

SCHOOLS OF ENCANTO: PUERTO RICO'S SCHOOLS CLOSURE POLICY  
STUDY CASE

by  
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## **1. Abstract**

Current research on school closures in the United States uses observational methods aiming to measure students' academic performance; however, studies are limited to big cities and either elementary or high school students. Large-scale school closures in Puerto Rico during year 2018-19 allowed for a direct comparison of academic performance in Spanish, Mathematics, English, and Science on schools that received displaced students, in both big and small cities and across all educational levels. Using t-tests to compare difference in means of standardized testing scores on schools receiving displaced students and schools not receiving displaced students, this study's findings revealed that, on average, schools receiving displaced students performed worse than their counterparts on all educational levels and, except for Mathematics, across all disciplines. Since local authorities cited only budget restructuring as justification for school closures unlike other cases studied, findings further advance the literature on school closure policies to attempt to diminish negative, academic effects on displaced students.

## Table of Contents

<b>2.</b>	<b><i>Introduction</i></b> .....	<b>1</b>
<b>3.</b>	<b><i>Literature Review</i></b> .....	<b>2</b>
<b>4.</b>	<b><i>Data and methods</i></b> .....	<b>7</b>
<b>4.2</b>	<b>Data</b> .....	<b>7</b>
<b>4.3</b>	<b>Methods</b> .....	<b>8</b>
<b>5.</b>	<b><i>Results</i></b> .....	<b>8</b>
<b>5.2</b>	<b>Primary Schools</b> .....	<b>8</b>
5.2.1	Spanish .....	8
5.2.2	Mathematics.....	9
5.2.3	English .....	10
5.2.4	Science.....	11
<b>5.3</b>	<b>Secondary Schools</b> .....	<b>12</b>
5.3.1	Spanish .....	12
5.3.2	Mathematics.....	13
5.3.3	English .....	14
5.3.4	Science.....	15
<b>6.</b>	<b><i>Conclusion</i></b> .....	<b>16</b>
<b>7.</b>	<b><i>References</i></b> .....	<b>19</b>
<b>8.</b>	<b><i>Curriculum Vita</i></b> .....	<b>20</b>

## 2. Introduction

During 2017-18 school year, former Puerto Rico's governor Ricardo Rosselló Nevarez announced its administration would close over a hundred schools in the upcoming year, citing declining student population and budget savings amid the island's debt restructuring process. Despite concerns of parents, students, and teachers, the administration did not lay out a path to implement the policy of school closures to minimize negative, academic effects on students.

While school closures remain a controversial topic across the nation, different studies have shown mixed results on students' academic performance after its implementation. However, school districts, Chicago for example, proactively identified underperforming schools and attempted to transfer its students to institutions performing relatively better academically. In this case, displaced students transferred from underperforming to higher achieving schools performed better in both reading and math (De la Torre and Gwynne 2009, p. 6-7)<sup>1</sup>. New York City Department of Education (NYCDOE), the largest school district in the United States, opted to phase out school closures. After identifying underperforming high schools, the NYCDOE provided parents and students the option to either remain at the closing school until graduation or until the transition period ended or transferring to another school whenever the parent or student decided. Results after New York City's policy implementation were mixed: the phase out process impacted neither positive, nor negative those students (both students who decided to stay or leave) enrolled

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<sup>1</sup> De la Torre, Marisa; Gwynne, Julia, When Schools Close: Effects on Displaced Students in Chicago Public Schools. Research Report. ERIC (2009), pages: 1-48

in schools identified as underperforming. On the other hand, the announcement of school closures led many 9th graders to decide enrolling in higher performing schools, improving their likelihood of graduating (Berner, Steiner, and Baltimore Education Research Consortium, (BERC) 2019, p. 3)<sup>2</sup>.

Although school closure policies cited above provided mixed results, Puerto Rico's case differed in its identification of underperforming schools and the timing of the policy implementation. This paper evaluated available META-PR scores—Puerto Rico's standardized tests—for school year 2018-19 on Spanish, Math, English, and Science for primary and secondary level school students. Unlike Chicago and New York City's examples, this paper highlights that, on average, schools receiving displaced students performed worse than schools not receiving displaced students following the school closures policy implementation.

### **3. Literature Review**

The literature available to study the consequences of school closing as consequence of policy, although numerous, provides mixed results. While some scholarly studies focus on the effect of attendance and behavior, other work focuses on academic performance. The work of Steinberg and MacDonald, the most recent study in the literature reviewed, studied the impact of public school closing in Philadelphia on student achievement and behavioral outcomes. In their work, student-level achievement on standardized state

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<sup>2</sup> Berner, Ashley, and David Steiner. "Quality and Schools: Managing School Closings to Optimize Student Outcomes." *Baltimore Education Research Consortium* (2019), pages: 1-4

exams were used to evaluate academic achievement. The main findings pointed that school closures had no effect on the average achievements of displaced student, in some cases academic achievement increased among students attending higher-performing schools (relative to the closing schools they were leaving), and that achievement of students from schools attending displaced students was negatively affected (Steinberg and MacDonald 2019, 25-60)<sup>3</sup>.

Besides Philadelphia, other big urban centers, such as New York and Chicago, are used in the literature. The case of New York provides a unique context since the city decided to phase the process of closing underperforming high schools. In this case, students were given the choice to either transfer to another school or remain at the closing school until graduation or until the school closed. Kemple's paper found school closing announcement led 9<sup>th</sup> grade students to enroll in higher performing schools, improving the likelihood of graduating. However, 10-12<sup>th</sup> graders (both students who decided to stay at the closing school during the phase out and students who decided to transfer earlier) experienced neither a positive, nor negative impact during the phase out process (Berner, Steiner, and Baltimore Education Research Consortium, (BERC) 2019, p. 3)<sup>4</sup>.

Unlike New York, Chicago focused on closing elementary schools that demonstrated continued low levels of academic performance. For this study, De la Torre and Gwynne

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<sup>3</sup> Steinberg, Matthew P; MacDonald, John M, "The effects of closing urban schools on students' academic and behavioral outcomes: Evidence from Philadelphia", *Economics of Education Review*, Volume 69 (2019): pages 25-60

<sup>4</sup> Kemple, James J, "High School Closures in New York City: Impacts on Students' Academic Outcomes, Attendance, and Mobility. Report. Research Alliance for New York City Schools": pages 1-69

focused on schools that were closed between 2001 and 2006; also, they compared groups of displaced children (aged eight and above) with students of the same group who were not displaced. De la Torre shared six findings: most students reenrolled in schools that were academically weak. The largest negative impact of school closing happened in the year before the schools were closed. On average, the effects on students' learning were neither positive nor negative. School closing policy affected summer school enrollment. Rates to graduate were no different when displaced students reached high school. The learning outcomes of displaced students depended on the characteristics of receiving schools (De la Torre and Gwynne 2009, p. 6-7)<sup>5</sup>.

Carlson and Lavertu discussed closures of low-performing, charter schools. Unlike the Education departments of Philadelphia, New York, and Chicago, the state of Ohio experienced the proliferation of charter schools (many of them with varying educational qualities). Findings point out that closing low-performing, charter schools eventually yields gains around 0.2 – 0.3 standard deviations in reading and math. In this case, Ohio's law required charter schools to be closed if its students failed to meet minimum academic performance standards (Carlson and Lavertu, p. 1)<sup>6</sup>.

Kirshner, Gaertner, and Pozzoboni examined the effects of school closing on Latino and African American students. They mentioned that 90% of the cohort were eligible for free or reduced lunch (indicating a low socio-economic background). Two common

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<sup>5</sup> De la Torre, Marisa; Gwynne, Julia, "When Schools Close: Effects on Displaced Students in Chicago Public Schools", 6-7.

<sup>6</sup> Carlson, Deven; Lavertu, Stéphane, "Charter school closure and student achievement: Evidence from Ohio", *Journal of Urban Economics*, Volume 95 (2016), pages: 31-48

explanations that districts provide for closures are low performance and under enrollment. Analysis was limited by the district's policy of administering standardized tests only through 10th grade (Kirshner, Gaertner, and Pozzoboni, p. 407)<sup>7</sup>.

Unlike other reasons cited in academia for closing schools, Imberman, Kugler, Sacerdote cite the aftermath of Hurricanes Katrina and Rita in 2005 as reason for the uproot and re-localization of students into other school districts. Students who were relocated were located in some of the worst-performing school districts among the nation, bringing concern to authorities in the receiving locations. On average, inflow of evacuees had little impact on incumbent students' achievements in Louisiana and Houston (although evidence of worsening attendance and behavior was found) (Imberman, Kugler, and Sacerdote, p. 2049 -2051)<sup>8</sup>.

Brummet investigated the effect of school closing policies on student achievement. The results indicated that, on average, school closings in Michigan did no harm to achievement of displaced students. Students from low-performing schools experienced achievement gains but not without imposing negative spillover effects on students in receiving schools. Uses statewide information on schools' closure, instead on focusing on a single city or district. The results show no significant change in reading scores in the two to three years before and after displacement. For mathematics, students are falling

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<sup>7</sup> Kirshner, Ben; Gaertner, Matthew and Pozzoboni, Kristen, "Tracing transitions: The effect of high school closure on displaced students", *Educational evaluation and policy analysis* Volume 32, Issue 3 (2010), pages: 407-429

<sup>8</sup> Imberman, Scott A; Kugler, Adriana D and Sacerdote, Bruce I, "Katrina's children: Evidence on the structure of peer effects from hurricane evacuees", *American Economic Review* Volume 102, Issue 5 (2012), pages: 2048-2082

behind their counterparts prior to the displacement. After closure students continue to perform at a low level in the first year but improve significantly within two or three years after the displacement (Brummet, p.108)<sup>9</sup>.

Larsen examines the effect of high school closures on student achievement and educational attainment. The study focuses on high school closure. Larsen found that school closings cause a negative shock and have long-run consequences on lowering the probability of high school graduation and college attendance. Milwaukee Public System enrollment had decreased by 10,000 students. The MPS took into account enrollment, academic performance to determine which school were to be closed. Two main strategies: achievement outcomes (GPA, attendance, and test scores (measured yearly), and “attainment” outcomes (high school graduation and college attendance) (Larsen, p.1)<sup>10</sup>.

Engberg, et al. mentioned that school district targeted low-performing schools in its closure plan to move students to higher-performing schools. Estimated the impact of school closures on students test scores and attendance rates by comparing the growth of measures among affected students. The study showed that students displaced by school closures can experience adverse effects on test scores and attendance, but these effects can be minimized when students move to schools that are higher performing. Study found

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<sup>9</sup> Brummet, Quentin, “The effect of school closings on student achievement”, *Journal of Public Economics* Volume 119 (2014), pages: 108-124

<sup>10</sup> Larsen, Matthew F, “Does closing schools close doors? The effect of high school closings on achievement and attainment”, *Economics of Education Review* Volume 76 (2020)

no adverse effects in the schools that are receiving transferring students (Engberg et al., p. 1)<sup>11</sup>.

#### **4. Data and methods**

##### **4.2 Data**

This study was made possible due to the availability of Puerto Rico's Department of Education dashboard containing information of each school within the public system. The data set obtained contained information of over a thousand schools for years 2016-17, 2017-18 (before school closures policy was implemented), and 2018-19 (year school closures policy began). Among the data obtained, it included information of each school's education region, the municipality the school is located, the school's level, grades instructed, school's enrollment, and school's META-PR (Puerto Rico's standardized test) for Spanish, Mathematics, English, and Science. Unlike other school district's metrics, META-PR measures the percentage of students in a school who scored at least 80 percent in a specific standard test. For example, if a school scored 60 in META-PR (Spanish), it means that 60 percent of that school's students scored at least 80 percent in the Spanish standard test. In addition, Puerto Rico's Department of Education released documents listing schools identified to be closed at the end of year 2017-18; this document allowed for the creation of a new column—receiving school (escuela receptora, in Spanish) a dichotomous variable indicating whether a school received displaced students. Once all the information for every school was collected, the data set was filtered to highlight only school year 2018-19.

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<sup>11</sup> John Enberg et al., "Closing schools in a shrinking district: Do student outcomes depend on which schools are closed?" *Journal of Urban Economics* Volume 2, Issue 2 (2012), pages: 189-203

### **4.3 Methods**

Due to several factors including: change Puerto Rico Department of Education's data collecting and dissemination, earthquakes in January 2020, and the effects of COVID-19 on schools during school years 2019-20 and 2020-21, the collection data to conduct a longer, longitudinal study was not possible. However, the dichotomous variable "receiving school" acted as a control variable, thus allowing for the direct comparison school closures policy had on academic performance. To conduct this analysis, this study segmentate the schools by educational level (primary and secondary) and proceeded to use t-test to compare score means for each discipline.

## **5. Results**

### **5.2 Primary Schools**

#### **5.2.1 Spanish**

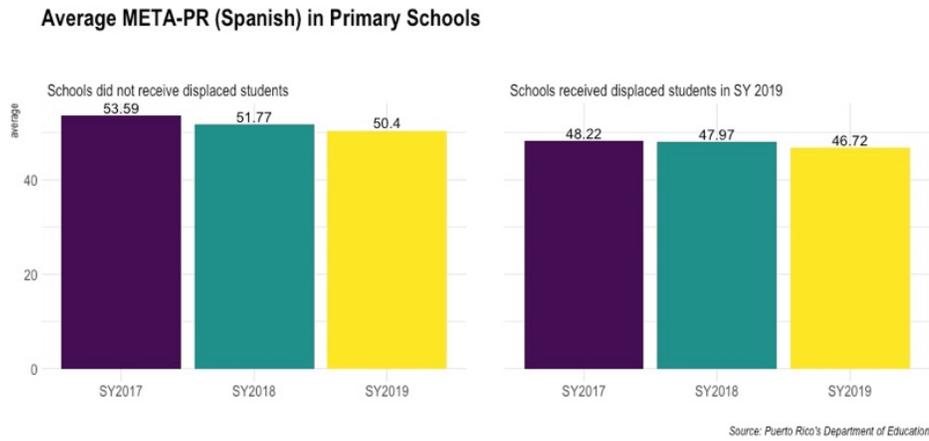
The study first highlights the results t-test comparison of average scores for META-PR (Spanish) in Table 1 and Graph 1. As can be observed from the graph, schools that did not receive displaced students outperformed schools receiving displaced students (50.4 and 46.72, respectively). Table 1 confirms the results using t-test summary results: The alternative hypothesis that the difference of average scores between the control variable (schools that did not receive displaced students) and the treatment group is greater than zero can be rejected (p-value = 0.008)

Table 1: Comparison of t-test results across all subjects among primary schools

Level	Subject	Mean schools not receiving displaced students	Mean schools receiving displaced students	Difference in means	t score	Ha > 0 p-value
Primary	Spanish	50.4	46.72	3.68	2.439	0.0078*
Primary	Mathematics	43.38	41.67	1.71	0.799	0.213
Primary	English	42.95	39.66	3.29	1.85	0.0324**
Primary	Science	55.43	52.87	2.56	1.312	0.0951***

\*  $\alpha < 0.01$ , \*\*  $\alpha < 0.05$ , \*\*\*  $\alpha < 0.1$

Graph:1 Comparison of average META-PR (Spanish Scores) for primary schools

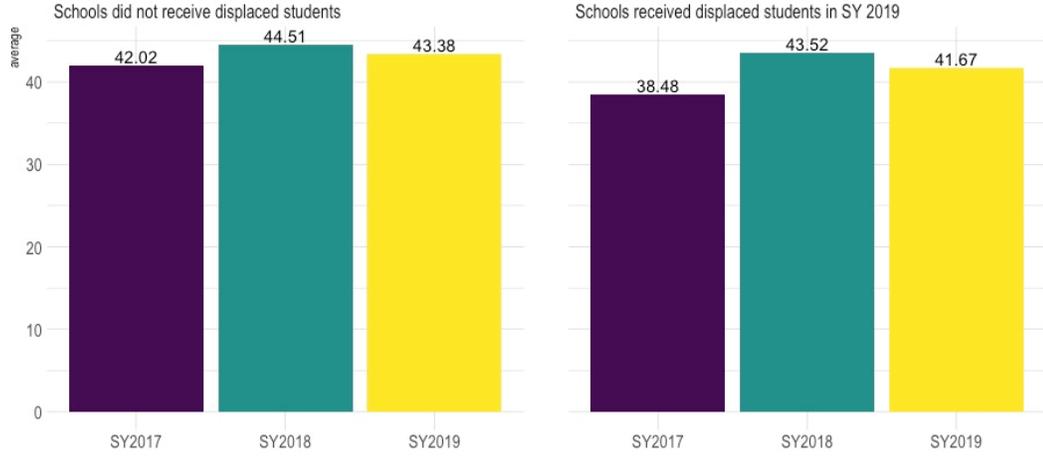


## 5.2.2 Mathematics

For the subject of mathematics, Graph 2 highlights schools that did not receive displaced students outperformed schools that received displaced students (43.38 and 41.67, respectively). However, a careful review of t-test summary results in Table 1 points out that although the difference in average META-PR (Mathematics) scores between the control and treatment variable is 1.71, the alternative hypothesis where the difference of means is greater than zero cannot be rejected (p-value = 0.21).

Graph:2 Comparison of average META-PR (Mathematic scores) for primary schools

### Average META-PR (Math) in Primary Schools



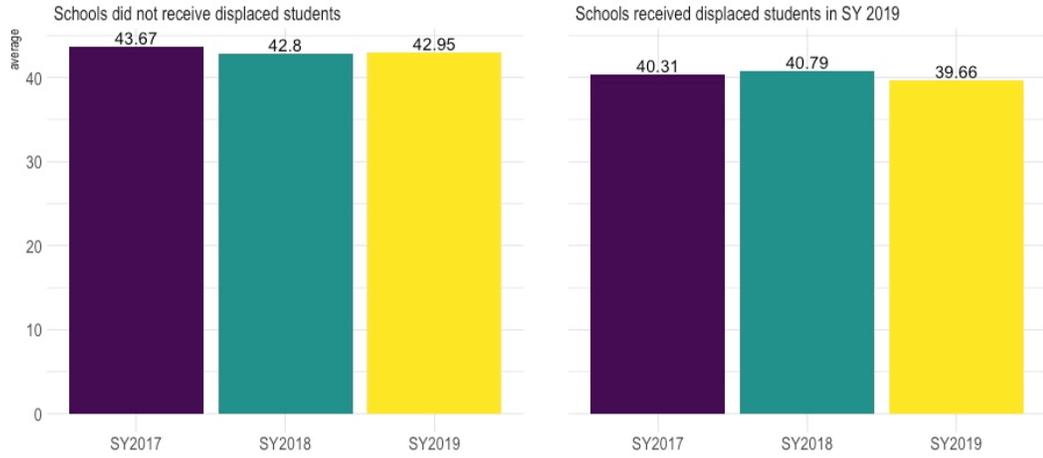
Source: Puerto Rico's Department of Education

### 5.2.3 English

For the subject of English, Graph 3 highlights schools that did not receive displaced students outperformed schools that received displaced students (42.95 and 39.66, respectively). Further, a review of t-test summary results in Table 1 confirms this finding since the alternative hypothesis where the difference between the control and treatment variables is greater than zero can be rejected ( $p$ -value = 0.03)

Graph:3 Comparison of average META-PR (English Scores) for primary schools

### Average META-PR (English) in Primary Schools



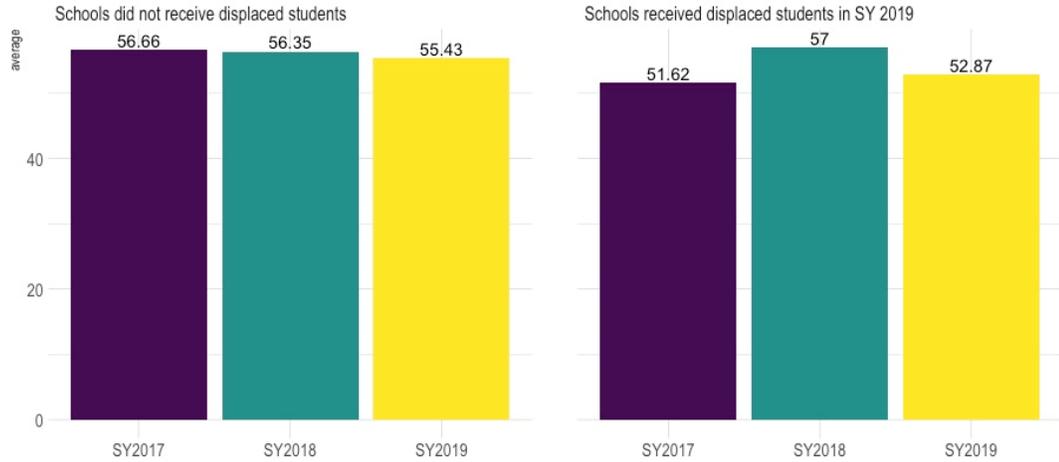
Source: Puerto Rico's Department of Education

#### 5.2.4 Science

For the subject of English, Graph 4 highlights schools that did not receive displaced students outperformed schools that received displaced students (55.43 and 52.87, respectively). Further, a review of t-test summary results in Table 1 confirms this finding since the alternative hypothesis where the difference between the control and treatment variables is greater than zero can be rejected ( $p$ -value = 0.09).

Graph:4 Comparison of average META-PR (English Scores) for primary schools

### Average META-PR (Science) in Primary Schools



Source: Puerto Rico's Department of Education

## 5.3 Secondary Schools

### 5.3.1 Spanish

For the subject of Spanish, Graph 5 highlights schools that did not receive displaced students outperformed schools that received displaced students (43.01 and 38.65, respectively). However, a careful review of t-test summary results in Table 2 points out that although the difference in average META-PR (Mathematics) scores between the control and treatment variable is 4.36, the alternative hypothesis where the difference of means is greater than zero cannot be rejected (p-value = 0.108).

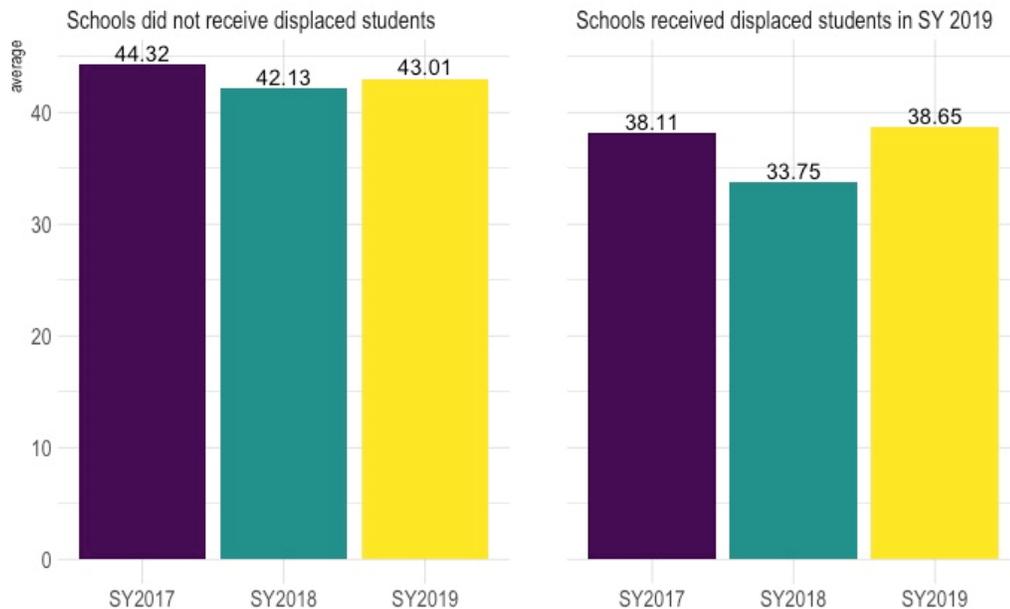
Table 2: Comparison of t-test results across all subjects among secondary schools

Level	Subject	Mean schools not receiving displaced students	Mean schools receiving displaced students	Difference in means	t score	Ha > 0 p-value
Secondary	Spanish	43.01	38.65	4.36	1.244	0.1078
Secondary	Mathematics	11.41	8.4	3	0.7523	0.227
Secondary	English	41.51	36.36	5.15	1.391	0.0832***
Secondary	Science	44.99	38.18	6.81	1.771	0.0393**

\*\*  $\alpha < 0.05$ , \*\*\*  $\alpha < 0.1$

Graph:5 Comparison of average META-PR (Spanish Scores) for secondary schools

### Average META-PR (Spanish) in Secondary Schools



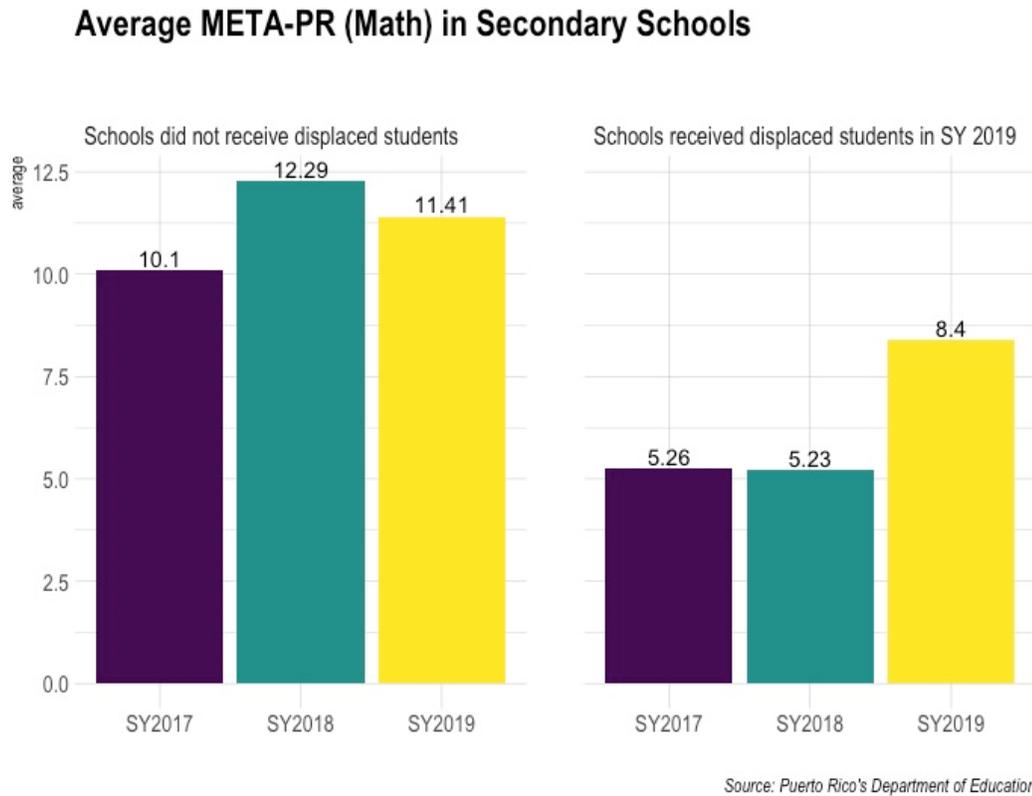
Source: Puerto Rico's Department of Education

### 5.3.2 Mathematics

For the subject of Mathematics, Graph 6 highlights schools that did not receive displaced students outperformed schools that received displaced students (11.41 and 8.4, respectively). However, a careful review of t-test summary results in Table 2 points out

that although the difference in average META-PR (Mathematics) scores between the control and treatment variable is 3, the alternative hypothesis where the difference of means is greater than zero cannot be rejected (p-value = 0.227).

Graph:6 Comparison of average META-PR (Mathematic Scores) for secondary schools

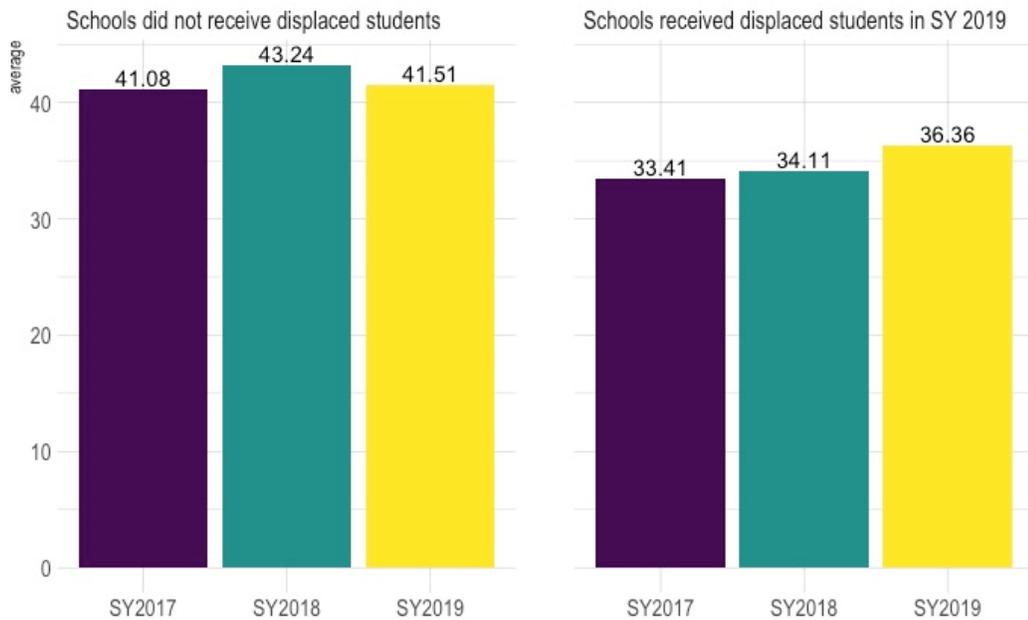


### 5.3.3 English

For the subject of English, Graph 7 highlights schools that did not receive displaced students outperformed schools that received displaced students (41.51 and 36.36, respectively). Further, a review of t-test summary results in Table 2 confirms this finding since the alternative hypothesis where the difference between the control and treatment variables is greater than zero can be rejected (p-value = 0.083)

Graph:7 Comparison of average META-PR (English Scores) for secondary schools

### Average META-PR (English) in Secondary Schools



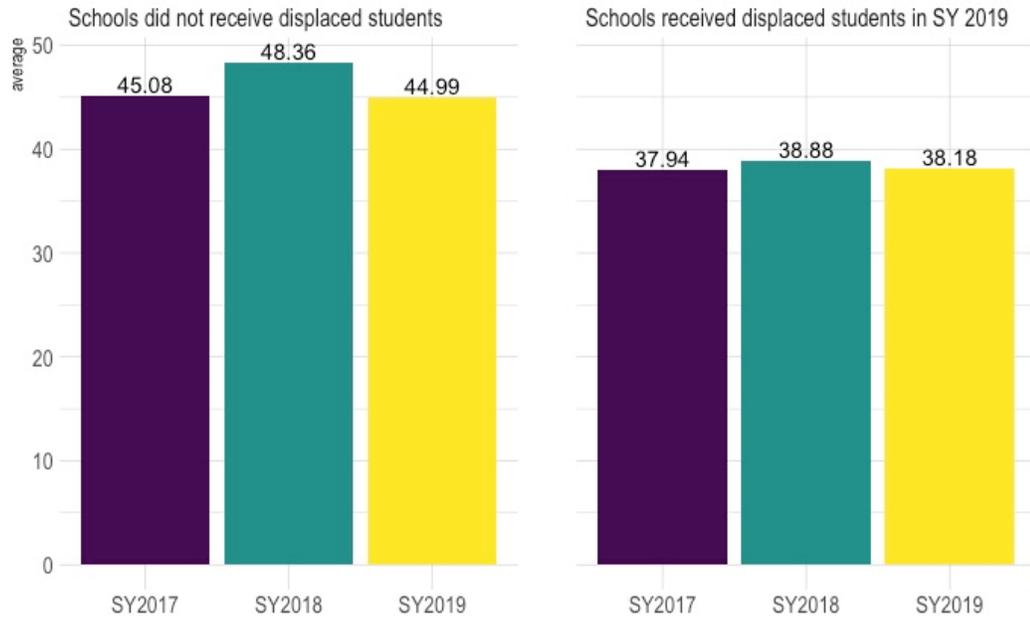
Source: Puerto Rico's Department of Education

#### 5.3.4 Science

For the subject of Science, Graph 8 highlights schools that did not receive displaced students outperformed schools that received displaced students (55.43 and 52.87, respectively). Further, a review of t-test summary results in Table 2 confirms this finding since the alternative hypothesis where the difference between the control and treatment variables is greater than zero can be rejected ( $p$ -value = 0.039)

Graph:8 Comparison of average META-PR (Science Scores) for secondary schools

## Average META-PR (Science) in Secondary Schools



Source: Puerto Rico's Department of Education

### 6. Conclusion

This paper sought to explore and to evaluate the impact school closures policy had on academic performance in Puerto Rico during the 2018-19 school year. While literature on school closures showed mixed results of the effect policies had on academic performance, this study demonstrated that, on average, schools receiving displaced students from closing schools performed worse than those schools not receiving displaced students.

Although this paper demonstrates the negative, academic effect closures had on schools, it does not show the direct, negative effect closures had on displaced students. Another limitation this study has is that, unlike other academic studies on school closures, the effect of performance is limited to the immediate school year after the policy was implemented. Drawbacks preventing longitudinal studies to analyze longer, negative effects of school closing are mainly due to changes Puerto Rico's Department of Education made on reporting its data. In addition, before the COVID-19 pandemic began in early 2020, a series of earthquakes hit the southwest part of the island causing severe disruptions on schools located in the affected regions; consequently, local authorities suspended META-PR testing. Further, continued educational disruptions COVID-19 caused will make more difficult to isolate the effect school closures had on academic performance. Nevertheless, this paper makes a compelling argument on the negative effects school closures policy had on Puerto Rican, academic performance.

Following other approaches used in similar academic papers, an excellent idea for a follow up study to analyze the effects school closures had on academic performance would be to identify and pair schools that closed prior the policy implementation with the schools chosen to receive displaced students. This proposed approach would answer two important questions. First, since Puerto Rican, government authorities only cited budget restructuring as justification for school closures, it would highlight whether underperforming schools were chosen to minimize academic impact on students—the approach used by other jurisdictions facing similar circumstances. Second, the new

proposed approach will provide a different perspective on academic effects after school closing policies were implemented. Finally, given the possibility of further school closures in Puerto Rico in the coming years, this study provides an excellent understanding of the effects this policy has on academic performance in schools.

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## **8. Curriculum Vita**

Edward René Rivera Rivera was born and raised Puerto Rico. At age 15, his parents moved to the state of Florida where he completed high school. After earning his associate degree in business administration, Edward enlisted in the United States military serving as an all-source intelligence analyst for three years.

While completing his B.S. in Economics on Penn State University, Edward spent various years as an economic analyst focusing on Pakistan for the United States Central Command. During this time, he developed a profound interest on how economic policies affected the general population and began to show initiatives to research on problems affecting Puerto Rico.

During his time in Johns Hopkins University, Edward focused on acquiring machine learning skills and tools to analyze textual data to continue his journey on furthering academic literature concerning Puerto Rico. Edward's major research as a Johns Hopkins student has been analyzing the effects school closures had on Puerto Rican students. After completing the capstone required for his master's graduation, he plans on conceptualizing a formal framework of using textual data to analyze how Puerto Rico's media shape public opinion and its effects on government policy.