The University of Texas at Austin

Education Research Center
www.texaserc.utexas.edu

POLICY BRIEF

# Evaluating the Impact of School Closures in Houston ISD, Part I: The Effect of School Closures on Patterns of Student Attendance and Achievement

Kori J. Stroub (Rice University) & Meredith P. Richards (Southern Methodist University)
March 2016

## What We Studied

Over the past decades, the closure of urban public schools has disrupted the educational experiences of hundreds of thousands of public schoolchildren. Since 2000, urban school districts in cities such as Chicago, Cincinnati, Detroit, Indianapolis, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, and Washington, D.C. have shuttered more than 20% of their public schools (Brummet, 2012; Dowdall, 2011). In the 2010-11 school year alone, urban school closures displaced over 100,000 students (Author calculations, NCES CCD). Indeed, even Texas, which has experienced sustained population growth over the past decades, has closed a number of schools, particularly in Dallas and Houston. While closures have often been motivated by declining enrollments in light of constricting budgets, districts are also increasingly utilizing closures as a reform strategy to combat chronic low academic performance. Indeed, such achievement-based closure reform has increasingly been incentivized by the federal government through reauthorization of current ESEA legislation and the creation of the Race to the Top Fund (Hurdle, 2013; Jack & Sludden, 2013). Despite the steadily increasing number of school closures and the controversial nature of closure reform, scant empirical attention has been devoted to examining the effects of closures on student outcomes. The limited evidence on school closures generally suggests that closures have slightly negative or null effects on the educational trajectories of displaced students. For instance, Engbert, et al. (2012) found that a wave of closures in Pittsburgh had a persistent negative effect on the test scores of displaced students, unless students were reassigned to school of sufficiently higher quality. A study on school closures in Chicago found no lasting effects of closure on student test scores (de la Torre & Gwynne, 2009). More recent findings in Ohio, however, suggest that closures can have positive effects on achievement, particularly if displaced students are reassigned to schools that are of sufficiently high quality (Carlson & Lavertu, 2015).

In Part I of this investigation of school closures in HISD, we examine the impact of closures on the academic achievement of displaced students. Being the largest school district in Texas, HISD has also experienced the largest number of closures, closing 55 schools between 2003 and 2010. In this study, we compare the achievement trajectories of 4,168 students that were displaced by a closure to a comparable set of students that did not experience a closure over the same time period.

## How We Analyzed the Data

In this study, we address the following four research questions:

- What types of schools were closed in HISD?
- To what types of schools do displaced students transfer?
- How do school closures affect the achievement trajectories of displaced students?
- Does the relative quality of the schools to which displaced students transfer moderate the impact of experiencing a closure?



TEXAS Education
The University of Texas at Austin
College of Education

**Data & Sample**

Annual student- and school-level data for this study were obtained from the Texas Education Research Center (TERC), which serves as Texas' longitudinal education data warehouse. Owing to changes in the state's testing system, longitudinally- comparable achievement data were only available for the period during which Texas administered the Texas Assessment of Knowledge and Skills (TAKS), which was first implemented in 2002-03 and administered to students through 2009-10. Our sample consists of 4,168 HISD students that were displaced by the closure of 27 regular public schools (i.e., non-alternative, non-charter campuses) between 2003 and 2010. As will be discussed in greater detail below, these students were matched to an equal sized comparison group of students that did not experience a closure over this same period. As such, our final analytic sample consists of 8,336 HISD students.

**Analytic Strategy**

In this study, we focus on the impact of school closures on student achievement over time, as measured via two primary dependent variables: math and reading achievement. For the years in which the TAKS was administered, students were tested in grades three through eleven. Math and reading achievement is measured via student TAKS raw scores. The primary independent variable of interest is whether or not a students' school experienced a closure. As specified by our regression models in the section that follows, we examine the effects of closure on achievement in the year immediately following a closure as well as on the slope of achievement over time. Because achievement trajectories are generally nonlinear and because the impact of closures may be larger in initial years and taper off over time (or vice versa), we use higher- order terms to capture this complexity in achievement trajectories. To account for the fact that closed schools likely differ from schools that are not closed in important ways, we employ a two-step matching procedure. The primary objective of this matching approach is to identify a comparable set of students to which the achievement trajectories of displaced students can be compared.

Step one of this procedure involved matching each of the 27 closed schools to a set of non-closed schools. Schools were matched using the two characteristics most closely associated with closure in the literature: Enrollment size and Achievement (see, for example, de la Torre & Gwynne, 2009). Using these two variables, schools were stratified into four equal sized groups (quartiles) on each variable for each year that there was a closure (See the chapter in Murnane & Willett, 2010 on covariate stratification). Then, closed schools were matched to all the non-closed schools that were in the same enrollment and achievement quartiles. For instance, if a school that closed at the end of the 2004-05 school year was in the first enrollment and achievement quartiles for that year, it would only be matched to those non-closed schools that were also in the first quartiles for each variable in 2004-05. In total, the 27 closed schools were matched to 107 non-closed schools. Once the matched set of schools was created, step two of the procedure involved matching each of the 4,168 displaced students to a similar student that was enrolled in one of the non-closed comparison schools to which they were matched in step one. The student-level match was accomplished using a nearest-neighbor propensity score matching procedure (PSM). First, the likelihood that each student would experience a closure was estimated using multilevel logistic regression. A variety of student-level covariates were accounted for in these models, including: basic student demographics (e.g., gender, race/ethnicity), educational characteristics (e.g., LEP, special education), attendance and mobility, and achievement (i.e., TAKS scores). Once these propensity scores were computed, each displaced student was matched to the student from the comparison group that had a propensity score that most closely matched their own (i.e., was equally likely to have experienced a closure). Using this procedure, we were able to match all 4,168 displaced students to a comparable non-displaced student, resulting in a final analytic sample of 8,336 students. As will be discussed in the following section, we then used this matched sample of students to compare the achievement trajectories of displaced students to the achievement trajectories of the non-displaced comparison students.

**Modeling Strategy**

To examine the effect of school closure on the achievement trajectories of displaced students, we estimate a series of multilevel discontinuous change models (see Singer & Willett, 2003), which capture the immediate effect of a closure on student performance in the year following closure as well as the longer-term impact that displacement has on test scores.

Even though schools and students were previously matched along a variety of characteristics, we follow the procedure outlined in Shadish, Clark, and Steiner (2008) and include student- and school-level covariates in our models to provide doubly-robust estimates of the closure effect. Moreover, because learning trajectories may not be linear, and the impact of closures on achievement may not be uniform over time, we test and incorporate terms capturing curvilinear changes in achievement over time as well as curvilinear effects of closures on achievement. Finally, in addition to estimating the overall main effect of closure on student achievement, we also test a closure by receiving school performance interaction. That is, we estimate the extent to which the impact of school closures depends on the relative performance (measured using aggregate TAKS scores) of the schools to which they transfer.

## What We Discovered

***What types of schools were closed in HISD?***
First, Table 1 demonstrates that, like closures in Northeastern and Midwestern cities, HISD's closures have disproportionately displaced poor and black students. Although HISD has a high poverty rate overall, schools that were closed tended to be particularly poor: 91% of students in schools that were closed were economically disadvantaged, as compared to 80% in HISD as a whole. Moreover, although only 27% of HISD's students are black, 43% of students affected by closures are black. As such, closures have had a uniquely acute impact on Houston's black communities.

*Table 1.* Characteristics of Students Displaced by Closure vs. HISD

| | Displaced | HISD |
|---|---|---|
| Race/Ethnicity | | |
| *American Indian* | 0.03% | 0.1% |
| *Asian* | 1.0% | 3.3% |
| *Black* | 42.6% | 27.1% |
| *Hispanic* | 54.3% | 61.8% |
| *White* | 2.1% | 7.6% |
| At-Risk | 62.5% | 63.4% |
| Economically Disadvantaged | 90.6% | 79.9% |
| LEP | 29.0% | 30.9% |
| Gifted/Talented | 7.6% | 13.4% |
| Special Education | 9.0% | 8.1% |
| TAKS Scores | | |
| *Math - Met Standard* | 67.0% | 81.0% |
| *Reading - Met Standard* | 81.1% | 87.0% |
| *Math - Commended* | 16.8% | 27.0% |
| *Reading - Commended* | 16.2% | 28.0% |

***To what types of schools do displaced students transfer?***
Second, contrary to the concerns of some critics, Table 2 demonstrates that overall, students displaced by closures do tend to be reassigned, both in HISD policy and in actuality, to schools that are slightly more advantaged than their closed school. Specifically, students tend to transfer to schools that are slightly more racially/ethnically and socioeconomically diverse and academically higher-performing than the schools they left. While displaced students tend to attend slightly better schools than those that closed, they still transferred to relatively low-performing schools in an absolute sense. Indeed, 52% of displaced students transferred to schools in the bottom third of the district in math achievement, while 43% of displaced students transferred to schools in the bottom third of HISD in reading achievement. Conversely, just 21% of displaced students transferred to high-performing schools in the top third of the district in math achievement, while 18% transferred to schools with high reading achievement. Moreover, disaggregated data on student transfer patterns reveal that the types of schools to which displaced students transfer tend to differ by student characteristics. For the sake of brevity, we focus here on two important student-level characteristics: student prior achievement and race/ethnicity (Figures 1 and 2, respectively). In particular, low-achieving students were substantially less likely than their higher-achieving peers to transfer to high-achieving receiving schools after experiencing a closure. Figure 1 demonstrates that high-achieving students were 1.6 times more likely to transfer to high-performing schools than low-achieving students (25% vs. 16%). However, low- and high-achieving students were roughly equally likely to transfer to low-performing schools (55% and 49%, respectively). Second, disaggregating the transfers of displaced students by race/ethnicity also reveals a troubling pattern of results. In particular, white students were significantly more likely to transfer to high-performing schools than black or Hispanic students. Figure 2 demonstrates that 51% of displaced white students transferred to schools that ranked in the top third of schools in terms of achievement. By contrast, only 28% of Black students and 20% of Hispanic students transferred to high-performing campuses. Conversely, while just 26% of displaced white students transferred to low-

achieving schools, 42% and 53% of displaced black and Hispanic students, respectively, transferred to campuses in the bottom third of all HISD schools.

***How do school closures affect the achievement trajectories of displaced students?***

Despite being transferred to higher- performing schools overall, our discontinuous regression models (Tables 3 and 4 for math and reading, respectively) indicate that displaced students fare little better academically in both the short- and long-term relative to their non-displaced peers. Moreover, while the overall impact of closures is small, the effects do vary somewhat across subjects.

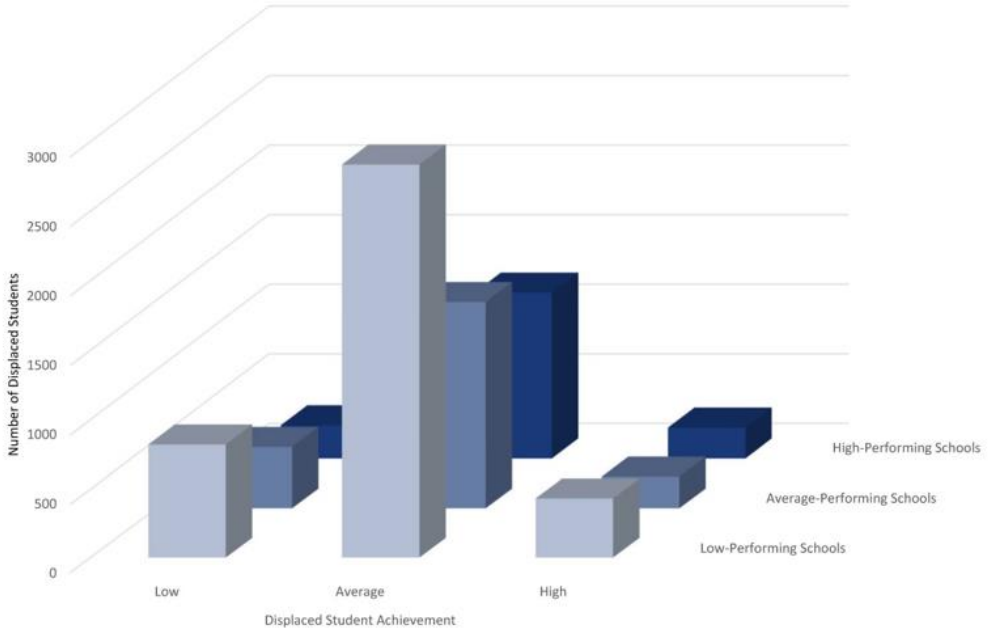
For instance, the second column in Table 5 ("Average column") demonstrates that, on average, displaced students displayed higher than expected math TAKS scores in the year immediately following a closure. Indeed, compared to comparable non-displaced students, displaced students averaged 1.3 more questions correct on the math TAKS. As Table 5 also indicates, however, the math gains are relatively short-lived, owing to flatter achievement trajectories. For example, between the first and second year after closure, the math achievement slope of displaced students is just 85% as large as that of their non-displaced peers. As a result of this flatter slope, two years after closure, the math gap between displaced and non-displaced students narrows to 0.8. By four years after closure, displaced students answer 0.3 fewer questions correctly than their non-displaced peers.

Moreover, given that most students experience closures in elementary school, the flatter achievement slopes of displaced students suggest that their math achievement lags further behind their peers with each progressing

**Table 2: Characteristics of Closed Schools & Their Designated & Actual Receiving Schools**

| | Closed | Designated Receiving | Actual Receiving |
|---|---|---|---|
| Enrollment | 368 | 637 | 693 |
| Race/Ethnicity | | | |
| *American Indian* | 0.01% | 0.04% | 0.1% |
| *Asian* | 0.8% | 1.8% | 2.1% |
| *Black* | 46.5% | 46.4% | 43.2% |
| *Hisp* | 51.1% | 48.6% | 49.9% |
| *White* | 1.7% | 3.2% | 4.7% |
| Attendance | 95.6% | 96.6% | 95.9% |
| Mobility | 28.0% | 22.6% | 23.9% |
| LEP | 34.1% | 29.3% | 28.9% |
| Special Education | 9.3% | 8.8% | 9.3% |
| Economically Disadvantaged | 95.5% | 90.5% | 87.6% |
| Gifted/Talented | 4.8% | 7.0% | 7.4% |
| TAKS Scores | | | |
| *All Tests* | 56.4% | 62.6% | 63.0% |
| *Math* | 69.9% | 75.8% | 75.5% |
| *Reading* | 71.7% | 77.4% | 78.4% |
| Student-Teacher Ratio | 16 | 17 | 16 |
| Teacher Years of Experience | 12 | 11 | 11 |

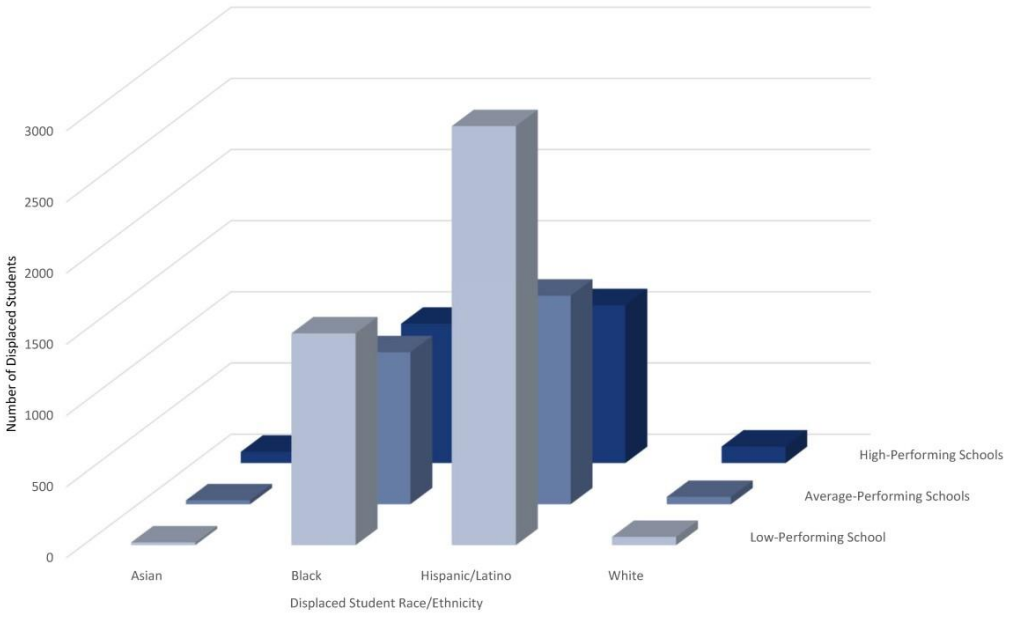
*Figure 1.* Low- and average-achieving displaced students are the most likely to transfer to the district's lowest-performing schools.




*Note.* Low, average, and high student achievement and school performance are computed using the 33rd and 66th percentiles of the student and school TAKS distributions, respectively.

year. As such, the earlier a student experiences a closure the more likely it is to have a negative impact on their achievement over their educational careers.

*Figure 2*. Displaced black and Hispanic students are the most likely to transfer to the district's lowest-performing schools.




*Note*. Low, average, and high school performance are computed using the 33rd and 66th percentiles of the school TAKS distribution.

By contrast, displaced students experienced no significant difference in their expected level of reading achievement in the year following a closure relative to non-displaced students. However, displaced students had flatter achievement trajectories after closure than their non-displaced peers. For example, between the first and second year after closure, the reading achievement slope of displaced students is just 87% as large as their non-displaced peers. As a result, displaced students under-performed relative to their non-displaced peers in the years after closure. As Table 5 demonstrates, on average, displaced students answer 0.7 fewer questions correctly 2 years after a closure than non-displaced students. By four years, the gap widens to 1.0 questions.

**Table 3: Effects of Closures on Math Achievement of Displaced Students**

| | Model 1A | | | | Model 1B | | |
|---|---|---|---|---|---|---|---|
| | Est. | | S.E. | | Est. | | S.E. |
| *Student Level Predictors* | | | | | | | |
| Intercept | 17.872 | * | 5.528 | | 17.924 | * | 0.876 |
| Year | 1.992 | * | 0.089 | | 1.966* | | 0.089 |
| Year$^2$ | -0.034 | * | 0.008 | | -0.031 | * | 0.008 |
| **Closure** | **1.311** | ***** | **0.169** | | **1.372** | ***** | **0.171** |
| **Post-Closure** | **-0.527** | ***** | **0.154** | | **-0.634** | ***** | **0.168** |
| **Post-Closure$^2$** | **-0.042** | | **0.037** | | **-0.052** | | **0.042** |
| Grade | 1.941 | * | 0.083 | | 1.946 | * | 0.083 |
| Age | -1.111 | * | 0.083 | | -1.116 | * | 0.083 |
| Asian/Pacific Islander | 0.865 | | 0.763 | | 0.851 | | 0.763 |
| Black | -4.598 | * | 0.413 | | -4.598 | * | 0.413 |
| Hispanic/Latino | -2.236 | * | 0.393 | | -2.237 | * | 0.393 |
| Female | -0.528 | * | 0.138 | | -0.527 | * | 0.138 |
| Attendance | 0.011 | * | 0.002 | | 0.011 | * | 0.002 |
| Economically Disadvantaged | 0.179 | | 0.109 | | 0.175 | | 0.019 |
| LEP | -1.608 | * | 0.113 | | -1.604 | * | 0.113 |
| Gifted/Talented | 3.010 | * | 0.151 | | 3.004 | * | 0.151 |
| Special Education | -3.698 | * | 0.195 | | -3.687 | * | 0.195 |
| Between-Year Mobility | -0.007 | | 0.072 | | -0.005 | | 0.072 |
| Within-Year Mobility | -0.808 | * | 0.064 | | -0.806 | * | 0.064 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Structural Mobility | 0.233 | | 0.128 | | 0.227 | | 0.128 |
| *School Level Predictors* | | | | | | | |
| Mean School Achievement | 0.121 | * | 0.004 | | 0.119 | * | 0.004 |
| Elementary School | -4.389 | * | 0.237 | | -4.436 | * | 0.235 |
| Middle School | -7.246 | * | 0.405 | | -7.268 | * | 0.402 |
| High School | -4.270 | * | 0.389 | | -4.428 | * | 0.388 |
| % White | -0.001 | | 0.007 | | -0.002 | | 0.007 |
| Attendance Rate | -0.008 | | 0.032 | | -0.007 | | 0.032 |
| % Economically Disadvantaged | 0.040 | * | 0.006 | | 0.038 | * | 0.006 |
| % LEP | -0.010 | * | 0.004 | | -0.009 | * | 0.004 |
| % Gifted/Talented | -0.047 | * | 0.007 | | -0.046 | * | 0.007 |
| % Special Education | 0.014 | | 0.015 | | 0.017 | | 0.015 |
| Mobility Rate | -0.018 | * | 0.007 | | -0.014 | | 0.007 |
| Student-Teacher Ratio | 0.026 | | 0.018 | | 0.028 | | 0.018 |
| Mean Years of Teacher Experience | 0.065 | * | 0.019 | | 0.068 | | 0.019 |
| Enrollment | -0.0003 | * | 0.0001 | | -0.0003 | * | 0.0001 |
| **Closure X Mean School Achievement** | – | | – | | **-0.026** | * | **0.009** |
| **Post-Closure X Mean School Achievement** | – | | – | | **0.033** | * | **0.011** |
| **Post-Closure$^2$ X Mean School Achievement** | – | | – | | **-0.002** | | **0.003** |

* $p < 0.05$

| Table 4: Effects of Closures on Reading Achievement of Displaced Students | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Model 2A | | | | Model 2B | | |
| | Est. | | S.E. | | Est. | | S.E. |
| *Student Level Predictors* | | | | | | | |
| Intercept | 13.305 | * | 5.653 | | 13.334 | * | 5.549 |
| Year | 2.039 | * | 0.077 | | 2.041 | * | 0.077 |
| Year$^2$ | -0.064 | * | 0.008 | | -0.064 | * | 0.008 |
| **Closure** | **-0.215** | | **0.157** | | **-0.188** | | **0.158** |
| **Post-Closure** | **-0.849** | * | **0.148** | | **-1.178** | * | **0.179** |
| **Post-Closure$^2$** | **0.168** | * | **0.035** | | **0.274** | * | **0.047** |
| Grade | 3.519 | * | 0.075 | | 3.522 | * | 0.075 |
| Age | -0.811 | * | 0.069 | | -0.812 | * | 0.069 |
| Asian/Pacific Islander | -1.451 | * | 0.618 | | -1.451 | * | 0.618 |
| Black | -3.011 | * | 0.332 | | -3.014 | * | 0.332 |
| Hispanic/Latino | -2.353 | * | 0.316 | | -2.356 | * | 0.316 |
| Female | 0.554 | * | 0.108 | | 0.553 | * | 0.108 |
| Attendance | 0.007 | * | -0.002 | | 0.008 | * | 0.002 |
| Economically Disadvantaged | -0.319 | * | 0.102 | | -0.320 | * | 0.102 |
| LEP | -3.224 | * | 0.104 | | -3.223 | * | 0.104 |
| Gifted/Talented | 2.279 | * | 0.138 | | 2.280 | * | 0.138 |
| Special Education | -3.881 | * | 0.174 | | -3.800 | * | 0.174 |
| Between-Year Mobility | -0.019 | | 0.064 | | -0.022 | | 0.064 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Within-Year Mobility | -0.378 | * | 0.057 | | -0.378 | * | 57.000 |
| Structural Mobility | -0.139 | | 0.111 | | -0.143 | | 0.111 |
| *School Level Predictors* | | | | | | | |
| Mean School Achievement | 0.113 | * | 0.005 | | 0.112 | * | 0.005 |
| Elementary School | -5.213 | * | 0.231 | | -5.242 | * | 0.232 |
| Middle School | -14.411 | * | 0.386 | | -14.409 | * | 0.387 |
| High School | -7.322 | * | 0.377 | | -7.341 | * | 0.378 |
| % White | -0.002 | | 0.007 | | -0.002 | | 0.007 |
| Attendance Rate | -0.073 | * | 0.030 | | -0.075 | * | 0.030 |
| % Economically Disadvantaged | 0.024 | * | 0.005 | | 0.024 | * | 0.005 |
| % LEP | 0.008 | | 0.004 | | 0.008 | | 0.004 |
| % Gifted/Talented | -0.012 | * | 0.007 | | -0.012 | | 0.007 |
| % Special Education | 0.062 | * | 0.015 | | 0.062 | * | 0.015 |
| Mobility Rate | -0.011 | | 0.007 | | -0.012 | | 0.007 |
| Student-Teacher Ratio | 0.006 | | 0.018 | | 0.007 | | 0.018 |
| Mean Years of Teacher Experience | -0.043 | * | 0.019 | | -0.044 | * | 0.019 |
| Enrollment | -0.0003 | * | 0.0001 | | -0.0003 | * | 0.0001 |
| **Closure X Mean School Achievement** | **–** | | **–** | | **0.004** | | **0.013** |
| **Post-Closure X Mean School Achievement** | **–** | | **–** | | **0.040** | ***** | **0.016** |
| **Post-Closure$^2$ X Mean School Achievement** | **–** | | **–** | | **-0.013** | ***** | **0.004** |

* $p < 0.05$

***Table 5*. Estimated Achievement of Displaced Students relative to Non- Displaced Students One to Four Years after Closure**

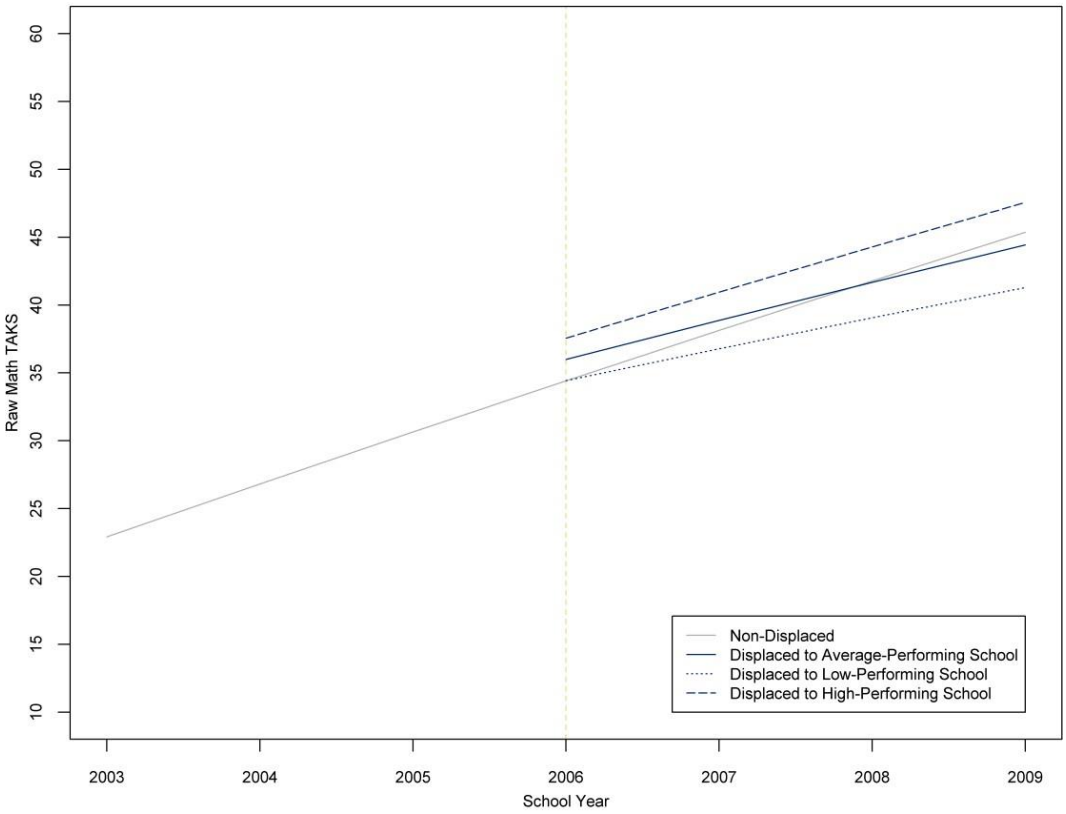
| | Receiving School Performance | | |
|---|---|---|---|
| | Average | Low | High |
| *Math TAKS* | | | |
| 1 year after closure | 1.3 | 0.0 | 3.1 |
| 2 years after closure | 0.8 | -1.3 | 2.8 |
| 3 years after closure | 0.3 | -2.7 | 2.5 |
| 4 years after closure | -0.3 | -4.1 | 2.2 |
| *Reading TAKS* | | | |
| 1 year after closure | 0.0 | -2.0 | 1.9 |
| 2 years after closure | -0.7 | -3.4 | 1.5 |
| 3 years after closure | -1.0 | -4.0 | 1.2 |
| 4 years after closure | -1.0 | -3.6 | 1.3 |

*Note*. The above values represent the difference in raw TAKS scores between displaced students and comparable non-displaced students. Positive values indicate that the displaced students are over-performing relative to their non- displaced peers, whereas negative values suggest they are under-performing. The values can be interpreted in terms of number of correct test questions on the TAKS exam.

***Does the relative quality of the schools to which displaced students transfer moderate the impact of experiencing a closure?***

While our results regarding the overall impact of closures suggest that they have a small impact on the achievement trajectories of displaced students, we find that the academic performance of the schools to which displaced students transfer plays an important role in moderating the impact of closures. As Figure 3 demonstrates, attending a high-performing receiving school (+1 standard deviation above the HISD mean) is associated with less negative outcomes than attending a school of average or low quality (-1 standard deviation). Indeed, as the last two columns of Table 5 indicate, displaced students score 3.1 points higher on math than expected when transferring to a high- performing campus the year following closure. Conversely, displaced students transferring to low- performing campuses experience no short-term positive effect of closure on math achievement. Beyond the immediate impact of closures on math achievement, the trajectories of displaced students' math scores tend to lag behind those of their non-displaced peers, regardless of the quality of the school to which they transfer. For example, between the first and the second year after closure, displaced students attending low-performing schools had math achievement slopes just 63% as large as those of their non-displaced peers. Perhaps more surprisingly, over the same period, displaced students attending high-performing schools had math achievement slopes just 91% as large as those of their non-displaced peers.

*Figure 3.* Estimated Effect of Closure on TAKS Math Achievement



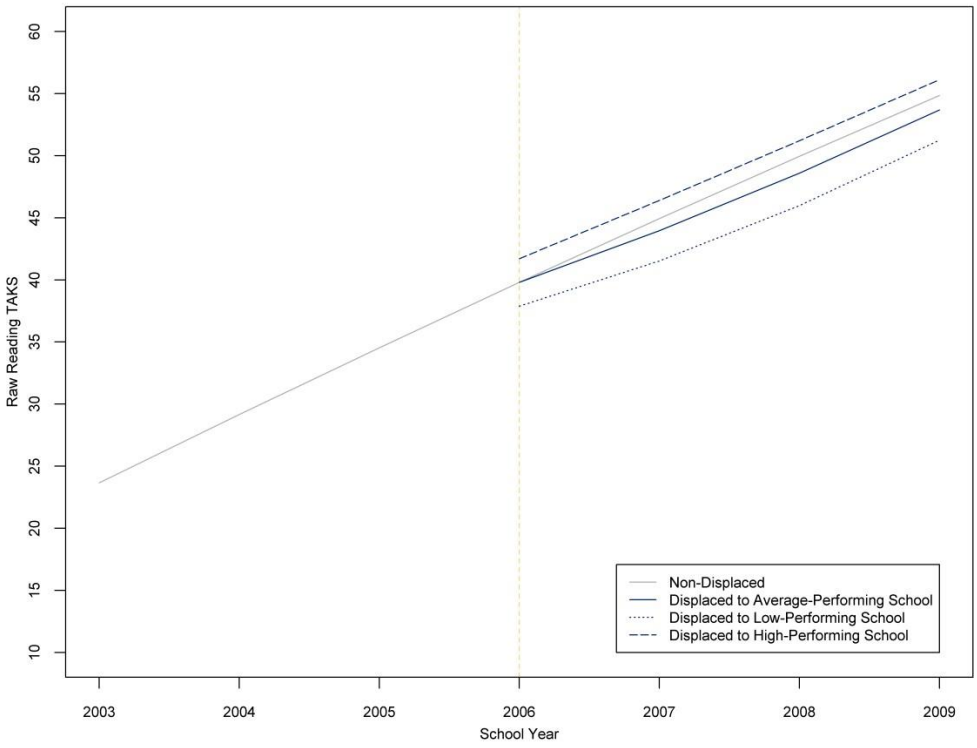

*Note.* The vertical yellow line represents a school closure in 2005-06. The solid grey line represents the estimated math trajectory of displaced students had they not experienced a closure. The solid, dotted, and dashed blue lines represent the effect of closures when transferring to average-, low-, and high-performing receiving schools, respectively.

As a result of these flatter math achievement slopes, although displaced students that transfer to low-performing receiving schools score no different on the math TAKS one year after closure than their non-displaced peers, by two and three years after closure they increasingly fall behind. As column 3 of Table 5 demonstrates, two years after closure displaced students in low-performing schools score 1.3 points lower than non-displaced students. By four years post-closure, the gap widens to more than 4 points. Although displaced students transferring to high quality schools also exhibit flatter math achievement slopes than their non-displaced peers, they still perform 2.2 points higher than their non- displaced peers by four years after closure owing to their large post-closure "bump" in math scores.

As with math achievement, receiving school performance has a statistically significant impact on the effect of experiencing a closure on reading achievement (see Figure 4). Indeed, transferring to a high-performing receiving school is associated with an immediate, albeit smaller, increase in reading TAKS scores relative to non-displaced students. As Table 5 illustrates, displaced students score 1.9 points higher on reading than expected when transferring to a high-performing campus the year following closure. However, transferring to a low-performing receiving school is associated with an immediate decline in reading achievement. Indeed, one year after experiencing a closure, displaced students answer, on average, 2 more questions wrong on the reading TAKS than their non-displaced peers.

As with math achievement, the reading trajectories of displaced students tend to lag behind those of non-displaced students, regardless of the quality of the school to which they transfer, at least initially. For example, between the first and the second year after closure, displaced students attending low-performing schools had reading achievement slopes just 71% as large as those of their non-displaced peers. Perhaps more surprisingly, over the same period, displaced students attending high-performing schools had reading achievement slopes just 91% as large as those of their non-displaced peers. Unlike with math, however, the gap in these trajectories narrows over time. As a result of these flatter reading achievement slopes, for students transferring to low-performing receiving schools, the gap between displaced and non-displaced students in reading TAKS increases to 3.4 points in year two and 4.0 points in year three, narrowing slightly to 3.6 points by year four. Moreover, for displaced students transferring to higher-performing schools, the initial benefit of transferring to a higher-performing school erodes somewhat over time. By year two, the initial gap of 1.9 narrows to 1.5; by year four the gap is 1.3 points.

*Figure 4.* Estimated Effect of Closure on TAKS Reading Achievement




*Note.* The vertical yellow line represents a school closure in 2005-06. The solid grey line represents the estimated reading trajectory of displaced students had they not experienced a closure. The solid, dotted, and dashed blue lines represent the effect of closures when transferring to average-, low-, and high-performing receiving schools, respectively.

While these findings suggest that closures in HISD have had the potential to positively impact the achievement trajectories of displaced students, our results indicate that they only appear to have done so when students transfer to high-performing schools. Although our earlier descriptive analyses demonstrated that displaced students did transfer to slightly higher-performing schools on average, these transfers did not occur evenly across the distribution of displaced students. Indeed, recall that Figures 1 and 2 revealed that relatively small proportions of students transferred to the highest performing schools in the district, with low-achieving and non- white students being the least likely to transfer to these advantaged campuses.

## Policy Recommendations/Implications

Underscoring the highly contentious and racialized discourse on school closures, we find that HISD's closures have had a disproportionate impact on poor, low-achieving, and black students. Somewhat encouragingly, unlike previous waves of closures in Chicago (de la Torre & Gwynne, 2009), but similar to findings in Ohio (Carlson & Lavertu, 2015), we find that on average, displaced students in HISD transferred to schools that were somewhat more diverse and higher-performing in terms of math and reading. Despite attending slightly higher-performing schools, however, displaced students do not experience higher achievement on average relative to what would have been expected in the absence of closures. Although displaced students appear to experience a short-term "bump" in math but not reading achievement immediately after a closure, their achievement growth tends to be flatter than their non-displaced peers in the years thereafter. As such, with each progressing year, displaced students lose ground to their non-displaced peers. On average, the gaps between displaced and non- displaced students are not large. However, they suggest that closures have fallen short of the espoused goal of improving student achievement.

Perhaps most importantly, however, we find that closures have the potential to benefit the achievement of displaced students if they transfer to high-performing campuses. Unfortunately, our analyses of student transfer patterns suggest that few students transfer to such high-performing campuses. Moreover, low-achieving students and students of color are particularly unlikely to transfer to high- performing schools. By facilitating transfer patterns whereby historically high-achieving groups transfer to higher-performing schools than historically low- achieving students, closures hold the potential to further exacerbate achievement gaps between traditionally disadvantaged groups and their peers. Taken together, our findings have important implications for closure policy in HISD. Results underscore the importance of district criteria in selecting both the schools that close as well as the schools to which displaced students will transfer. To aid in minimizing the negative effects of closures, the district must be judicious in closing only the lowest-performing schools. In addition, to maximize the benefit of closures, students must be offered significantly higher-performing transfer options. Towards that end, we recommend that displaced students are reassigned to schools that are significantly higher-performing than the schools that were closed. Moreover, given HISD's high degree of school choice and open enrollment policies, we also recommend that displaced students be given preferential admissions or reserved slots in several high-performing campuses across the district.

Second, given the risk at which closure places displaced students, particularly in the longer-term, districts should carefully monitor the progress of and, if necessary, target interventions at these students. Our results suggest that displaced students fare better than their peers, in terms of math, in the year after closure, yet fall behind their peers over time. As such, this highlights the importance of ensuring that monitoring and interventions continue throughout a students' educational careers.

## References


Brummet, Q. (2012). The effect of school closings on student achievement. Working paper.

Corley, C. (2013, March 22). Chicago teachers, parents riled by plan to close 54 public schools. NPR Education.

Carlson, D. & Lavertu, S. (2015). School closures and student achievement: An analysis of Ohio's urban districts and charter schools. Thomas B. Fordham Institute: Columbus, OH.

de la Torre, M. & Gwynne, J. (2009). When schools close: Effects on displaced students in Chicago public schools. Consortium on Chicago School Research: Chicago, IL.

Dowdall, E. (2011, October). Closing Public Schools in Philadelphia: Lessons from Six Urban Districts. The Pew Charitable Trust: Philadelphia, PA.

Duffin, E. (2009, March). Displaced kids doing poorly. Catalyst.

Engberg, J., Gill, B., Zamarro, G., & Zimmer, R. (2012). Closing schools in a shrinking district: Do student outcomes depend on which schools are closed? Journal of Urban Economics, 71(2), 189- 203.

Jack, J. & Sludden, J. (2013). School closings in Philadelphia. Penn GSE Perspectives on Urban Education, 10(1).

Mid-Atlantic Equity Center. (2009). Does closing schools cause educational harm? A review of the research. Bethesda, MD.

Murnane, R. J., & Willett, J. B. (2010). Methods matter: Improving causal inference in educational and social science research. Oxford University Press.

Fleisher, L. (2013, January 28). School closures challenged. The Wall Street Journal.

Hanushek, E., Kain, J., & Rivkin, S. (2004). Disruption versus Tiebout improvement: The costs and benefits of switching schools. Journal of Public Economics, 88, 1721-1746.

Hurdle, J. (2013, January 28). Education Dept. to Hear School Closing Complaints. The New York Times.

PEW Charitable Trust (2013). Shuttering public schools: The struggle to bring old buildings to new life. Philadelphia, PA.

Rumberger, R. (2003). The causes and consequences of student mobility. Journal of Negro Education, 72(1), 6-21.

Schwartz, A. & Stiefel, L. (2012). Moving matters: The causal effect of school mobility on student performance. Paper presented at the Annual Conference of the Association for Education Finance and Policy.

Shadish, W. R., Clark, M. H., & Steiner, P. M. (2008). Can nonrandomized experiments yield accurate answers? A randomized experiment comparing random and nonrandom assignments. Journal of the American Statistical Association, 103(484), 1334-1344.

Singer, J. & Willett, J. (2003). Applied longitudinal data analysis: Modeling change and event occurrence. London: Oxford University Press.

Sunderman, G. L., & Payne, P. (2009). Does closing schools cause educational harm? A review of the research. Mid-Atlantic Equity Center: Bethesda, MD.

Xu, Z., Hanaway, J., & D'Souza, S. (2009). Student transience in North Carolina: The effect of mobility on student outcomes using longitudinal data. National Center for the Analysis of Longitudinal Data in Education Research: Washington, DC. Working Paper #22.