
Public Schools, Public Housing: The Education of Children Living in Public Housing

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Abstract

In the United States, public housing developments are predominantly located in neighborhoods with low median incomes, high rates of poverty and disproportionate concentrations of minorities. While research consistently shows that public housing developments are located in economically and socially disadvantaged neighborhoods, we know little about the characteristics of the schools serving students living in public housing. In this paper, we examine the characteristics of elementary and middle schools attended by students living in public housing developments in New York City. Using the proportion of public housing students attending each elementary and middle school as our weight, we calculate the weighted average of school characteristics to describe the typical school attended by students living in public housing. We then compare these characteristics to those of the typical school attended by other students throughout the city in an effort to assess whether students living in public housing attend systematically different schools than other students. We find no large differences between the resources of the schools attended by students living in public housing and the schools attended by their peers living elsewhere in the city; however,

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we find significant differences in student characteristics and performance on standardized exams. These school differences, however, fail to fully explain the performance disparities amongst students. Our results point to a need for more nuanced analyses of the policies and practices in schools, as well as the outside-of-school factors that shape educational success, to identify and address the needs of students in public housing.

Keywords

education, public housing, schools

Public housing developments are typically located in neighborhoods with low median incomes, high rates of poverty, and disproportionate concentrations of minorities (Newman and Schnare 1997). These developments were often intentionally built in disadvantaged neighborhoods, especially before the U.S. Department of Housing and Urban Development (HUD) adopted regulations designed to stop such siting practices in the 1970s (Hirsch 1983; Rohe and Freeman 2001). While a growing literature describes the demographic characteristics of the neighborhoods surrounding subsidized housing developments, few if any studies have systematically examined the characteristics of local schools serving students living in public housing. This absence is noteworthy, as education is a critical determinant of labor market outcomes and good schools are in turn critical to academic success (see, e.g., Card and Kreuger 1992; Card 2001).

In this article, we ask whether public education in New York City systematically disadvantages students living public housing developments. Recent studies of public housing and education have had a different focus, relying on individual-level variables to determine whether residency in public housing causes children to perform better or worse in school (Currie and Yelowitz 2000; Newman and Harkness 2000). These studies pay little attention to (and rarely use data on) the characteristics of schools attended. Other studies have focused on the educational outcomes of students moving out of public housing, rather than those living in it, and again have paid relatively little attention to school characteristics (see, e.g., Kling, Liebman, and Katz 2007; Sanbonmatsu et al. 2006; Leventhal and Brooks-Gunn 2004).

In our analysis, we begin by examining whether—and to what extent—students living in public housing perform worse on standardized exams relative to their peers living elsewhere in the city. We find that they do. In an attempt to explain this performance gap, we quickly turn our attention toward

the quality of schools serving public housing and nonpublic housing students. We compile a unique data set to compare the characteristics of the typical school attended by public housing students to the characteristics of the typical school attended by other students throughout the city. Our comparisons yield decidedly mixed results. On one hand, the peer group in the typical school attended by public housing students is poorer and performs substantially worse on standardized exams than the peer groups at other schools throughout the city. On the other hand, we find no large differences between the resources and teacher characteristics at the schools attended by students living in public housing and the schools attended by their peers living elsewhere in the city.

Moreover, while students living in public housing score lower on standardized tests than other students, these differences in school characteristics fail to fully explain the performance disparities. In fact, we find that students living in public housing earn lower scores on standardized tests, on average, than their schoolmates who attend the very same school but live outside of public housing. These results point to a need for further analysis of community and home environments that may shape educational success. They also highlight the need for more nuanced analyses of the policies and practices within schools to learn how schools might better serve students living in public housing.

The article begins with a brief review of the literature describing the characteristics of the neighborhoods where public housing is located. Drawing on existing evidence, we note that public housing developments are disproportionately located in largely minority and high-poverty urban neighborhoods. In the next section, we explain our data and methods, and then we present our results. We conclude with a discussion of the policy and planning implications of our research.

Siting of Public Housing

With the passage of the Housing Act of 1937, the federal government committed to providing subsidies to local public housing authorities to create and manage assisted housing for low-income families. Many local housing authorities constructed large-scale, densely populated housing developments, which soon became a mainstay of the urban landscape. The Housing Act of 1949 later declared as a national goal “a decent home and suitable living environment” for all Americans (von Hoffman 2000, 309). Yet observers have questioned whether public housing itself provides such a “suitable living environment.” Research consistently finds that public housing

developments are disproportionately located in neighborhoods with high rates of urban poverty and racial concentration. In an analysis of project-based assisted housing, Newman and Schnare (1997, 712–14) report that over half of public housing units nationwide are in neighborhoods with over 50% minority residents and over one-third of public housing units are located in neighborhoods with poverty rates greater than 40%.

While HUD moved to end the placement of public housing in disadvantaged neighborhoods in the 1970s, public housing residents appear to continue to live in more racially and economically isolated neighborhoods than other poor or minority households (Carter, Schill, and Wachter 1998; Newman and Schnare 1997). This is due, in part, to the siting of public housing developments in higher poverty neighborhoods and, in part, to the racial homogeneity of public housing developments themselves, which further contributes to the racial isolation experienced by their residents (Massey and Kanaiaupuni 1993). Utilizing HUD data on 15 cities, Bickford and Massey (1991) confirm high levels of segregation in the public housing developments, although subsequent analysis finds that segregation within public housing developments declined slightly between 1977 and 1990 (Goering, Kamely, and Richardson 1997).

Especially following the publication of Wilson's (1987) *The Truly Disadvantaged*, researchers sought to measure whether living in disadvantaged neighborhoods leads to worse health outcomes, lower levels of educational attainment, and inferior labor market outcomes. Research consistently finds that children growing up in more disadvantaged neighborhoods fare worse across a variety of social and economic outcomes (Ellen and Turner 1997). There is some question about the extent to which neighborhood disadvantage actually causes children to do worse, but research from the Moving to Opportunity Program (MTO) suggests that at least some outcomes are shaped by neighborhood poverty level, especially for female youth. Recent evidence from MTO reports that female adolescents moving from high-poverty neighborhoods experience improved mental health, physical health, and educational outcomes, although their male peers do not (Kling, Liebman, and Katz 2007). Similarly, moving from a high-poverty neighborhood leads to reductions in criminal behavior and delinquency among female youth (Kling, Ludwig, and Katz 2005).

Poverty and racial isolation may hamper academic success because of their impact on the quality and availability of citywide resources and public services. Studies indicate that residents of high-poverty, segregated neighborhoods have less access to public services, such as hospitals (Halfon and Newacheck 1993; Chow, Jaffee, and Snowden 2003), and local institutions,

such as supermarkets (Zenk et al. 2005). Until now, while the allocation of resources across districts has been well studied, there has been surprisingly little research comparing the allocation of educational resources across neighborhoods within districts. The few studies that focus on intradistrict resource allocation have found that disparities do exist (Rubenstein et al. 2007; Schwartz and Stiefel 2004; Clotfelter, Ladd, and Vigdor 2005; Betts, Rueben, and Danenberg 2000). For example, Rubenstein et al. (2007) find that schools with higher percentages of poor students receive more money and teachers per student, but the teachers at these high-poverty schools receive lower pay and have less experience. These disparities are not necessarily the direct result of policy decisions aimed at creating the observed distribution but rather the indirect result of teacher assignment and other educational policies. Districts such as New York have union contracts with uniform teacher salary schedules, so teachers with more experience choose to work in schools with fewer “harder to educate” students (Lankford, Loeb, and Wyckoff 2002).¹ “Harder to educate” students include poor students and may include—as we investigate in this study—poor students who live in public housing.

Our contribution builds on this literature to move beyond decrying the poor quality of schools in low-income neighborhoods. We address whether the schools serving students living in public housing developments in New York City systematically disadvantage their pupils by providing fewer resources, lower quality teachers, or underperforming peers. Furthermore, we look within schools, examining the extent to which student performance differs between public housing residents and nonresidents attending the same school.

Data and Method

Data

The project relies on data from the New York City Department of Education (DOE) and the New York City Housing Authority (NYCHA). The NYCHA data contain information on the characteristics and location of each public housing development in New York City. In total, NYCHA manages 343 separate public housing developments, including scatter-site developments, senior housing, and traditional high-rise public housing. Given our interest in school-aged children, we limit our universe to the nonsenior housing in the NYCHA portfolio.² As a result, our data set for public housing in New York City includes 286 public housing developments containing 4,243 buildings and 169,105 units of public housing. Of these units, slightly fewer than 30%

are located in Manhattan and slightly more than 30% are located in Brooklyn. One-quarter of units are in the Bronx, with the remaining units scattered throughout Staten Island and Queens.

Selection into NYCHA developments is conducted through a citywide lottery. Eligible applicants who meet the income restrictions are invited to rank their first and second borough choice in New York City but are not permitted to select individual developments. After periodically determining the number of vacant units, NYCHA conducts a computer-generated lottery to select applicants based on borough choice, apartment size, housing priority, and date of application. Priority is given to applicants with particularly acute housing needs, including victims of domestic violence, applicants living in housing declared uninhabitable, and those referred from other city agencies (e.g., the Department of Housing Preservation and Development, the Administration for Children's Services, etc.). The vacancy rate for NYCHA development is quite low (less than 1%), and the annual turnover rate for units is just over 3% (NYCHA 2008). Research suggests that unit turnover is higher for tenants with high incomes and small apartments as well as for those living in higher crime neighborhoods (Bachieva and Hosier 2001).

NYCHA developments house approximately 5% of the city's population. The majority of residents have low incomes, are minorities, and live in female-headed households.³ According to data from HUD, 51% of NYCHA residents are African-American and 40% are Hispanic, while upward of 75% of households are female headed (U.S. Department of Housing and Urban Development 2000). In 2008, NYCHA reported that 31% of residents are minors younger than 18. The mean rent stood at \$362, and the mean family income edged slightly higher than \$22,000.

The data from the DOE enable us to examine both individual student records and school characteristics across the city. We utilize student-level records from the 2002–2003 academic year provided by the DOE. During the 2002–2003 academic year, 736,274 students were enrolled in public elementary and middle schools in New York City. Each student record includes individual test scores, attendance rates, free lunch eligibility status, basic demographic characteristics (e.g., race, gender, nativity status), school attended, and residential address. The individual records are matched to public housing developments from NYCHA using information on student addresses. In total, 111,865 students enrolled in the New York City public school system during the 2002–2003 academic year are matched to addresses of NYCHA developments.⁴ We focus on the 84,526 of these students who attend elementary or middle schools.⁵

Table 1. Descriptive Statistics of the City's Elementary and Middle Schools

	<i>M</i>	Min	Max
School size ^a	816.22	55	2,854
% New York City Housing Authority	14.12	0	100
% White	15.39	0	92.60
% Black	34.57	0	96.80
% Hispanic	38.19	2.20	98.30
% Asian	11.85	0	91.10
% free lunch eligible	74.03	7.40	100
% limited English proficient	11.11	0	52.50
Attendance rate	92.41	84.20	97.90
% passing reading	48.70	6.80	97.60
% passing math	50.70	3.30	98.40
Expenditure per pupil (all pupils; \$)	11,944.83	6,790.97	28,325.77
Expenditure per pupil (general education pupils; \$)	10,574.03	6,790.97	24,478.97
Teacher salaries (\$)	51,021.97	34,263.19	72,662.31
Pupil-teacher ratio	13.71	5.75	25.96
% of teachers with a master's degree	76.26	30	100
% of teachers with 5 or more years of experience	51.47	0	88.90
% of teachers with less than 2 years of experience in that school	37.89	0	100

Note: Descriptive statistics are limited to cases without missing data ($N = 875$).

a. School size is measured by the number of students registered as of October 31, 2002.

To identify school-level characteristics, we utilize the publicly available Annual School Reports and the School-Based Expenditure Reports from the New York City DOE. The school reports supply information on average student performance on city and state standardized exams, student demographics, teacher characteristics, and school- and grade-level enrollment and attendance. The expenditure reports source information on expenditure and funding sources. By combining the Annual School Reports and the School-Based Expenditure Reports, we create a school-level data set with information on school characteristics and finance expenditures. Our combined data set includes information on the 825 elementary schools and 219 middle schools in New York City.

In Table 1, we provide descriptive statistics on school characteristics used throughout our analysis. Among all public elementary and middle schools in New York City, the mean percentage of students living in public housing is 14%. We refer to the students living in public housing as "NYCHA

students.” In the average school, slightly more than 15% of students are White, nearly 35% are Black, and 38% are Hispanic. Table 1 also reports that the mean rate of free lunch eligibility in New York City’s elementary and middle schools is approximately 74%.⁶ Significantly, the range in demographic characteristics across schools is considerable. Some schools have few Black students, while others are overwhelmingly Black. Others have few White students, while others are overwhelmingly White.

Table 1 includes several indicators of average academic performance and resource levels across schools. The measure of limited English proficiency is based on students’ scores on the Language Assessment Battery, a set of tests used to assess English proficiency and eligibility for specialized instructional services, and allows us to identify students with varying English skills. The table similarly reports on the mean passing rate on standardized reading and math exams in New York City elementary and middle schools. For mathematics, we rely on the New York State Math Assessment (or the California Achievement Test), and for reading we use results from the New York State English Language Assessment or the CTB/McGraw-Hill Test of Basic Skills. As Table 1 reports, the mean passing rate is slightly below 50% for reading exams, while the mean passing rate is slightly above 50% for the mathematics assessment.

Table 1 also reports on education expenditures. The overall per-pupil expenditure includes full-time special education *and* general education students; the general education expenditure, on the other hand, includes *only* general education students and *part-time* special education students. We also report the mean teacher salary. The average salary is slightly more than \$50,000, although Table 1 reveals substantial variation in the mean salary range across public schools in the city.⁷

Weighted Averages of School Characteristics

To calculate the characteristics of the *typical* elementary or middle school attended by NYCHA students), we calculate a weighted average of school characteristics using the percentage of all NYCHA students in the city who attend each elementary and middle school as our weight. Specifically, to calculate the weight assigned to an elementary or middle school, we take the number of NYCHA students at that school and divide by the total number of elementary and middle school students in the city identified as living in NYCHA public housing (which, as noted above, is 84,526). By way of example, imagine that School X has 845 students who live in public housing and School Y has just 100 students who live in public housing. School X would receive a weight of 0.01 ($845 \div 84,526$) while School Y would receive a

weight of 0.0012 ($100 \div 84,526$) in our calculations of a weighted average of school characteristics. A school with no NYCHA students would receive a weight of zero.⁸

We perform the same weighting process for students who are not identified as living in public housing (non-NYCHA students), enabling us to compare the characteristics of the typical school attended by NYCHA students to those of the typical school attended by non-NYCHA students.⁹

Results

Do Students Living in Public Housing Perform Differently?

Our results show that on average students living in public housing in New York City perform substantially worse on standardized math and reading exams than their peers living elsewhere in the city. Studying academic performance for the 2002–2003 school year, we find that the average NYCHA fifth grade student scores 0.31 standard deviations below the citywide mean on math tests and 0.33 standard deviations below the citywide mean on reading tests. The typical non-NYCHA fifth grade student, on the other hand, scores about 0.06 standard deviations above the citywide average on both reading and math exams.¹⁰ In Figure 1, we show average standardized math and reading scores for fifth grade students by public housing residence.

There are numerous factors that might explain the achievement gap between NYCHA and non-NYCHA students. The experience of living in public housing itself could contribute to the disparity if NYCHA students have difficulty finding academic role models in their community or are heavily surrounded by underperforming peers. Alternatively, unobserved differences in individual- or family-level characteristics between the students who live in public housing and those who do not could be driving differential performance. A third possibility—and the one under examination in the current article—is that students living in public housing attend worse schools. In the remainder of the article, we explore whether, as compared to other students, the average public housing student attends schools with fewer resources, lower performing peers, and/or teachers with less teaching experience.

Do the Typical Schools Attended by NYCHA Students Differ from the Typical Schools Attended by Non-NYCHA Students?

Students living in public housing developments are served by a relatively small number of schools in the New York City public school system. Examining the concentration of school-aged children living in public housing

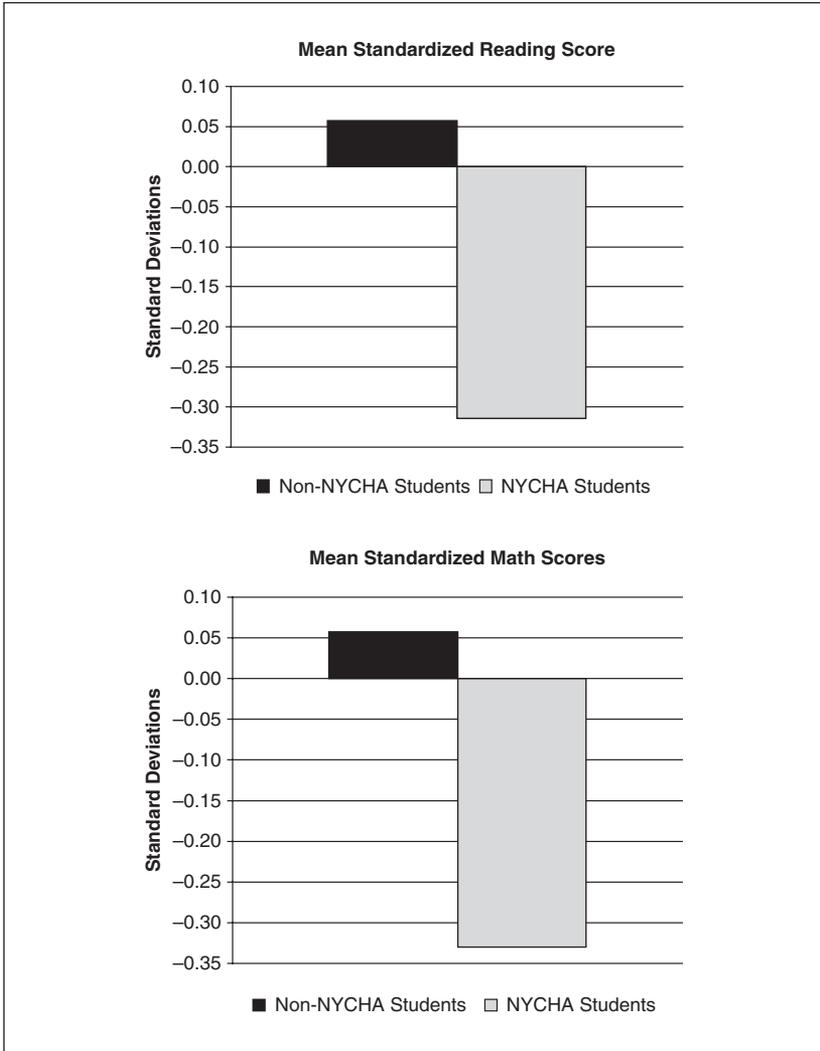


Figure 1. Mean standardized score on reading and math exams, by public housing residency

Note: Figure 1 represents the deviation from the mean score on standardized mathematics and reading exams for fifth grade students in the New York City public school system during the 2002–2003 academic year. Deviations are expressed in z scores. Non–New York City Housing Authority (NYCHA) students scored 0.06 standard deviations *above* the mean on both reading and math scores. NYCHA students scored 0.31 standard deviations *below* the mean on mathematics exams and 0.33 standard deviations *below* the mean on reading exams.

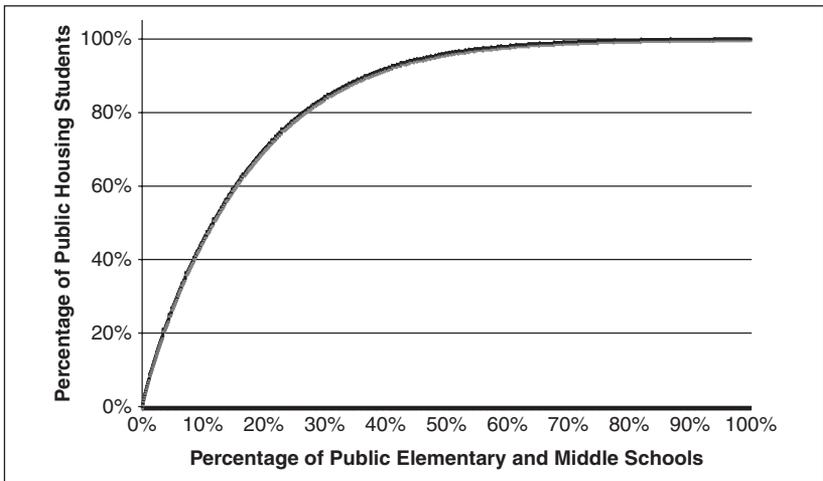


Figure 2. Cumulative distribution of public housing students in New York City elementary and middle schools, 2002–2003

developments in the city's elementary and middle schools, we find that half of all students living in public housing are concentrated in just 10% of the city's elementary and middle schools, or 83 schools. Two-thirds of all students living in public housing are concentrated in 15% of the city's elementary and middle schools, or 127 schools. This concentration results from the combination of locally zoned schools and densely concentrated public housing in New York City. In practice, it means that a fraction of the city's public schools educate the majority of students residing in public housing in New York City. In Figure 2, we present a graph of the cumulative distribution of public housing students in the city's elementary and middle schools.

As for differences in school quality between schools attended by students living in public housing and those living elsewhere in the city, Table 2a reports basic differences in the demographic characteristics of the *typical* school attended by students living in public housing and those of the *typical* school attended by students living elsewhere in the city.¹¹ The typical school attended by students living in public housing has a higher percentage of Black and Hispanic students and a lower proportion of White students. In the typical school attended by public housing students, 38% of a student's peers also reside in a public housing development; in the typical school attended by other students, less than 8% of the student body lives in public housing. Over 85% of students in the typical school attended by public housing students are

Table 2a. Demographic Characteristics of Elementary and Middle Schools Attended by the Average Student, by Residence, 2002–2003

	Non-NYCHA	NYCHA
School size	1,019	789
% students living in NYCHA	7.90	37.70
% White	16.41	5.91
% Black	30.86	45.12
% Hispanic	38.67	43.18
% Asian	14.05	5.79
% free lunch eligible	72.27	85.28
% limited English proficient	12.46	9.79

Note: NYCHA = New York City Housing Authority. Figures are average school characteristics weighted by the relevant population.

Table 2b. Performance Indicators of Elementary and Middle Schools Attended by the Average Student, by Residence, 2002–2003

	Non-NYCHA	NYCHA
Attendance rate	92.70	91.21
% passing reading	49.97	38.48
% passing math	51.51	40.94

Note: NYCHA = New York City Housing Authority. Figures are average school characteristics weighted by the relevant population.

eligible for free lunch, whereas slightly more than 70% of students in the typical school attended by other students are free lunch eligible. If the academic achievement of students is affected by the poverty rate of their school, then the typical NYCHA student could be disadvantaged by his or her attendance at schools with significantly higher concentrations of free lunch eligible students.

In Table 2b, we report differences in the average academic performance of students in a school on standardized reading and math exams as well as variation in attendance between typical schools. We observe very little variation in attendance rates, with attendance hovering around 92% in both sets of schools, but our results indicate substantial differences in academic performance. The percentage of students passing standardized exams is lower at the typical schools attended by NYCHA students than at the typical school attended by non-NYCHA students. In the former, about 38% of students pass reading test and about 41% pass math tests. In the typical school attended by

Table 2c. Teacher and Expenditure Characteristics of Elementary and Middle Schools Attended by the Average Student, by Residence, 2002–2003

	Non-NYCHA	NYCHA
Expenditure per pupil		
All pupils (\$)	11,235	12,619
General education pupils (\$)	9,982	10,883
Teacher salaries (\$)	51,298	49,334
Pupil–teacher ratio	14.33	12.77
Teacher characteristics		
% with a master's degree or higher	76.70	72.90
% with 5 or more years of experience	52.59	48.88
% with less than 2 years of experience in that school	36.20	39.58

Note: NYCHA = New York City Housing Authority. Figures are average school characteristics weighted by the relevant population.

non-NYCHA students, the pass rates for reading and math tests are 50% and 51%, respectively. This variation suggests that, alongside demographic differences, the academic performance of a student's peer group varies substantially at the typical schools attended by NYCHA and non-NYCHA students.

While differences in demographic characteristics and academic performance are large, Table 2c shows much smaller differences in teacher characteristics and expenditures per pupil. Teachers in schools attended by NYCHA students have slightly less education and experience than the teachers in schools attended by non-NYCHA students, but these disparities are slight. In the former schools, approximately 73% of teachers hold advanced degrees and only 49% have more than five years of teaching experience. In the typical school attended by students who do not live in public housing, 77% of teachers hold advanced degrees and 53% have more than five years of teaching experience. There is a higher percentage of new teachers in the typical school attended by NYCHA students, with nearly 40% of teachers having less than two years of teaching experience at that particular school, while only slightly more than 36% of teachers had less than two years of in-school experience at the typical school attended by non-NYCHA students.

Although their teachers are slightly less experienced, it does not appear that schools attended by NYCHA students receive less funding. Indeed, the typical school attended by NYCHA students enjoys slightly higher per-pupil expenditures than other schools. Per-pupil expenditures at the typical school attended by NYCHA students are approximately 12% greater than expenditures at other schools, and per-pupil expenditures for general education

students are approximately 9% greater. Similarly, the schools attended by public housing students have fewer students in the classroom. Their student-to-teacher ratio is 13:1, while the comparable rate in schools attended by non-NYCHA students is 14:1. This may be the result of compensatory funding programs—such as the federal Title I program—targeted at schools with a high percentage of poor students.

In summary then, our school-level analysis offers mixed results. On one hand, the availability of resources and the quality of teachers vary little between the typical schools attended by NYCHA and non-NYCHA students. Teachers in the former set of schools have slightly less education and experience but enjoy slightly higher per-pupil expenditures and lower pupil-to-teacher ratios, suggesting more interaction between teachers and their students in these schools. On the other hand, the peer group of students attending the typical NYCHA school is more likely to be poor and less likely to pass standardized reading and math exams than comparable students at the typical school attended by non-NYCHA students. To the extent that peers matter, public housing students are clearly disadvantaged.

Do Differences in School Characteristics Explain Differences in Performance?

In the previous section, we highlighted differences in average test scores and demographics between the typical schools serving NYCHA and non-NYCHA students. In this section, we explore whether differences in the characteristics of schools attended help to explain disparities between the performance of students who live in public housing and those who do not. Although our analysis captures important characteristics of local schools, it is possible that other unobserved (or unmeasured) school characteristics also contribute to the differentials in academic performance shown in Figure 1. For example, the typical school attended by students living in public housing might have higher levels of in-school violence or poorer classroom facilities.

Thus, to test whether any school characteristics matter—whether observed or unobserved—we include a dummy variable for a student's school in individual-level models of academic performance—that is, we use school fixed effects. Although this specification does not identify which school characteristics matter to individual student performance, it allows us to measure the overall impact of differences in schools. In Figure 3, each bar represents the difference in standardized test scores between non-NYCHA and NYCHA fifth graders during the 2002–2003 academic year. The top three sets of bars show differences in test scores for nonpoor students (i.e., students

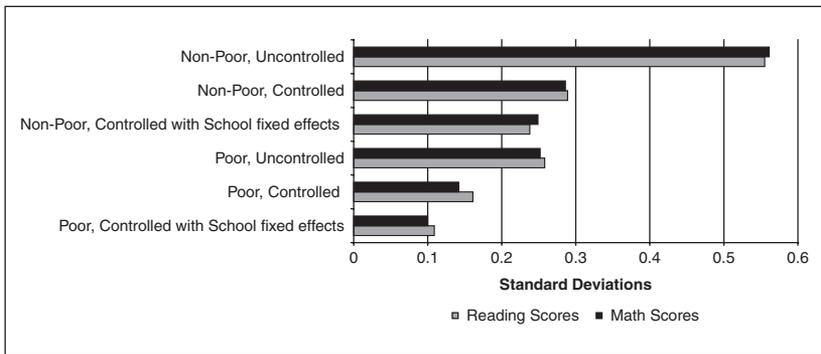


Figure 3. Regression-adjusted mean differences in standardized math and reading scores between NYCHA and non-NYCHA students

not eligible for free lunch), and the bottom three sets show differences for poor students (i.e., students eligible for free lunch). In each series, the top bars, labeled “uncontrolled,” show the raw differences in average reading and math scores between public housing residents and nonpublic housing residents. The next bars, labeled “controlled,” report the regression-adjusted mean difference in test scores when we control for the race, gender, and nativity status of each public school student.¹² Finally, the bars labeled “controlled with school fixed effects” control for the difference in individual and school characteristics by including a series of dummy variables to control for the schools attended by each student as well as the individual characteristics controlled for in the previous series.

As shown, for both poor and nonpoor students, the gap in standardized test scores between NYCHA and non-NYCHA fifth graders attenuates substantially when we control for race, sex, and nativity status. While the magnitude of the achievement gap shrinks, it persists even after accounting for these basic student characteristics. Adding school fixed effects in the subsequent bar, we find that the gap in performance further attenuates but does not disappear entirely. This suggests that students living in public housing perform worse than their classmates who have the same observable characteristics and who attend the very same school but who do *not* live in public housing. In other words, neither observed individual attributes nor the school attended can alone explain variation in academic performance.

There are several possible explanations for this within-school disparity. First, schools (or teachers) might treat NYCHA and non-NYCHA students differently, and school dummies do *not* capture this varied impact of school

characteristics. Alternatively, students living in public housing may *respond* differently to a common set of school characteristics. For example, particular school attributes (e.g., incidence of violence, pupil-to-teacher ratio) may affect the academic performance of NYCHA students more than others. A third possibility is that differential within-school performance is because of unmeasured differences in family background. Finally, neighborhood environments outside of school may differ and shape performance, too. Although the current analysis is not designed to test these alternatives, our finding of persistent within-school variation is important and calls for attention and future research.

Conclusion

Even as a broad consensus has emerged in the United States that the public housing model is flawed and subsidized housing policies increasingly focus on subsidies for privately owned rental housing and tenant-based vouchers, over a million households remain in public housing. Policy makers should not ignore these residents. While other researchers have shown that the neighborhoods surrounding public housing are disadvantaged, our unique contribution is a rich description of the schools attended by public housing students. This detailed analysis is important because the lives—and life chances—of children living in public housing are powerfully shaped by the education they receive.

Our comparison of the typical school attended by students living in public housing with the typical school attended by other students yields mixed results. We find little difference between the teacher characteristics and per-pupil expenditures in schools attended by public housing students and other schools, although we do find notable differences in peer group performance. Schools serving public housing students have nearly equal financial and teacher resources as other schools, but their students earn lower scores on standardized exams.

In short, our research suggests that simply equalizing resources across schools will be insufficient to close the achievement gap between students living in public housing and their peers. The achievement gap appears to run deeper and beyond the schools, driven perhaps by unobserved individual- or family-level characteristics associated with households living in public housing. These may include differences in wealth or parents' employment status. Differences in neighborhood environment may also contribute to performance disparities. NYCHA students, for instance, may have difficulty finding academic role models in their community, or the location of public housing may

offer limited public transportation options and limit access to more desirable public schools or other city resources. Our findings suggest that researchers and policy makers should continue to examine the community environments experienced by children and families living in public housing to identify factors outside of local schools that help to shape the observed performance gap.

Researchers should also look to school policies. It may be that additional compensatory spending is required—that is, schools serving students living in public housing may need more resources and/or different services than otherwise similar schools. Clearly, more research is needed to understand the quality of public services serving public housing residents and the ways in which the public sector can improve the quality of life for students living in public housing.

Authors' Note

The authors are listed in reverse alphabetical order. All contributed equally.

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Notes

1. To ameliorate these effects, the New York City Department of Education (DOE) implemented a new budget allocation method called Fair Student Funding (FSF) during the 2007–2008 academic year, committing \$5.3 of a citywide \$8.7 billion in operating funds to the program. Under FSF—or weighted student funding, as it is more commonly known—school budgets are based on the number and characteristics of students enrolled in each school. Schools receive a flat per-student allocation that is adjusted (“weighted”) to reflect student needs. For example, students receiving special education or bilingual education services receive greater weight (higher per capita allocations) than students participating in a regular education program. Students from low-income families or other at-risk categories are also given additional weight. Such systems of student weighting have long been used in allocating state aid to school districts (Duncombe and Yinger 2005), but only recently has the approach been applied at the school district level. In New York City, the 2007–2008 formula provides each school with a \$200,000 foundation and a \$3,788 per capita allocation with additional weights for English language

- learners, special education, middle and high school students, and students testing below state standards.
2. Specifically, we excluded 10,114 units in 78 buildings coded as buildings for senior citizens. If we included these senior-assisted housing units, our universe would rise to nearly 180,000 units in over 4,300 buildings, accounting for all of New York City Housing Authority's (NYCHA) 343 developments.
 3. As of May 2008, the maximum income for NYCHA eligibility was \$49,150 for a two-person household, \$55,300 for a three-person household, and \$61,450 for a four-person household. By comparison, the 2008 federal poverty thresholds from the U.S. Census Bureau are \$14,051 for a two-person household, \$17,163 for a three-person household, and \$22,025 for a four-person household. Because of the income guidelines for NYCHA housing, there are children whom we classify as "nonpoor" living in NYCHA developments, although the vast majority of children residents fit our definition of poverty (85.65%).
 4. In matching students, we first compared student addresses with building addresses provided by the NYCHA. This match identified 99,192 students living in public housing—a figure considerably below the 130,000 school-aged children that NYCHA estimates live in public housing. Of course, some of the NYCHA students may attend private schools and would *not* be included in the DOE's student records, although we expect this is only a small number. A detailed examination of the data suggests that this undercounting may be largely attributable to data entry mistakes. For instance, different spacing between words, misspelled street names, and abbreviation of street identifiers seem to be leading to this undercount. As a result, we performed a second match using geographic information systems to identify the distance between each student's address and the closest NYCHA development. We then visually inspected the student records identified as being within 150 feet of a public housing development to determine if their addresses are, in fact, NYCHA developments. This match yielded an additional 13,722 public school students living in public housing.
 5. In New York City, children have the right to attend their zoned school. In addition, they can choose to apply to magnet schools, charter schools, gifted and talented programs, and selective or specialized middle schools. Charter and magnet schools hold lotteries for admission. Admission to gifted and talented programs and selective schools is based on test results.
 6. As is typical, in the administrative data New York City DOE does *not* include information on students' socioeconomic characteristics (e.g., parental income). We therefore use free lunch eligibility as our proxy for poverty throughout the analysis. Students in New York City's public schools are eligible for free lunch if their families receive Temporary Assistance to Needy Families or food stamps, if they are in foster care or are homeless, or if their family income is less than or equal to 130% of the federal poverty line.

7. This variation could be the result of the different mix of general education and full-time special education students in the schools attended by the average NYCHA and non-NYCHA student: 8.06% of students receive full-time special education services in the average NYCHA resident's school compared to 5.50% for the average non-NYCHA student. If this were the case, however, one might expect higher teacher salaries in the average NYCHA student's school, an expectation not supported by teacher salary figures in Table 2c. It is possible that average teacher salaries were suppressed by larger numbers of inexperienced—and thus less well compensated—teachers needed to reduce class sizes (pupil–teacher ratio) for average NYCHA students' school to a level lower than that for non-NYCHA students, as reported in Table 2c.
8. There are a total of 105 elementary and middle schools with no public housing students. Of these, 96 are elementary schools (11.6% of the total) and 9 are middle schools (4.1% of the total).
9. We conduct a parallel analysis for poor students in public schools, limiting our universe to poor students living in NYCHA and non-NYCHA housing. Throughout the analysis, we use free lunch eligibility as our indicator of poverty status. To arrive at these estimates of school characteristics, we conduct an analogous weighting process to describe the characteristics of the typical school attended by poor NYCHA students and poor non-NYCHA students. Of 84,526 students identified as living in NYCHA developments, we find that more than 85% of them (72,401) are free lunch eligible; among the 651,748 non-NYCHA students, fewer than 70% (453,974) are free lunch eligible. Results for poor students are available from the authors on request.
10. We report results only for fifth grade students, but the results for students in third grade to eighth grade are available from the authors on request.
11. When we limit our analysis to *just* free lunch eligible students—our indicator of poverty—we find patterns analogous to those reported in Tables 2a, 2b, and 2c.
12. Our data also include information on each student's age, limited English proficient status, and recent immigrant status, but our results do not change substantively when controlling for these variables. Although we would like to control for a wider range of covariates affecting academic performance, the data available for this study were limited. In future work, we hope to make use of richer data.

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