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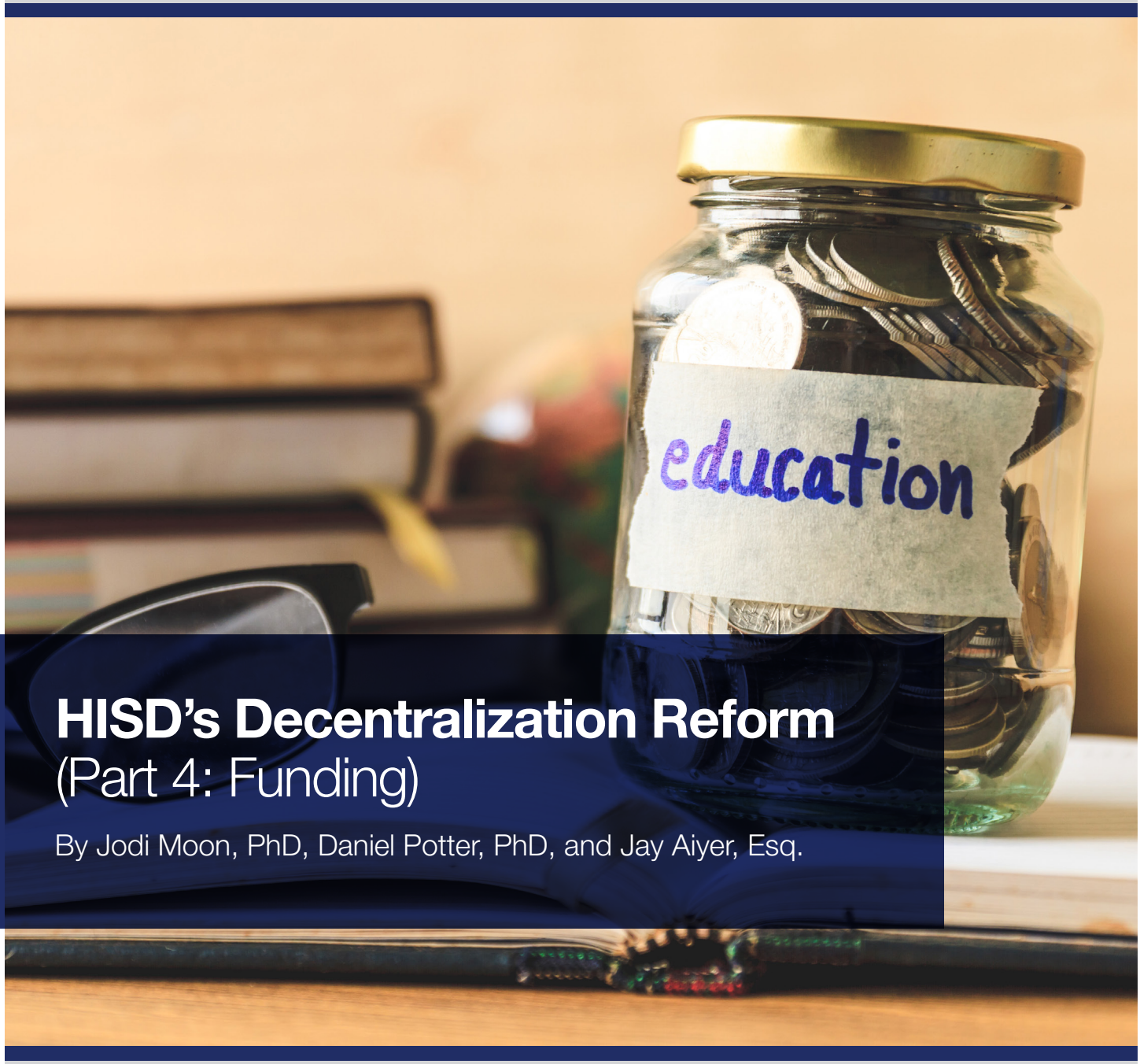


# HISD's Decentralization Reform (Part 4: Funding)

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**Research Brief**
for the Houston Independent School District

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Research Brief Abstract

# HISD's Decentralization Reform (Part 4: Funding)

This research brief is Part 4 of a four-part study of decentralization in Houston Independent School District (ISD).

- Part 1 describes how decentralization was enacted in HISD.
- Part 2 reports HISD principal attitudes and satisfaction within the current decentralized model.
- Part 3 examines the impact of decentralization on student outcomes.
- Part 4 examines the impact of decentralization on funding equity.

## Findings from Part 4

In this fourth and final brief, we look at the general fund budgeting strategy in Houston ISD from 1999–2000 through 2015–16 to see how much money schools got and use human resource data from 2013–14 through 2015–16 to see how they were using it. We found that:

- Middle schools and high schools had larger total general fund budgets and more per student spending than elementary schools;
- Small schools[1] had higher per student spending than non-small schools, even though their total general fund budgets were not different;
- Schools with a higher proportion of economically disadvantaged students had larger total general fund budgets, while having slightly lower per student spending; and
- Enrollment size was the best predictor of key personnel at a school, with larger schools being more likely to have assistant principals, counselors, nurses, and librarians.

1 The definition of "small school" changed in Houston ISD during the years of the study. For years prior to and including the 2001–02 school year, small school was defined as an enrollment of 400 students or less. During the 2002–03 school year, small school was defined as an enrollment of 500 students or less. Beginning in 2003–04, a separate definition of small school was given to elementary-, middle-, and high-schools. Beginning in 2003–04, a small school elementary school was defined as an enrollment of 500 students or less; a small school middle school was defined as an enrollment of 750 students or less; and, a small school high school was defined as an enrollment of 1,000 students or less.

# Introduction

In the late 1980s, the Houston Independent School District (HISD) was a centralized bureaucracy like many other urban school districts. Student performance was a concern: the drop-out rate for HISD was double the state average (10% in HISD versus 5% state average in 1990), and student outcomes on average were low (e.g., 32% of 9th graders met or exceeded the minimum expectations on the Texas Assessment of Academic Skills TAAS in 1990 compared to the state average of 49%). Over the course of several years (1990–1999), the Houston ISD School Board adopted a decentralization plan to improve student achievement and increase equity in funding; both the board and the administration believed that this could be accomplished by shifting more decision-making to the local level (campus). This reform culminated in a shift from a full-time equivalency funding model (FTE) to a weighted student funding model (WSF) in the 1999–2000 school year; the district refers to this as a per unit allocation (PUA) model.

This brief is the final part of a larger study that addressed four topics related to decentralization in Houston ISD. Here, we look at Houston ISD's Resource Allocation Formula for its general funds from school years 1999–2000 through 2015–16 to see how much money schools are getting and how it is being spent. This study examines the current general fund budgeting strategy overall, and by grade level served (i.e., elementary, middle, and high school). Additionally, special attention was given to small schools, as well as the percent of students at a school who were economically disadvantaged, black, Hispanic, or white.

# Research Questions

The research questions guiding this brief are:

How is Houston ISD's current Resource Allocation Formula funding schools, and how are those funds being used by schools in the district:

1. Across different types of schools (e.g., grade level and size)?
2. According to characteristics built into the current strategy (e.g., economically disadvantaged, career and technical education)?
3. For characteristics not directly targeted by the strategy (e.g., number of black students, bilingual students)?

# Data and methods

Appendix D has details on the data and methods used for this study. In brief, we compared general fund budgets and presence of key personnel across a range of school characteristics, focusing on grade levels served and small school status. In addition, we looked at how the current general fund budgeting strategy was working in schools based on their proportion of economically disadvantaged students, black students, Hispanic, and white students served. For each of these student body characteristics, schools were grouped into high, medium, and low categories based on the percentage of their students classified as the focal characteristic (see Exhibit A, for definition).

**Exhibit A. Definition of high-, medium-, and low-percent schools based on student body characteristics**

| Student body characteristics | Group | Meaning |
|---|---|---|
| ■ Economically disadvantaged<br>■ Black students<br>■ White students<br>■ Hispanic students | High | Percent of students at a school with the specified student body characteristic is higher than the 80th percentile (i.e., higher than 80 percent of other schools). For example, a "high-percent" economically disadvantaged school has a higher percent of economically disadvantaged students than 80 percent of other schools in the district. |
| | Medium | Percent of students at a school with the specified student body characteristic is between the 20th and 80th percentile of all schools. |
| | Low | Percent of students at a school with the specified student body characteristic is below the 20th percentile (i.e., lower than 80 percent of other schools) |

# Results

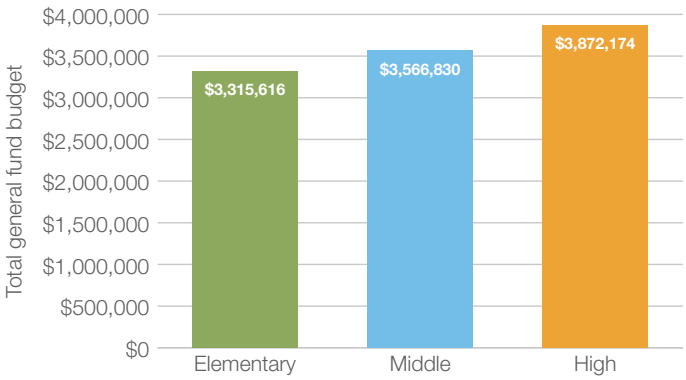
During the 2015–16 school year, the average total general fund budget of a school in Houston ISD was $3.96 million with a standard deviation of $2.45 million[2]. Houston ISD schools' total general fund budgets ranged from $487,000 to $16.97 million. For the same school year, the average per student spending of total general fund budgets was $5,158 with a standard deviation of $1,034. Finally, the average percent of a school's budget spent on instruction was 79.5 percent with a standard deviation of 5.8 percent.

Selected results from the regression analyses are reported below. Full results are shown in Table 2.

### Findings for schools' total general fund budget

***Middle schools and high schools had larger general fund budgets than elementary schools.*** From the 1999–2000 school year to the 2015–16 school year, in the baseline analysis, middle schools' general fund budgets were, on average, more than $610,000 higher than elementary schools' general fund budgets. From the same baseline analysis, the budgets for high schools were $2.6 million dollars higher than elementary schools. Elementary school budgets were less than middle and high school budgets largely because of the enrollment sizes of these schools. From the 1999–2000 school year to the 2015–16 school year, the average enrollment in elementary schools was 660 students, in middle schools was 930 students, and in high schools was 1,340 students. Schools were not the same sizes, so the analyses were run again with enrollment size (along with other student body characteristics) included in order to see which part of a school's general fund budget was due to its size, and which part of a school's general fund budget was because of the grade levels it served. In the full analysis considering enrollment size and other student body characteristics, the general fund budgets of middle schools were about $250,000 higher than elementary schools, and the general fund budgets of high schools were about $560,000 higher than elementary schools (see Figure 1).

**Figure 1. Predicted total general fund budgets of elementary schools, middle schools, and high schools, 1999–2000 through 2015–16**



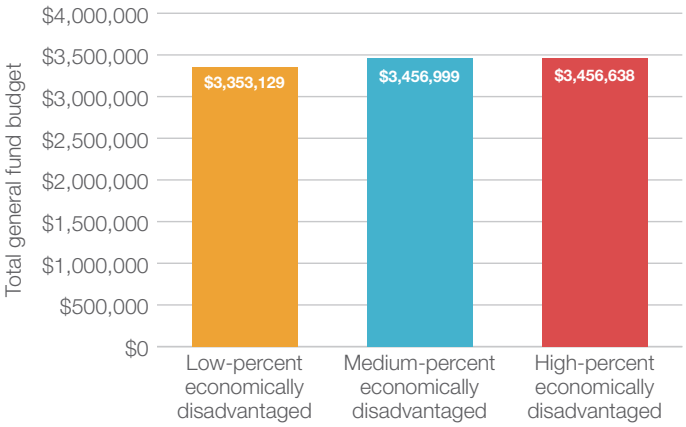

Note: Bars reflect predicted average total general fund budgets of elementary schools, middle schools, and high schools controlling for school year, enrollment size, and other relevant variables. Differences are statistically significant ($p < 0.05$).

***Small schools had smaller budgets because of their size and who they serve.*** Comparing the general fund budgets of small schools to non-small schools, the total general fund budgets of small schools are about $530,000 less than the general fund budgets of non-small schools. Once enrollment size and student body characteristics were considered, the total general fund budgets of small schools were about $1,000 less than the total general fund budgets of non-small schools, which is neither a statistically nor substantively significant difference.

2 Standard deviation is the average difference between any given value in the sample, and the sample mean. In the case of total general fund budget, standard deviation is the average difference between the total general fund budget of any school in Houston ISD and the mean total general fund budget of Houston ISD.

***Schools serving more economically disadvantaged students had larger total general fund budgets than schools serving fewer economically disadvantaged students.*** High-percent economically disadvantaged schools had total general fund budgets that were about $100,000 higher than low-percent economically disadvantaged schools.[3] Medium-percent economically disadvantaged schools also had larger total general fund budgets than low-percent economically disadvantaged schools (see Figure 2).[4]

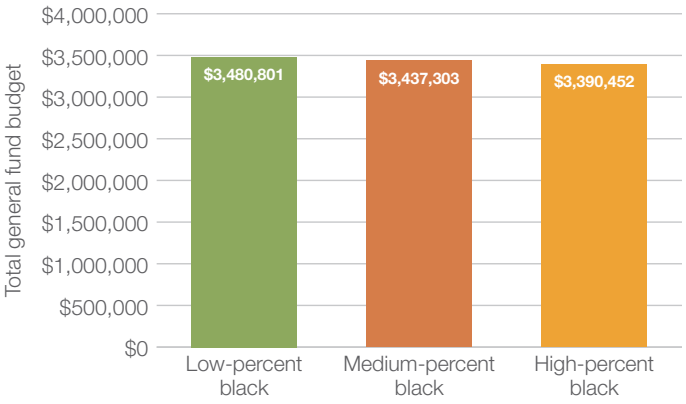
### Figure 2. Predicted total general fund budget for low-, medium-, and high-percent economically disadvantaged schools, 1999–2000 through 2015–16




NOTE: Bars reflect predicted total general fund budget for schools serving low-percent, medium-percent, and high-percent economically disadvantaged students compared to schools serving low-percent economically disadvantaged students. Medium-percent and high-percent economically disadvantaged were statistically significantly different from low-percent economically disadvantaged ($p < 0.05$). Medium-percent was not statistically significantly different from high-percent economically disadvantaged ($p = 0.986$).

***Schools serving more black students had smaller total general fund budgets than schools serving fewer black students, but this was explained by differences in the presence of professional personnel at the school.*** In addition to looking at differences in total general fund budgets by percent of economic disadvantaged students in a school, analyses were also run to look at the total general fund budgets of schools serving higher- and lower-percent black and Hispanic students. These analyses controlled for school's enrollment size, which is an important factor in total general fund budget of a school. High-percent black schools had total general fund budgets about $180,000 less than the total general fund budgets of low-percent black schools even after controlling for schools' enrollment sizes; however, this difference was explained by high-percent black schools having fewer professional staff. Once differences in the number of professional staff was considered the difference in schools' budgets was no longer statistically significant (see Figure 3).[5] Additional analyses revealed the difference in total general fund budgets of high-percent black and low-percent black schools may primarily reflect differences in spending at the elementary school level (see Appendix E for more details). No difference in total general fund budget was identified between high-percent Hispanic and low-percent Hispanic schools (see Table 2).

### Figure 3. Predicted total general fund budget for low-, medium-, and high-percent black schools, 1999–2000 through 2015–16



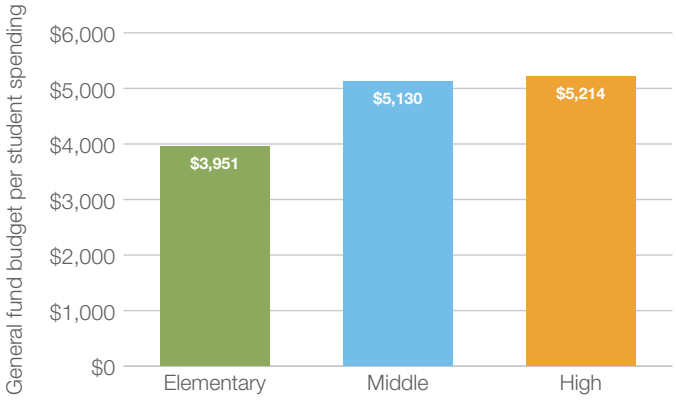

NOTE: Bars reflect predicted total general fund budget for schools serving low-percent, medium-percent, and high-percent black students. Differences are not statistically significant ($p > 0.05$).

## Findings for schools' general fund per student spending

***Middle schools and high schools had higher per student spending than elementary schools.*** The larger total budgets of middle schools and high schools were reflected in these schools' per student spending, even after considering enrollment size and student body characteristics. Middle schools' general fund per student spending was about $1,180 more than the general fund per student spending of elementary schools. High schools' general fund per student spending was about $1,260 higher than the general fund per student spending of elementary schools (see Figure 4).

3 See Exhibit A for definition of "high-percent" and "low-percent".
4 See Exhibit A for definition of "medium-percent" and "low-percent".
5 See Exhibit A for definition of "high-percent" and "low-percent".

### Figure 4. General fund per student spending for elementary, middle, and high schools, 1999–2000 through 2015–16




NOTE: Predicted general fund per student spending for elementary, middle, and high schools. Middle and high school are statistically significantly higher than elementary schools ($p < 0.05$). Predicted general fund per student spending differences between middle and high schools was not statistically significant ($p = 0.55$).

***Small schools had higher per student spending than non-small schools.*** Small schools' general fund per student spending is about $330 higher than the general fund per student spending of non-small schools.

***Schools serving more economically disadvantaged students had lower general fund per student spending than schools serving fewer economically disadvantaged students.*** High-percent economically disadvantaged schools had lower general fund spending of about $120 less per student than low-percent economically disadvantaged schools.[6] Medium-percent economically disadvantaged schools had lower general fund spending of about $100 less per student than low-percent economically disadvantaged schools.[7]

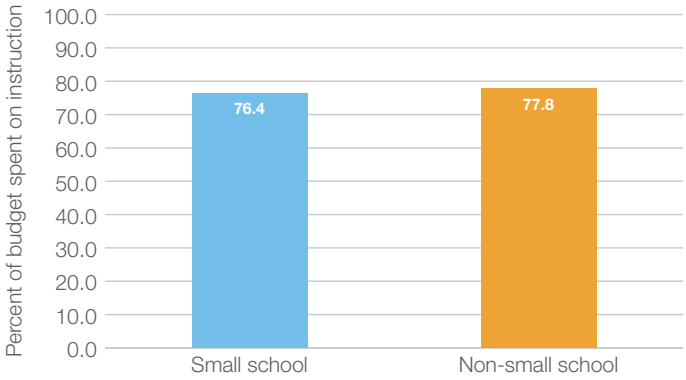
In order to answer questions about how schools are using their general fund budgets, we examined the percent of schools' general fund budget being spent on instruction (see Table 2), as well as whether or not key personnel were present in a school (see Table 3 through Table 6). Selected results focused on grade levels served, small school status, and student body characteristics are discussed in the main text. Full results are in Table 2 through Table 6.

## Findings for percent of general fund budget spent on instruction

***Middle schools and high schools spent a lower percentage of their total general fund budgets on instruction than did elementary schools.*** Middle schools and high schools spent a lower percentage of their general fund budgets on instruction (i.e., category 11 expenses) than did elementary schools. Enrollment size and student body characteristics do not appear to explain much of this difference.

***Small schools spent a lower percentage of their total general fund budgets on instruction than did non-small schools.*** Small schools, on average, spent about 1.4 percent less of their general fund budget on instruction (i.e., category 11 expenses) than did non-small schools (see Figure 5).

### Figure 5. Percent of a school's general fund budget spent on instruction, 1999–2000 through 2015–16




NOTE: Predicted percent of general fund budget spent on instruction for small and non-small schools estimated controlling for full set of variables. Difference is statistically significant ($p < 0.05$).

***Schools serving more black students spent a lower percentage of their total general fund budget on instruction, while schools serving more Hispanic students spent a higher percentage of their total general fund budget on instruction.*** High-percent black schools spent about 1% less of their total general fund budget on instruction (i.e., category 11 expenses), than low-percent black schools.[8] In contrast, high-percent Hispanic schools spent about 1% more of their total general fund budget on instruction than low-percent Hispanic schools.[9]

6 See Exhibit A for definition of "high-percent" and "low-percent".
7 See Exhibit A for definition of "medium-percent" and "low-percent".
8 See Exhibit A for definition of "high-percent" and "low percent".
9 See Exhibit A for definition of "high-percent" and "low-percent".

## Findings for the presence of key personnel

***High schools are more likely to have a counselor and less likely to have a nurse than elementary schools.*** High schools are more likely to have a counselor on staff than elementary schools, net of enrollment size. In contrast, high schools are less likely to have a nurse on staff than elementary schools.

***For small schools, differences in the presence of key personnel were almost entirely the result of differences in enrollment size***. Small schools appear to be less likely than non-small schools to have assistant principals, librarians, and nurses, which is more reflective of enrollment size and not something unique about being a small school.[10]

***Schools serving more economically disadvantaged students were less likely to have librarians than schools serving fewer economically disadvantaged students***. High-percent economically disadvantaged schools were less likely to have a librarian than low-percent economically disadvantaged schools.[11]

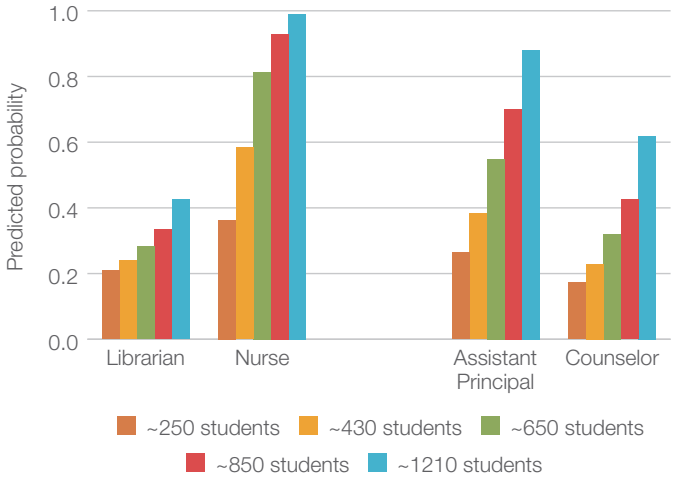
***Schools serving more Hispanic students were less likely to have counselors than schools serving fewer Hispanic students***. High-percent Hispanic schools were less likely to have a counselor on staff than low-percent Hispanic schools.[12]

***Schools serving more black students were less likely to have librarians than schools serving fewer black students***. High-percent black schools were less likely to have a librarian on staff than low-percent black schools.[13]

***Schools serving more white students were more likely to have nurses than schools serving fewer white students***. High-percent white schools were more likely to have a nurse on staff than low-percent white schools.[14]

***Enrollment size was a very important driver for determining the likelihood of key personnel being present in a school***. For each of the key personnel positions considered for this analysis, enrollment size positively and significantly predicted the likelihood of a school having someone on staff in that role. The larger a school, the more likely it was to have an assistant principal, counselor, librarian, or nurse on staff (see Figure 6).

### Figure 6. Predicted probability key personnel present, by number of students in school




NOTE: Predicted probability that a key personnel will be present at a school, based on a school's size.

10 To test this assertion, supplemental analyses were performed that limited the analysis to schools with a restricted range of enrollment size (e.g., small school value +/–100 students). See Appendix F, Table F-1 for an explanation and models showing these results.
11 See Exhibit A for definition of "high-percent" and "low-percent".
12 See Exhibit A for definition of "high-percent" and "low-percent".
13 See Exhibit A for definition of "high-percent" and "low-percent".
14 See Exhibit A for definition of "high-percent" and "low-percent".

# Discussion

In general, Houston ISD's current Resource Allocation Formula appears to be operating as intended. Middle schools and high schools, which tend to have larger enrollments, receive larger total general fund budgets. Additionally, there is evidence the general fund budgeting strategy is fulfilling the intended goal of a more equitable distribution of the general fund to schools in the district, as schools serving a higher proportion of economically disadvantaged students had larger total general fund budgets. This evidence suggests Houston ISD's current Resource Allocation Formula is operating as intended. What's unclear is if what was intended is currently what's wanted.

While there is evidence that schools are, in general, funded equitably, there is also evidence of inequality, particularly as it relates to the presence of professional staff and key personnel. Schools with higher percentage black students have fewer professional staff, which appears to account for the lower total general fund budgets of those schools. This pattern of fewer professional staff is reflected in the models predicting the presence of key personnel[15] as well. The presence of key personnel is directly tied to enrollment size. Larger schools are more likely to have assistant principals, counselors, librarians, and nurses. Several schools in the district are large enough to almost ensure their students have access to key personnel, but the same cannot be said for lower enrollment schools. The issue of enrollment is further complicated by the types of students served by lower enrollment schools. Higher proportion black schools have, on average, lower enrollments. Higher proportion Hispanic schools have, on average, lower enrollments. Higher proportion economically disadvantaged schools have, on average, lower enrollment. Despite a majority of Houston ISD students being Hispanic and about 75 percent of Houston ISD students being economically disadvantaged, these students are disproportionately concentrated in smaller schools. The district's small school subsidy appears to somewhat compensate smaller schools from a dollars and cents perspective, but smaller enrollment sizes continue to be linked to lower likelihoods of key personnel being present in schools. Houston ISD may have an equitable funding formula, but there is some evidence that this equity is not providing sufficiently for the least advantaged schools and students.

15 We define key personnel as non-instructional staff that are commonly described as providing essential services that are conducive to a successful learning environment, such as a school nurse; this definition is based on conversations with HISD staff and review of the principal survey responses (see Decentralization Study Brief 2 for more detail).

# Recommendations

### Centrally maintained personnel

To ensure every campus, regardless of enrollment size, has access to a district-determined baseline of services and key personnel, the district could hire and maintain individuals who are tasked with serving at multiple, lower-enrollment campuses throughout the district. Examples of services or personnel that are sometimes maintained centrally include security, nurses, and special education services. Houston ISD could develop its own designated list of baseline services and personnel it believes all schools should have, centrally maintain these staff, determine a set of qualifications that automatically provide lower-enrollment campuses access to the centrally maintained staff and services, and design a process for schools that did not automatically qualify to apply to have access. Campuses with larger enrollments could therefore opt to utilize centrally-maintained staff and services or choose to provide key personnel and services by hiring with their own budget funds.

### Minimum and maximum school sizes

Given the importance of enrollment size in each of the analyses, with larger schools typically having larger budgets and being more likely to have key personnel on staff, the district could consider establishing minimum and maximum school sizes to narrow the disparities in budgets and personnel under the current system. Along these lines, Houston ISD could research the operational cost of running a school in order to determine feasible cut-points for maximum and minimum sizes. Such a study would need to consider the grade levels served by a school, if it is a separate and unique school or comprehensive, as well as a geographic proximity between schools. Additionally, Houston ISD may find it useful to conduct a root cause analysis of declining enrollment at certain schools around the district, in order to either stem the outflow of students or develop early warning indicators of a school's decline.

### Weights

While there is some evidence Houston ISD's current Resource Allocation Formula is working to put more money in schools serving more economically disadvantaged students, whether this equity is enough and whether there are other characteristics the district would like to consider is something that could be addressed by reviewing and revising the current funding formula weights. Of specific interest, the current state compensatory education (economic disadvantage) funding weight is added to only 50% of students identified as economically disadvantaged at a school. Houston ISD might consider applying the funding weight to all economically disadvantaged students at a school. While this recommendation would add strain to the district's already stretched budget, it may be possible that in holistically reviewing all the formula weights, other weights could be revised lower to help offset some of the increase in more fully funding economically disadvantaged students.[16]

16 Notably, the Houston ISD Resource Allocation Advisory Committee (RAAC) is currently reviewing the PUA weights used by the district.

# Limitations

Key personnel positions identified from the HR data were not listed by funding source; hence, some positions might be funded by non-PUA funding.[17] This analysis does not include external private or non-profit funding sources, nor does it factor in non-fiscal resources such as teacher/principal experience level, or parental involvement.

17 Any position tagged in the personnel as Title II or Apollo funded were identified by their title and removed from the analysis. This was primarily limited to tutors and teachers, which were positions not reported in the final set of analyses.

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## Table 1. Mean, standard deviation, and other estimates of variables in analysis, Houston ISD overall: School year 2015–2016

| | N | Mean | SD | Median | 50th percentile | 75th percentile | Min | Max |
|---|---|---|---|---|---|---|---|---|
| **Dependent variables** | | | | | | | | |
| Total general fund (in $100K) | 252 | 39.60 | 24.47 | 33.87 | 26.43 | 44.21 | 4.87 | 169.71 |
| General fund per student | 252 | 5157.79 | 1034.03 | 4916.18 | 4620.98 | 5307.53 | 3531.96 | 13179.09 |
| Percent on instruction | 252 | 79.45 | 5.83 | 80.36 | 75.92 | 82.92 | 61.11 | 100.00 |
| Presence of key personnel | | | | | | | | |
| Assistant principal | 248 | 0.66 | 0.48 | 1 | 0 | 1 | 0 | 1 |
| Counselor | 248 | 0.41 | 0.49 | 0 | 0 | 1 | 0 | 1 |
| Librarian | 248 | 0.28 | 0.45 | 0 | 0 | 1 | 0 | 1 |
| Nurse | 248 | 0.81 | 0.39 | 1 | 1 | 1 | 0 | 1 |
| School characteristics | | | | | | | | |
| Small school | 252 | 0.31 | 0.46 | 0 | 0 | 1 | 0 | 1 |
| Separate and unique | 252 | 0.41 | 0.49 | 0 | 0 | 1 | 0 | 1 |
| Achieve 180 | 252 | 0.16 | 0.37 | 0 | 0 | 0 | 0 | 1 |
| Resource allocation components | | | | | | | | |
| Percent economic disadvantaged | 252 | 79.34 | 21.04 | 87.70 | 74.05 | 93.15 | 1.40 | 99.60 |
| Percent special education | 252 | 7.17 | 3.90 | 6.40 | 5.00 | 8.80 | 0.00 | 21.70 |
| Percent English language learners | 252 | 32.35 | 21.79 | 27.65 | 13.30 | 49.50 | 0.00 | 100.00 |
| Percent gifted/talented | 252 | 14.51 | 15.58 | 9.20 | 5.05 | 18.00 | 0.00 | 100.00 |
| Percent career and technical education | 252 | 12.25 | 26.81 | 0.00 | 0.00 | 3.30 | 0.00 | 100.00 |
| Student body characteristics | | | | | | | | |
| Percent bilingual | 252 | 31.91 | 22.92 | 29.55 | 12.05 | 49.85 | 0.00 | 100.00 |
| Percent black | 252 | 26.92 | 25.96 | 17.85 | 6.30 | 40.75 | 0.40 | 98.00 |
| Percent Hispanic | 252 | 62.30 | 27.92 | 68.70 | 38.20 | 88.00 | 2.00 | 98.80 |
| Percent white | 252 | 6.57 | 11.76 | 1.50 | 0.80 | 4.65 | 0.00 | 63.70 |
| Enrollment size | 252 | 778.20 | 473.73 | 698.00 | 519.00 | 874.50 | 99.00 | 3572.00 |

## Table 2. Regression models predicting school's total general fund budget (in $100K), general fund per student spending, and percent of budget spent on instruction, 1999–2000 through 2015–16 school years

| | Total general fund budget ($100K) | | | General fund per student spending | | | Percent budget spent on instruction | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model 1 b | Model 2 b | Model 3 b | Model 1 b | Model 2 b | Model 3 b | Model 1 b | Model 2 b | Model 3 b |
| Fiscal year | 0.794*** | 0.790*** | 0.805*** | 91.231*** | 91.395*** | 92.660*** | 0.068*** | 0.069*** | 0.068*** |
| Enrollment size | 0.031*** | 0.032*** | 0.009*** | -1.550*** | -1.536*** | -3.638*** | 0.003*** | 0.003*** | 0.005*** |
| **Grade levels served (*reference group—elementary*)** | | | | | | | | | |
| Middle | 7.449*** | 5.667*** | 2.512*** | 1510.330*** | 1449.022*** | 1178.944*** | -3.197*** | -3.294*** | -3.098*** |
| High | 11.179*** | 9.590*** | 5.566*** | 1531.930*** | 1584.361*** | 1263.722*** | -6.682*** | -6.402*** | -6.091*** |
| **Achieve180 status (*reference group—no*)** | | | | | | | | | |
| Yes | 1.936* | 1.400 | 0.364 | 130.094 | 138.320 | 55.044 | -2.698** | -1.835* | -1.742* |
| **Separate and unique schools (*reference group—no*)** | | | | | | | | | |
| Yes | 2.199** | 2.478*** | 1.390*** | 219.095* | 204.681 | 123.762 | -1.593* | -1.656* | -1.552* |
| **Small school status (*reference group—no*)** | | | | | | | | | |
| Yes | -0.572* | -0.454 | -0.011 | 298.451*** | 307.860*** | 333.910*** | -1.503*** | -1.416*** | -1.441*** |
| **Percent economically disadvantaged (*reference group—low percent*)** | | | | | | | | | |
| Medium | | 1.642*** | 1.039** | | -59.392 | -102.378* | | -0.536 | -0.482 |
| High | | 1.581*** | 1.035* | | -79.936 | -117.825* | | -0.717* | -0.669 |
| **Percent career and technical education (*reference group—low and medium percent*)** | | | | | | | | | |
| High | | -0.095 | -0.384 | | -173.197*** | -203.258*** | | -0.562 | -0.533 |
| **Percent special education (*reference group—low percent*)** | | | | | | | | | |
| Medium | | 1.348*** | 1.241*** | | 90.390** | 75.201* | | -0.002 | 0.022 |
| High | | 3.429*** | 2.941*** | | 182.607*** | 127.755** | | -0.159 | -0.084 |
| **Percent English language learner (*reference group—low percent*)** | | | | | | | | | |
| Medium | | -2.984*** | -2.635*** | | -300.225*** | -280.951*** | | -0.032 | -0.052 |
| High | | -2.555*** | -2.198*** | | -250.749** | -232.115** | | -0.023 | -0.042 |
| **Percent gifted/talented (*reference group—low percent*)** | | | | | | | | | |
| Medium | | 0.114 | -0.030 | | 76.221* | 64.296* | | 0.145 | 0.155 |
| High | | -0.788 | -0.666 | | 7.896 | 9.026 | | 0.104 | 0.094 |
| **Percent bilingual (*reference group—low percent*)** | | | | | | | | | |
| Medium | | 0.341 | 0.394 | | 110.962* | 108.500* | | 0.065 | 0.071 |
| High | | 0.034 | 0.074 | | 119.626 | 121.405 | | -0.050 | -0.049 |
| **Percent black (*reference group—low percent*)** | | | | | | | | | |
| Medium | | -0.853* | -0.435 | | -99.244 | -67.197 | | 0.151 | 0.118 |
| High | | -1.783** | -0.904 | | -64.738 | 1.969 | | -1.111* | -1.182* |
| **Percent Hispanic (*reference group—low percent*)** | | | | | | | | | |
| Medium | | 0.277 | 0.089 | | 81.047 | 67.175 | | 1.250*** | 1.264*** |
| High | | 1.046 | 0.732 | | 34.550 | 24.509 | | 1.412** | 1.424** |
| **Percent white (*reference group—low percent*)** | | | | | | | | | |
| Medium | | -0.527* | -0.416 | | -19.252 | -8.819 | | -0.273 | -0.285 |
| High | | 0.352 | 0.809 | | 87.759 | 121.114 | | 0.128 | 0.080 |
| **Count of professional staff** | | | 0.462*** | | | 40.880*** | | | -0.046*** |
| **Intercept** | 4.963*** | 4.853*** | 0.796 | 4855.491*** | 4948.653*** | 4655.392*** | 77.899*** | 77.536*** | 77.821*** |

* p<0.05, **p<0.01, *** p<0.001

NOTE: Analytic sample includes schools open as of the 2017–18 school year, classified as either an elementary, middle, or high school, whose general fund budget per student amount was less than or equal to $15,000 and greater than or equal to $2,000. Models include random intercept to adjust for nesting of data within schools. Standard errors reported in separate table in appendix.

SOURCE: Houston Independent School District General Fund Budget Data, 1999–2000 through 2015–16

## Table 3. Odds ratios from logistic regression models predicting presence of assistant principal, 2013–14 through 2015–16

| | Model 1 OR | Model 2 OR | Model 3 OR | Model 4 OR |
|---|---|---|---|---|
| Fiscal year | 1.26** | 1.26** | 1.26** | 1.29** |
| Enrollment size | 1.00** | 1.00 | 1.00* | 1.00* |
| **Grade levels served (*reference group—elementary*)** | | | | |
| Middle | | 2.06 | 5.17* | 6.01* |
| High | | 1.21 | 1.93 | 2.33 |
| **Achieve180 status (*reference group—no*)** | | | | |
| Yes | | 0.76 | 0.82 | 0.87 |
| **Separate and unique schools (*reference group—no*)** | | | | |
| Yes | | 0.90 | 0.88 | 0.96 |
| **Small school status (*reference group—no*)** | | | | |
| Yes | | 0.74 | 0.72 | 0.63 |
| **Percent economically disadvantaged (*reference group—low percent*)** | | | | |
| Medium | | | 0.93 | 1.04 |
| High | | | 0.70 | 0.73 |
| **Percent career and technical education (*reference group—low percent*)** | | | | |
| Medium | | | 0.32 | 0.33 |
| High | | | 0.98 | 1.14 |
| **Percent special education (*reference group—low percent*)** | | | | |
| Medium | | | 0.64 | 0.62 |
| High | | | 0.97 | 1.01 |
| **Percent English language learner (*reference group—low percent*)** | | | | |
| Medium | | | 1.21 | 2.09 |
| High | | | 1.14 | 0.69 |
| **Percent gifted/talented (*reference group—low percent*)** | | | | |
| Medium | | | 0.96 | 1.08 |
| High | | | 0.94 | 1.08 |
| **Percent bilingual (*reference group—low percent*)** | | | | |
| Medium | | | | 0.64 |
| High | | | | 2.18 |
| **Percent black (*reference group—low percent*)** | | | | |
| Medium | | | | 1.47 |
| High | | | | 0.55 |
| **Percent Hispanic (*reference group—low percent*)** | | | | |
| Medium | | | | 0.37 |
| High | | | | 0.32 |
| **Percent white (*reference group—low percent*)** | | | | |
| Medium | | | | 0.96 |
| High | | | | 0.58 |

* p<0.05, **p<0.01, *** p<0.001

NOTE: Analytic sample includes schools open as of the 2017–18 school year, classified as either an elementary, middle, or high school, whose general fund budget per student amount was less than or equal to $15,000 and greater than or equal to $2,000. Models include adjustment to variance estimate due to nested nature of data. Data from human resource records from Houston ISD for the 2013–14, 2014–15, and 2015–16 school years. Coefficients are reported in odds ratios. A coefficient greater than 1 means something is more likely, and a coefficient less than 1 means something is less likely. See table in appendix for standard errors.

SOURCE: Houston Independent School District, Human Reource data, 2013–14 through 2015–16

## Table 4. Odds ratios from logistic regression models predicting presence of counselor, 2013–14 through 2015–16

| | Model 1 OR | Model 2 OR | Model 3 OR | Model 4 OR |
|---|---|---|---|---|
| Fiscal year | 1.16* | 1.18* | 1.19* | 1.19* |
| Enrollment size | 1.00*** | 1.00*** | 1.00*** | 1.00*** |
| **Grade levels served (*reference group—elementary*)** | | | | |
| Middle | | 1.50 | 3.14* | 3.55* |
| High | | 5.26*** | 11.52*** | 12.46*** |
| **Achieve180 status (*reference group—no*)** | | | | |
| Yes | | 0.89 | 0.60 | 0.48 |
| **Separate and unique schools (*reference group—no*)** | | | | |
| Yes | | 1.44 | 1.54 | 1.59 |
| **Small school status (*reference group—no*)** | | | | |
| Yes | | 1.12 | 1.05 | 0.96 |
| **Percent economically disadvantaged (*reference group—low percent*)** | | | | |
| Medium | | | 0.83 | 0.48 |
| High | | | 0.78 | 0.51 |
| **Percent career and technical education (*reference group—low percent*)** | | | | |
| Medium | | | 0.73 | 0.44 |
| High | | | 1.91 | 1.30 |
| **Percent special education (*reference group—low percent*)** | | | | |
| Medium | | | 1.33 | 1.29 |
| High | | | 1.31 | 1.16 |
| **Percent English language learner (*reference group—low percent*)** | | | | |
| Medium | | | 1.26 | 1.11 |
| High | | | 0.97 | 0.92 |
| **Percent gifted/talented (*reference group—low percent*)** | | | | |
| Medium | | | 0.34** | 0.46* |
| High | | | 0.26** | 0.41 |
| **Percent bilingual (*reference group—low percent*)** | | | | |
| Medium | | | | 2.27* |
| High | | | | 2.39 |
| **Percent black (*reference group—low percent*)** | | | | |
| Medium | | | | 0.36 |
| High | | | | 0.59 |
| **Percent Hispanic (*reference group—low percent*)** | | | | |
| Medium | | | | 0.56 |
| High | | | | 0.15* |
| **Percent white (*reference group—low percent*)** | | | | |
| Medium | | | | 1.14 |
| High | | | | 0.51 |

* p<0.05, **p<0.01, *** p<0.001

NOTE: Analytic sample includes schools open as of the 2017–18 school year, classified as either an elementary, middle, or high school, whose general fund budget per student amount was less than or equal to $15,000 and greater than or equal to $2,000. Models include adjustment to variance estimate due to nested nature of data. Data from human resource records from Houston ISD for the 2013–14, 2014–15, and 2015–16 school years. Coefficients are reported in odds ratios. A coefficient greater than 1 means something is more likely, and a coefficient less than 1 means something is less likely. See table in appendix for standard errors.

SOURCE: Houston Independent School District, Human Reource data, 2013–14 through 2015–16

## Table 5. Odds ratios from logistic regression models predicting presence of librarian, 2013–14 through 2015–16

| | Model 1 OR | Model 2 OR | Model 3 OR | Model 4 OR |
|---|---|---|---|---|
| Fiscal year | 0.81** | 0.80** | 0.78** | 0.77*** |
| Enrollment size | 1.00** | 1.00 | 1.00 | 1.00 |
| **Grade levels served (*reference group—elementary*)** | | | | |
| Middle | | 0.50 | 0.40 | 0.38 |
| High | | 0.94 | 0.79 | 0.82 |
| **Achieve180 status (*reference group—no*)** | | | | |
| Yes | | 1.03 | 1.50 | 1.88 |
| **Separate and unique schools (*reference group—no*)** | | | | |
| Yes | | 2.30** | 1.89* | 2.15* |
| **Small school status (*reference group—no*)** | | | | |
| Yes | | 0.59 | 0.61 | 0.59 |
| **Percent economically disadvantaged (*reference group—low percent*)** | | | | |
| Medium | | | 0.30*** | 0.48 |
| High | | | 0.20*** | 0.32* |
| **Percent career and technical education (*reference group—low percent*)** | | | | |
| Medium | | | 0.75 | 1.03 |
| High | | | 0.52 | 0.67 |
| **Percent special education (*reference group—low percent*)** | | | | |
| Medium | | | 0.93 | 1.02 |
| High | | | 0.78 | 0.86 |
| **Percent English language learner (*reference group—low percent*)** | | | | |
| Medium | | | 0.86 | 0.94 |
| High | | | 1.29 | 1.35 |
| **Percent gifted/talented (*reference group—low percent*)** | | | | |
| Medium | | | 1.02 | 0.87 |
| High | | | 1.18 | 0.73 |
| **Percent bilingual (*reference group—low percent*)** | | | | |
| Medium | | | | 0.91 |
| High | | | | 0.87 |
| **Percent black (*reference group—low percent*)** | | | | |
| Medium | | | | 0.48 |
| High | | | | 0.18* |
| **Percent Hispanic (*reference group—low percent*)** | | | | |
| Medium | | | | 0.43 |
| High | | | | 0.30 |
| **Percent white (*reference group—low percent*)** | | | | |
| Medium | | | | 1.85 |
| High | | | | 2.79 |

* p<0.05, **p<0.01, *** p<0.001

NOTE: Analytic sample includes schools open as of the 2017–18 school year, classified as either an elementary, middle, or high school, whose general fund budget per student amount was less than or equal to $15,000 and greater than or equal to $2,000. Models include adjustment to variance estimate due to nested nature of data. Data from human resource records from Houston ISD for the 2013–14, 2014–15, and 2015–16 school years. Coefficients are reported in odds ratios. A coefficient greater than 1 means something is more likely, and a coefficient less than 1 means something is less likely. See table in appendix for standard errors.

SOURCE: Houston Independent School District, Human Reource data, 2013–14 through 2015–16

## Table 6. Odds ratios from logistic regression models predicting presence of nurse, 2013–14 through 2015–16

| | Model 1 OR | Model 2 OR | Model 3 OR | Model 4 OR |
|---|---|---|---|---|
| Fiscal year | 0.93 | 0.94 | 0.93 | 0.94 |
| Enrollment size | 1.01*** | 1.01*** | 1.01*** | 1.01*** |
| **Grade levels served (*reference group—elementary*)** | | | | |
| Middle | | 0.19*** | 0.63 | 0.59 |
| High | | 0.20** | 0.68 | 0.67 |
| **Achieve180 status (*reference group—no*)** | | | | |
| Yes | | 0.71 | 0.80 | 0.79 |
| **Separate and unique schools (*reference group—no*)** | | | | |
| Yes | | 1.44 | 1.37 | 1.32 |
| **Small school status (*reference group—no*)** | | | | |
| Yes | | 1.08 | 1.11 | 1.00 |
| **Percent economically disadvantaged (*reference group—low percent*)** | | | | |
| Medium | | | 0.31* | 1.43 |
| High | | | 0.25* | 1.27 |
| **Percent career and technical education (*reference group—low percent*)** | | | | |
| Medium | | | 1.18 | 1.61 |
| High | | | 5.60 | 7.63* |
| **Percent special education (*reference group—low percent*)** | | | | |
| Medium | | | 1.36 | 1.40 |
| High | | | 1.37 | 1.25 |
| **Percent English language learner (*reference group—low percent*)** | | | | |
| Medium | | | 1.11 | 1.55 |
| High | | | 1.04 | 2.91 |
| **Percent gifted/talented (*reference group—low percent*)** | | | | |
| Medium | | | 1.31 | 1.46 |
| High | | | 0.46 | 0.31 |
| **Percent bilingual (*reference group—low percent*)** | | | | |
| Medium | | | | 0.81 |
| High | | | | 0.41 |
| **Percent black (*reference group—low percent*)** | | | | |
| Medium | | | | 0.41 |
| High | | | | 0.75 |
| **Percent Hispanic (*reference group—low percent*)** | | | | |
| Medium | | | | 0.94 |
| High | | | | 0.59 |
| **Percent white (*reference group—low percent*)** | | | | |
| Medium | | | | 1.44 |
| High | | | | 18.74** |

* p<0.05, **p<0.01, *** p<0.001

NOTE: Analytic sample includes schools open as of the 2017–18 school year, classified as either an elementary, middle, or high school, whose general fund budget per student amount was less than or equal to $15,000 and greater than or equal to $2,000. Models include adjustment to variance estimate due to nested nature of data. Data from human resource records from Houston ISD for the 2013–14, 2014–15, and 2015–16 school years. Coefficients are reported in odds ratios. A coefficient greater than 1 means something is more likely, and a coefficient less than 1 means something is less likely. See table in appendix for standard errors.

SOURCE: Houston Independent School District, Human Reource data, 2013–14 through 2015–16

# Appendix A: Useful Terms

### Equity

Equity is different from equality. Equality is when everyone gets the same thing. Equity is when everyone gets what they need to succeed. The Organization for Economic Cooperation and Development (OECD) defines equity as:

> Equity as inclusion means ensuring that all students reach at least a basic minimum level of skills. Equitable education systems are fair and inclusive and support their students to reach their learning potential without either formally or informally pre-setting barriers or lowering expectations. Equity as fairness implies that personal or socio-economic circumstances, such as gender, ethnic origin or family background are not obstacles to educational success (2012, p. 15):

### Funding Equity

One of the stated goals of Houston ISD is to promote positive student outcomes through funding equity. According to the district, funding equity is when specific characteristics that merit additional funding, such as poverty or historically under-served race/ethnic groups, are positively and significantly associated with funding.

### Weighted Student Funding (WSF)

WSF allocates campus level funds based on school level enrollment (elementary, middle or high school) and average daily attendance, incorporating additional funding for student characteristics such as English language learner or gifted/talented. Houston ISD calls the base amount a Per Unit Allocation (PUA) and adds extra funds for certain student characteristics (i.e., adds weights).

### Improvement Required (IR)

IR is a designation placed on a school by the Texas Education Agency (TEA) indicating that a specific number of students at that school did not meet current accountability standards. Those standards are derived largely by performance on the statewide assessment exam, State of Texas Assessment of Academic Readiness (STAAR). Multiple years of a school in IR status could trigger closure by the district or by the TEA.

### State Compensatory Education Unit (SCE)

SCE is a state designated funding category based on the number of students who are economically and academically disadvantaged. Houston ISD determines economically disadvantaged students using the free/reduced lunch applications and the economic survey form for non-Community Eligibility Provision and Community Eligibility Provision schools, respectively.

# Appendix B

**Table B-1. Houston ISD base amount PUA funding, by level of school: School years 2003–04 to 2016–17**

| Year | Per Unit Allocation | | |
|---|---|---|---|
| | Elementary | Middle | High |
| 2003–2004 | $2,732 | | |
| 2004–2005 | $2,802 | | |
| 2005–2006 | $2,768 | | |
| 2006– 2007 | $2,832 | $2,842 | $2,871 |
| 2007–2008 | $3,071 | $3,096 | $3,085 |
| 2008–2009 | $3,257 | $3,282 | $3,246 |
| 2009–2010 | $3,368 | $3,393 | $3,357 |
| 2010–2011 | $3,485 | $3,510 | $3,474 |
| 2011– 2012 | $3,257 | $3,282 | $3,246 |
| 2012–2013 | $3,341 | $3,366 | $3,330 |
| 2013–2014 | $3,378 | $3,403 | $3,367 |
| 2014–2015 | $3,470 | $3,495 | $3,459 |
| 2015–2016 | $3,589 | $3,625 | $3,589 |
| 2016–2017 | $3,522 | $3,558 | $3,522 |

# Appendix C: Brief overview of state and Houston ISD funding

Texas funds public schools through a multi-tiered funding structure utilizing a combination of state and local taxes. While local revenues account for more than half of all education spending, all money is allocated through the state funding formula system, and is state controlled. The amount a specific district can retain from local property taxes is capped, with all additional dollars sent to the state to be distributed to 'property poor' school districts through a system known as *recapture*. Reductions in state funding and an increased reliance on local tax dollars have impacted overall funding levels. It is also important to note that while equity within a district may exist as it relates to available resources, it should not be viewed that those resources are "adequate" as that term is legally used in school funding.

The state funding formula utilizes a weighted student funding (WSF) approach, which is a common mechanism at the state level (Hanushek, 2012; Verstegen, 2016). This funding includes the basic allotment per student, adjusted based on several district specific features such as the cost of education in a region or the sparsity of population; weights are then added to deliver additional funding for students with specific characteristics. The cost of education index[18], or CEI, was last updated in 1991. Many of the weights and allocations have not been updated since 1989.

Over the last 15 years, the share of funding provided by the State has consistently been less than half of all education spending. The foundation schools program, the primary mechanism to fund Texas schools has seen increases in overall spending, climbing from over $22 billion in 2000 to over $48 billion in 2018. While the increase in spending over this period may appear dramatic, adjusted for inflation and student population growth, the spending level has largely been flat. During that period the average percentage of state taxes contributing to public education has averaged less than 44% of overall spending. In real terms, the contribution of local taxes to the overall spending in public education has more than doubled over this period, climbing from over $11 billion in 2000, to over $28 billion in 2018. Much of this increase has been a result of an increase in property values that serve as the basis of local property taxes. This increase has seen more school districts designated as property rich, placing them into recapture and triggering a distribution of those local revenues, Houston ISD has been in recapture since the 2016–2017 fiscal year.

Houston ISD's decentralized funding system mirrors the state WSF system, apportioning per unit allocations (PUAs) for students at the elementary, middle, and high school levels. (See Appendix B, Table B-1 for table of historical PUA amounts.) Like the state system, the district's weights have not been updated recently[19]. Currently, the PUA accounts for approximately 46% of a school's budget. The number of students is calculated based upon attendance, plus the presence of special population units.

18 The current CEI attempts to adjust for varying economic conditions across the state, based mainly on the size of the district, the teacher salaries of neighboring districts, and the percentage of low-income students in the district in 1989–1990. The index has not been updated since that time (TEC, §42.102).

19 As one exception, the mobility weight of .1 was split into the two categories of homeless (.05) and refugee (.05) in 2013.

**Table C-1. Houston ISD special population weight values: 2016–17**

| Special population | Weights |
|---|---|
| State compensatory education (SCE) | .15 |
| Special Education | .15 |
| Gifted/talented (GT) | .12* |
| English language learner (ELL) | .10* |
| Homeless | .05 |
| Refugee | .05 |
| Career and Technical Education (CTE) | .35* |

NOTE: Asterisk indicates Houston ISD weights that are equivalent to the TEA weights for those specific categories. Weights reflect values from 2016–17, which have gone largely unchanged compared to the years of data included in the analyses.

As seen in Table 1, there are six special population groups receiving extra funding through a student population weight system, as well as the career and technical education (CTE) programming. From an equity perspective, the state compensatory education (SCE) weight is particularly relevant. An SCE weight of 15% is applied to half of the economically disadvantaged and at-risk students at a school. That is the equivalent of every economically disadvantaged and at-risk student at a school receiving a weight of 7.5%.

For the career and technical education (CTE) weight, Houston ISD uses a full-time equivalent (FTE)-based weighting system of 35% that generates full-time equivalents based upon the number of CTE students in a school.

Houston ISD has also shifted its magnet funding system to a hybrid FTE-WSF model that provides full time-equivalents based upon program participation. Schools receive a "capital allocation" that in 2016–17 amounted to $10 per pupil.

Finally, schools designated as "small schools" receive an additional subsidy to defray the higher marginal cost of running a small operation.

For all schools in Houston ISD, the only staffing requirements specified by policy are a principal and a secretary.

Notably, during the 2016–17 school year, 262 of the 284 HISD campuses receive Title I funds from the federal government, which are designed to provide supplemental funds for at-risk and low-income students, thereby playing a significant role in promoting funding equity. Houston ISD applies a progressive distribution with Title I funds, so that schools with more than 35% economically disadvantaged students receive an additional $424–$482 per student, depending on the population of economically disadvantaged. This progressive weight is a result of equity expert recommendations based on the impact of high concentrations of poverty at specific schools. Of note, the analyses described in this report do not include Title I or any federal source of funding.

# Appendix D: Description of Data, Sample Preparation, Variables, and Methods

For this study, we used general fund budget data from the 1999–2000 through 2015–16 school years, as well as human resource data from the 2013–14 through 2015–16 school years. Table 1 in the main body of the text provides description of the data used in analyses from the 2015–16 school year, and of data for each school year included in the study, overall for the district and separately for elementary, middle, and high schools is available from the authors upon request.

General fund budget data were used to look at schools' total general fund budget, per student spending of general funds, and percentage of general fund budget spent on instruction. Funds spent on instruction were identified as any funds spent on a category 11 expense in the line-item generalized fund data. This study does not look at schools' total budgets, only the parts of schools' budgets resulting from the district's current Resource Allocation Formula (i.e., funds determined through the PUA model).

Human resource data were used to determine the presence of key personnel at Houston ISD schools, focusing specifically on the presence of assistant principals, counselors, nurses, and librarians. These roles were identified for consideration as part of this analysis because they were frequently the roles identified by Houston ISD staff and Board members as essential personnel for a school. The three years of HR data used as part of this study (2013–14 through 2015–16) were the three most recently available years of data at the time of the analyses.

Budget data were stored in campus-year format, where each row of the data file represented a single year from a campus (e.g., row 1 contained data from Campus A, Year 2000; row 2 contained data from Campus A, Year 2001; row 3 contained data from Campus A, Year 2002). The general fund budget data included only public funds sent from the district to its schools as part of the current funding strategy of Houston ISD. None of the analyses include external, private, or non-profit funding sources, such as money from grants, school-specific organizations, or federal sources. The original data file contained 4,843 campus-year records. In order to arrive at the final sample of schools included in the analyses, several filters were applied.

First, we limited the sample to include data from schools that were open as of the 2017–18 school year, which resulted in dropping 694 campus-year records. Next, we dropped data related to campus-years reporting the grade level served as "Both", which resulted in dropping 74 campus-year records. Finally, we calculated a "per student spending adjusted for inflation" measure (to account for changes in the value of the dollar over the duration of the available data) and identified extremely high values (i.e., schools receiving inflation-adjusted general fund amounts of more than $15,000 per student) and extremely low values (i.e., schools receiving inflation-adjusted general fund amounts of less than $2,000 per student). There were 35 campus-years dropped because of extremely high values, and 149 campus-years dropped because of extremely low values. The final analytic sample for the Houston ISD general fund budget data was 3,891 campus-years belonging to 171 elementary school campuses, 40 middle school campuses, and 41 high school campuses that were open at the start of the 2017–18 school year.

### Total general fund budget in $100K

Total general fund budget was calculated by summing together the total amount of funds associated with a school within a given school year in the funding records. Multiple categories of expenses were included in the total general fund budget: community services, curriculum development, data processing, debt services, extracurricular activities, facilities maintenance operation, facilities acquisition construction, food services, general administration, guidance counseling, health services, instruction, instructional leadership, inter-governmental charges,

juvenile justice alternative education placement (JJAEP), media services, school leadership, security, social work services, staff development, tax increment reinvestment zone (TIRZ), transfers out, and transportation. Total general fund budgets was divided by 100,000 to create the variable used in the study.

### General fund budget amount per student

For each campus-year, a school's total general fund budget was divided by the school's enrollment to calculate the general fund budget amount per student at a school.

### Percentage of total general fund budget spent on instruction

For each campus-year, to calculate the percentage of total general fund budget spent on instruction, the dollar amount reported for the category "instruction" was divided by the total general fund budget and then multiplied by 100.

### Presence of key personnel at a school

Using the human resource data from the 2013–14 school year, 2014–15 school year, and 2015–16 school year, presence of key personnel was determined for each school year based on whether or not a school reported a person working in the school in that position. The original data contained 784 campus-year records in the human resource file. Applying the filters described above, the final analytic sample was made up of 730 campus-year belonging to 170 elementary schools, 39 middle schools, and 39 high schools that were open at the start of the 2017–18 school year.

Four key personnel roles were identified: assistant principal, counselor, librarian, and nurse. The position could be full-time or part-time. Presence of the key personnel was coded a 1, and absence was coded a 0 for each campus-year of data available for a school.

### Grade levels served

Grade levels served was based on the classification of the school as elementary school, middle school, or high school during the 2017–18 school year by Houston ISD. Elementary school, middle school, and high school status were coded as 1 to indicate the school belonged to that classification and 0 to indicate the school did not belong to that classification. Middle school and high school indicators were included in the analyses, with the elementary school indicator left out as the reference group. As a result, all comparisons are made to elementary schools.

### Small Schools

The definition of small school has changed in the district over the time period covered in this study. Between the 1999–2000 and 2001–2002 school years, small school was defined as any school with an enrollment of less than 400. During the 2002–03 school year, small school was defined as any school with an enrollment of less than 500. Beginning in 2003–04, the definition of small school was changed to be grade level specific. Any elementary school with less than 500 students, middle school with less than 750 students, or high school with less than 1000 students was classified as a small school. These definitions were applied to each campus year of data. If a school met the condition for being classified as a small school, it was coded 1, and all non-small schools were coded 0.

### Separate and Unique Schools (SUS)

Separate and unique schools (SUS) were identified using lists from Houston ISD's website of magnet choice programs located here. These programs were present during the 2017–18 school year, and schools were identified as SUS, regardless of when a program started at a school. Schools appearing on the list of magnet choice programs were coded as 1, and all other schools were coded as 0.

### Chronically Improvement Required (IR) schools

Chronically improvement required schools were identified as any school appearing on the list of schools currently associated with the "Achieve 180" program at the start of the 2017–18 school year. These include schools at all four levels of the Achieve 180 program: tertiary group, secondary group, primary group, and Superintendent's schools. Schools appear on the list of Achieve 180 schools were coded as 1, and all other schools were coded as 0. Note, Achieve 180 status could indicate that a school was a first year IR school, a second year IR school, or perhaps, a former IR school.

### Resource Allocation Components

Four of the six student characteristic that have funding weights applied to them, as well as career and technical education (CTE) students at a school were included in the study. The original data provided information on the percent of students at a school for a given year who were economically disadvantaged, gifted/talented, English language learners, special education, and CTE. These campus-year percentages were categorized into high-, medium-, and low-percent schools based on the distribution of percentages for each year (see Exhibit A). The cut-point for identifying high-percent schools was the 80th per-

centile, the cut-point for identifying low-percent schools was the 20th percentile, and the medium-percent group was defined as all schools between the high- and low-percent schools. These cut-points were largely data driven, and set to ensure sufficient sample sizes in each group to allow for stable estimates. The high-percent and medium-percent indicators were included in the models, with the low-percent indicator left out as the reference group. Since the low-percent indicator was set as the reference group, all comparisons are made to this group.

### Student body characteristics

Four measures of student body characteristics were included in the analysis reflecting the percent of students in a school who were bilingual, black, Hispanic, or white. Similar to the Resource Allocation Component variables, the percent variables for student body characteristics were categorized into high-, medium-, and low-percent schools based on the distribution of percentages for each year (see Exhibit A). The cut-point for identifying high-percent schools was the 80th percentile, the cut-point for identifying low-percent schools was the 20th percentile, and the medium-percent group was defined as all schools between the high- and low-percent schools. These cut-points were largely data driven, and set to ensure sufficient sample sizes in each group to allow for stable estimates. The high-percent and medium-percent indicators were included in the models, with the low-percent indicator left out as the reference group. Since the low-percent indicator was set as the reference group, all comparisons are made to the low-percent group.

### Count of professional staff at a school

Texas Academic Performance Reports (TAPR) and Academic Excellence Indicator System (AEIS) data were used to determine the number of professional staff at a school during each campus-year a school was present in the data. The variable CPSTOFC was used for these analyses, which contains information on the total full time equivalent (FTE) professional staff at a school in a given school year.

### Time

Data were provided in campus-year format, so to adjust for changes in the budget taking place over time, the analyses included a linear effect of time using the fiscal year associated with each campus-year. In order for the intercept to be somewhat meaningful, fiscal-year was centered, so that fiscal-year 2008 is now set to 0, so that the intercept reflect the average expected value for the 2008 fiscal year.

### Enrollment size

Enrollment size was reported for each campus-year. In order for the intercept to be somewhat meaningful, enrollment was centered, so that the intercept reflects the average expected value for the average sized school.

For models predicting total general fund budgets, per student spending, and percent general fund budget spent on instruction, a multi-level mixed effect model was used. For models predicting the presence of key personnel in a school, a logistic regression model with variance adjustments for clustered data was used

In addition to the independent variables of interest (i.e., grade level served, small school status, percent economically disadvantaged, and percent Hispanic, black, or white students), full models included control variables for Achieve 180 status (as of 2017–18), separate and unique school status (as of 2017–18), enrollment size, proportion career and technical education (CTE) students, proportion special education students, proportion English language learner (ELL) students, proportion gifted/talented students, and proportion bilingual students.

### Mixed-effect linear regression model

For models predicting total general fund budget, general fund budget per student spending, and percent of total general fund budget spent on instruction, a mixed-effect linear model was used. Mixed-effect linear regression models are able to incorporate time-varying (level-1) and time-invariant (level-2) measures, which was important given the different ways variables in the data were coded. For analyses using the budget data, the time-varying campus-year measures (n = 3,891) were nested in schools (n = 251). Descriptive statistics were computed for each campus-year of data and are reported in Appendix E. For each of the outcome (dependent) variables, a step-wise modeling strategy is used to first, establish if a bivariate association exists between the predictor (independent) variable and the outcome, and then second, a full(er) model is used to see if the association observed at the bivariate level remains under more stringent conditions.

Most of the results discussed in this brief focus on findings from the full models, as these represent the most stringent tests of an association, and allow for the reader to determine if an association exists between the predictor variable and outcome variable after other variables are included in the model, it provides more convincing evidence that the two variables are related. If after including other variables in the model the bivariate relationship goes

away, it suggests that there may not be a direct relationship between the predictor variable and outcome variable.

The equations for the full models are presented below:

Level 1:

$$Y_{ti} = \pi_{0i} + \pi_{1i}\,(\text{TIME}_{ti}) + \pi_{2i}\,(\text{ENROLL}_{TI}) + \pi_{si}\,(\text{SMALL}_{TI}) + \pi_{ni}\,(\text{RAC}_{TI}) + \pi_{ki}\,(\text{STUDENT}_{TI}) + e_{ti}$$

Level 2:

$$\pi_{0i} = \beta_{00} + \beta_{01}\,\text{ACHIEVE180}_i + \beta_{02}\,\text{SUS}_i + \beta_{03}\,\text{LEVEL}_i + r_{0i}$$

$$\pi_{1i} = \beta_{10}$$

$$\pi_{2i} = \beta_{20}$$

$$\pi_{si} = \beta_{s0}$$

$$\pi_{ni} = \beta_{n0}$$

$$\pi_{ki} = \beta_{k0}$$

where Y is total general fund budget in $100K, total general fund per student spending, or percent of total general fund budget spent on instruction. TIME is the fiscal year variable that has been centered on 2008 and represents the average linear change in annual funding during the duration of years of data used in this analysis. ENROLL is the enrollment variable that has been centered on the grand mean for enrollment in Houston ISD during the duration of years of data in this analysis, and represents the expected average change in the predictor variable associated with one additional student at a school. SMALL is a time-varying measure of small school status, and represents the expected average difference in the predictor variable of being a small school versus a non-small school. RAC is a vector of time-varying Resource Allocation Component variables coded into high-percent, medium-percent, and low-percent, and represents the average difference in the outcome variable for either a medium-percent or high-percent school relative to a low-percent school. At level 2, ACHIEVE180 is the time-invariant measure indicating if a school is designated as part of the Achieve 180 program during the 2017–18 school year, and represents the average difference in the outcome variable between Achieve 180 and non-Achieve 180 schools. SUS is the time-invariant measure of separate and unique schools, and represents the average difference in the outcome variable between SUS and non-SUS schools. LEVEL is the time-invariant measure of grade level served, and is a categorical measure of elementary school, middle school, and high school; with elementary school set as the reference group, representing the average difference in the outcome variable for either middle schools or high schools.

### Logistic regression model with variance adjustments for clustered data

For models predicting the presence of key personnel, because the outcome variable was a binary measure (i.e., a variable with a value of 1 or 0), the mixed-effect linear regression model would not be a sufficient estimation strategy. As a result, logistic regression was used with adjustments to the variance for the clustered nature of the data. In logistic regression, the models produce coefficients that represented the predicted change in the log odds of the outcome variable associated with the predictor variable. These units (i.e., log odds) are generally unintelligible, so to make the results more intuitive, all regression coefficients from the logistic regression models are reported in odds ratios. Odds ratios can be interpreted as "for a one unit change in the predictor variable, the predicted odds of the outcome variable happening changes by [($e^b$–1) * 100] percent". More simply stated, odds ratio values greater than 1 mean that as the predictor variable changes the odds of the outcome variable happening go up, while odds ratio values less than 1 means that as the predictor variable changes the odds of the outcome variable happening goes down.

Results from logistic regression models can be used to create "predicted probabilities", which reflect the predicted likelihood of an event happening based on certain values of the predictor variable. Figure X reports predicted probabilities of key personnel for different enrollment sizes to make clear the important role of enrollment size in the presence of key personnel at a school.

# Appendix E: Study results from analyses run separately by school level

In addition to the analyses reported in the main body of the text, which performed analyses on the entire district, when sufficient data were available, these analyses were also run separately by school level (i.e., elementary, middle, and high schools). Selected results from the school level-specific analyses are reported below, as are tables containing the full set of results from these analyses. Please note, any results mentioned below are from the full analysis model, which included the full set of control variables. See main body of text for list of control variables.

## General fund budget—Total budget and per student spending—By school level

***Among elementary schools, schools serving more black students had smaller total general fund budgets than schools serving fewer black students.*** High-percent black elementary schools had total general fund budgets that were $80,000 less than the total general fund budgets of low-percent black elementary schools, even after controlling for number of professional staff in a school.

***Among elementary schools, schools serving more white students had smaller total general fund budgets than schools serving fewer white students***. High-percent white elementary schools had total general fund budgets that were about $70,000 less than the total general fund budgets of low-percent white elementary schools, even after controlling for number of professional staff in a school.

***Among middle schools, small schools had smaller general fund budgets than non-small schools***. Middle schools that were classified as small schools had total general fund budgets that were about $270,000 less than the total general fund budgets of middle schools that were non-small schools, even after considering enrollment size, student body characteristics, and number of professional staff.

***Among high schools, small schools had smaller total general fund budgets than non-small schools***. High schools that were classified as small schools had total general fund budgets that were about $660,000 less than the total general fund budgets of high schools that were non-small schools, net of enrollment size, student body characteristics, and number of professional staff.

***Among high schools, schools serving more white students had lower per student spending than schools serving fewer white students***. High-percent white high schools had per student spending based on the total general fund budget that was about $630 less than the per student spending of low-percent white high schools.[20] Medium-percent white high schools had per student spending that was about $390 less than the per student spending of low-percent white high schools.[21]

## Percent spent on instruction and presence of key personnel—By school level

***Among elementary schools, small schools spent a lower percentage of their total general fund budget on instruction than did elementary schools that were non-small schools***. Elementary schools classified as small schools spent about 1.4% less of their total general fund budget on instruction (i.e., category 11 expenses), than did elementary schools that were non-small schools. There was no difference between small and non-small schools at the middle school and high school levels.

20 See Exhibit A for definition of "high-percent" and "low-percent".
21 See Exhibit A for definition of "medium-percent" and "low-percent".

***Among middle schools, schools serving more black students spent a lower percent of their total general fund budget on instruction than schools serving fewer black students.*** High-percent black middle schools spent about 4.1% less of their total general fund budget on instruction than did low-percent black middle schools.[22]

***Within each school type, enrollment was positively and significantly related to the likelihood of key personnel at a school***. For elementary schools, middle schools, and high schools, enrollment size was positively related to the likelihood of a school having an assistant principal, counselor, librarian, or nurse on staff.

Due to the limited number of years of available personnel data (i.e., 2013–14, 2014–15, and 2015–16), we were unable to look at the likelihood of key personnel by certain student body characteristics separately for each grade type (i.e., elementary, middle, and high).

In summary, results from the analyses run separately by school level returned findings that did not always align with the findings from the models reported on in the main body of the text, which were run on data from the whole district in a single model. For example, overall in the district, small school status is not related to the total general fund budget; however, when looking at small school separately by level (i.e., elementary, middle, and high), the total general fund budgets of small middle schools and small high schools were smaller than the total general fund budgets of non-small middle schools and non-small high schools. As another example, when looking at the overall district, schools serving more economically disadvantaged students had larger total general fund budgets, but this pattern did not remain when looking within elementary, middle, or high schools.

22 See Exhibit A for definition of "high-percent" and "low-percent".

## Table E-1. Regression models predicting school's total general fund budget (in $100Ks) for elementary schools, middle schools, and high schools, 1999–2000 through 2015–16 school year

| | Elementary schools | | Middle schools | | High schools | |
|---|---|---|---|---|---|---|
| | Model 1 b | Model 2 b | Model 1 b | Model 2 b | Model 1 b | Model 2 b |
| Fiscal year | 0.60*** | 0.62*** | 1.01*** | 1.08*** | 1.89*** | 1.78*** |
| Enrollment size | 0.03*** | 0.01*** | 0.03*** | 0.00 | 0.04*** | 0.01*** |
| **Achieve180 status (*reference group—no*)** | | | | | | |
| Yes | -0.90 | -0.45 | 4.87 | 1.45 | 7.42** | 3.73 |
| **Separate and unique schools (*reference group—no*)** | | | | | | |
| Yes | 1.04** | 0.70*** | 7.44*** | 5.16*** | 6.41** | 6.01** |
| **Small school status (*reference group—no*)** | | | | | | |
| Yes | -0.71*** | -0.18 | -2.39*** | -2.66*** | -8.40*** | -6.64*** |
| **Percent economically disadvantaged (*reference group—low percent*)** | | | | | | |
| Medium | | -0.11 | | -1.40 | | -0.55 |
| High | | 0.10 | | -2.06 | | 0.60 |
| **Percent career and technical education (*reference group—low percent*)** | | | | | | |
| Medium | | - - | | -2.27** | | -0.07 |
| High | | - - | | -2.55** | | 0.00 |
| **Percent special education (*reference group—low percent*)** | | | | | | |
| Medium | | 0.53*** | | 2.01** | | 0.34 |
| High | | 0.94*** | | 2.24* | | 0.07 |
| **Percent English language learner (*reference group—low percent*)** | | | | | | |
| Medium | | -0.13 | | -0.76 | | -1.63 |
| High | | 0.52 | | -2.39* | | -2.50 |
| **Percent gifted/talented (*reference group—low percent*)** | | | | | | |
| Medium | | 0.78*** | | -1.25* | | -0.27 |
| High | | 1.48*** | | -1.41 | | -7.09*** |
| **Percent bilingual (*reference group—low percent*)** | | | | | | |
| Medium | | -0.15 | | -0.63 | | -0.72 |
| High | | -0.50 | | -0.83 | | 1.18 |
| **Percent black (*reference group—low percent*)** | | | | | | |
| Medium | | -0.13 | | -0.91 | | 1.52 |
| High | | -0.75* | | 0.55 | | 1.50 |
| **Percent Hispanic (*reference group—low percent*)** | | | | | | |
| Medium | | -0.42 | | -0.26 | | 0.73 |
| High | | -0.57 | | 1.03 | | -1.07 |
| **Percent white (*reference group—low percent*)** | | | | | | |
| Medium | | -0.18 | | 0.13 | | -1.23 |
| High | | -0.67* | | 0.16 | | 0.33 |
| **Count of professional staff** | | 0.42*** | | 0.46*** | | 0.39*** |
| **Intercept** | 8.57*** | 2.91*** | 12.15*** | 12.69*** | 8.06** | 6.86 |

* p<0.05, **p<0.01, *** p<0.001

NOTE: Analytic sample includes schools open as of the 2017–18 school year, classified as either an elementary, middle, or high school, whose general fund budget per student amount was less than or equal to $15,000 and greater than or equal to $2,000. Models include adjustment to variance estimate due to nested nature of data. Data from human resource records from Houston ISD for the 2013–14, 2014–15, and 2015–16 school years. Coefficients are reported in odds ratios. A coefficient greater than 1 means something is more likely, and a coefficient less than 1 means something is less likely. See table in appendix for standard errors.

SOURCE: Houston Independent School District General Fund Budget Data, 1999–2000 through 2015–16

## Table E-2. Regression models predicting school's per student spending of general fund budget for elementary schools, middle schools, and high schools, 1999–2000 through 2015–16 school year

| | Elementary schools | | Middle schools | | High schools | |
|---|---|---|---|---|---|---|
| | Model 1 b | Model 2 b | Model 1 b | Model 2 b | Model 1 b | Model 2 b |
| Fiscal year | 85.75*** | 85.68*** | 119.79*** | 125.12*** | 129.31*** | 127.23*** |
| **Achieve180 status (*reference group—no*)** | | | | | | |
| Yes | -33.11 | -34.51 | 471.07 | 82.10 | 657.03* | 432.57 |
| **Separate and unique schools (*reference group—no*)** | | | | | | |
| Yes | 195.24*** | 200.46*** | 399.05 | 355.20 | 365.28 | 345.32 |
| **Small school status (*reference group—no*)** | | | | | | |
| Yes | 442.45*** | 442.22*** | 698.29*** | 623.09*** | 569.55*** | 571.80*** |
| **Percent economically disadvantaged (*reference group—low percent*)** | | | | | | |
| Medium | | 11.72 | | -146.74 | | 89.60 |
| High | | 28.43 | | -152.46 | | 70.26 |
| **Percent career and technical education (*reference group—low percent*)** | | | | | | |
| Medium | | - - | | -98.10 | | -144.79 |
| High | | - - | | -280.49 | | 138.93 |
| **Percent special education (*reference group—low percent*)** | | | | | | |
| Medium | | 120.55*** | | -215.78 | | -16.45 |
| High | | 281.63*** | | -128.60 | | -9.95 |
| **Percent English language learner (*reference group—low percent*)** | | | | | | |
| Medium | | -61.13 | | -52.21 | | 14.53 |
| High | | -23.56 | | -273.37 | | -157.02 |
| **Percent gifted/talented (*reference group—low percent*)** | | | | | | |
| Medium | | 39.48 | | -0.64 | | 13.95 |
| High | | 109.92* | | -54.13 | | -48.87 |
| **Percent bilingual (*reference group—low percent*)** | | | | | | |
| Medium | | 35.28 | | -36.83 | | 93.33 |
| High | | 32.31 | | -89.89 | | 186.95 |
| **Percent black (*reference group—low percent*)** | | | | | | |
| Medium | | -15.38 | | 295.36 | | 505.44* |
| High | | -83.08 | | 1111.45*** | | 353.62 |
| **Percent Hispanic (*reference group—low percent*)** | | | | | | |
| Medium | | -49.52 | | 1.86 | | -190.31 |
| High | | -23.40 | | 58.38 | | 77.13 |
| **Percent white (*reference group—low percent*)** | | | | | | |
| Medium | | -28.26 | | 116.41 | | -391.23** |
| High | | -38.66 | | -269.10 | | -632.63* |
| **Intercept** | 3953.03*** | 3863.74*** | 4252.23*** | 4442.20*** | 4109.86*** | 4216.01*** |

* p<0.05, **p<0.01, *** p<0.001

NOTE: Analytic sample includes schools open as of the 2017–18 school year, classified as either an elementary, middle, or high school, whose general fund budget per student amount was less than or equal to $15,000 and greater than or equal to $2,000. Models include adjustment to variance estimate due to nested nature of data. Data from human resource records from Houston ISD for the 2013–14, 2014–15, and 2015–16 school years. Coefficients are reported in odds ratios. A coefficient greater than 1 means something is more likely, and a coefficient less than 1 means something is less likely. See table in appendix for standard errors.

SOURCE: Houston Independent School District General Fund Budget Data, 1999–2000 through 2015–16

## Table E-3. Regression models predicting school's percent spent on instruction for elementary schools, middle schools, and high schools, 1999–2000 through 2015–16 school year

| | Elementary schools | | Middle schools | | High schools | |
|---|---|---|---|---|---|---|
| | Model 1 b | Model 2 b | Model 1 b | Model 2 b | Model 1 b | Model 2 b |
| Fiscal year | 0.10*** | 0.10*** | 0.05 | 0.08* | -0.15*** | -0.14*** |
| Enrollment size | 0.01*** | 0.01*** | 0.00 | 0.00* | 0.00* | 0.00 |
| **Achieve180 status (*reference group—no*)** | | | | | | |
| Yes | -0.72 | -0.36 | -5.85* | -4.46 | -7.13** | -4.76 |
| **Separate and unique schools (*reference group—no*)** | | | | | | |
| Yes | 0.72 | 0.47 | -4.92* | -5.05** | -6.57** | -6.91** |
| **Small school status (*reference group—no*)** | | | | | | |
| Yes | -1.45*** | -1.39*** | -0.51 | -0.19 | -0.65 | -0.26 |
| **Percent economically disadvantaged (*reference group—low percent*)** | | | | | | |
| Medium | | -0.22 | | -1.70 | | -0.98 |
| High | | -0.40 | | -2.34* | | -1.85 |
| **Percent career and technical education (*reference group—low percent*)** | | | | | | |
| Medium | | - - | | -3.14** | | 0.31 |
| High | | - - | | -3.10** | | 0.10 |
| **Percent special education (*reference group—low percent*)** | | | | | | |
| Medium | | 0.25 | | -0.90 | | 0.47 |
| High | | 0.26 | | -0.76 | | -1.38 |
| **Percent English language learner (*reference group—low percent*)** | | | | | | |
| Medium | | -0.47 | | 0.18 | | 1.90* |
| High | | -0.70 | | 0.68 | | 1.96 |
| **Percent gifted/talented (*reference group—low percent*)** | | | | | | |
| Medium | | 0.01 | | 0.44 | | 1.24* |
| High | | 0.28 | | -0.44 | | 3.05*** |
| **Percent bilingual (*reference group—low percent*)** | | | | | | |
| Medium | | 0.09 | | -0.78 | | 0.23 |
| High | | 0.52 | | -0.65 | | 0.48 |
| **Percent black (*reference group—low percent*)** | | | | | | |
| Medium | | 0.57 | | -2.07* | | -0.94 |
| High | | -0.17 | | -4.12** | | -2.22 |
| **Percent Hispanic (*reference group—low percent*)** | | | | | | |
| Medium | | 0.54 | | 1.07 | | 1.87* |
| High | | 0.81 | | 0.22 | | 0.68 |
| **Percent white (*reference group—low percent*)** | | | | | | |
| Medium | | -0.42* | | -0.82 | | -0.03 |
| High | | 0.21 | | -1.65 | | 1.04 |
| **Intercept** | 74.67*** | 74.32*** | 76.27*** | 83.17*** | 77.07*** | 74.01*** |

* p<0.05, **p<0.01, *** p<0.001

NOTE: Analytic sample includes schools open as of the 2017–18 school year, classified as either an elementary, middle, or high school, whose general fund budget per student amount was less than or equal to $15,000 and greater than or equal to $2,000. Models include adjustment to variance estimate due to nested nature of data. Data from human resource records from Houston ISD for the 2013–14, 2014–15, and 2015–16 school years. Coefficients are reported in odds ratios. A coefficient greater than 1 means something is more likely, and a coefficient less than 1 means something is less likely. See table in appendix for standard errors.

SOURCE: Houston Independent School District General Fund Budget Data, 1999–2000 through 2015–16

# Appendix F: Supplemental analysis on sample size versus small school status

In Houston ISD, a school is designated a small school based on its enrollment size; therefore, models controlling for enrollment size and small school status were in part double-counting the important that the number of students in a school had in predicting the presence of personnel at a school. To provide additional insight into whether small school status mattered for the presence of personnel in a school, an additional analysis was done in which the sample was limited to a set of schools whose enrollment size was within a restricted range around the definition of "small school" (see Footnote 1 in main body of text for more detail on definition of small school in Houston ISD). Specifically, the sample of schools was limited to schools with enrollment sizes +/–100 of the small school threshold. For example, currently, the definition of a small school for middle schools is 750 students. In the restricted range analysis, for a middle school to be included in the analysis, the enrollment size of the middle school needed to range between 650 and 850 students (i.e., small school threshold +/- 100 students).

The logic behind the limited range analysis is that these schools are, generally speaking, more similar to each other in their appearance, structure, and functioning because they are all roughly the same size, than other schools that are either much larger or much smaller. To offer a more concrete example, a middle school that has 675 students is more similar to a middle school that has 825 students than either school is to a middle school serving 1,350 students.

With this restricted range sample in place, a regression analysis was run predicting the presence of certain personnel at a school and including in the model fiscal year, school level, and small school status. In other words, enrollment size was not controlled. In the context of these models with a restricted range of enrollment size, small school status was not a statistically significant predictor for the presence of any personnel.

In other words, small school status did not differentiate the presence of absence of personnel among schools whose enrollment size was immediately above or immediately below the cut-off for what it meant to be a small school.

Taking the results from these restricted-range analysis, along with the other models presented in this brief that show a consistent statistically significant associations between enrollment size and the outcomes and inconsistently significant associations between small school status and the outcomes, we conclude that enrollment size, as a continuum of sizes, is more important for understanding a school's budget and how a school is spending its budget than whether a school is above or below a certain threshold in size (i.e., the small school status).

See Table E-1 for results from regression models run with the sample filtered based on a restricted range of enrollment size.

## Table F-1. Regression models predicting presence of assistant principal, counselor, librarian, or nurse at a school with restricted range of enrollment size +/-100 of the small school threshold, 2013–14 through 2015–16 school years

| | Assistant principal | | Counselor | | Librarian | | Nurse | |
|---|---|---|---|---|---|---|---|---|
| | Model 1 OR | Model 2 OR | Model 1 OR | Model 2 OR | Model 1 OR | Model 2 OR | Model 1 OR | Model 2 OR |
| Fiscal year | 1.75*** | 1.88** | 1.09 | 1.04 | 0.87 | 0.85 | 0.87 | 0.86 |
| **Grade levels served (*reference group—elementary*)** | | | | | | | | |
| Middle | | 22.27*** | | 5.82* | | 1.17 | | 3.41 |
| High | | 3.31 | | - - | | 2.39 | | 0.95 |
| **Small school status (*reference group—no*)** | | | | | | | | |
| Yes | | 0.69 | | 0.70 | | 0.63 | | 0.55 |

* p<0.05, **p<0.01, *** p<0.001

NOTE: Analytic sample includes schools open as of the 2017–18 school year, classified as either an elementary, middle, or high school, whose general fund budget per student amount was less than or equal to $15,000 and greater than or equal to $2,000, and whose enrollment size was +/-100 of the threshold for small school status. Setting the restricted range of sample size compares schools immediately above and below the cut-off for small school, to detect if small school status significantly alters the likelihood of key personnel at a school. Models include adjustment to variance estimate due to nested nature of data. Data from human resource records from Houston ISD for the 2013–14, 2014–15, and 2015–16 school years. Coefficients are reported in odds ratios. A coefficient greater than 1 means something is more likely, and a coefficient less than 1 means something is less likely. Coefficients with standard errors more than 50 percent the size of the coefficient should be interpreted with extreme caution, as the relative size of the standard error suggests the estimate is unstable.

SOURCE: Houston Independent School District, Human Resource Data, 2013–14 through 2015–16

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