



IRLA as a Predictor of PSSA Score

Maggie Fields, Research Intern

Jeremy Raff, Director of Data Analytics

Introduction

According to the American Reading Company, the Independent Reading Level Assessment or IRLA, is a formative assessment that can be used by teachers and administrators to acquire actionable data and alter teaching tactics and procedures in the classroom and beyond (2023). School District of Lancaster has been using IRLA for a number of years in order to gauge student reading level and gain some idea of what to expect from PSSA reading scores. This report summarizes how well IRLA was able to predict PSSA scores for third, fourth, and fifth graders in 2023. Ultimately, this analysis will guide administrators and teachers in future use and interpretation of IRLA data.

Research Design

The purpose of this study is to determine the IRLA assessment's ability to accurately predict a student's PSSA score. Ascertaining predictability can be accomplished through a regression analysis in which there is a dependent variable (in this case the PSSA ELA score) and an explanatory variable (the IRLA score). In this study, we conduct linear regressions for numerical test scores. The visuals in this report include graphs with regression lines. These lines represent the linear relationship between the explanatory and dependent variables and the predictions of PSSA score the model makes based on the IRLA score. Each relationship has a correlation coefficient that classifies the strength of the relationship numerically. Correlation coefficients fall between -1 and 1 , with 1 being a perfect positive correlation and -1 being a perfect negative correlation. Generally, a correlation coefficient between $.40$ and $.59$ is considered a moderate correlation, a coefficient between $.60$ and $.79$ is considered strong and a coefficient between $.80$ and 1 is very strong (Akoglu, 2018). The sensitivity and specificity of the IRLA is also included to highlight how often a student's benchmark score on IRLA and PSSA matched. Sensitivity represents the true positivity rate of how often someone who



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was expected to receive a positive result (for example, a student who scored ‘proficient or above’ on IRLA proficiency level) and also scored either proficient or advanced on the actual assessment (for example, proficient or advanced on the PSSA). Specificity refers to the true negativity rate or how often a student who was expected to receive a negative result (Emergency or At-Risk on IRLA Proficiency Level) also scored Below Basic or Basic on the ELA PSSA.

Variables

IRLA Score uses the most recent scaled numerical IRLA score prior to the ELA PSSA. *IRLA Proficiency Level* identifies whether student reading levels are Emergency, At-Risk, or Proficient or Above. *School* identifies the specific building each student attended and *Grade* indicates their current grade level when tested. Several demographic variables are included as well. These include *Economically Disadvantaged* for students who qualify for free or reduced lunch in the district’s school information system. *English Language Learners* are identified as the same status by the district. The variable *Special Education* indicates whether a student has an individualized education plan (IEP). Finally, *Chronically Absent* indicates whether students were absent more than 10% of days during the 2022-2023 school year.

Sample Description

Data for this analysis comes from the 2023 PSSA preliminary test file. This includes all third through fifth-grade students who completed the ELA PSSA assessment at School District of Lancaster. Importantly, this is *not* the final accountability file with attribution for district students, but all test takers associated with the district who also have an IRLA score available.

This sample consists of 2,006 students across thirteen elementary schools. Students are primarily Hispanic (61.9%), followed by Black or African American (15.2%), White (12.3%), Multi-Racial/Two or More (5.9%), and Asian (4.2%). 89.9% of students are economically disadvantaged, 21.9% are English language learners, 26.6% have an IEP, and 18.2% are chronically absent, with an average attendance rate of 93.7%.

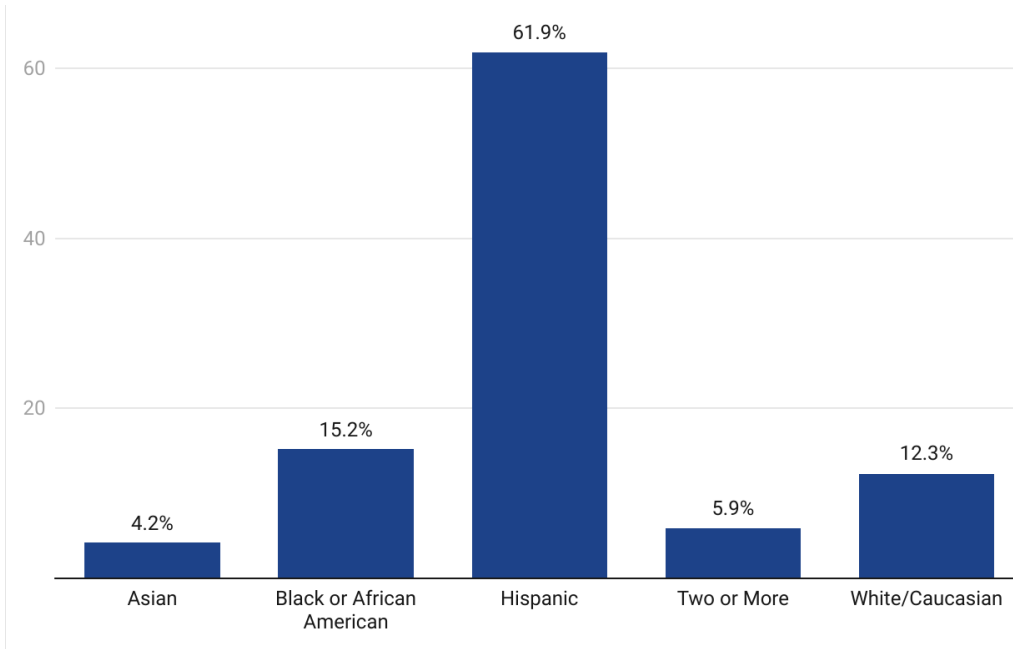


Figure 1: Racial breakdown by % of sample

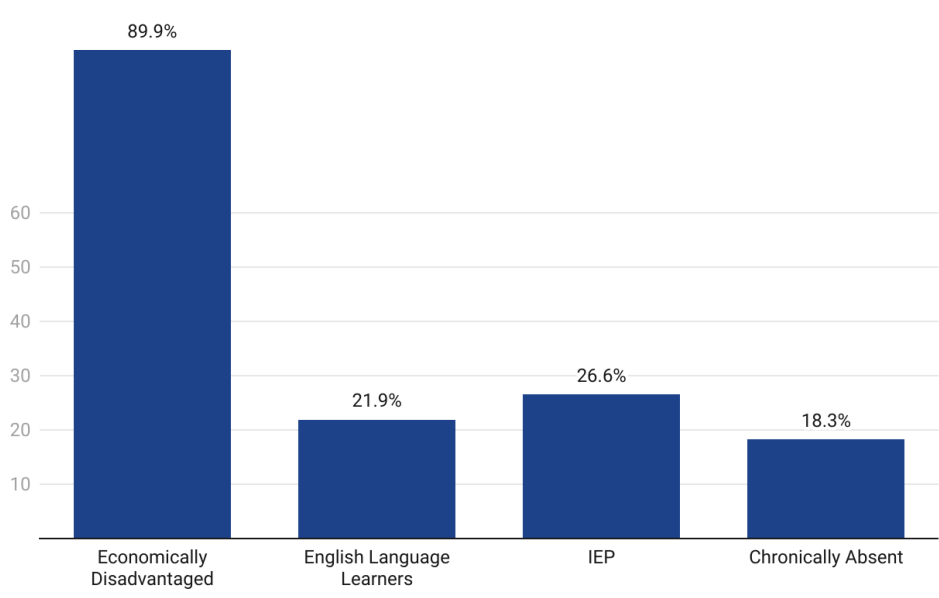




Figure 2: Breakdown of subgroups by % of sample

Results

Benchmark Categories: Sensitivity and Specificity

IRLA identifies students as Emergency, At-risk, or Proficient or Above based on their scores. The PSSA assessment uses the standard categories Below Basic, Basic, Proficient and Advanced to classify students. This comparison is not perfect as one assessment uses three proficiency levels and the other uses four. For this comparison, Proficient and Advanced PSSA scores are grouped together in order to understand their relationship to Proficient or Above IRLA scores. For students identified as Emergency on IRLA, **71.4%** scored Below Basic on the PSSA and for those who did not qualify as Emergency on the IRLA, **86.6%** did not score Below Basic on the PSSA. Therefore, specificity is higher than sensitivity for this group. For students who were classified as At-risk on the IRLA, **61.8%** scored Basic on the PSSA and out of those who were not identified as At-risk on the IRLA, **62.3%** did not score Basic on the PSSA. Therefore, specificity and sensitivity are quite similar for this group. Out of the students classified as Proficient or Above on the IRLA, **50.7%** scored advanced or proficient on the PSSA. Out of those who were not identified as Proficient or Above on the IRLA, **96.8%** did not score advanced or proficient on the PSSA. Sensitivity is quite a bit lower for this group, whereas the specificity of this group is quite high.

	PSSA Level: Below Basic	PSSA Level: Not Below Basic
IRLA Level: Emergency	71.4%	28.6%
IRLA Level: Not Emergency	13.4%	86.6%

Figures 3: Percent of IRLA Emergency level group that scored Below Basic PSSA level or not.



	PSSA Level: Basic	PSSA Level: Not Basic
IRLA Level: At-risk	61.8%	38.2%
IRLA Level: Not At-risk	37.7%	62.3%

Figures 4: Percent of IRLA At-risk level group that scored Basic PSSA level or not.

	PSSA Level: Proficient or Advanced	PSSA Level: Not Proficient or Advanced
IRLA Level: Proficient or Above	50.7%	49.3%
IRLA Level: Not Proficient or Above	3.2%	96.8%

Figures 5: Percent of IRLA Proficient or above level group that scored Proficient or Advanced PSSA level or not.

Overall Analysis

Across the entire sample of students, IRLA and PSSA scores were *moderately* correlated with a correlation coefficient of **.594**. However, there are a number of variables that affect this correlation. To get a better understanding of the IRLA’s predictive capability and how different types of students perform on the IRLA and PSSA, a closer look at a number of those variables is necessary.

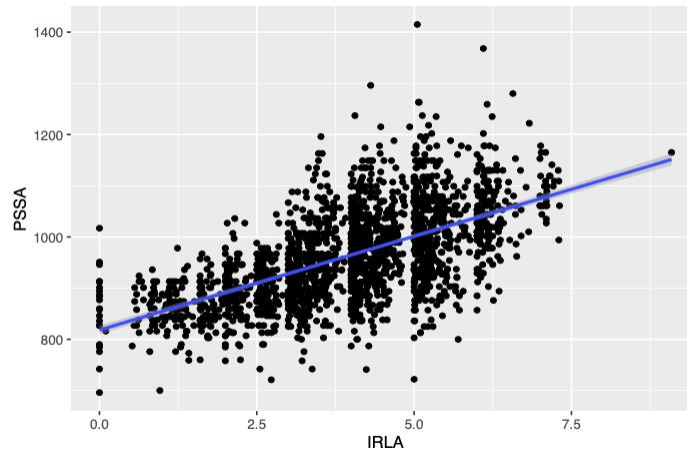


Figure 6: IRLA and PSSA scores overall

Multivariate Analysis

When we apply certain variables to the overall regression model, we can see just how much the predictability of PSSA scores are affected by additional variables. The variables included in the visuals below are economically disadvantaged, English language learner status, chronic absenteeism, and IEP status. Each of these variables' relationship to PSSA score is statistically significant with a p-value of less than .05. However, aside from economic disadvantage, each variable's effect size is smaller than IRLA's effect size (Figure 8). This means a student's IRLA score has a larger effect on their PSSA score than their IEP status, ELL status, or chronically absent status, but not a larger effect than a student's economically disadvantaged status. Additionally, this regression analysis has an adjusted R-squared of .38 meaning only about 38% of the variance in the output was accounted for by the explanatory variables.

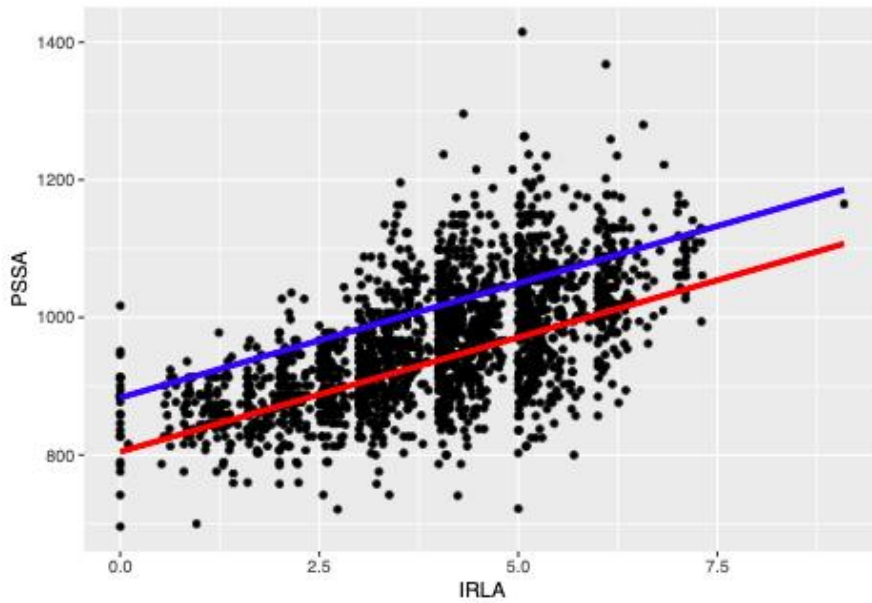


Figure 7: IRLA and PSSA scores overall, red multiple regression line

Explanatory Variable	Regression Coefficient
IRLA	33.25
Chronically Absent Status	-6.69
Economically Disadvantaged	-50.16
English Language Learners	-8.28
IEP Status	-13.53

Figure 8: Coefficients for the multiple regression line.

Correlations Among Demographic Subgroups



There are 1805 economically disadvantaged students in the third, fourth, and fifth grade classes of 2023, representing 89.9% of the sample. The correlation coefficient for IRLA and PSSA scores for economically disadvantaged students is **.591**, very similar to the coefficient for all students. Among English language students (440 students, 21.9% of the sample) and chronically absent students (367 students, 18.2% of the sample) the correlation is weaker but still represented a *moderate* relationship. English language students have a correlation coefficient of **.582** and chronically absent students have a correlation coefficient of **.569**. For students with an IEP (534 students, 26.6% of the sample), the relationship between PSSA scores and IRLA scores is *strong*, with a correlation coefficient of **.654**.

Demographic Subgroup	Correlation Coefficient
Chronically Absent Status	0.569
Economically Disadvantaged	0.591
English Language Learners	0.582
IEP Status	0.654

Figure 9: Demographic subgroups' correlation coefficient for PSSA and IRLA scores.

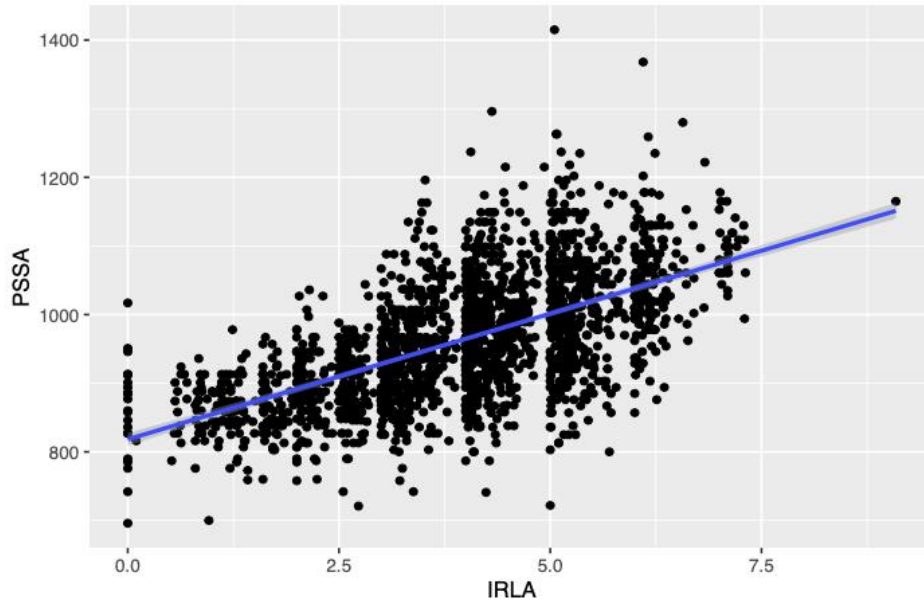


Figure 10: IRLA and PSSA scores for economically disadvantaged students

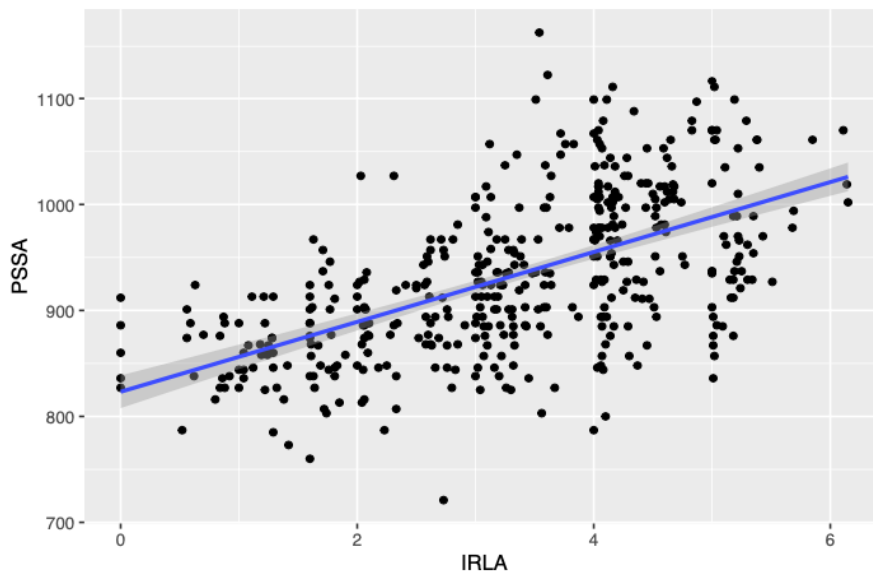


Figure 11: IRLA and PSSA scores for English language students

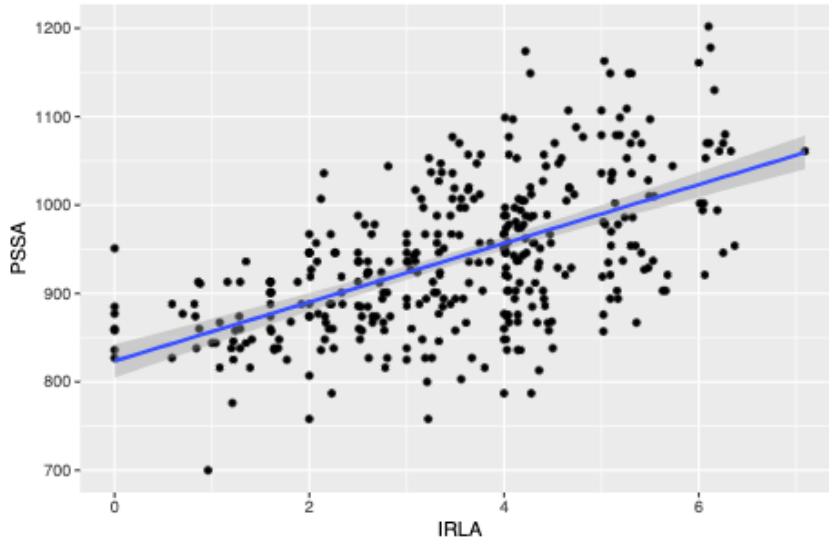


Figure 12: IRLA and PSSA scores for chronically absent students

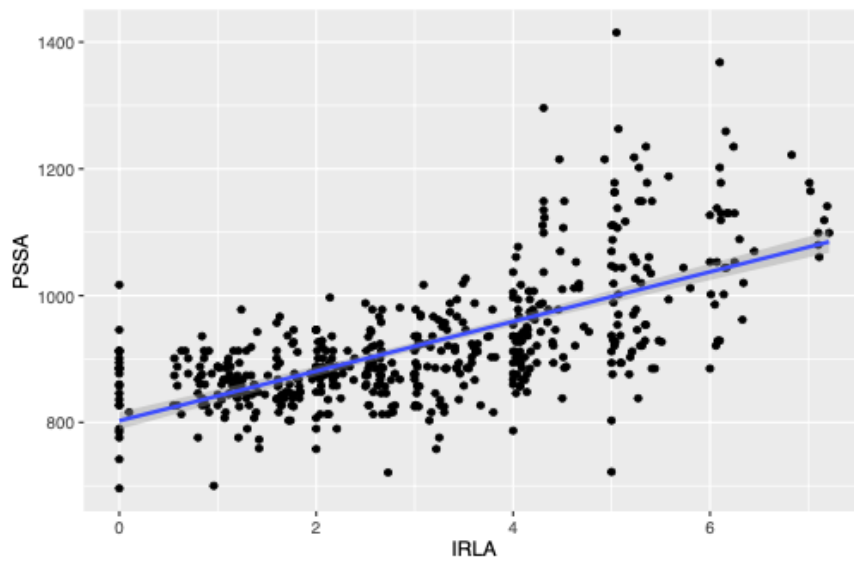


Figure 13: IRLA and PSSA scores for students with an IEP

Elementary School Buildings



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IRLA and PSSA scores at Wickersham, Wharton, Price, Hamilton, Fulton, Carter and MacRae, and Burrowes elementary schools all hold *strong* correlations, with correlation coefficients all fell between .60 and .70. Washington, SWE, Ross, Martin, Lafayette, and King elementary schools all had *moderate* correlations between PSSA and IRLA test scores, with correlation coefficients between .48 and .59 for each building.

Elementary School	Correlation Coefficient
Wharton	0.635
Wickersham	0.640
Price	0.618
Fulton	0.691
Hamilton	0.686
Carter and MacRae	0.620
Burrowes	0.648

Figure 14: Elementary Schools with *strong* correlations between PSSA and IRLA scores.



Elementary School	Correlation Coefficient
Washington	0.519
Smith Wade-El	0.559
Ross	0.599
Martin	0.522
Lafayette	0.592
King	0.486

Figure 14: Elementary Schools with *moderate* correlations between PSSA and IRLA scores.

Limitations

This study and its results are limited in some respects. These limitations should be taken into account when applying these results in practice.

- The third, fourth, and fifth grade classes of 2023 were affected by the COVID-19 pandemic. It is possible that these students have a different relationship to standardized testing due to a delay or halt in their instruction caused by the pandemic.
- This report does not account for causation. This analysis highlights the different predictive capabilities of IRLA across school buildings and demographic groups, but does not provide specific reasons as to why these differences may have occurred.
- This analysis used the most recent IRLA score prior to PSSA testing that was available for each student. Therefore, it is possible that IRLA scores in this sample were pulled from multiple different months or years. This could have an effect on the IRLA score's relationship to PSSA score.
- The multivariate analysis does not explain all the variance present in the PSSA scores. This is clear from the R-squared value of .38. It is likely that there are other variables at play that have not been taken into consideration.



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These may include but are not limited to student behavior, attendance, grades, and community or social factors

- The IRLA itself is somewhat subjective for a standardized test. There is a high level of teacher involvement. The teacher a student took the exam with could have been a confounding variable for this study. In the future, setting teacher (or grade and school combined) as an explanatory variable may provide insight into how subjective the IRLA is.

Applications and Recommendations

The purpose of this report is to provide data and observations on the relationship between IRLA and PSSA so that teachers and administrators can improve their understanding of student achievement and alter their expectations for students.

There are a few possible ways this data can be applied in the future.

- If students are identified as ‘emergency’ on the IRLA, it is likely they will score below basic on the PSSA. However, it is less likely that if they are classified as ‘at-risk’ they will score basic on the PSSA and even less likely still that if they are classified as ‘proficient or above’ they will score proficient or advanced on the PSSA. Teachers should take this into account. For example, if a teacher creates small groups of students based on assessment scores to provide individualized instruction, they should be aware that the IRLA benchmark categories do not have an extremely direct correlation to PSSA benchmark categories.



References

Formative assessment. (2023). American Reading Company.
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Akoglu H. (2018). User's guide to correlation coefficients. *Turkish journal of emergency medicine*, 18(3), 91–93. <https://doi.org/10.1016/j.tjem.2018.08.001>