

ACHIEVING ESCAPE VELOCITY: NEIGHBORHOOD AND SCHOOL INTERVENTIONS TO REDUCE PERSISTENT INEQUALITY

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Nearly fifty years after the Civil Rights Act of 1964, racial inequality in America remains a persistent empirical regularity. Despite much progress in the 1960s and 1970s, large adverse black-white gaps persist in earnings, employment, family income, health, life expectancy, incarceration, teen pregnancy, educational attainment, and academic achievement. Hispanic-white gaps in economic and educational outcomes also remain substantial (Fryer 2011).

Minority children from low-income families residing in high-poverty (and increasingly economically-isolated) neighborhoods appear to be particularly disadvantaged. For example, Figure 1 shows a strong positive correlation between mean residential neighborhood (zip code) income and the academic performance

of 8th grade students in New York City for 2009-10.

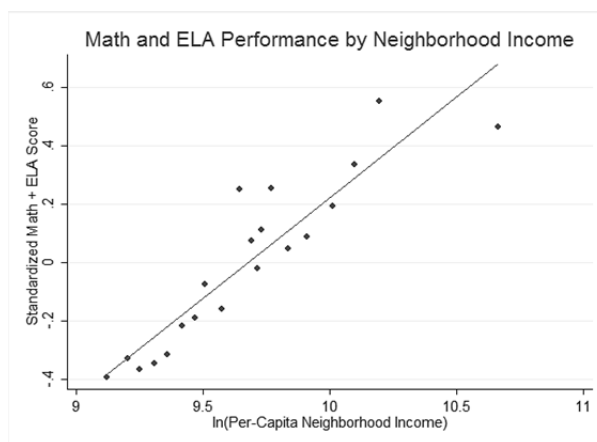


FIGURE 1. EIGHTH GRADE MATH AND ELA PERFORMANCE BY NEW YORK CITY NEIGHBORHOOD INCOME

Note: The figure plots the raw correlation between the natural logarithm of neighborhood per-capita income and 8th grade standardized New York State Math and English Language Arts (ELA) achievement test scores. Neighborhood per-capita income is binned into twenty equal sized (5 percentile point) bins. Mean $\ln(\text{neighborhood per-capita income})$ in each bin is plotted against the mean of Math and ELA scores for students residing in the bin's neighborhoods. The solid line shows the OLS estimates on the underlying student-level data. Math and ELA test score is constructed by summing test-by-grade specific scale scores from New York City Department of Education (NYCDOE) administrative data and standardizing the resulting sum to have a mean of zero and a standard deviation of one across the NYC 8th grade sample. Neighborhood is the zip code listed as a student's primary residence in NYCDOE administrative files. Per-capita income by zip code is from the 2000 Census of Population.

This correlation could reflect the causal effects of direct neighborhood characteristics, school quality differences by neighborhood, or family background factors.

A key policy question is whether high-quality schools alone can weaken the cycle of

intergenerational poverty for those growing up in high-poverty areas or whether broader neighborhood-based interventions are necessary or sufficient to achieve this aim.¹ An ideal randomized experiment would contrast a treatment of improving neighborhood quality while keeping school quality constant to one of improving school quality while leaving the neighborhood unchanged to one that improved both neighborhood and school quality. Although no such study exists, there is a growing body of evidence using credible experimental and quasi-experimental sources of variation in neighborhoods and schools. We examine this literature, using a simple conceptual framework, to shed light on which interventions may achieve escape velocity for disadvantaged children – allowing youth to escape the gravitational pull of poverty.

I. Conceptual Framework

To aid in interpreting the set of reduced form estimates in the literature, we develop a simple model of production. Let $outcome^j$ denote a representative outcome j , where j might represent outcomes such as physical health, mental health, human capital, and risky behaviors. For each j , we assume a simple

production process: $outcome^j = f^j(\eta, \sigma, \phi)$, where η represents neighborhood quality, σ denotes school quality, and ϕ captures family background. We assume that f is smooth and twice continuously differentiable in its arguments.²

Imagine that the outcome of interest is mental health and we want to understand the impact of important changes in neighborhood quality on this outcome holding school quality and family background fixed. This is equivalent to estimating $\frac{\partial f^{health}}{\partial \eta}$. On the other hand, one may want to understand the impact of investments in K-12 education reform on human capital holding neighborhood quality and family background fixed by estimating $\frac{\partial f^{human\ capital}}{\partial \sigma}$.

In some cases, such as the Harlem Children’s Zone (HCZ), interventions can change both neighborhood and school quality. However, Dobbie and Fryer (2011) argue that students who live outside the boundaries of the HCZ, making them less likely to reap the benefits of neighborhood investments, garner the same test score gains from HCZ’s Promise Academy charter school as do students inside the zone. Students living out of the zone get better schools with no change in neighborhood

¹ Other approaches include policies to improve parenting practices and to increase family resources.

² In a more general functional form, one could allow there to be other direct and indirect effects of inputs on outputs.

quality or family background ($\frac{\partial f^j}{\partial \sigma}$). Students living in the zone who attend the Promise Academy (relative to students in the Zone who do not attend the schools) get $\frac{\partial f^j}{\partial \sigma} + \frac{\partial f^{2j}}{\partial \sigma \partial \eta}$. If these two estimates are similar, it implies that the interaction term is trivial.

II. Neighborhoods

The Moving to Opportunity (MTO) randomized housing mobility experiment provides substantial exogenous variation in the neighborhood environments facing low-income families.³ From 1994 to 1998, MTO enrolled 4,604 poor families with children residing in public housing in high-poverty neighborhoods of Baltimore, Boston, Chicago, Los Angeles, and New York City. Families were randomly assigned to three groups: (1) the *Experimental voucher group*, which received a restricted housing voucher that could be used to pay for private rental housing initially restricted to be in a low-poverty area (a census tract with under a 10 percent poverty rate in 1990) and housing-mobility counseling; (2) the *Section-8 only voucher group*, which received regular Section 8 housing vouchers with no MTO relocation

constraint; and (3) a *control group*, which received no assistance through MTO.

Across the MTO treatment sites, 61 percent of household heads were non-Hispanic blacks, 31 percent were Hispanic, and nearly all households were female-headed at baseline. About half of the Experimental group and 63 percent of the Section 8-only group were able to lease up and move with an MTO voucher (the compliance rate). The MTO families were tracked for 15 years using administrative data as well as major interim (4 to 7 years after random assignment) and long-term (10 to 15 years after random assignment) follow-up surveys and analyses (Kling, Liebman, and Katz 2007; Sanbonmatsu et al. 2011).

MTO generated large and persistent improvements in residential neighborhoods for the treatment groups (especially the Experimental group) relative to the control group but only modest changes in school quality (as seen in Appendix Table 1). The average MTO family lived at baseline in a neighborhood with a 53 percent poverty rate. MTO led to a 9 percentage point decline in the duration-weighted average tract poverty rate over the 10-15 year follow-up period for the Experimental group relative to the control group and a 19 percentage point decline for Experimental compliers (those who moved with an MTO voucher).

³ Credible quasi-experimental studies of neighborhood effects include Oreopoulos (2003) or Jacob (2004).

In stark contrast, MTO only modestly improved school quality for the MTO treatment groups. From the time of random assignment until the long-term follow-up, Experimental group children attended schools that outranked their control group peers' by only 3 percentile points on state exams, and Section-8 only group children attended schools that performed just 1 percentile point higher. MTO treatment group students also typically remained in schools where the majority of the students were low-income and minority. MTO reduced the share of students eligible for free or reduced-price lunch by 4 percentage points for the Experimental group.

Although it is difficult to compare the size of neighborhood quality change to that of school quality change, MTO appears to have improved neighborhood quality by substantially more. The MTO treatment groups experienced more than twice as large a reduction in the share of poor residential peers as compared to poor school peers and more than three times as large an improvement in percentile rank in the national Census-tract poverty distribution for their neighborhoods than in the state test score distribution for their schools. Many of the MTO movers remained in the same school districts and very similar schools. MTO also had no significant impact on adult economic self-sufficiency or family

income at the interim or long-run follow-ups. Thus, an analysis of the impacts of MTO treatments on child outcomes comes close to getting at the pure effects of changes in neighborhood conditions for disadvantaged kids (with little change in schools or family economic resources): $\frac{\partial f^j}{\partial \eta}$ in our framework.

The MTO voucher treatments did not detectably impact parent's economic outcomes, but they did significantly and persistently improve key aspects of mother's (adult female's) mental and physical health including substantial reductions in psychological distress, extreme obesity, and diabetes (Ludwig et al. 2011; Sanbonmatsu et al. 2011). MTO movers also experienced significant increases in adult subjective well-being with larger gains for adults from sites where treatment induced larger reductions in neighborhood poverty (Ludwig et al. 2012). For female youth, MTO treatments similarly led to persistent and significant improvements in mental health (including substantial reductions in psychological distress) and marginally significant improvements in physical health, but there were no long-term detectable health impacts for male youth (Kling, Liebman and Katz 2007; Sanbonmatsu et al. 2011.)

Interestingly, MTO produced no sustained improvements in academic achievement,

educational attainment, risky behaviors, or labor market outcomes for either female or male children, including those that were below school age at the time of random assignment. Furthermore, the variation across sites in the degree of changes in neighborhood quality induced by treatment generates no detectable long-term relationship between changes in neighborhood poverty and youth educational outcomes or risky behaviors.⁴

The MTO findings imply that even large improvements in neighborhood conditions for poor families (in the range feasible with Section 8 vouchers) that do not also lead large improvements in school quality do not produce noticeable gains in children's economic and educational outcomes ($\frac{\partial f^{human\ capital}}{\partial \eta} \approx 0$) but can improve girl's health ($\frac{\partial f^{health}}{\partial \eta} > 0$ for females). Variation across sites in the school quality changes induced by treatment is suggestive of a key role for schools in children's human capital outcomes and risky behaviors.

⁴ There is variation across MTO sites in changes in school quality by treatment group as seen in state test score percentile rankings and MTO children's self-reports of school climate. These data demonstrate a positive (but typically not statistically significant) relationship between MTO treatment group educational and risky behavior outcomes and mean gains in school quality that is stronger for males than females (Appendix Figures 1 to 4).

III. Schools

The MTO experiment produced large exogenous changes in neighborhoods and small changes in schools – an example of altering neighborhoods while holding schools fixed. In this section, we briefly describe alternative research designs in which important elements of the educational production function were changed, while neighborhoods remained constant. In our framework, this is equivalent to $\frac{\partial f^j}{\partial \sigma}$ for outcomes j . We conclude by examining the Harlem Children's Zone, a social experiment designed to increase both neighborhood and school quality, which provides estimates of the different components of the total derivative: $\frac{\partial f^j}{\partial \sigma} + \frac{\partial f^j}{\partial \eta} + \frac{\partial f^{2j}}{\partial \sigma \partial \eta}$.

Using data from Project STAR – an experiment carried out in 79 Tennessee schools from 1985 to 1989 where 11,571 students in grades K to 3 were randomly assigned to small classes averaging 15 students or regular classes averaging 22 students – Chetty et al. (2011) estimate the impact of reduced class size on young adult educational and economic outcomes by linking students from Project STAR to individual and administrative tax records collected by the U.S. Internal Revenue

Service. They find positive effects of being randomly assigned to a smaller class size in early grades on college attendance and a summary index of adult outcomes designed to broadly capture socioeconomic success in young adulthood.

Similarly, Fredriksson, Öckert, and Oosterbeek (2013) use a regression-discontinuity design that exploits a maximum class size rule to examine the effects of attending smaller classes in primary grades. Using rich administrative data from Sweden, they find substantial and statistically significant positive effects on educational attainment, adult wages, and earnings at ages 27 to 42 years. In symbols, $\frac{\partial f^j}{\partial \sigma} > 0$ for outcomes such as college attendance, earnings, and other adult economic outcomes when school quality is measured as a reduction in class size while holding teacher quality constant.

Good teachers also seem to matter. To test the causal impact of high value-added (VA) teachers on medium-term outcomes such as college attendance, earnings, and teen pregnancy, Chetty, Friedman, and Rockoff (2011) link individual-level student achievement data on over 2 million students in a large U.S. urban school district to administrative tax data on the students' parental characteristics and adult outcomes.

They use a quasi-experimental research design exploiting changes in teaching staff. Students assigned to a high-VA teacher in grades 4 to 8 earn more at age 28, are less likely to be teen parents, and are more likely enroll in college or attend a high-quality college.

The Harlem Children's Zone is a 97-block area in Harlem, New York, that combines "No Excuses" charter schools with neighborhood services designed to ensure the social environment outside of school is positive and supportive for children from birth to college graduation.⁵ HCZ was created to address all the problems that poor children in Harlem face – housing, schools, crime, asthma, and so on – through a "conveyor belt" of services from birth to college. The approach is based on the assumption that one must improve both neighborhoods and schools to affect student achievement (Dobbie and Fryer 2011).

Dobbie and Fryer (2012) use the random-assignment nature of lottery admissions to determine the causal effect of being offered admission to the HCZ Promise Academy charter school on academic achievement and medium-term life outcomes. Because many of the students admitted to the HCZ schools live outside the boundary of HCZ neighborhood

⁵ "No Excuses" schools typically allow the principal considerable administrative freedom, set measurable goals that are regularly tested using interim assessments, emphasize parent participation, and create a culture of universal achievement that make no excuses based on the students' background.

supports, comparing student outcomes and Promise Academy lottery-based treatment effect estimates for those who live inside the zone with those who live outside the zone can help separate out the impacts of schools, neighborhoods, and their interaction on youth outcomes.

To analyze the impact of attending the charter schools in HCZ on medium-term life outcomes, Dobbie and Fryer (2012) survey the middle school lottery cohorts six to seven years after the initial lottery and link administrative data to the New York City Department of Education and National Student Clearinghouse records. Dobbie and Fryer (2012) find that lottery winners have large and significant increases in math performance and marginal improvements in reading, and are 14.1 percentage points more likely to enroll in college. Female lottery winners are 12.1 percentage points less likely to be teen mothers, and male lottery winners are 4.3 percentage points less likely to be incarcerated. Creating indices for human capital, risky behaviors, and health, Dobbie and Fryer (2012) report large and significant increases in human capital, large and marginally significant decreases in risky behaviors, and no observable impact on health outcomes. These HCZ results, summarized in Appendix Figure 5, stand in direct contrast to

the results from the MTO neighborhood intervention, where positive female health effects were paired with null results on youth human capital and risky behavior.

A key issue for understanding the HCZ results within our framework concerns distilling the independent effects of the HCZ neighborhood supports in addition to improvements in school quality. To do this, Dobbie and Fryer (2012) examine differential treatment effects based upon how far from the boundaries of HCZ a student lives. Comparing lottery winners outside the zone to lottery losers outside the zone provides an estimate of pure school quality effects $\left(\frac{\partial f^j}{\partial \sigma}\right)$ for individuals exposed to HCZ's charter schools but not its neighborhood programs (normalizing $\eta=0$ for the out of zone group). On this set of individuals, Dobbie and Fryer report large positive treatment effects on an index of human capital variables, large (but only marginally significant) reductions in risky behaviors, and no detectable impacts on physical or mental health.

Comparing lottery winners within the zone to lottery losers in the zone yields an estimate of $\frac{\partial f^j}{\partial \sigma} + \frac{\partial f^{2j}}{\partial \sigma \partial \eta}$. Dobbie and Fryer (2012) estimate that in only one out of thirteen outcomes (number of advanced high school exams passed) is the treatment effect of

gaining access to the Promise Academy for those in the zone ($\frac{\partial f^j}{\partial \sigma} + \frac{\partial f^{2j}}{\partial \sigma \partial \eta}$) larger than that for those out of the zone ($\frac{\partial f^j}{\partial \sigma}$). These findings imply that for the outcomes analyzed there is no important interaction of neighborhood and school quality ($\frac{\partial f^{2j}}{\partial \sigma \partial \eta} \approx 0$). If one restricts attention to the three main outcome indices (human capital, risky behavior, and health), the interaction term effectively is zero.

Finally, comparing lottery losers outside the zone to lottery losers inside the zone provides an estimate of neighborhood effects ($\frac{\partial f^j}{\partial \eta}$). Across all three outcome indices, the estimates are zero though imprecisely measured. The MTO experiment provides a better laboratory for estimating $\frac{\partial f^j}{\partial \eta}$, indicating little neighborhood quality impacts on human capital and risky behavior outcomes but substantial health impacts for females.

V. Conclusions

The estimates reviewed provide some guidance as to how neighborhoods and schools enter the production functions for children's medium-term outcomes in the domains of human capital, risky behaviors, and health. The evidence suggests that investments in school quality are more

effective in decreasing persistent economic and educational inequalities and for reducing risky behaviors. Neighborhood improvements, however, do more to reduce mental and physical health inequalities. With sufficient budgetary resources, policy-makers would try to improve both neighborhood and school quality for low-income children. However, in the face of increasingly stringent budgetary limits, policy-makers face trade-offs and it is important to choose appropriate instruments for the outcomes one wants to affect. A vital policy question is how to generate systematic large-scale improvements in school and teacher quality for low-income students growing up in high-poverty neighborhoods.

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