Poverty and performance on standardized tests in Rhode Island and Massachusetts: Implications for policy reform

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Executive Summary

It is critical that schools and school districts be held accountable for academic progress of their students and how they utilize public resources. Academic progress must be interpreted in light of the extent to which school performance depends on social background because students enter school with a vast array of social experience and competency. This study examined the relationship between academic performance and level of poverty in all public-school districts in Rhode Island and Massachusetts on the common assessment system for the 2018-19 school year. Rhode Island had a lower share of students who were proficient in English (38% vs. 52%) and Math (29% vs. 49%) but a higher rate of poverty (47.4% vs. 31.2%). Poverty was strongly associated with performance in each state. Performance gaps between Rhode Island and Massachusetts were wide in low poverty school districts and narrowed in high poverty schools. This suggests that overall performance advantages in Massachusetts reflect a lower share of low poverty districts coupled with somewhat higher performance in these districts. Based on these findings, the study suggests policy changes as to how we measure school effectiveness and the need to develop programs and practices that mitigate the effects of poverty.

Introduction

Improving educational outcomes for Rhode Island's K-12 students is essential for the future of the state. While not an end in themselves, standardized tests can be used to measure school and statewide progress and guide accountability efforts. While extensive research has examined how student, family, school, and community factors influence test performance, one factor sticks out: student poverty ([Reardon (2011;)](#) ([Carnoy & Garcia, 2017;)](#) ([Ford, 2011](#), [Kornrich & Furstenberg (2013;)](#) [Duncan & Murnane, 2011](#)). Because poverty is so closely related to performance, the failure to account for poverty can lead to misleading assessments of school performance, distorting policy efforts.

However, the relationship between poverty and school performance in Rhode Island, and how this should guide policy, is not well understood. Rhode Island currently uses standardized test data to comply with national reporting, benchmark performance, and identify opportunities for improvement. Expecting a fixed level of academic achievement for a certain amount of educational investment per student neglects the substantial variation in student experience and competency due to unequal family resources. A more nuanced understanding of the relationship between poverty and education would help to isolate schools that are performing well, and poorly, relative to their students' poverty rate. Understanding the performance of Rhode Island relative to Massachusetts, a wealthy state and national leader in education reform, can help to elucidate the role of poverty in driving achievement gaps.

In this context, we used data on student poverty and 2018-2019 standardized test performance for elementary, middle, and high school students in Rhode Island and Massachusetts to examine the relationship between school district-level poverty and performance.

Methods
Data and study variables

We use district-level data for all public districts on achievement among students in grade 3 through grade 8 and grade 10 in the 2018-2019 school year. Massachusetts data is from the MCAS assessment. Rhode Island data for grades 3-8 is from the RICAS assessment and data from grade 10 is from the PSAT, taken by all Rhode Island students. Student performance was measured by the percentage of students who tested at or above proficiency. Students at this level demonstrate a solid understanding of challenging subject matter and solve a wide variety of problems. English and math performance were evaluated separately.
Student poverty rate was assessed as the proportion of test-takers in each school who received free or reduced-priced lunch. Students are eligible for free lunch if their household income is less than 130 per cent of the federal poverty line, and for reduced-priced lunch if their household income is between 130 and 185 per cent of the federal poverty threshold. These data were downloaded from state Department of Education websites.

We excluded observations from charter schools. Our final sample included 36 districts with a total of 133,091 tested students in Rhode

Island and 209 districts in Massachusetts with a total of 818,757 students assessed.

Statistical analysis

Analysis was performed at the district-subject level. We estimated linear regression models to examine the unadjusted association between poverty and performance separately for Rhode Island and Massachusetts. Sensitivity analysis adjusted for district-level covariates. We used Huber-White standard errors to account for heteroskedasticity.

Results

Table 1 shows a comparison of performance between Rhode Island and Massachusetts. Massachusetts outperforms Rhode Island in ELA (52 vs 38) and Math (49 vs 29) proficiency rates. The level of poverty is higher in Rhode Island 47.4% vs 31.2%.
Figure 1 shows the distribution of poverty in Rhode Island and Massachusetts districts. Rhode Island has a higher mean poverty rate, a larger share of high poverty districts, and a lower share of low poverty districts. For instance, 37% of Rhode Island districts have poverty rates under 20%, compared to 48% in Massachusetts.

In Figure 2 the horizontal axis shows the percentage of students eligible for free or reduced-price lunch. The vertical axis shows the percentage of students who met or exceeded English proficiency on the RICAS/MCAS. The fitted line for Rhode Island shows that a one percentage point increase in poverty is associated with a 0.66 percentage point reduction in English proficiency. The fitted line for Massachusetts shows that a one percentage point increase in poverty is associated with a 0.76 percentage point reduction in English proficiency (see Appendix for details). Although Massachusetts out-performed Rhode Island students on average, the gap is fairly narrow and decreases as the poverty rate increases.

In Figure 3 the horizontal axis shows the percentage of students eligible for free or reduced-price lunch. The vertical axis shows the percentage of students who met or exceeded Math proficiency on the RICAS/MCAS. The fitted line for Rhode Island shows that a one percentage point increase in poverty is associated with a 0.59 percentage point reduction in math proficiency. The fitted line for Massachusetts shows that a one percentage point increase in poverty is associated with a 0.82 percentage point reduction in math proficiency (see Appendix for details).
Although Massachusetts out-performed Rhode Island students on average, the gap is fairly narrow and decreases as the poverty rate increases. The gap in math performance is greater than the gap in ELA and decreases as the poverty rate increases.

Discussion

In this study of the relationship between poverty and student performance in Rhode Island, we report 3 main findings. First, Rhode Island public school districts have higher poverty than Massachusetts overall, and a lower share of low poverty districts. Second, poverty is strongly associated with English and Math performance in both Rhode Island and Massachusetts. Yet the association between poverty and performance is stronger in Massachusetts than in Rhode Island. Third, higher student proficiency in Massachusetts can be explained in part by the differences in student poverty rates. Performance in high poverty districts was similar in Rhode Island and Massachusetts, but performance in low poverty districts was higher in Massachusetts. Overall performance advantages in Massachusetts reflect a lower share of low poverty districts coupled with somewhat higher performance in these districts.

Our study has a number of relevant limitations. We did not have access to student-level data and instead assessed districts-level data. We also did not have access to data on other relevant controls, such as parental education. While the relationship between poverty and achievement may be somewhat different at the student level or while controlling for a more comprehensive set of variables, our results are consistent with a large literature showing an association between poverty and student performance (Reardon, Weathers, Fable, Heewon, & Kalogris 2019;) (Rearson, Bischoff, Owens & Townsend 2018), Fable & Reardon 2018;). We also examined only one year of data. However, the strong associations we observed are unlikely to be substantially different over longer periods.

These limitations notwithstanding results have important policy implications for Rhode Island:

- Direct comparisons in achievement across states must account for the distribution of poverty. Massachusetts has a large share of low poverty districts that perform extremely well. These districts drive the overall performance differences across states. Comparisons of the effects of school policy, such as mandatory testing, district improvement plans, curriculum presentations, may be confounded by differences in poverty
- Programs that mitigate the effects of poverty must be addressed to reduce performance gaps
- The study is timely in light of the COVID pandemic. Middle class families have the resources to maintain academic performance while the children of poorer families face extreme challenges with distance learning and will most likely fall further behind their more advantaged peers.

Poverty impacts student performance in many ways: students in poverty often have health-related issues and miss school more frequently (Aber et al. 1997); poverty leads to increased mobility and disrupts consistent school attendance (Ziol-Guest 2014); poverty makes it necessary for parents to work additional hours, pulling them from their children and quality interaction or enrichment time (Kalil, 2017); poverty is related to stress and food security among parents and children, with implications for attention and learning (Cool and Frank 2008); (Whitaker et al. 2006); and poverty is related to child brain development (Decker et al. 2020); (Hair et al. 2015).

Specific policy recommendations from the study include:

- Develop a standard performance metric based on poverty.
- Conduct case studies on schools that perform above or below performance expected based on poverty.
- Revise school accountability measures based on expected performance.
- Fund targeted activities in high poverty schools such as a longer school day and summer extended learning.

Table 1. Characteristics of study sample, 2018/2019

Variable	Rhode Island		Massachusetts	
	Mean	Std Dev	Mean	Std Dev
% Proficient - ELA	52.48	16.68	63.64	14.32
% Proficient - Math	41.18	15.74	59.20	15.54
% Free/Reduced-Price Lunch Eligibility	31.33	22.77	24.46	16.18
% IEP	15.09	3.50	17.70	3.14
Enrollment	3696.97	4208.50	3917.50	4763.32
Per Pupil Spending	18788.00	4944.31	15480.59	2294.31
N Districts	36		209	
N test takers	133,091		818,757	

Figure 1. Distribution of district-level poverty in Rhode Island and Massachusetts
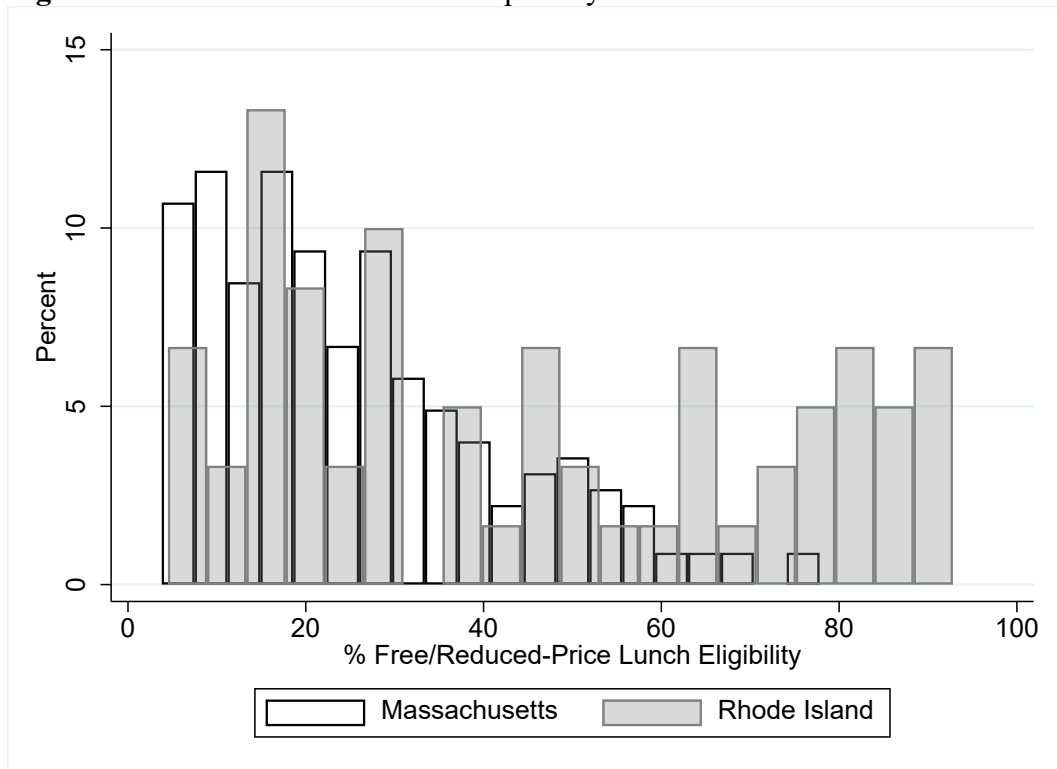
Figure 2. English Proficiency by Poverty in Rhode Island and Massachusetts
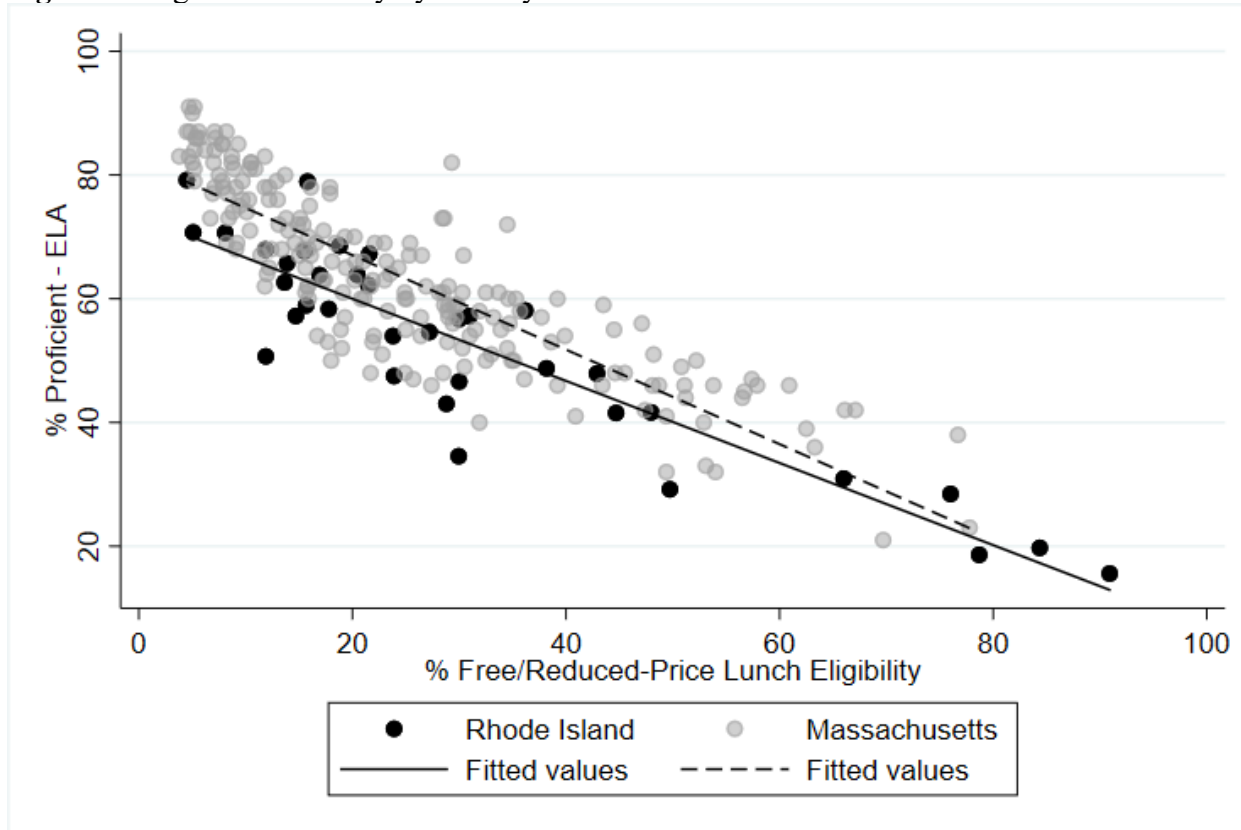
Figure 3. Math Proficiency by Poverty in Rhode Island and Massachusetts

Appendix.
Table 1. Descriptive Statistics

Excluding Charter Schools

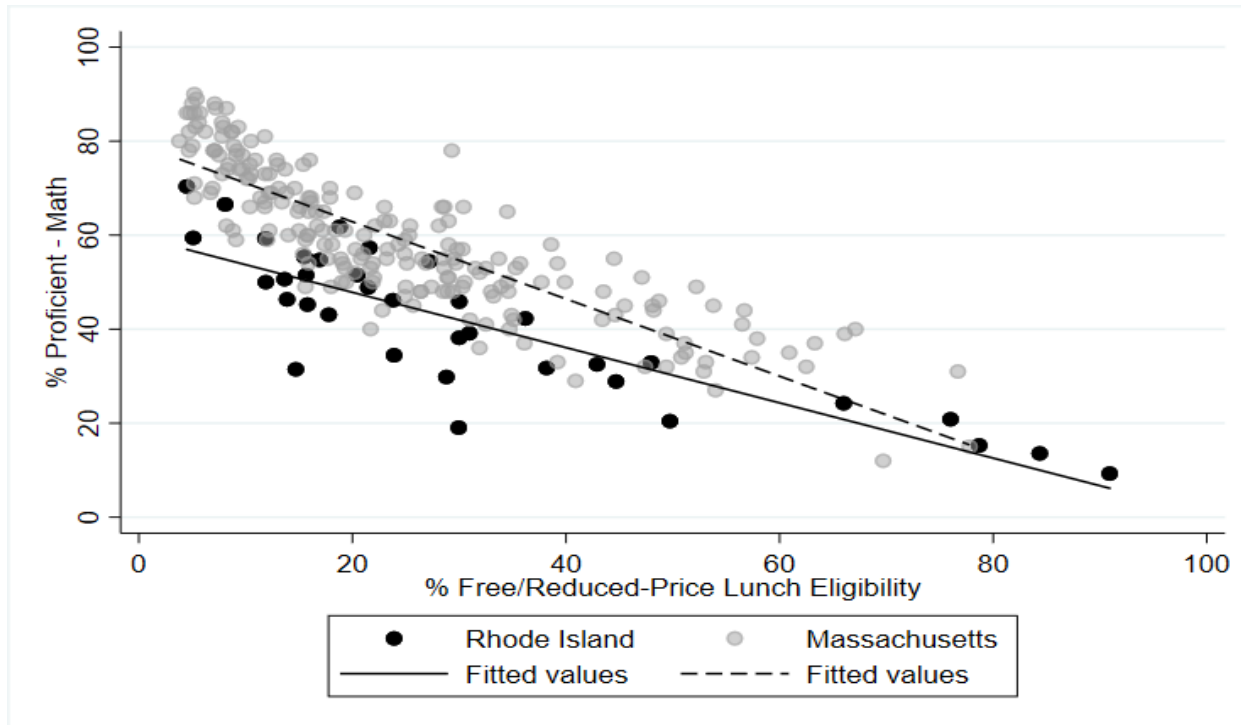|	Rhode Island				Massachusetts			
Variable	Mean	Std Dev	Minimum	Maximum	Mean	Std Dev	Minimum	Maximum
% Proficient - ELA	52.48	16.68	15.59	79.19	63.64	14.32	21.00	91.00
% Proficient - Math	41.18	15.74	9.28	70.36	59.20	15.54	12.00	90.00
% Free/Reduced-Price Lunch Eligibility	31.33	22.77	4.49	90.91	24.46	16.18	3.80	77.80
% IEP	15.09	3.50	8.70	26.70	17.70	3.14	9.00	26.40
Enrollment	3696.97	4208.50	133.00	23955.00	3917.50	4763.32	436.00	51433.00
Per Pupil Spending	18788.00	4944.31	14527.00	41339.00	15480.59	2294.31	11599.00	28638.00
N Districts	36				209			
N Students	133091				818757			

Including Charter Schools

	Rhode Island				Massachusetts			
Variable	Mean	Std Dev	Minimum	Maximum	Mean	Std Dev	Minimum	Maximum
% Proficient - ELA	50.60	17.38	15.59	79.19	63.02	14.64	14.00	91.00
% Proficient - Math	39.85	17.16	8.46	74.76	58.27	16.19	9.00	90.00
% Free/Reduced-Price Lunch Eligibility	37.66	26.37	4.49	92.80	25.31	16.30	3.80	77.80
% IEP	14.63	3.53	8.00	26.70	17.47	3.40	5.50	26.40
Enrollment	2971.66	3911.44	133.00	23955.00	3721.83	4646.72	182.00	51433.00
Per Pupil Spending	17929.74	4640.61	12379.00	41339.00	15480.59	2294.31	11599.00	28638.00
N Districts	47				225			
N Students	139668				837412			

Note that analyses are limited to K-12 school districts (excluding some MA districts that do not span K-12).

Table 2. Bivariate correlations between achievement and poverty rate by state

Excluding charter schools

	RI	MA
% Proficient - ELA	90.5	86.2
% Proficient - Math	85.0	85.6

Including charter schools

	RI	MA
% Proficient - ELA	78.5	84.0
% Proficient - Math	70.5	81.8

Table 3. Regression Analyses
Results suggest a weaker relationship between poverty and achievement in RI than in MA.

Panel A. Excluding Charter Schools
Predicted ELA Proficiency Rate

VARIABLES	(1) RI	(2) RI	(3) MA	(4) MA
% Free/Reduced-Price Lunch Eligibility	-0.663**	-0.712**	-0.763**	-0.818**
	(0.037)	(0.084)	(0.032)	(0.034)
Enrollment (log)		3.117		4.054**
		(2.158)		(0.626)
Per Pupil Spending		0.001		0.001**
		(0.000)		(0.000)
% IEP Students		-0.018		0.115
		(0.394)		(0.179)
Constant	73.263**	38.736	82.306**	37.209**
	(1.958)	(23.030)	(0.906)	(6.280)
Observations	36	36	209	209
R-squared	0.820	0.841	0.744	0.802

Robust standard errors in parentheses. ** $p<0.01$, * $p<0.05$, + $p<0.1$
OLS regression models predicting district percent proficient, excluding charter schools and districts that are not K-12. Control variables in even-numbers regressions include enrollment (logged to reduce skewness), spending per pupil, and proportion of special education students.

Predicted Math Proficiency Rate

VARIABLES	(1) RI	(2) RI	(3) MA	(4) MA
% Free/Reduced-Price Lunch Eligibility	-0.588**	-0.690**	-0.821**	-0.898**
	(0.045)	(0.115)	(0.038)	(0.037)
Enrollment (log)		2.569		5.653**
		(2.522)		(0.689)
Per Pupil Spending		0.000		0.001**
		(0.000)		(0.000)
% IEP Students		0.404		0.133
		(0.652)		(0.204)
Constant	59.592**	33.273	79.286**	23.168**
	(2.395)	(28.433)	(1.052)	(6.865)
Observations	36	36	209	209
R-squared	0.723	0.737	0.732	0.812

Robust standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1
OLS regression models predicting district percent proficient, excluding charter schools and districts that are not K-12. Control variables in even-numbers regressions include enrollment (logged to reduce skewness), spending per pupil, and proportion of special education students.

Panel B. Including Charter Schools
Predicted ELA Proficiency Rate

VARIABLES	(1) RI	(2) RI	(3) MA	(4) MA
% Free/Reduced-Price Lunch Eligibility	-0.517**	-0.454**	-0.751**	-0.818**
	(0.072)	(0.085)	(0.035)	(0.034)
Enrollment (log)		0.104		4.054**
		(1.681)		(0.626)
Per Pupil Spending		0.000		0.001**
		(0.000)		(0.000)
% IEP Students		-1.035		0.115
		(0.641)		(0.179)
Constant	70.080**	74.010**	82.139**	37.209**
	(2.418)	(16.735)	(0.932)	(6.280)
Observations	47	47	224	209
R-squared	0.615	0.659	0.706	0.802

Robust standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1
OLS regression models predicting district percent proficient, excluding charter schools and districts that are not K-12. Control variables in even-numbers regressions include enrollment (logged to reduce skewness), spending per pupil, and proportion of special education students.

Predicted Math Proficiency Rate

VARIABLES	(1) RI	(2) RI	(3) MA	(4) MA
% Free/Reduced-Price Lunch Eligibility	-0.459**	-0.423**	-0.804**	-0.898**
	(0.078)	(0.098)	(0.043)	(0.037)
Enrollment (log)		0.215		5.653**
		(1.672)		(0.689)
Per Pupil Spending		0.000		0.001**
		(0.000)		(0.000)
% IEP Students		-0.863		0.133
		(0.762)		(0.204)
Constant	57.123**	66.499**	78.781**	23.168**
	(2.901)	(18.329)	(1.109)	(6.865)
Observations	47	47	224	209
R-squared	0.497	0.524	0.669	0.812

Robust standard errors in parentheses. ** $p<0.01$, * $p<0.05$, + $p<0.1$

OLS regression models predicting district percent proficient, excluding charter schools and districts that are not K-12. Control variables in even-numbers regressions include enrollment (logged to reduce skewness), spending per pupil, and proportion of special education students.

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