Appendix 1
Attrition from the Public Housing Student Sample

A total of 1,198 children lived in public housing and enrolled in any one grade in K–6 in Montgomery County Public Schools during 2001–07. As described below, only the 877 out of 1,198 children living in public housing that had at least two years of test scores and received less than fourteen hours per week of special education services were considered in the analysis. But of the entire population of 1,198 children in public housing who were enrolled in the district at some point during 2001–07, 4 percent exited the district during 2001–07 before reaching seventh grade. (When children rise into seventh grade, they drop from the sample.) The 48 exiting children (4 percent of 1,198) were no different in aggregate from their remaining peers in public housing in terms of family income, initial test scores, or initial school poverty levels. Of the 48 children who exited the sample for nonstructural reasons, the first school in which they enrolled had an average of 26 percent of schoolmates qualified for free and reduced price meals (FARM), versus an average of 29 percent of schoolmates who qualified for FARM in the first year of school for the balance of the public housing students. Of the 48 exiting students, 21 were enrolled in at least one grade level that was tested, and the remaining 27 were not. (Recall the district tested second through sixth graders for at least some of the years between 2001 and 2007.) For those with at least one test score, exiting children's first math and first reading score were not statistically different from the first scores of their peers in public housing.

Putting this in a regression framework, students whose first test score was above the average of their peers in public housing and whose first school had moderately high poverty (that is, more than 20 percent of students qualified for FARM) were no more likely to exit the sample than their peers in public housing who also first scored above average but were enrolled in the district's

lowest-poverty schools (where less than 20 percent of students qualified for FARM).

A total of 877 out of 1,019 children living in public housing met the three sample restrictions—(a) enrolled in elementary grades K–6 for at least two consecutive years within the 2001–07 school-year period, (b) have at least one test score and (c) do not qualify for special education services of more than fourteen hours per week. Of these 877 children, a total of 2 percent of the sample (19 children) exited, leaving a total of 858 children for the analysis. The 19 children that met the sample criteria and that exited the district were not systematically higher (or lower) performing than their peers, nor did they first attend public schools that were poorer or wealthier on the whole than their peers.

Looking at attrition from a different angle, approximately one hundred public housing family apartments become available to new admittees in any given year in the county. Most of the turnover occured in public housing situated in the poorer neighborhoods within the county. This means that a disproportionate share of the newest families in the public housing system lived in the highest-poverty areas where public housing is located. However, families *without* elementary-age children drove the turnover. In other words, families in public housing whose children originally were assigned to the highest-poverty schools (that is, more than 40 percent of schoolmates qualify for FARM) were no more likely to switch schools or to leave the district during the 2001–07 window of this study than families with children originally assigned to low-poverty elementary schools (that is, where less than 20 percent of schoolmates qualify for FARM).

Appendix 2
Randomization of Children across School Poverty Levels

	Low-Poverty Schools (0–20% of first grade-mates qualify for FARM*)	Moderate-Poverty Schools (20–40% of first grade-mates qualify for FARM*)	Moderately High-Poverty Schools (40–85% of first grade-mates qualify for FARM*)
Characteristics of students in public housing in the first year of school within the district			
African American	73%	69%	71%
Asian American	4%	7%	7%
Hispanic	16%	15%	17%
White	5%	7%	5%
Female	48%	52%	55%
Earliest grade level in district	1.85	2.07	1.80
English as a second language	**9%****	13%	**16%****
Receives 1–14 hour a week of special education services	9%	12%	8%
Average math score (percentile rank)	39	36	37
Average reading score (percentile rank)	42	37	42

	Low-Poverty Schools (0–20% of first grade-mates qualify for FARM*)	Moderate-Poverty Schools (20–40% of first grade-mates qualify for FARM*)	Moderately High-Poverty Schools (40–85% of first grade-mates qualify for FARM*)
Characteristics of families in public housing in child's first year of school within the district			
Average household income	$21,147	$20,253	$20,571
Average household assets	$448	$986	$743
Average number of children age 0–18 in family	3.26	3.26	3.31
Household headed by a female	88%	86%	85%
Age of head of household (years)	**40.19****	39.97	**38.66****
Wages is a primary source of income	69%	76%	71%
Head of household is disabled	8%	7%	7%

Note: The results include 958 children in public housing, 345 of which attended low-poverty, 353 moderate-poverty, and 260 moderately high-poverty schools in their first year. Only 235 of 958 children were in grade levels such that they had test scores in their first year within the district. The 958 children are distributed across 114 of the elementary schools in the district. Note that, for completeness, the sample includes all forms of special education students, which exceeds the number of students included in the regression analyses.

* FARM stands for free and reduced-price meals, which is the only income measure public schools collect.

** Within the same row, the t-statistic indicates that there is less than a 5 percent likelihood that the difference in the distribution of that row's characteristic is solely due to chance.

Appendix 3: Effects of Four Levels of School Poverty

Figure A1. Math Scores of Public Housing Students:
0–20 Percent versus 20–85 Percent of Schoolmates in Poverty

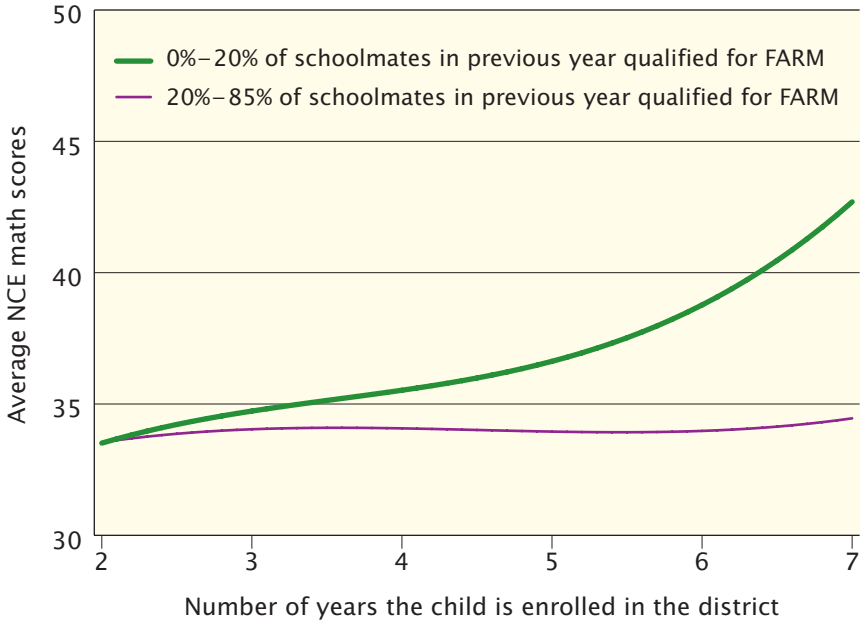


Figure A2. Math Scores of Public Housing Students:
0–25 Percent versus 25–85 Percent of Schoolmates in Poverty

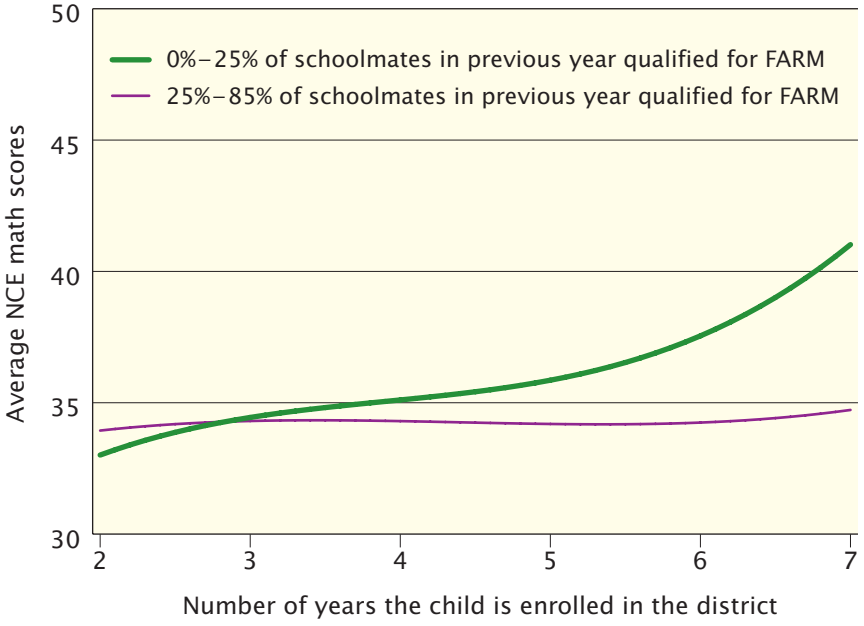


Figure A3. Math Scores of Public Housing Students:
0–30 Percent versus 30–85 Percent of Schoolmates in Poverty

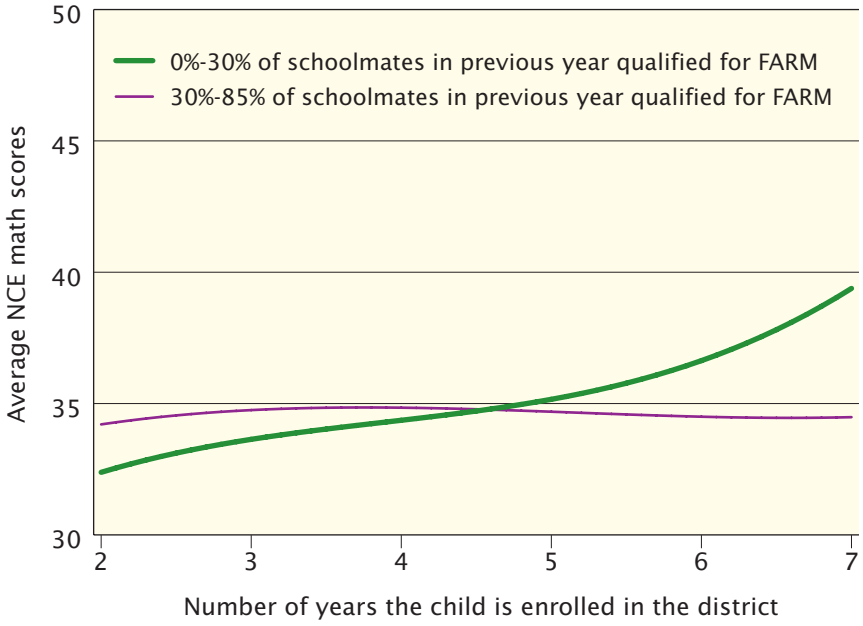
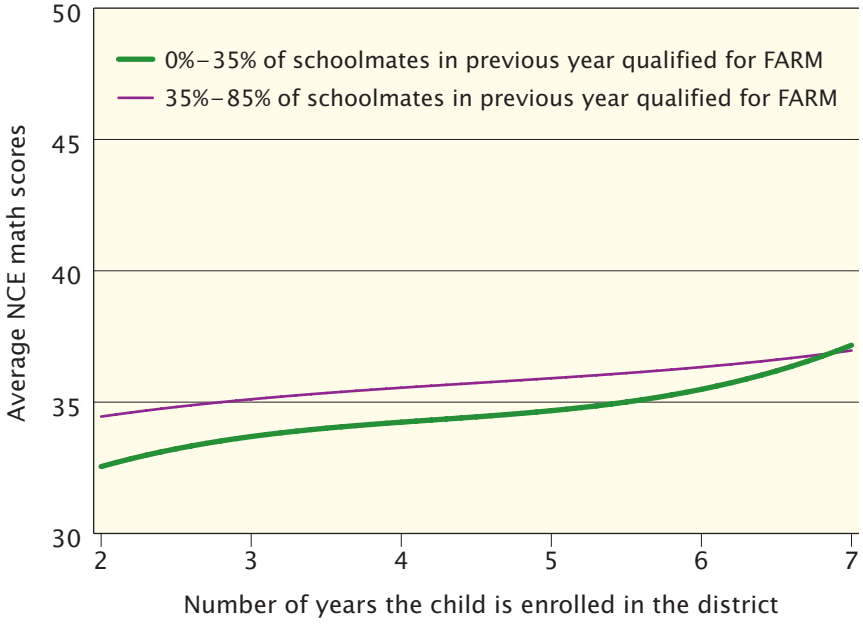


Figure A4. Math Scores of Public Housing Students:
0–35 Percent versus 35–85 Percent of Schoolmates in Poverty



Appendix 4
Technical Appendix

Test Scores

To maximize the number of students, grades, and years analyzed, the results of analyses shown in Figures 3, 4, and 6–10 draw on individual students' norm-referenced test scores from the CTBS TerraNova, CTBS TerraNova2, and Stanford 9 (which were are part of the Maryland State Assessment) tests administered to second, fourth, and sixth grades in 2001 and 2002, and second through sixth grades in 2003 through 2007. The national percentile rank norm-referenced scores of students in public housing were available from each test type. In each case, individual students' national percentile rank scores first were converted using a published conversion equation to normal curve equivalent (NCE) scores using grade- and year-specific Montgomery County district data. This conversion from percentile rank scores to normal curve equivalent (NCE) scores was necessary to place the individual students' test scores on an equal interval scale.

An NCE score measures where a student falls on the normal curve of test scores for that grade and year within the school district. NCE scores range from 1 to 99, and have a mean score of 50 and a standard deviation of 21.06. Put another way, the average NCE math score in the school district for any grade level in any year is 50, and two-thirds of students in the district in any given grade level scored between 28.94 and 71.06 (50 +/- 21.06).

To check whether the results shown in the figures were biased due to the use of public housing students' test scores from two test types (Stanford 9 on the Maryland State Assessment and CTBS), I performed separate sensitivity analyses using scores from only one of the tests (the Maryland State Assessment), first with students' norm-referenced scores and then with their criterion-referenced scale scores. (Note that students obtained both a norm-referenced score and a criterion-referenced score from the MSA derived

from subsets of the MSA test questions. The criterion-references scores on the MSA were used for accountability purposes to determine whether schools passed or failed Adequate Yearly Progress. The norm-referenced scores, which are the ones used in the primary analysis and in figures throughout the report, had no accountability stakes attached to them. The MSA was administered to third and fifth graders in 2003 and to third through sixth graders in 2004 – 2007. Analyzing only the scores from the MSA and not the CTBS TerraNova reduced the number of scores included in the regression analysis from 2,034 math NCE scores and 2,001 reading NCE scores to 1,344 math and 1,249 reading scale scores from the Maryland State Assessment. Nevertheless, the trend lines and effect sizes from the MSA scale score-only analyses are largely the same as those for the NCE scores shown in the narrative that combines scores from both the MSA and the TerraNova. The differences between the scores of children in public housing in the lowest-poverty versus moderate-poverty schools using the MSA-only tests are also statistically significant at the 10 percent level in year five to year seven.

Empirical Analysis

Since children in public housing across the county are assigned randomly to neighborhoods and schools, the concept behind estimating the effect of school and neighborhood poverty levels is relatively simple: compare the average performance of children in public housing according to the poverty levels of their schools and neighborhoods. Call Y the outcome measure (that is, reading or math score) in year t for student i. The estimated effect for children in public housing of moving from moderately high poverty to the lowest-poverty schools equals:

Equation 1

$$\delta = E\,[\boldsymbol{Y}_{\text{it}} \mid Lowpov.school_{i(t\text{-}1)}=1] - E\,[\boldsymbol{Y}_{it} \mid Modpov.school_{\,i\,(t\text{-}1)}=1]$$

where *Lowpov.school* is a dichotomous variable that either equals 1 if less than 20 percent of the student's schoolmates in the previous year (t–1) qualified for FARM or equals 0 if not. Likewise, *modpov.school* is a binary variable that equals 1 if more than 20 percent of the student's grademates in the previous year (t–1) qualified for FARM. Schoolmates from the year prior to the test score are chosen since the outcome measure (Y) is a test administered before the end of the school year. The estimated effect of neighborhood poverty rates is identical, with the substitution of indicators for *lowpov.neighborhood* and *modpov.neighborhood,* respectively.

In Equation 1, δ represents the average effect of shifting from a moderate-poverty to a low-poverty school for all the children in public housing in the sample, regardless of how many years those children have been enrolled in the district during 2001–07. It is important to recall that the population parameter δ applies to children of families who signed up for and then won admission to public housing in an affluent suburb. Strictly speaking, this means the impacts are generalizable to this kind of student.

However, the structure of the longitudinal data is such that typically there are multiple test scores per child, multiple children in public housing per school, and multiple children in public housing per neighborhood.[39] To take advantage of the multiple years of information about children, the unit of analysis in the study is not the student but rather a test score Y obtained by student i in year t. However, test scores corresponding to a single student should be highly correlated with one another. To a lesser degree, test scores corresponding to students who live in the same neighborhood or attend the same school should also be correlated. To account for the dependencies among the test scores, I fit a multilevel regression model where test scores (level 1) are nested within students (level 2A) who are, in turn, nested within schools (level 3) and separately nested within

neighborhoods (level 2B). Since neighborhoods as defined in this study (that is, census block groups) are unaligned with school boundaries,[40] the fitted model has both a nested and non-nested structure.

Equation 2: Three-level model to estimate impact of school (neighborhood) poverty level on the test scores of children in public housing

Level 1: test score-level equation

$$Y_{it} = \alpha_i + \alpha_{j[it]} + \beta 1\ \text{low.povschool}_{it-1} + \beta 2\ \text{mod.povschool}_{it-1} + \mathbf{X}_i\beta + \varepsilon_{it}$$

where:
Y = standardized math or reading score
i = student
t = time *t* = school year 2001…2007
j = neighborhood where student *i* lived at time *t*
X = vector of five predictors to control for random differences in student characteristics across the three treatment groups and for time trends—i.e., student ESL status and school year dummies

$$\varepsilon_{it} \sim N(0, \sigma_{\varepsilon}^2)$$

Here, each test score Y for student *i* at time *t* is modeled as a linear function of: a mean for the student *i* who produced the score; the contribution of school *s* in which student *i* was enrolled at time *t*; the contribution of neighborhood *j* in which student *i* lived at time *t*; the poverty level of the school student *i* attended in the year *t-1*; and student *i*'s ESL status at time *t* and year fixed effects (contained in **X**). The residual term ε_{it} represents the unexplained difference between the student *i*'s test score at time *t* and the sum of the fitted model predictors. It is assumed that ε_{it} is normally distributed and has a mean of zero and a standard deviation of σ_{it}.

Level 2A: student-level regression

$$\alpha_i = \alpha_{s[it]} + \varepsilon_i$$

where i = 1, … students and s = 1,…n schools, and $\varepsilon_i \sim N(0, \sigma^2_\varepsilon)$

The level 2A equation models the child-level variation within each school, where $\alpha_{s[it]}$ is the average standardized test score of children in public housing who attended the school s that student i attended at time t. ε_i is normally distributed, with a mean of zero and a standard deviation of $\sigma_{\alpha[i]}$. The error term, $\varepsilon_{i,}$ represents the variation among students that is not explained by the data-level predictors (level 1) and the school-level predictor.

Level 3: school-level regression

$$\alpha_{s[it]} = \mu_{\alpha[s]} + \varepsilon_{s[it]}$$

where s = 1,…n schools, and $\varepsilon_s \sim N(0, \sigma^2_\varepsilon)$

The level 3 equation models the school-level variation between the elementary schools that children in public housing attended. The index term s refers to the school student i attended at time t. The error term, ε_s, is normally distributed with a mean value of zero and a standard deviation of $\sigma_{\alpha[s].}$

Level 2B: neighborhood-level regression

$$\alpha_{j[it]} = \mu_{\alpha[j]} + \varepsilon_{j[it]}$$

where j = 1, … n neighborhoods, and $\varepsilon_j \sim N(0, \sigma^2_\varepsilon)$

The level 2B regression models the neighborhood-level variation between the neighborhoods where children in public housing lived. The error term, ε_j, is normally distributed with a mean value of zero and a standard deviation of $\sigma_{\alpha[j].}$[41]

The slopes β1 and β2 from level 1 of the model—which are fixed in the sense that the two coefficients do not vary over the observations whereas the two random effect intercepts do—indicate the average effect of the two respective poverty levels (low and moderate) among schools in the year prior to a student's test score in the following year. For example, taking the difference between fitted coefficients for β1 and β2 provides the estimated average effect of moving from a low-poverty school to a moderate-poverty school in the prior year on a public housing student's subsequent year's test score. The standard deviation of the respective coefficients for $\alpha_{s,}$ $\alpha_{j,}$ and $\alpha_{i\text{-}s}$ indicate what proportion schools, neighborhoods, and students respectively comprised of the variability in public housing students' test scores.

For the purposes of this study, taking the difference between the estimated coefficients β1 and β2 answer the primary question: do poor students benefit academically from exposure to low-poverty schools? But they do not address the more policy-rich questions of when effects occur. To test when effects occur, I expand the baseline model (equation 2) by introducing nine additional predictors: the interactions of three time-related predictors—time (in days) elapsed since student *i* first entered the school district and time *t* of the test score, time elapsed squared, and time elapsed cubed—with each of the two poverty-related predictors (β1 and β2). The interaction terms are included to see if the effects of poverty differ according to the number of years the child has been enrolled in the district.

Notes

1. David Rusk, "Trends in School Segregation," in *Divided We Fail: Coming Together through School Choice: The Report of The Century Foundation Task Force on The Common School* (New York: The Century Foundation Press, 2002).

2. Stacy Childress, Denis Doyle, and David Thomas, *Leading for Equity: The Pursuit of Excellence in Montgomery County Public Schools* (Cambridge, Mass.: Harvard Education Press, 2009).

3. Michael Birnbaum, "Montgomery Schools Add to their A+ Reputation; System Will Be Paid to Create Curriculum, which Firm Will Sell," *Washington Post*, June 9, 2010, A1.

4. Digest of Education Statistics, Table 42, Institute of Education Statistics, U.S. Department of Education, 2009, http://nces.ed.gov/programs/digest/d09/tables/dt09_042.asp.

5. Heather Schwartz and Martin Wachs, "Inclusionary Zoning and Schools," Report for the MacArthur Foundation (ongoing).

6. High-poverty schools are here defined as those with 75 percent or higher concentrations of students who qualify for a free or reduced-price meal (those who come from families making less than 185 percent of the poverty line). Fifty-five percent of fourth graders and 47 percent of eighth graders scored "below basic" on the National Assessment of Educational Progress in 2009 in high-poverty schools, whereas 17 percent of fourth graders and 13 percent of eighth graders scored "below basic" from schools were less than 20 percent of students qualified for a free or reduced-price meal. Susan Aud, William Hussar, Michael Planty, Thomas Snyder, Kevin Bianco, Mary Ann Fox, Lauren Frohlich, Jana Kemp, and Lauren Drake, *The Condition of Education 2010,* NCES 2010-028 (Washington, D.C.: National Center for Education Statistics, 2010).

7. Ibid.

8. See Leonard S Rubinowitz and James E. Rosenbaum, *Crossing the Class and Color Lines* (Chicago: University of Chicago Press, 2000) for details of the *Gautreaux* case. In a 1989 survey that compared families in public housing who had moved eight to thirteen years earlier to white Chicago neighborhoods, versus families in public housing who had moved around the same time to white neighborhoods in Chicago's suburbs, children of African-American suburban movers were more likely to have not dropped out of school (20 percent versus 5 percent), were more likely to be in college-track classes (24 percent versus 40 percent), were more likely to attend college (21 percent versus 54 percent), and more likely to attend a four-year college (4 percent versus 27 percent).

9. For the full evaluation of Moving to Opportunity, see Larry Orr, Judith Feins, Robin Jacob, Eric Beecroft, Lisa Sanbonmatsu, Lawrence F. Katz, Jeffrey B. Liebman, and Jeffrey R. Kling, *Moving to Opportunity Interim Impacts Evaluation* (Washington, D.C.: U.S. Department of Housing and Urban Development, 2003), http://www.

huduser.org/Publications/pdf/MTOFullReport.pdf. For further research regarding schools and Moving to Opportunity, see Lisa Sanbonmatsu, Jeffrey R. Kling, Greg J. Duncan, and Jeanne Brooks-Gunn, "Neighborhoods and Academic Achievement: Results from the Moving to Opportunity Experiment," NBER Working Paper 11909, National Bureau of Economic Research, Cambridge, Mass., January 2006, 18 and 45, Table 2.

10. David J. Harding, Lisa Gennetian, Christopher Winship, Lisa Sanbonmatsu, and Jeffrey R Kling, "Unpacking Neighborhood Influences on Education Outcomes: Setting the Stage for Future Research," Working Paper 16055, National Bureau of Economic Research, Cambridge, Mass., June 2010; Greg J. Duncan and Katherine A. Magnuson, "Can Family Socioeconomic Resources Account for Racial and Ethnic Test Score Gaps? *The Future of Children* 15, no. 1 (2005): 35–54; Greg J. Duncan and Jeanne Brooks-Gunn, "The Effects of Poverty on Children," *The Future of Children* 7, no. 2 (1997): 55–71; Christopher Jencks and Susan E. Mayer, "The Social Consequences of Growing Up in a Poor Neighborhood, in *Inner-City Poverty in the United States*, ed. Laurence E. Lynn, Jr., and Michael G. H. McGeary (Washington, D.C.: National Academy Press, 1990), 111–86.

11. For studies on *teacher sorting*, see Brian A. Jacob, "The Challenges of Staffing Urban Schools with Effective Teachers," *The Future of Children* 17, no. 1 (2007): 129–53; Eric A. Hanushek, John F. Kain, and Steven G. Rivkin, "Why Public Schools Lose Teachers," *The Journal of Human Resources* 39, no. 2 (2004): 326–54; Eric A. Hanushek, John F. Kain, and Steven G. Rivkin, "Teachers, Schools, and Academic Achievement," *Econometrica* 73, no. 2 (2005): 417–58; Donald Boyd, Hamilton Lankford, Susanna Loeb, and James Wyckoff, "The Draw of Home: How Teachers' Preferences for Proximity Disadvantage Urban Schools," *Journal of Policy Analysis and Management* 24, no. 1 (2005): 113–32; Donald Boyd, Hamilton Lankford, Susanna Loeb, and James Wyckoff, "Explaining the Short Careers of High-achieving Teachers in Schools with Low-performing Students," *American Economic Review* 95, no. 2 (2005): 166–71; Benjamin Scafidi, David L. Sjoquist, and Todd R. Stinebrickner, "Race, Poverty, and Teacher Mobility," *Economics of Education Review* 26 (2007): 145–59; and Robert P. Strauss, Lori L. Bowes, Mindy S. Marks, and Mark S. Plesko, "Improving Teacher Preparation and Selection: Lessons from the Pennsylvania Experience," *Economics of Education Review* 19, no. 4 (2000): 387–415. For studies on *student absenteeism and mobility*, see Committee on the Impact of Mobility and Change on the Lives of Young Children, Schools, and Neighborhoods, "Student Mobility: Exploring the Impact of Frequent Moves on Achievement: Summary of a Workshop," National Academies Press, 2010, http://www.nap.edu/catalog/12853.html (accessed on July 12, 2010); Hanushek, Kain, and Rivkin, "Why Public Schools Lose Teachers"; Russell W. Rumberger and Katherine A. Larson, "Student Mobility and the Increased Risk of High School Dropout," *American Journal of Education* 107, no. 1 (1998): 1–35; Christopher A. Kearney, "School Absenteeism and School Refusal Behavior in Youth: A Contemporary Review," *Clinical Psychology Review*

28, no. 3 (2008.): 451–71. For ethnographic studies about *high poverty school environments*, see Judith M. Parr and Michael A. R. Townsend, "Environments, Processes, and Mechanisms in Peer Learning," *International Journal of Educational Research* 37 (2002): 403–23; Martin Thrupp, "A Decade of Reform in New Zealand Education: Where to Now? Introduction," *New Zealand Journal of Educational Studies* 34, no. 1 (1999): 5–7; Martin Thrupp, "Education Policy and Social Change," *British Journal of Sociology of Education* 23, no. 2 (2002): 321–32. For studies about *parental interactions with schools*, see Annette Lareau and Erin M. Horvat, "Moments of Social Inclusion and Exclusion: Race, Class, and Social Capital in Family-School Relationships," *Sociology of Education* 72, no. 1 (1999): 37–53; Erin M. Horvat, Elliot B. Weininger, and Annette Lareau, "From Social Ties to Social Capital: Class Differences in the Relations between Schools and Parent Networks," *American Educational Research Journal* 40, no. 2 (2003): 319–51. For studies about *teacher expectations* and *student-teacher interactions*, see Annette Lareau, "Social Class Differences in Family-School Relationships: The Importance of Cultural Capital," *Sociology of Education* 60, no. 2 (1987): 73–85; Susan Lasky, "The Cultural and Emotional Politics of Teacher-Parent Interactions," *Teaching and Teacher Education* 16, no. 8 (2000): 843–60; P. Penny Hauser-Cram, Selcuk R. Sirin, and Deborah Stipek, "When Teachers' and Parents' Values Differ: Teachers' Ratings of Academic Competence in Children from Low-income Families," *Journal of Educational Psychology* 95, no. 4 (2003): 813–20; Ian A. G. Wilkinson, "Introduction: Peer Influences on Learning: Where Are They?" *International Journal of Educational Research* 37 (2002): 395–401; Matthew L. Pittinsky, "Smart by (Perceived) Association: Cognitive Social Networks and Teacher Academic Judgments," PhD dissertation, Columbia University, 2008; and Barbara F. Chorzempa and Steven Graham, "Primary-grade Teachers' Use of Within-class Ability Grouping in Reading," *Journal of Educational Psychology* 98, no. 3 (2006.): 529–41.

12. Frederick M. Hess, *Spinning Wheels: The Politics of Urban School Reform* (Washington, D.C.: Brookings Institution Press, 1999).

13. A number of studies find a link between achievement levels and school socioeconomic status above and beyond the effect of family socioeconomic status. For a summary, see, for example, Richard D. Kahlenberg, *All Together Now: Creating Middle Class Schools through Public School Choice,"* (Washington, D.C.: Brookings Institution Press, 2001), 25–42, and Richard D. Kahlenberg, "Turnaround Schools that Work: Moving beyond Separate but Equal," Agenda Brief, The Century Foundation, 2009, 7–10. Some of these studies attempt to control for self-selection. But studies of specific interventions for socioeconomic (as opposed to racial) integration are rare.

14. Approximately sixty school districts that collectively educate four million students have adopted some form of economic integration policy, up from two districts in 2000 (Kahlenberg, "Turnaround Schools that Work").

15. This has proved a challenge to researching the impacts of optional inter-district enrollment programs such as Boston's Metco program and the Voluntary Interdistrict Choice Corporation in St. Louis, Missouri.

16. Jim Mann and Kirk Sharfenberg, "Montgomery Eyes Methods to Solve Housing Crisis," *Washington Post,* March 11, 1971, F1.

17. Neighborhoods are defined in this study as census block groups, which respectively house about 500 households per block group and are approximately 0.25 square miles each.

18. Note that the maximum rate of poverty in any given school that a public housing student attended varied by school year. In 2001, public housing students attended five elementary schools where the percent of students who qualified for a free or reduced price meal exceeded 65 percent. In 2002, 2004, and 2005, four schools met this criterion, while in 2003, students in public housing attended three such schools. In 2006, students in public housing attended one school that met this criterion, and then two schools in 2007. For consistency, and to keep every possible school in the analysis, the graphs below show school poverty ranges up to 85 percent, which is the highest poverty rate in any single elementary school that a public housing child attended in any year from 2001 to 2007. It should be noted, however, that only one school out of 114 attended had a poverty rate in excess of 80 percent, and up to three schools in any given year had a poverty rate of 70 percent to 80 percent.

19. *Our Call to Action* (Rockville, Md.: Montgomery County Public Schools, 1999).

20. *Early Success Performance Plan: Educational Reform in Montgomery County Public Schools* (Rockville, Md.: Montgomery County Public Schools, May 2003), http://www.montgomeryschoolsmd.org/info/CTBS2003/PDF/EarlySuccessPerformancePlan.pdf.

21. For a history and description of inclusionary zoning, see David Rusk, *Inside Game/Outside Game: Winning Strategies for Saving Urban America* (Washington D.C.: Brookings Institution Press, 2001), and Robert Burchell, et al., "Inclusionary Zoning: A Viable Solution to the Affordable Housing Crisis?" *New Century Housing* 1, no. 2 (2000).

22. Since the housing authority does not track rejected offers, this statistic was derived from six months of offers made during 2008.

23. To validate findings, the study also examined a second set of low-income children: 3,200 children whose families used a federally subsidized housing voucher to rent an apartment in Montgomery County during 2001–07. Unlike public housing, however, these families were not randomly assigned to neighborhoods or schools, so their results are not discussed here. However, these children's outcomes were consistent with those described for public housing children.

24. Since children were not tested until the second grade in Montgomery County, too few public housing children had test scores prior to two years enrollment in the district (that is, only those who first ported into the district at grade levels higher than kindergarten) to derive estimates.

25. For example, having a teacher with less than two full years of experience was associated with a reduction of student test score gains in math and reading of

approximately 0.1 of a standard deviation (Hanushek, Rivkin, and Kain, "Teachers, Schools, and Academic Achievement," for children in Texas; Thomas J. Kane and Douglas O. Staiger, "Using Imperfect Information to Identify Effective Teachers," unpublished paper, School of Public Affairs, University of California–Los Angeles, 2005 for children in Los Angeles; and Jonah E. Rockoff, "The Impact of Individual Teachers on Student Achievement: Evidence from Panel Data," *American Economic Review* 94, no. 2 [2004]: 247–52 for children in two New Jersey districts). A teacher's cognitive ability (as measured by performance on teacher exams or standardized tests like ACT or SAT) positively impacted student performance; having a teacher whose test score on the state's teacher test was at the top or bottom of the distribution of teachers' scores had a modest effect (+/- 0.06 of a standard deviation) (see also Brian A. Jacob, "The Challenges of Staffing Urban Schools with Effective Teachers,"; Charles T. Clotfelter, Helen F. Ladd, and Jacob L. Vigdor. "Teacher Credentials and Student Achievement: Longitudinal Analysis with Student Fixed Effects," *Economics of Education Review* 26, no. 6 [2007]: 673–82).

26. Aud et al., *The Condition of Education 2010;* Kahlenberg, *All Together Now*, 39–40, citing Jonathan Crane, "The Epidemic Theory of Ghettos and Neighborhood Effects on Dropping Out and Teenage Childbearing," *American Journal of Sociology* 96, no. 5 (1991): 1226–59, and Dennis P. Hogan and Evelyn M. Kitagawa, "The Impact of Social Status, Family Structure, and Neighborhood on the Fertility of Black Adolescents," *American Journal of Sociology* 90, no. 4 (1985): 825–55.

27. Two studies of Texas and Georgia teachers suggest that the percentage of black students within the school and students' academic performance are respectively the two most important predictors of teacher mobility, followed by the economic composition of the student body (Hanushek, Kain, and Rivkin, "Why Public Schools Lose Teachers"; Scafidi, Sjoquist, and Stinebrickner, "Race, Poverty, and Teacher Mobility").

28. During the study period, the school district had a global gifted and talented screening process for all second graders as well as for students who ported into the district in third through fifth grades.

29. Initial gaps in public housing students' reading and math scores between green and red zone schools are not statistically significant at the $p<.20$ level.

30. As described in the technical appendix, public housing children's test scores were regressed on their prior school year's status (in this case, attendance at a red zone or green zone school). Thus, for children who had seven years of data, children's sixth grade scores (which was the first year of middle school) were regressed on their fifth grade red zone status, which was the last grade level in their elementary school.

31. *Our Call to Action*.

32. Paul Jargowsky, and Mohamed El Komi, "Before or After the Bell? School Context and Neighborhood Effects on Student Achievement," Working Paper 28, National Center for Analysis of Longitudinal Data in Education Research, Urban Institute, 2009.

33. For example, Montgomery County has the highest proportion of three bedroom public housing apartments among the trio of Prince Georges and Washington, D.C., public housing portfolios. This makes Montgomery County a draw for larger sized households, who may or may not have a preference for Montgomery County's public school system.

34. For information about the expansion of inclusionary zoning, see David Rusk, "Nine Lessons for Inclusionary Zoning," Keynote remarks, National Inclusionary Housing Conference, Washington, D.C., 2005, http://www.gamaliel.org/DavidRusk/keynote%2010-5-05.pdf.

35. Kahlenberg, *All Together Now*, 114, citing Gary Orfield and Susan E. Eaton, *Dismantling Desegregation: The Quiet Reversal of* Brown *v.* Board of Education (New York: New Press, 1996), 93, and Nina S. Mounts and Laurence Steinberg, "An Ecological Analysis of Peer Influence on Adolescent Grade Point Average and Drug Use," *Developmental Psychology* 31, no. 6 (November 1995): 915–22.

36. Aud et al., *The Condition of Education 2010.*

37. For information about the expansion of inclusionary zoning, see Rusk, "Nine Lessons for Inclusionary Zoning."

38. Jewel Bellush and Murray Hausknecht, "Public Housing: The Contexts of Failure," in *Housing Urban America*, ed. Jon Pynoos, Robert Schafer, and Chester Hartman (Chicago, Ill.: Aldine Publishing Company, 1967), 116.

39. Children in public housing were so widely spread across schools throughout the school district that they were infrequently clustered within the same classrooms in schools. For example, in 2006, 56 percent of students in public housing were the only students in public housing within their respective homerooms, 29 percent of students in public housing were in homerooms with one other student in public housing, 9 percent of students in public housing were enrolled in homerooms with three students in public housing, and the remaining 6 percent of students in public housing were enrolled in homerooms where anywhere from four to seven students in public housing were enrolled.

40. Students in public housing who lived in a single census block group attended as many as three different elementary schools. But, students in public housing who attended the same school in a given year were drawn from as many as sixteen census block groups.

41. It is assumed that the variance terms from levels 2A, 3, and 2B are uncorrelated with each other, and that they have a mean of 0 and unrestricted covariance matrices of $\Sigma \varepsilon_{i,} \Sigma \varepsilon_{s,}$ and $\Sigma \varepsilon_{j.}$

About the Author

Heather Schwartz is an associate policy researcher at the RAND Corporation in New Orleans, Louisiana. She received her PhD in education policy from Teachers College, Columbia University. Her research regards housing and schooling policies intended to reduce the negative effects of poverty on children. Specifically, her work falls in four policy areas intended to help close the income achievement gap: economically integrative housing policies, universal preschool, school choice, and school accountability measures under No Child Left Behind. She currently co-leads a MacArthur Foundation-funded study of inclusionary zoning and schools in ten cities.

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