Consistency in Campus Student Mobility

Predicting Campus Mobility at Houston Area Public Schools

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A campus's mobility rate from one year was the best predictor of its mobility rate in the next year. This study used five years of data (school years 2012-13 through 2016-17) from across the Houston area to look at what predicted the amount of school year mobility taking place on a campus. Several predictors were considered, including the type of students on a campus (student body characteristics), the type of neighborhood a school was located in (neighborhood features), the grade level served and other characteristics about the school (campus attributes), as well as the availability of other schools nearby (alternative options). Many things predicted the amount of school year mobility taking place on a campus, but far and away the strongest predictor was prior mobility. Districts can use this finding to efficiently target resources to campuses in support of mobile students, their classmates, and teachers.

Key Terms

School-Year Campus Mobility Rate: the number of moves per 100 students at a campus, (i.e., the number of school changes that enter or exit a campus during the school year)

Key Findings

A campus's mobility rate in one year was the best predictor of its mobility rate the next year

- Campuses with high mobility in the previous year were predicted to have a mobility rate 18 points higher than campuses with low levels of mobility – meaning high mobility campuses experienced 18 more moves per 100 students than low mobility campuses.

While prior mobility was the best predictor, other factors were also related to a campus's student mobility rate, though these relationships were much smaller.

- Some factors were associated with slightly higher student mobility rates, such as the proportion of Black students at a school or a school being located in a neighborhood with more poverty. Other factors were related to campuses having lower student mobility rates, like having a magnet program at a school or higher average STAAR Index I scores.
- **Significant but not substantive:** Besides previous year's mobility, the other factors that were predictive of campus mobility were not substantively meaningful.

Key Findings

Introduction

Student mobility is a widespread phenomenon in Houston area public schools (Potter et al. 2020), which often has negative consequences for students' performance and attainment (Gasper, DeLuca, and Estacion 2012; Hanushek, Kain, and Rivkin 2004; Rumberger 2003; Stroub and Gill 2021). While being widespread, student mobility is not uniform across all campuses (Welsh 2017). This brief builds on earlier research looking at what predicted whether a student would change schools during a school year (Gill 2021) to focus on what predicts the amount of student mobility taking place at a campus. As such, this brief relays findings from analyses exploring how campuses' student body characteristics, neighborhood features, campus attributes, and nearby alternative schooling options influence campus mobility rates. Knowing where student mobility is likely to be more common provides critical insights for districts to efficiently direct additional supports and resources to students, teachers, and schools.

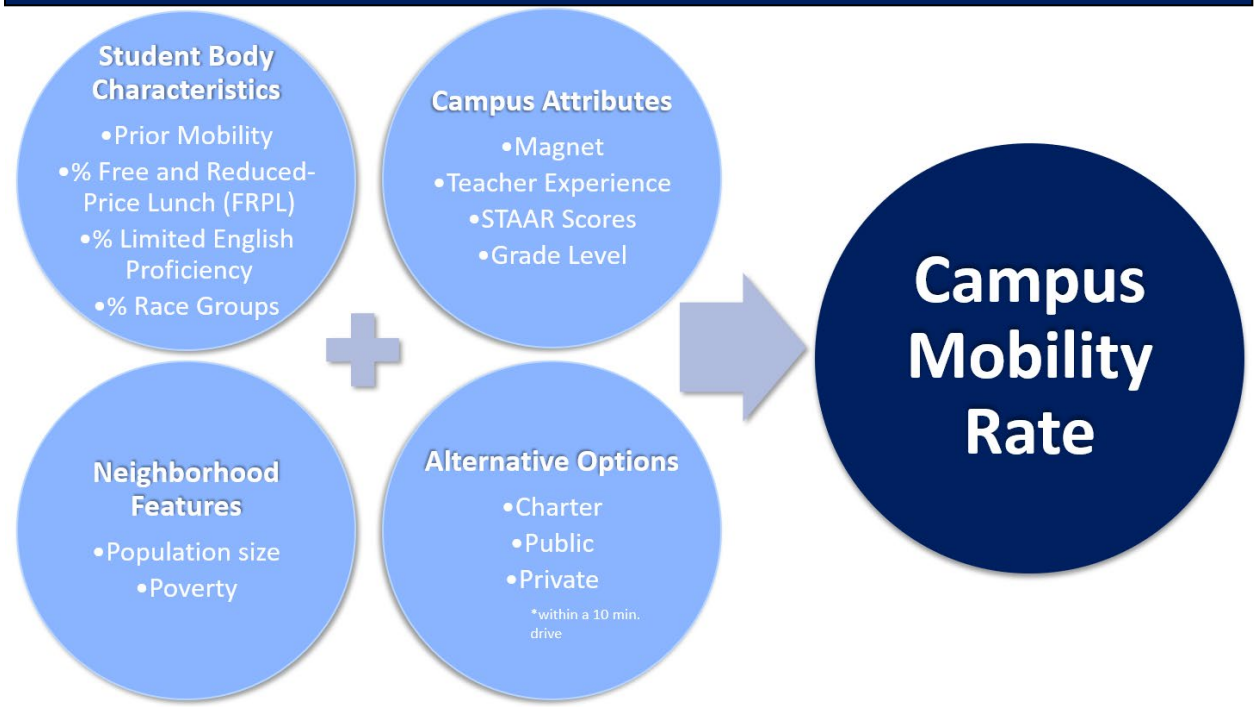
Research Question

What predicts a campus's school year student mobility rate?

Data and Methods

Analyses for this study used Public Education Information Management System (PEIMS) data from the Texas Education Agency (TEA), American Community Survey (ACS) data, Common Core of Data (CCD) data, and the Private School Survey (PSS) data. Measures of campus mobility rates were calculated for each school in 10 public school districts in the Houston area, for the 2012-13 through 2016-17 school years. More detail on how student mobility was calculated is available here. ACS data were used to measure neighborhood characteristics. Finally, CCD and PSS data were used to generate the full list of nearby public and private schools within a 10-minute drive of each school in the Houston region. Figure 1 shows a conceptual model of the analyses performed: student body characteristics, campus attributes, neighborhood features, and alternative options predicting a campus's mobility rate. Please see Appendix A for more information on the data and methods used for this study.

Figure 1. Conceptual Model Used to Predict Campus Student Mobility

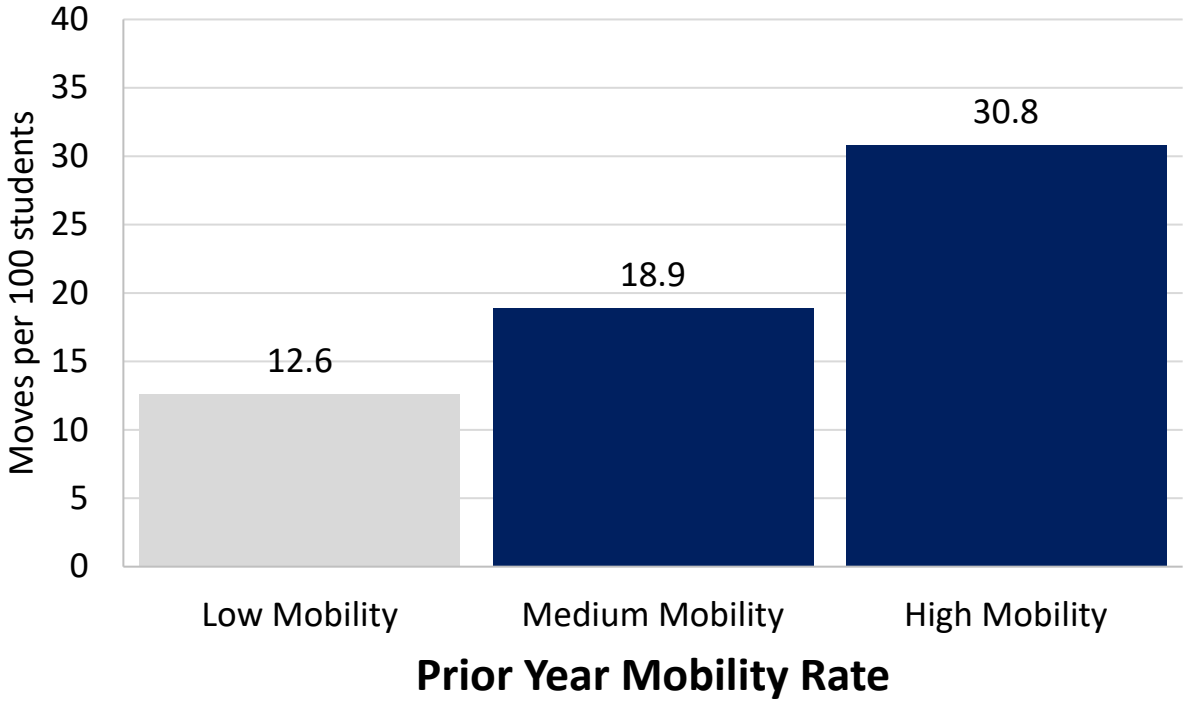


1 A school's mobility rate from one year was the best predictor of its mobility rate the next year

The importance of previous year's mobility

The strongest predictor of a campus's mobility was its mobility from the year before. In this way, campuses with lower mobility rates typically continued to have lower mobility rates, and campuses with higher mobility rates continued to have higher mobility rates. For example, campuses with low mobility in the previous year were predicted to have a school year mobility rate of less than 13 moves per 100 students the following year (Figure 2). In contrast, campuses with high mobility in the previous year were predicted to have a school year mobility rate of around 31 moves per 100 students the following year. Campus mobility rates changed from one year to the next, but campuses with low mobility in the past tended to have low mobility in the future while campuses with high mobility in the past tended to have high mobility in the future. Therefore, knowing a campus's mobility in the previous year was the best predictor of its future mobility.

Figure 2. Campuses with higher mobility in one year tended to also have higher school mobility in the following year



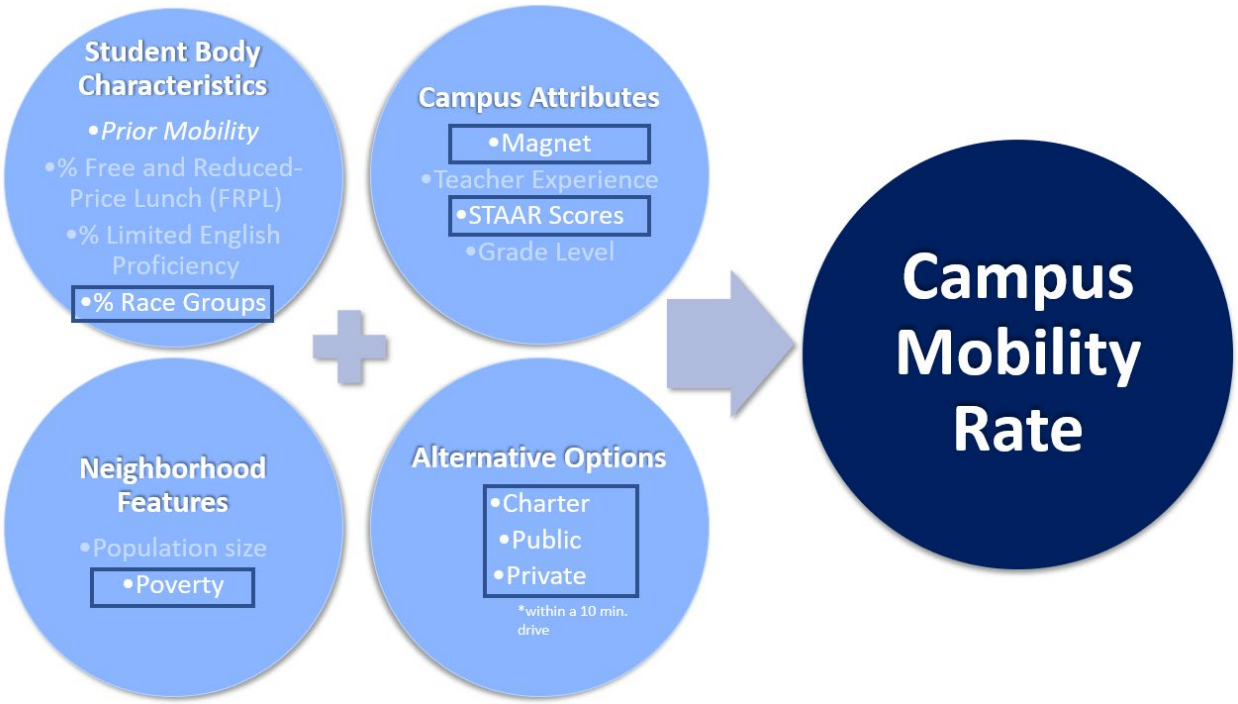
Note: Low mobility campuses had a school year mobility rate of less than 11 moves per 100 students; medium mobility campuses had a school year mobility rate of between 11 and 28 moves per 100 students, and high mobility campuses had a school year mobility rate of more than 28 moves per 100 students

2 While prior mobility was the strongest predictor, other factors were also related to a campus's student mobility rate

Other factors were associated with a campus's student mobility rate, but mattered much less than prior mobility

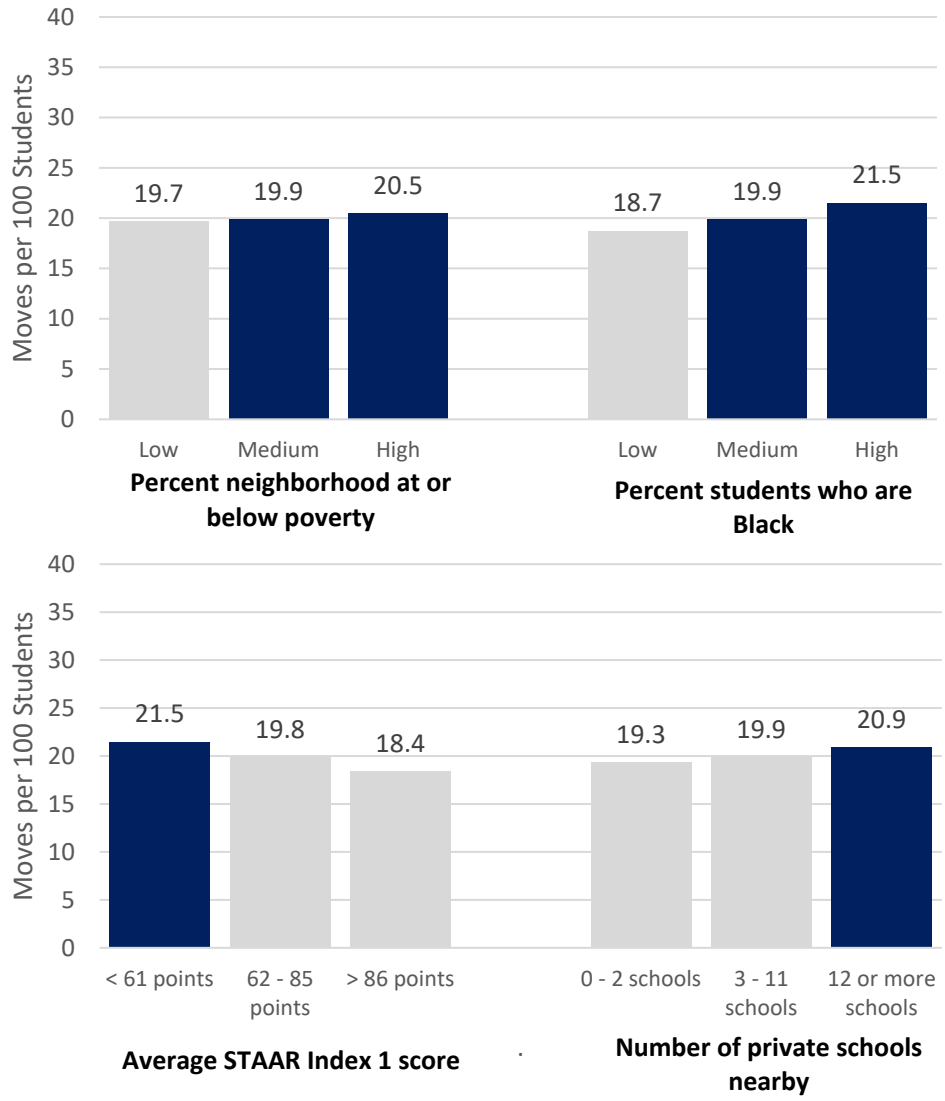
Items outlined in Figure 3 predicted a campus's school year mobility rate. At least one factor from each of the four components was significant. The race/ethnicity composition of schools was associated with campus mobility rates; specifically, campuses with higher proportions of black students had higher campus's mobility rates. When examining campus attributes, presence of a magnet program and campus STAAR Index 1 scores were associated with lower school year mobility. In terms of neighborhood features, the proportion of households living at or below the poverty level was associated with higher school mobility rates. Finally, the number of alternative schools near a campus, whether a public, private or charter school, within a 10-minute drive of a campus predicted a campus's mobility rate.

Figure 3. Other factors that predicted a campus's student mobility rate



Although the relationships mentioned above were all significant predictors of campus mobility, the size of these associations were generally underwhelming, particularly in comparison to the predictive power of prior mobility. Figure 4 displays the predicted mobility rates of campuses. In contrast to the very distinct and different mobility levels shown in Figure 2 (above), in Figure 4, the differences are relatively minimal. For example, schools in neighborhoods with a low percent of residents at or below poverty had about 20 moves per 100 students, while schools in neighborhoods with a high percent of residents at or below poverty had about 21 moves per 100 students. Each of the differences in Figure 4 are *statistically* significant but carry very little substantive importance.

Figure 4. Other predictors related to campus's mobility rate did not have a meaningful association



Conclusion

Implications and Recommendations

There are many predictors of a campus's student mobility, but the strongest predictor is its mobility in the previous year. Since a campus's prior mobility is the strongest predictor of its current mobility rate, this poses both significant challenges as well as important opportunities for districts.

A core challenge raised by these findings is understanding why this inertia in school year student mobility rate exists. The consistency of student mobility rates at a campus from one year to the next suggests an influence that extends beyond the school itself. This study took into consideration characteristics about the students served by schools, as well as several features of the neighborhoods around schools – things that would seemingly be "beyond the school". Despite including these factors, and despite these factors being related to a campus's mobility, their influence paled in comparison to the salience of prior mobility. Future research needs to look beyond these demographic features of schools and their surrounding neighborhoods. For example, it may be that there are cultures of mobility at campuses that create more (or less) mobility than would be expected based on that campus's neighborhood and student body. Future research exploring the inertia of student mobility at schools around the region could offer key insights needed for how to interject into and disrupt this self-perpetuating and academically disruptive cycle of mobility taking place in Houston area schools.

Even as additional research may be needed to understand the mechanisms at work in shaping campus mobility rates over time, the findings from this study offer districts a path forward for equitably allocating resources to campuses in support of mobile students. The strongest predictor of a campus's mobility next year is its mobility this year. Districts wanting to allocate their limited resources in a way that will target those schools most needing supports in educating mobile students can do so most effectively by targeting the campuses currently with the highest mobility. Until the inertia of mobility is interrupted, last year's high mobility campuses are the most likely candidates for being next year's high mobility campuses. Concentrating support to campuses with a track record of higher mobility rates will allow districts to best support students while more is done to untangle and address the complex and cyclical nature of student mobility.

References

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Appendix A: Research Methodology

Data

Public Education Information Management System (PEIMS) data were used for this study. The six-weeks attendance file was used to identify every campus a student attended at some point during the 2012-13 to 2016-17 school years in the Houston area. Students who changed the school they attended were identified as being mobile, and the amount of mobility at a campus was calculated by summing together the total number of moves entering or exiting a campus during the school year. For each of the school years considered in the study, a campus mobility rate was calculated, resulting in a long data set of campus-year specific observations (i.e., the same campus appears multiple times, once for each school year). Multiple years of data were used to maximize statistical power and avoid drawing conclusions that could be overly dependent on a single year of data. From this original sample, a small number of schools were excluded if they were classified by PEIMS as being something other than an elementary school, middle school, or high school (i.e., schools classified as "Both" were excluded from the analysis). Schools in the data classified as "Both" tended to serve a wide range of grade spans, such as kindergarten through eighth grade, as well as several specialty and alternative setting campuses, such as campuses housing districts' juvenile justice alternative education placement schools (JJAEPs) or disciplinary alternative education placement schools (DAEPs). Finally, individual campus-years were removed from the analysis if they had unusually high mobility rates. Specifically, if a particular campus-year had a school year mobility rate of 100 moves or more per 100 students that campus-year observation was excluded. Campus-years with unusually high mobility rates tended to belong to schools specifically designed to serve students placed in an alternative setting or credit recovery programs, i.e., non-traditional school settings.

Variables

Dependent/Outcome variable – Campus school year mobility rate

Campus school year mobility rate was defined as the number of moves (i.e., school changes) per 100 students at a campus during the school year. Moves could be either students entering or exiting a campus. It was possible for the same student to enter and exit the same campus multiple times during the school year, which is why the mobility rate looks at number of moves per 100 students. Campus school year mobility rate was calculated for every campus remaining in the analytic sample in the Houston area.

Independent/Predictor variables - Student Body Characteristics

Prior mobility was taken from a campus's school year mobility rate in the previous school year. This was done by lagging each current year's school year mobility and using it as a predictor in the regression models predicting "current" mobility. For example, models estimating school year campus mobility for the 2015-16 school year included measures of prior mobility by using the school year campus mobility rate from the 2014-15 school year. For the first year of data in these analyses, data from the 2012-13 school year, prior mobility was ascertained by merging in mobility rates calculated using data from the 2011-12 school year. Data from the 2011-12 school year were only used to provide a measure of prior mobility for the 2012-13 school year.

Percent free and reduced priced lunch was the proportion of students at a campus during the given school year that received free and/or reduced priced lunch, as indicated in the PEIMS data.

Percent limited English proficiency (LEP) was the proportion of students at a campus during the given school year that were classified as being limited English proficient, as indicated in the PEIMS data.

Percent race/ethnicity at a campus is based on the percentage of each race/ethnic group in the student body at a school. Percentage were calculated for each race/ethnic group at schools in the Houston area. Due to multicollinearity among student body characteristics, the final models included percent of students who were Black and percent of students who were Asian. These two groups were chosen, because based on prior research (Potter et al. 2021), these race/ethnic groups were the most and least mobile.

Independent/Predictor variables – Neighborhood Features

For each school year, the variables measuring neighborhood features were taken from the corresponding year of American Community Surveys (ACS) data. ACS data were matched to specific campuses around the Houston area at the census block level. That is, for each school year, a campus's block group was identified using its geospatial coordinates, and that block group's unique identifier was used to merge in ACS data describing the neighborhood conditions immediately around a school.

Neighborhood size was a measure of the number of households in the block group of the campus during a particular school year.

Neighborhood poverty was the percent of households in the census block group living at or below the federal poverty line for a particular school year.

Independent/Predictor variables – Campus Attributes

Magnet was a binary variable used to indicate if a magnet program/school was located at a campus. Campuses that had a magnet program/school were coded as 1 and campuses that were did not have a magnet program/school at a campus were coded as 0.

Teacher experience measured the average years taught by the teachers at a campus. The measure used for this study considered all teacher experience, and not just experience the teacher had at a particular campus.

STAAR scores was a measure of campus performance, specifically a campus's average STAAR Index I score for a particular school year.

Grade level was a categorical measure of the grades served at a campus: elementary, middle, or high school. For the analyses, elementary served as the reference group.

Independent/Predictor variables – Alternative Options

To calculate the number of alternative options near a school, information about every public school in the Houston area was identified using the Common Core of Data (CCD) file and every private school in the Houston area was identified using Private School Survey (PSS) data. Using information from each of these data sources, geospatial coordinates were determined for each campus and mapped using ArcGIS software. Next, using the street map feature of ArcGIS, a 10-minute drive radius was calculated for each school in the Houston area. Using these 10-minute drive radii, measures of alternative options were created by counting the number of other campuses nearby. For a campus to be considered an

"alternative option", it had to serve the same grade levels. For example, in calculating the number of alternative options for an elementary school in the Houston area, only other "elementary schools" were considered, since high schools and middle schools were not typically viable options. In other words, a student who changes schools in the middle of the school year, with very rare exception, is not going from an elementary school to a middle school or high school, but is instead going to another elementary school. Using these geospatial data, three variables reflecting alternative options were calculated: number of nearby charter schools, number of nearby public schools, and number of nearby private schools.

The number of nearby charter schools was a count of the non-district charter schools within a 10-minute drive of a campus in a particular school year.

The number of nearby public schools was a count of other public schools, either in the same district or in another public school district, within a 10-minute drive of a campus for a particular school year.

The number of nearby private schools was a count of the private schools within a 10-minute drive of a campus for a particular school year. PSS data are released once every two years, so there is a slight misalignment for some of the years in our data set and when the census of private schools was conducted.

Methods

Analyses for this report utilized ordinary least squares (OLS) regression with campus school-year mobility rate as the dependent/outcome variable. Fixed effects for the school year were included to adjust estimates for having the same campus appear multiple times in the analysis over time. Fixed effects for district were also included to adjust for the nesting of campuses within districts. Regression results can be found in Table A1.

The model shown in Table A1 utilizes continuous predictors for variables indicated as such in the variable section above. However, to make bar charts used for Figures 2 and 4 in the body of the brief, categorical versions of these variables were substituted into the model to aid in the calculation and interpretation of margins. For example, the regression output in Table A1 includes a continuous measure of prior mobility; however, to create Figure 2 the continuous version of prior mobility was swapped for a categorical version that divided the variable into three categories: the bottom 20th percentile, middle 60th percentile, and top 20th percentile. While it is possible to calculate margins with a continuous variable using separate cut-points, the decision to use categorical versions of the variables was made for interpretability and accuracy of discussion. Switching to categorical versions of variables did alter some of the coefficients and estimates for other variables in the model, but left unchanged the main takeaway from this report: prior mobility is the strongest and best predictor of future mobility at a campus in the Houston area.

Appendix A

Table A1.

Ordinary Least Squares (OLS) Regression Predicting Campus's School Year Mobility Rates

Variable	B	SE
Constant	14.40	1.45
Prior Mobility	0.60**	0.01
% LEP	0.02	0.01
% FRPL	1.00	0.97
% Asian	-1.02	1.97
% black	7.99**	0.82
Middle School Grade Level	-0.37	0.32
High School Grade Level	-0.22	0.40
Magnet	-1.47**	0.31
STARR Index I Scores	-0.14**	0.01
Teacher Experience	0.05	0.04
Neighborhood Size	-0.11	0.07
Neighborhood Poverty	2.22*	0.82
Number of Nearby Public Schools	-0.05*	0.02
Number of Nearby Charter Schools	-0.11*	0.03
Number of Nearby Private Schools	0.08*	0.02
2013-14 School Year	0.73*	0.29
2014-15 School Year	0.09	0.29
2015-16 School Year	0.17	0.29
2016-17 School Year	0.66*	0.29
Aldine	0.11	0.37
Alief	1.36**	0.47
CyFair	0.96*	0.41
Pasadena	1.71**	0.43
Spring Branch	-0.89	0.51
Katy	1.59**	0.49
Sheldon	-1.34	0.85
Spring	1.08*	0.48
Klein	1.05*	0.48

Note: The 2012-13 school year is the reference group for estimating the coefficient for the fixed effect for school year. Houston ISD is the reference group for the fixed effect for school district.

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