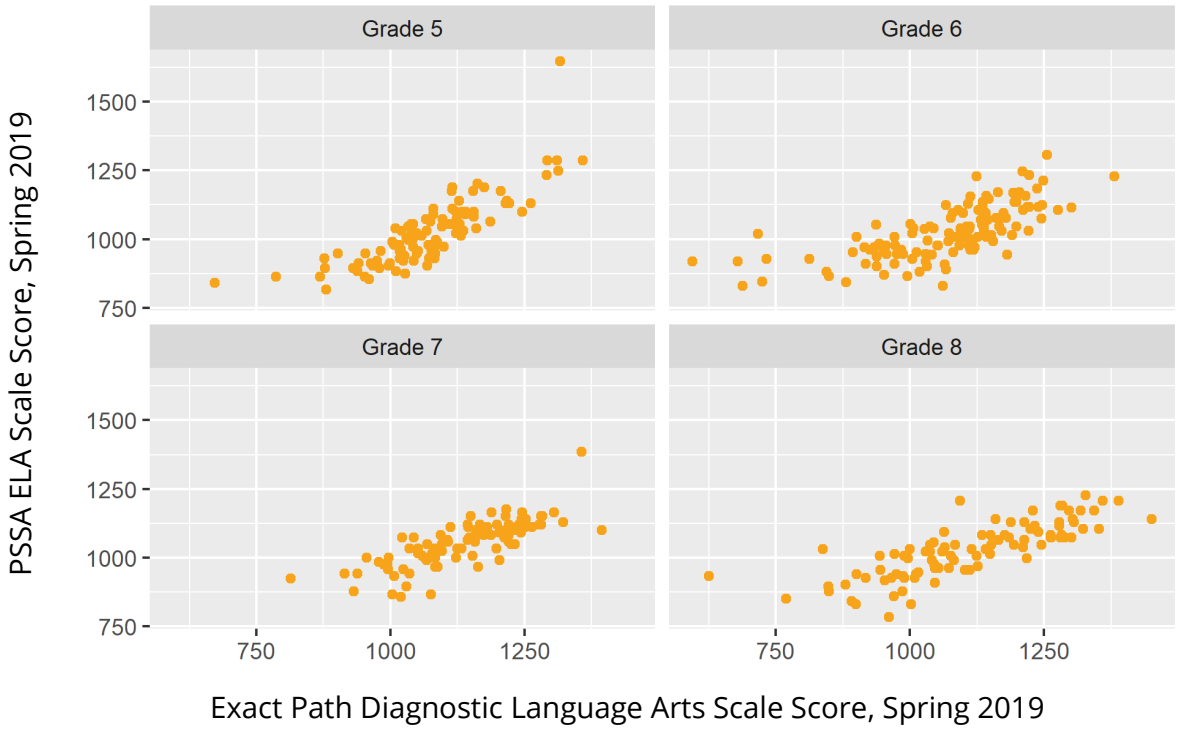

Figure A1. Scatterplot of Spring Exact Path Language Arts Score and PSSA ELA Score

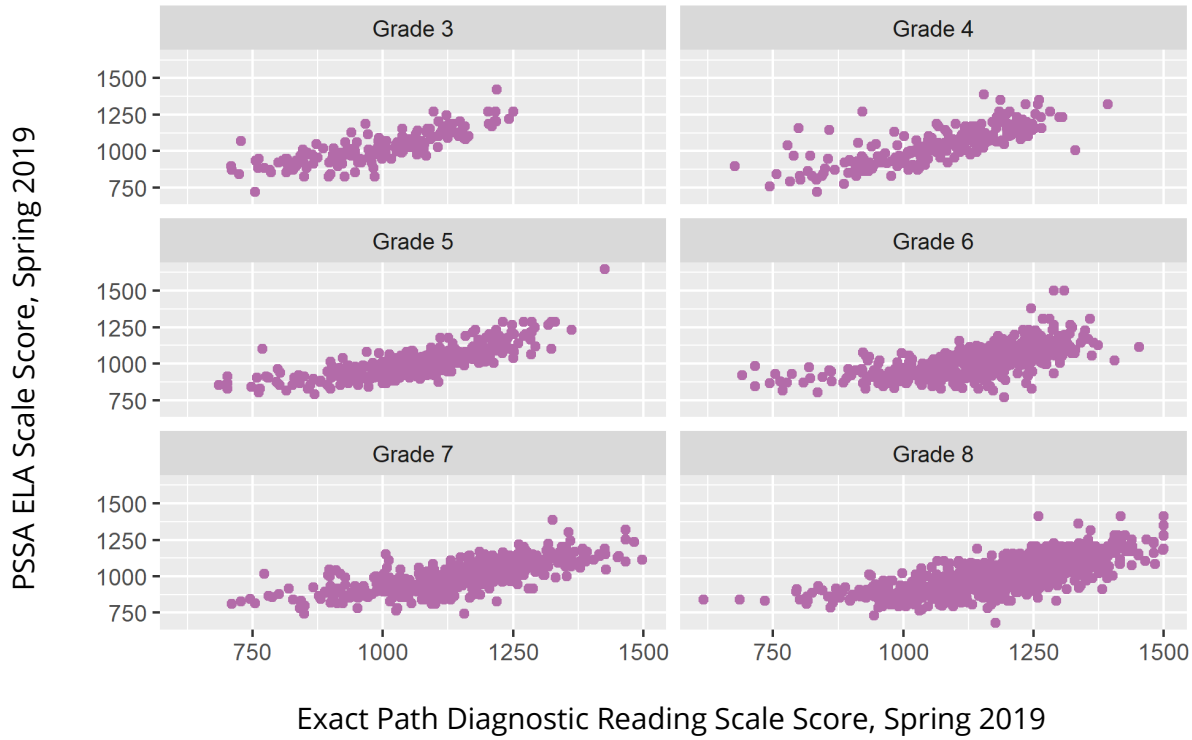

Figure A2. Scatterplot of Spring Exact Path Reading Score and PSSA ELA Score

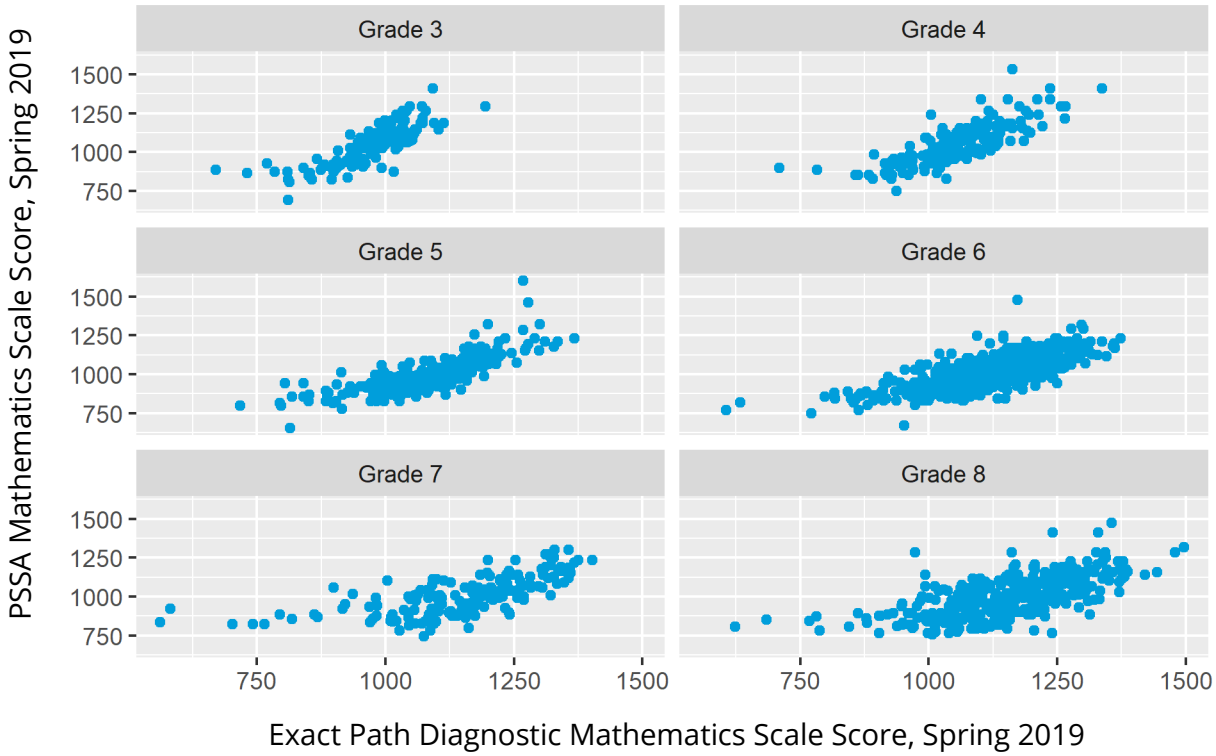

Figure A3. Scatterplot of Spring Exact Path Mathematics Score and PSSA Mathematics Score

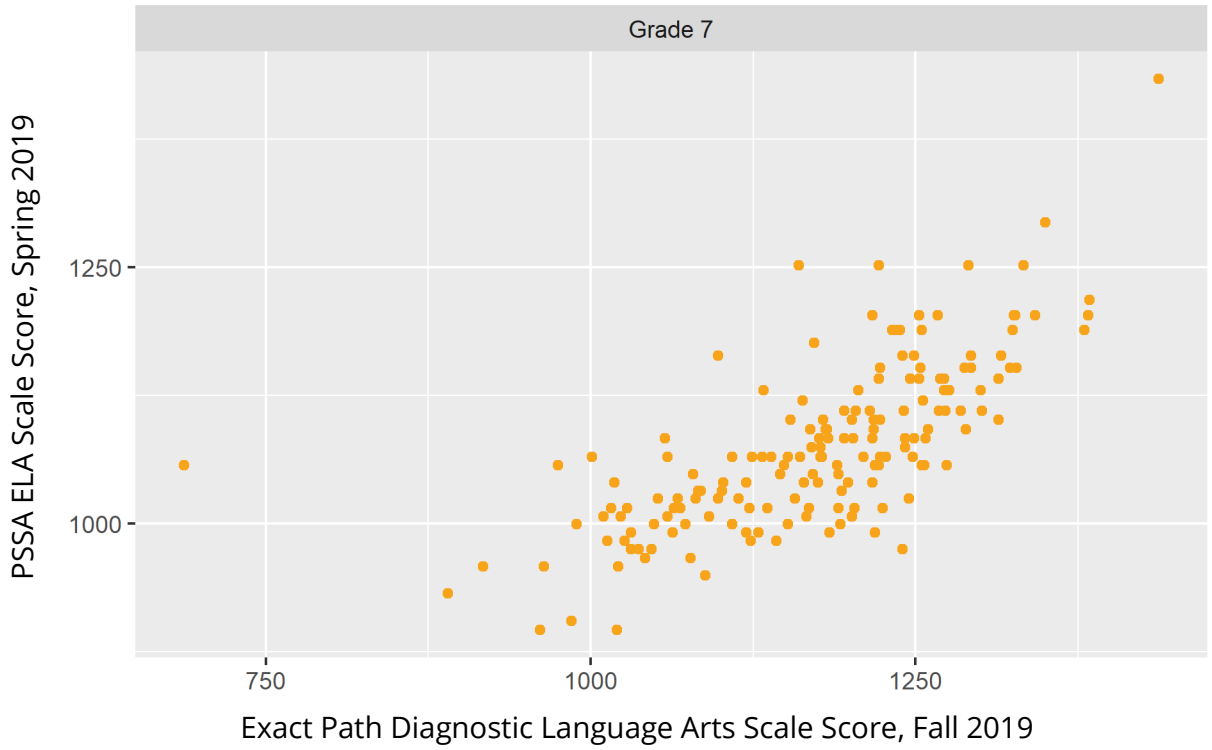

Figure A4. Scatterplot of Fall Exact Path Language Arts Score and Spring PSSA ELA Score

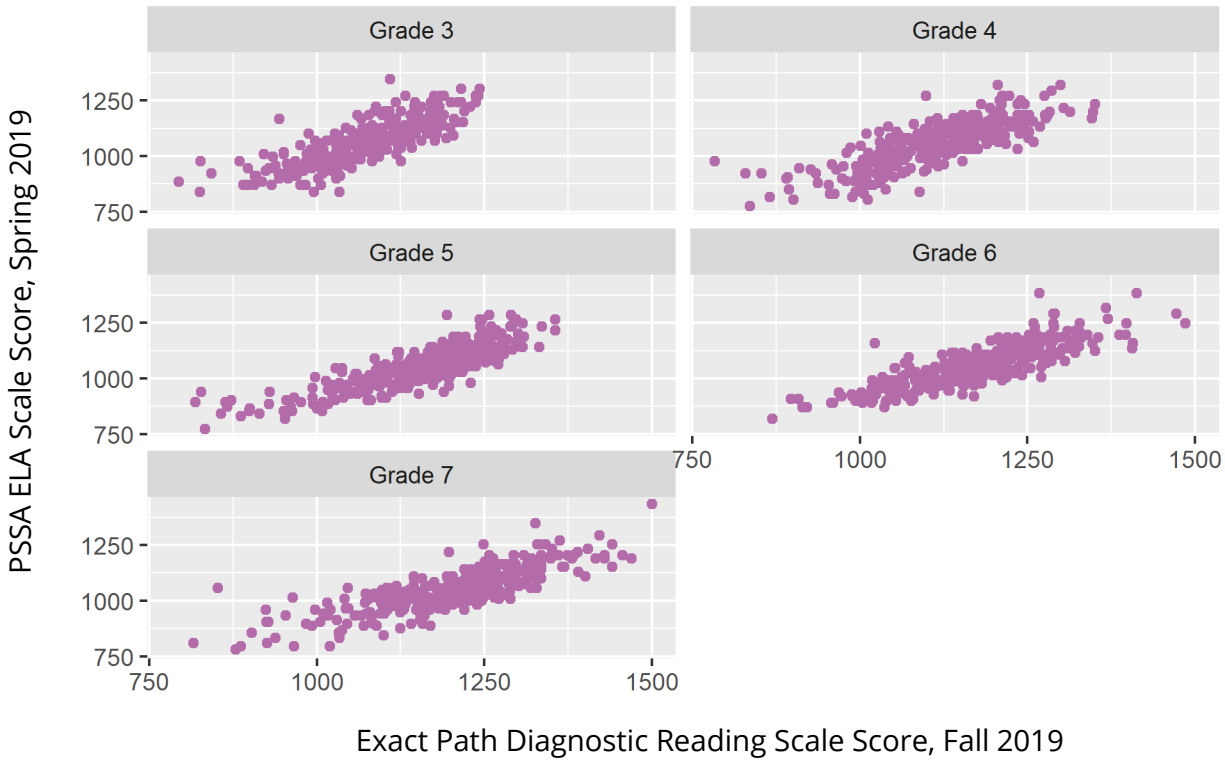

Figure A5. Scatterplot of Fall Exact Path Reading Score and Spring PSSA ELA Score

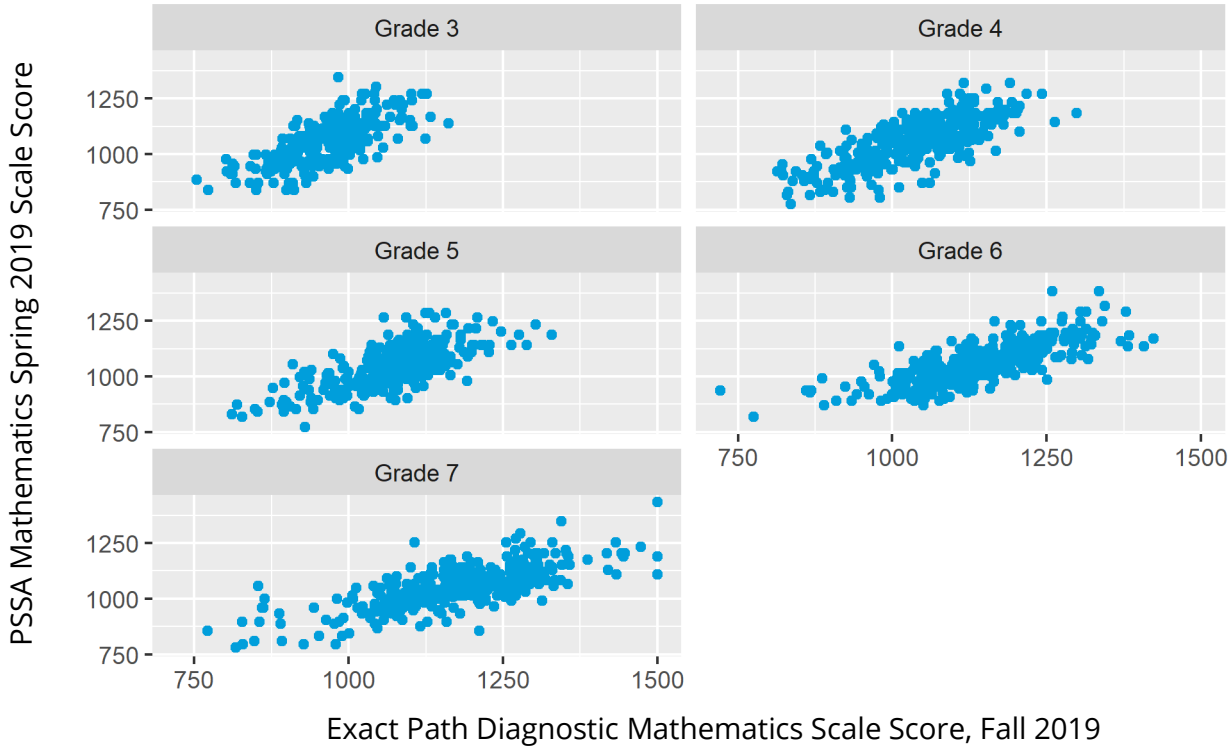

Figure A6. Scatterplot of Fall Exact Path Mathematics Score and Spring PSSA Mathematics Score

Customer Support
800.447.5286
support@edmentum.com