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ABSTRACT

How does one's place of residence affect individual behavior and long-run outcomes? Understanding neighborhood and place effects has been a leading question for social scientists during the past half-century. Recent empirical studies using experimental and quasi-experimental research designs have generated new insights on the importance of residential neighborhoods in childhood and adulthood. This paper summarizes the recent neighborhood effects literature and interprets the findings. Childhood neighborhoods affect long-run economic and educational outcomes in a manner consistent with exposure models of neighborhood effects. For adults, neighborhood environments matter for their health and well-being but have more ambiguous impacts on labor market outcomes. We discuss the evidence on the mechanisms behind the observed patterns and conclude by highlighting directions for future research.

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1 Introduction

In 1966, Dorothy Gautreaux and three other Chicago residents sued the Chicago Housing Authority (CHA) in the first major public housing desegregation lawsuit in the United States. Their case highlighted the fact that only 63 of the more than 10,000 public housing units the CHA had built in the previous decade were outside of low-income and racially segregated areas. The resulting settlement reached in 1976 between the CHA and the U.S. Department of Housing and Urban Development created the Gautreaux Assisted Housing Program, which provided housing vouchers and mobility assistance to a limited number of African American residents from public housing projects in Chicago. From 1976 to 1998, the Gautreaux program helped around 7,100 families move to private rental housing in areas ranging from inner-city neighborhoods to upper-middle-class suburbs.

The Gautreaux program provided a promising opportunity for researchers to study the importance of neighborhoods. Social scientists have long hypothesized that living in a disadvantaged area directly affects the outcomes of adults and life courses of children. Descriptive research has supported this idea by showing that individuals living in high-poverty areas fare worse both contemporaneously and over the long-run in terms of important outcomes such as education, criminal involvement, health, and earnings (Wilson, 1987; Jencks and Mayer, 1990; Brooks-Gunn et al., 1993; Sampson, Morenoff and Gannon-Rowley, 2002; Sharkey and Faber, 2014). Yet, a lingering concern is that such correlations between individual outcomes and neighborhood characteristics may reflect unmeasured differences in individual characteristics that affect both outcomes and selection into living in a disadvantaged area. After all, under everyday circumstances, a household's decision on where to live is not random. Prior observational studies suggest that the magnitude of estimated neighborhood effects is often reduced when researchers control for detailed family background measures (Solon, 1999).

A crucial feature in the Gautreaux setting was what appeared to be a substantial de-

gree of randomness in the process by which households were matched to available rental units in different neighborhoods. Housing counselors identified rental units—regardless of whether the units were in the city or a suburb of Chicago—and offered them to families based on their position on a waiting list. This process potentially limited the extent to which difficult-to-measure household advantages and disadvantages drove the neighborhood choices of Gautreaux families.

Influential early work on Gautreaux strongly suggested that place of residence mattered: families who moved to the more advantaged suburbs had better outcomes. Popkin, Rosenbaum and Meaden (1993) studied a survey of female household heads from Gautreaux, finding substantially higher employment rates for the suburban movers compared with their counterparts who stayed in the city. Children from Gautreaux households that moved to the suburbs were less likely to drop out from high school, were more likely to attend a four-year college, and had higher rates of employment relative to those whose families moved within the city of Chicago (Kaufman and Rosenbaum, 1992; Rosenbaum, 1995).

Yet, the Gautreaux results became less clear as further evidence accumulated. When Mendenhall, DeLuca and Duncan (2006) conducted a longer-term and more comprehensive follow-up analysis, they found little systematic effects of suburban (versus city) relocation on employment or welfare receipt for the female household heads. Their work and subsequent studies provide evidence that the placement type (i.e., a suburban or city rental unit) was systematically related to pre-move household characteristics, suggesting that the Gautreaux setting may not approximate a randomized experiment (Votruba and Kling, 2009; DeLuca et al., 2010).

Inspired by the early promising findings from Gautreaux as well as by its methodological limitations, the subsequent generation of neighborhood effects studies have addressed selection bias by relying on randomized field experiments and on quasi-experimental sources of variation. For example, several studies use data from the U.S. Department of Housing and

Urban Development's Moving to Opportunity randomized housing mobility demonstration, which helped a treatment group of public housing families move to lower-poverty areas by providing them with housing vouchers and mobility counseling. Other studies have relied on quasi-experimental research designs including comparisons of children who moved to new areas at different ages and examinations of individuals forced to relocate due to plausibly exogenous events such as natural disasters or public housing demolitions.

In this essay, we summarize what has been learned about the causal impact of neighborhoods in the two decades since the early research on Gautreaux. Our discussion is motivated by new findings that have reshaped how scholars understand the importance of neighborhood environments for adults and children. We concentrate on empirical studies and do not attempt to comprehensively review the methodological and econometric issues covered in prior reviews such as Durlauf (2004) and Graham (2018). Our work complements and extends other recent reviews of neighborhood effects research such as Sharkey and Faber (2014) and Galster and Sharkey (2017). Although our focus is on evidence from high-income countries, we believe that lessons regarding neighborhood effects in developed countries may have relevance for understanding neighborhood influences in developing countries as well.

We begin with descriptive evidence indicating that key outcomes of adults and children are strongly correlated with neighborhood poverty rates. Such patterns have motivated the search for compelling approaches to estimate the causal effects of neighborhoods on a range of outcomes. We then sketch a conceptual model that highlights the potential influences of *current* neighborhoods through contemporaneous (or situational) effects and of *past* neighborhoods through exposure (or developmental) effects that accumulate during childhood. The hypothesis that neighborhood effects on socioeconomic and health outcomes operate through the length of exposure to different neighborhood environments has been emphasized by Wilson (1987), Jencks and Mayer (1990), and Sampson (2012). A key prediction of the exposure hypothesis is that the gains to moving to neighborhoods with beneficial at-

tributes will be larger for children who are younger at the time of a move and thus exposed for a longer period.

Next, we discuss the findings from recent experimental and quasi-experimental studies for adults and children separately. Our review of the evidence can be summarized in two main points. First, the findings for adults require a nuanced interpretation. Recent work provides little evidence that changing neighborhoods within a city (or commuting zone) has impacts on contemporaneous economic outcomes (at least for adult heads of low-income households). The within-city pattern contrasts with several studies that show longer-distance relocations by adults to higher-wage labor markets (cities or regions) can improve their economic outcomes. The evidence for health outcomes and health-related behaviors (like smoking) is more consistent and suggests that adults benefit from both local and longer-distance moves to higher-opportunity areas. Second, studies of children strongly support the existence of effects in which longer exposure to "better" neighborhood environments during childhood leads to improved long-run outcomes.

We also assess the evidence for different mechanisms that could drive the observed neighborhood impacts. For adults, we discuss how the evidence on the effects of within-city relocation is at least superficially inconsistent with the influential spatial mismatch hypothesis of Kain (1968). The analysis of adult health outcomes suggests that neighborhood stressors and health-related behaviors (e.g., smoking) are key channels. For children, at least five factors appear to be mediators of place effects: school quality, peer influences, pollution, exposure to violence, and criminal justice policies.

Finally, we discuss the implications of recent studies of neighborhood effects for the design of housing policies and conclude by raising outstanding research questions. Open issues include understanding the relative importance of different mechanisms behind neighborhood effects, assessing the general equilibrium impacts of housing mobility policies and other low-income housing assistance programs, and examining the impacts of place-based neighborhood

revitalization policies on the pre-existing residents of targeted areas.

2 Background on Neighborhoods and Outcomes

In this section, we use publicly available U.S. data to conduct descriptive analyses that motivate the idea that place of residence matters. For the unit of analysis, we focus on several geographies analyzed in prior studies of neighborhood effects. The largest units of geography that we consider are commuting zones, which are aggregations of counties based on commuting patterns in the 1990 Census and can be viewed as approximating a local labor market. There are 741 U.S. commuting zones. We also examine relationships at more granular levels such as school districts and census tracts. There are over 12,000 school districts and about 72,000 census tracts in the United States. Census tracts typically have a few thousand residents and come closer to what most people commonly refer to as a "neighborhood." To classify these geographic areas by economic opportunity, we use the poverty rate from the 2000 Decennial Census.[1] Poverty rates are a widely used measure in the neighborhood effects literature (Sampson and Sharkey, 2008) and can be broadly interpreted as a summary index of the bundle of characteristics associated with a neighborhood (Kling, Liebman and Katz, 2007).

Figure 1 illustrates a strong association between an area's poverty rate and the outcomes for adults and children. Each panel plots averages based on grouping commuting zones (in panels A, B, and C) or school districts (in panel D) into one of 20 "bins" by poverty rate. The results in Panel A show that a one percentage point increase in the poverty rate in a commuting zone is associated with a 0.8 percentage point decline in the adult employment rate using data from the 2000 Decennial Census. Panel B shows that adult health (as measured by life expectancy at age 40) also decreases with the poverty rate. Life expectancy is measured using data from Chetty et al. (2016a) and is based on mortality records from the

[1]For our analysis of school district test scores, we rely on poverty rates using measures from the American Community Survey for the years 2007-2011 and 2012-2016.

Social Security Administration.

The results in Figure 1 also show that upward mobility and academic achievement of children both decrease with the poverty rate. The measure of upward mobility is the mean household income (measured at ages 31-37) for children who grew up in each commuting zone and were born to low-income parents (those at the 25th percentile of the income distribution) from the Opportunity Atlas (Chetty et al., 2020a).[2] The measure of achievement is based on the mean of standardized test scores for school districts from the Stanford Education Data Archive. Panels C and D of Figure 1 show that a one percentage point increase in the poverty rate is associated with declines of $371 in a child's expected adult income and 0.025 standard deviations in academic achievement, respectively. All the relationships in Figure 1 are statistically significant at the one percent level, as indicated in the regression results reported in Columns 1-4 of Table 1.

The correlations between the poverty rate and outcomes are not simply due to broad differences across metropolitan areas. Columns 5 and 6 of Table 1 present correlations between poverty rates and resident outcomes at the census-tract level using data on all U.S. tracts and specifications that control for county fixed effects. These within-county results generate estimates that are similar to what we observe in the commuting zone level analysis.

Figure 2 provides another illustration of within-city patterns using Chicago as an example and providing maps of tract level poverty rates, adult employment, and child outcomes. Dark red indicates areas with relatively worse outcomes (e.g., higher poverty) while dark blue areas have better outcomes (e.g., lower poverty). Panel A shows that there is substantial variation in poverty rates within the city. The tracts that are high poverty are predominately located

[2]Chetty et al. (2020a) created the Opportunity Atlas using data from the U.S. Census and federal income tax returns. They study a sample of 20.5 million children born between 1978-1983 who are in their mid-30s in 2014-2015. Children are mapped back to Census tracts where they lived until age 23. They construct a measure of average outcomes by measuring parent and child percentile ranks in the national distribution. The Opportunity Atlas contains measures of the average percentile for children in each area. To aid interpretation of this outcome, we converted their rank outcomes into real 2015 U.S. dollars using the national income distribution.

in the western and southern areas. In line with the results from Table 1, Panels B and C show that these high-poverty areas are also those where adults have the lowest employment rates and low-income children have the least upward mobility.

Associations between neighborhood poverty and individual contemporaneous and longer-term outcomes could be driven by two very different sources. One possibility is that neighborhood environments have causal impacts on adults and children. Another possibility is that the observed patterns reflect the non-random sorting of the types of people who end up living in disadvantaged areas. In the next section, we sketch a model of neighborhood effects and use it to illuminate the need for experimental or quasi-experimental approaches to estimate causal neighborhood effects.

3 Conceptual Framework for Neighborhood Effects

Models in economics and sociology postulate a "production function" relationship in which the outcomes for an individual (such as earnings, health status, or academic achievement) are influenced by both contemporaneous and developmental neighborhood effects, in addition to family inputs.[3] Developmental neighborhood effects (also called exposure effects) are typically hypothesized to depend on the length of past exposure to neighborhoods of different quality, especially during childhood. In addition, neighborhood environments might also have larger and long-lasting impacts at certain ages (e.g., early childhood or the start of adolescence) as embodied in the "critical age effects" hypothesis (Almond and Currie, 2011; Heckman and Mosso, 2014). Note that neighborhood effects can operate through multiple channels including peer influences, neighborhood safety and exposure to violence, school quality, the physical environment, and access to employment and criminal opportunities (Kain, 1968; Jencks and Mayer, 1990; Glaeser, Sacerdote and Scheinkman, 1996).

[3]For a formal exposition of the model behind our thinking in this paper, and how it leads to some of the prominent equations that are estimated in empirical work, see Online Appendix A. Topa and Zenou (2015) provides a more-detailed overview of theoretical models of neighborhood effects.

A prominent approach to analyzing neighborhood effects is the canonical linear-in-means model of social interactions that features only contemporaneous effects (Manski, 1993; Brock and Durlauf, 2001). In this model, the impact of neighborhoods stems from three sources. First, endogenous (peer) effects arise due to the propensity for individual behavior to depend on the expected (mean) behavior of their neighborhood peers. Second, exogenous effects represent the possibility that individual behavior is shaped by the average characteristics of neighbors (such as their income and education). Third, correlated effects refer to the fact that individuals within a neighborhood face the same institutional and physical environments including schools, law enforcement policies, and levels of pollution.

In this canonical model, it is typically not possible to identify endogenous effects separately either from exogenous effects or from unmeasured correlated effects (Manski, 1993). However, a reduced form can be estimated to provide evidence of contemporaneous neighborhood effects by regressing the outcome of interest on an individual's own characteristics, the mean characteristics of current residential neighbors (like their socioeconomic background), and other current neighborhood characteristics (like school resources). The reduced form estimates can provide suggestive evidence for the presence of peer effects (from the impacts of mean neighbor background characteristics) and effects of neighborhood attributes (from the impacts of specific neighborhood characteristics). Experimental or quasi-experimental variation in peer behavior is needed to estimate causal endogenous peer effects as in the randomized field experiments analyzed by Duflo and Saez (2003) and Bursztyn et al. (2014).

More recently, much attention has focused on models that center solely on developmental neighborhood effects for children. For example, Chetty and Hendren (2018) study the impacts of moving a child to a new neighborhood where other children typically do well. They characterize neighborhoods by measuring the mean adult outcomes of children who spend their entire childhood in an area ("permanent residents"). Their approach studies children who moved at different ages and examines how their later-life adult outcomes vary

with the duration of childhood exposure to more advantaged neighborhoods. The idea that neighborhoods have exposure effects also has been examined in observational studies in sociology (Wodtke, Harding and Elwert, 2011; Sharkey and Faber, 2014) and is closely related to models of social capital in economics (Loury, 1977; Glaeser, Sacerdote and Scheinkman, 1996).

Persuasive statistical identification of contemporaneous or development neighborhood effects can be challenging due to non-random selection of people into neighborhoods. The neighborhood effects literature has followed broader trends in economics to address self-selection bias by using experimental and quasi-experimental approaches. The key feature is that the analysts study settings in which there is substantial random (exogenous) variation in exposure to different neighborhood environments. Such an approach is clearest in research using the experimental data from the Moving to Opportunity demonstration. Other studies that rely on quasi-experimental methods address concerns over selection bias by comparing groups where the variation in neighborhood exposure approximates random assignment.

4 Evidence on Neighborhood Effects for Adults

Beginning in 1994, the Moving to Opportunity housing mobility demonstration randomized access to housing vouchers and assistance in moving to less-distressed communities to about 4,600 families living in public housing projects located in deeply impoverished neighborhoods in five cities (Baltimore, Boston, Chicago, Los Angeles, and New York). The program randomized families into three groups: 1) a low-poverty voucher group (also called the "experimental group") that was offered housing-mobility counseling and restricted housing vouchers that could only be used to move to low-poverty areas (Census tracts with 1990 poverty rates below 10 percent); 2) a traditional voucher group that was offered regular Section 8 housing vouchers that had no additional locational constraints (also called the Section 8 group); and 3) a control group that received no assistance through the program.

The Moving to Opportunity experiment generated large changes in neighborhood environments. One year after baseline, the average adult in the control group was living in a neighborhood with a tract poverty rate of 50 percent. Moving with a low poverty or traditional voucher reduced average tract poverty rates by 35 and 21 percentage points, respectively (Ludwig et al., 2013). At the time of the final follow-up survey conducted 10 to 15 years after random assignment, the Moving to Opportunity groups showed large differences in duration-weighted average neighborhood poverty rates since program entry. And families in the experimental voucher group reported feeling safer in their neighborhoods and less likely to have observed conditions of local disorder such as drug activity.

Policymakers had hoped that moves through Moving to Opportunity would generate gains in work and reductions in welfare participation for the adult household heads, but there is little evidence of improved economic self-sufficiency from moves to lower-poverty neighborhoods for adults. For example, Kling, Liebman and Katz (2007) find no detectable impacts on economic self-sufficiency four to seven years after random assignment, and Ludwig et al. (2013) find a similar pattern 10 to 15 years after random assignment. Chetty, Hendren and Katz (2016b) use administrative Internal Revenue Service records to conduct a longer-term analysis and similarly find no statistically significant effects of Moving to Opportunity vouchers on earnings or employment of adults.

At the same time, the Moving to Opportunity program did generate statistically significant improvements in physical and mental health as well as subjective well-being for adults. Specifically, the low-poverty voucher group experienced decreased incidence of extreme obesity and diabetes (Ludwig et al., 2011), a reduction in psychological stress and increase in calmness and tranquility (Katz, Kling and Liebman, 2001; Kling, Liebman and Katz, 2007), and an increase in subjective well-being (Ludwig et al., 2012) in the short-run (one to three years after random assignment), interim (four to seven years after random assignment), and final (10 to 15 years after random assignment) follow-up surveys.

Since the launch of the Moving to Opportunity demonstration experiment, studies of natural experiments generated by housing assistance policies have provided further evidence on neighborhood effects for adults.[4] Chyn (2018) examined neighborhood effects for adults by studying public housing demolitions in Chicago during the 1990s. To estimate causal impacts, Chyn compared *ex ante* similar displaced and non-displaced public housing residents. This approach revealed that demolition notably improved residential outcomes, as displaced households typically relocated to areas with less poverty and lower crime rates. Despite improvements in neighborhood quality, there were no statistically significant impacts on employment, earnings or participation in social assistance programs for the displaced adults who had children. In line with these results from Chicago, Haltiwanger et al. (2020) study a broader national set of public housing demolitions and find that displaced adult household heads experience no employment or earnings gains over the next 10 years even when moving to neighborhoods with greater nearby job accessibility.

Recent studies of within-country regional migration provide additional evidence on the importance of place effects for adults.[5] Deryugina, Kawano and Levitt (2018) and Deryugina and Molitor (2020) used a quasi-experimental approach to estimate impacts of relocation due to Hurricane Katrina on income and health, respectively: specifically they compared outcomes for displaced New Orleans residents with a comparison group living in similar U.S. cities using a difference-in-difference framework. They found long-run improvements in labor market outcomes and reductions in mortality for the elderly, which were likely driven by the

[4]In the context of a low-income county, Barnhardt, Field and Pande (2017) studied an urban housing lottery in India which provided winning residents of slums with the opportunity to move to improved housing in a new neighborhood. They found that 14 years after the housing allocation, lottery winners lived in safer and cleaner locations, but there was no evidence of improvements in other socioeconomic outcomes such as income or labor force participation.

[5]Studies of international immigration also provide evidence on the impacts of place of residence. Abramitzky, Boustan and Eriksson (2012) estimate large economic returns to immigration from Norway to the United States during the late 19th century. Clemens (2013) shows that Indian software workers who win a US visa lottery to immigrate earn substantially more than their coworkers who perform similar duties but lost the lottery. McKenzie, Stillman and Gibson (2010) find large earnings gains for Tongans who randomly win the opportunity to migrate to New Zealand.

fact that Hurricane Katrina victims typically moved to areas with stronger labor markets and better health outcomes. Collins and Wanamaker (2014) and Boustan (2016) studied the Great Migration—the massive movement of African Americans from the rural South to urban areas in the North—and find large increases in earnings based on a sibling fixed effects approach. Finally, Black et al. (2015) and Johnson and Taylor (2019) study historical U.S. rural-urban migration using instrumental variable strategies. Their results show that moving to urban areas was damaging for health and that this impact may have been mediated by changes in migrant health-related behaviors.

The experimental and quasi-experimental evidence on adults suggests two main findings. First, relocation within a city or commuting zone does not seem to improve earnings or other economic outcomes for adults, but long-distance migration to higher-wage areas or stronger labor markets generates notable economic gains. The significant negative cross-sectional relationship for adult employment and neighborhood poverty within a commuting zone (Column 5 of Table 1) appears to largely reflect selection and residential sorting. Place effects on contemporaneous adult labor market outcomes appear to operate at a broader geographic level (the local labor market, commuting zone, region, or country) than one's residential neighborhood within a commuting zone. Second, place of residence has large impacts on physical and mental health outcomes for adults in studies of both within-city and cross-city moves.

5 Mechanisms for Adults

What do the empirical findings for adults imply for theories of neighborhood effects? The conclusion that within-commuting-zone moves into areas with higher employment have little impact on economic outcomes for low-income minority household heads superficially appears inconsistent with the "spatial mismatch hypothesis" (Kain, 1968; Wilson, 1987;

Holzer, 1991).[6] This hypothesis posits that racial economic disparities have resulted in part from unequal access to suburban job opportunities: that is, as a large number of jobs and white residents shifted from urban to suburban areas in the post-1950s period, a combination of housing market discrimination and poor public transportation options limited the access of racial and ethnic minorities to those jobs. A contributing factor could be greater discrimination against minority job applicants by employers in more affluent and mostly white neighborhoods, as found by Agan and Starr (2020) in a recent randomized audit study. An augmented spatial mismatch model potentially consistent with the findings in mobility studies is one in which housing market discrimination coupled with high commuting costs could reduce the labor market options for minority workers, effectively increase employer monopsony power in the low-wage labor market, and thereby serve to reduce employment rates and wages for less-advantaged minorities throughout a metropolitan area.

For adult health, recent studies are consistent with two broad conclusions regarding theory and mechanisms. First, exposure to community disorder and violence has adverse impacts on mental health. Participants in the Moving to Opportunity demonstration stated that concerns about neighborhood violence and crime were the primary motivations for their desire to move out of public housing, and the moves to lower-poverty areas were associated with reductions in neighborhoods crime rates and increases in neighborhood collective efficacy. These moves to higher-opportunity neighborhoods also led to lower self-reports of criminal victimization and improved perceptions of neighborhood safety (Katz, Kling and Liebman, 2001; Kling, Liebman and Katz, 2007; Ludwig et al., 2013). Second, place of residence may help to shape health behaviors. For example, Black et al. (2015) and Johnson and Taylor (2019) provide suggestive evidence that historical U.S. rural-urban migration increased mortality due to changes in smoking behavior and alcohol consumption. Moreover, Kling,

[6] In contrast, the finding of Haltiwanger et al. (2020) that labor market outcomes at age 26 for children displaced in public housing demolitions are positively related to neighborhood job accessibility is consistent with the traditional spatial mismatch hypothesis playing a role for young minority adults.

Liebman and Katz (2007) find that the reductions in obesity and the mental health gains for the low-poverty voucher treatment group in Moving to Opportunity were modestly associated in the medium-term with increases in physical exercise and dietary shifts toward fruits and vegetables.

6 Evidence on Neighborhood Effects for Children

In the initial Moving to Opportunity studies, researchers focused on older children and found mixed evidence on the effects of moving to low-poverty neighborhoods. For example, Kling, Liebman and Katz (2007) found beneficial effects on education, risky behaviors, and physical health for female youth in the five-year post-enrollment survey. However, the beneficial impacts for teenage girls stood in contrast to adverse effects of moving for teenage boys. To study these gender differences in effects, Clampet-Lundquist et al. (2011) collected in-depth interviews for a subsample of children in the experiment. They found that gender differences in daily routines, the ability to fit in with neighborhood norms, and neighborhood navigation strategies may have contributed to how girls appeared to benefit more than boys from moves to lower-poverty neighborhoods.

Only recently has enough time passed to study long-run outcomes for the younger children in the Moving to Opportunity demonstration. Chetty, Hendren and Katz (2016b) linked the Moving to Opportunity sample to administrative tax records to study impacts for children of all ages. A major goal of their analysis is to study whether the duration of childhood exposure to new neighborhood environments matters. They do this by comparing program impacts on younger children (those younger than age 13 at random assignment) to older children (those who were 13 to 18 years old at random assignment). They found substantial positive effects on adult earnings and the likelihood of attending college for younger children in the experimental treatment group.[7] However, Chetty, Hendren and Katz found no detectable effects (or even

[7]Other studies have considered long-run impacts of Moving to Opportunity on additional outcomes. Pollack et al. (2019) find that moving led to reductions in annual hospital spending for younger children.

negative impacts) on longer-run measures of adult earnings and college attendance for older children in the experimental treatment group. The long-run economic gains from moves to lower-poverty areas for the younger children and the, if anything, adverse effects for the older children in Moving to Opportunity are apparent and similar in magnitude for both male and female children, despite the observed gender differences in short-run adjustments to new neighborhood environments.

The differential pattern of treatment effects on economic outcomes for younger and older children in the Moving to Opportunity experiment are consistent with a model that contains a disruption cost for moving to a different type of neighborhood and allows the benefits from relocating to lower poverty areas to be proportional to the duration of exposure during childhood. Exposure effects can be sufficiently large to outweigh a disruption cost when moves occur at early ages. Disruption effects may occur because moving to a different environment in childhood, especially during adolescence, could have negative impacts on social ties or other adverse effects on development (Wood et al., 1993).

Chyn (2018) provided further evidence on the importance of childhood neighborhoods by exploiting the vagaries of timing and choice of units impacted by public housing demolitions. He found that public housing demolitions in Chicago led to relocations to lower-poverty neighborhoods and significantly improved the later-life labor market and criminal justice outcomes for children.[8] Notably, he found the long-run positive impacts are larger for children displaced Notably, he found the long-run positive impacts are larger for children displaced before age 13.[9] In a similar vein, Nakamura, Sigurdsson and Steinsson (2020) studied long-

Miller and Soo (2020) detect increases in credit scores and credit use for those making Moving to Opportunity moves as young children.

[8] Additional work by Chyn and Haggag (2019) shows that children displaced by public housing demolitions were much more likely to be politically active relative to their non-displaced counterparts.

[9] Jacob (2004) similarly provides evidence of the short-run effects on children of public housing demolitions in Chicago. He used data from Chicago Public Schools and found no beneficial impacts of relocation due to demolition on high school graduation or academic achievement. Haltiwanger et al. (2020) studied a national sample of public housing demolitions and found large long-run labor market gains from public housing demolition for children at ages 10 to 18 years at the time of the demolition.

term effects of forced relocation due to a 1973 volcanic eruption in Iceland. They found increased earnings and educational outcomes for the displaced, but only for those who were younger than age 25 at the time of the eruption. Overall, the results from these two quasi-experimental settings are in line with the childhood exposure evidence in Chetty, Hendren and Katz (2016b).

Some of the most compelling evidence of neighborhood exposure effects for children can be found in Chetty and Hendren (2018). They used quasi-experimental methods and tax records to study U.S. children (born from 1980 to 1988) from seven million families that moved across commuting zones. They compared outcomes for children whose families moved when they were different ages to understand how effects vary with the duration of time spent living in more-advantaged areas (those where the children of permanent residents have higher average outcomes). Their approach identifies childhood neighborhood exposure effects under the assumption that selection effects do not vary with the child's age at move among families moving across the same types of locations. Chetty and Hendren used three primary approaches to support the reasonableness of this assumption: 1) their results are robust to controlling for family fixed effects (thereby relying only on the variation in neighborhood exposure among siblings); 2) their findings are robust to controlling for time-varying observable family characteristics reflecting changes in parental economic circumstances; and 3) they obtain similar results when focusing on a subset of moves that are likely to be driven by plausibly exogenous regional shocks such as natural disasters.

The findings of Chetty and Hendren (2018) revealed significant neighborhood exposure effects on intergenerational mobility: the adult incomes of children who moved converge to the adult incomes of children of permanent residents in the destination at a rate of four percent per year of childhood exposure. In other words, this estimate suggests that a young child who moves at birth to a better area and stays there for 15 years would pick up 60 percent of the difference in permanent resident adult economic outcomes between their origin and

destinations. Additional work has shown that there are similarly large exposure effects for other long-term outcomes such as college attendance, marriage, teenage birth rates, and incarceration (Chetty and Hendren, 2018; Chetty et al., 2020a).

Several recent papers have used the same empirical framework from Chetty and Hendren (2018) and replicated their findings using data from other countries. Deutscher (2020) found evidence of exposure effects on labor market outcomes using tax records from Australia. Notably, his analysis estimated exposure effects from infancy onward and showed that exposure effects in his setting are largest in the teenage years. Laliberte (2021) detected exposure effects on educational attainment in Canada using academic records from Montreal. His estimates are of similar magnitude in Chetty and Hendren (2018): educational attainment of movers converges linearly at a rate of 4.5 percent per year.

Broadly speaking, these recent experimental and quasi-experimental studies provide robust evidence that childhood neighborhood of residence matters for long-run outcomes.[10] In particular, the effects of moving at early ages to more advantaged neighborhoods seem positive for labor market outcomes (Chetty, Hendren and Katz, 2016b; Chyn, 2018; Chetty and Hendren, 2018; Nakamura, Sigurdsson and Steinsson, 2020; Deutscher, 2020) and long-run schooling (Chetty, Hendren and Katz, 2016b; Chyn, 2018; Chetty and Hendren, 2018; Laliberte, 2021). In terms of adverse outcomes, the effects of moving at early ages to higher opportunity neighborhoods is negative for teenage pregnancy (Chetty and Hendren, 2018), incarcerations (Chetty et al., 2020b), and hospitalizations (Pollack et al., 2019). Thus, increased childhood exposure to better neighborhood environments generates beneficial im-

[10]In contrast, Oreopoulos (2003) is a compelling quasi-experimental study that found no evidence of childhood neighborhoods affecting adult economic outcomes. Specifically, he compared long-run outcomes for children who were assigned to live in different public housing projects in Toronto and found that the children's long-run labor market outcomes are not systematically related to the neighborhood environments surrounding their residential public housing projects. One possible explanation is that neighborhood effects operate at a hyperlocal level (limited to the area within the public housing project), and the environment within public housing projects is similar across projects despite substantial variation in the broader surrounding neighborhood environments.

pacts on long-run economic, schooling, social, and health outcomes.

7 Mechanisms for Children

This section discusses the evidence on several mechanisms thought to mediate the impacts of childhood neighborhoods on long-run outcomes: school quality, peer influences, pollution, exposure to violence, and criminal justice policies. Each of these channels varies substantially across U.S. cities and neighborhoods due to socioeconomic and race-based residential segregation. Recent studies provide compelling causal evidence in support of each of these mechanisms. In contrast, the recent evidence suggests the causal component of childhood neighborhood exposure effects is not mediated by improvements in parental income.

First, lower poverty neighborhoods might also have greater school resources and better-performing schools. During the past decade or so, many studies have used lottery-based admissions to experimentally estimate the effect of attending schools with higher-levels of teacher quality or school value-added. These studies have found that attending higher-quality schools improves academic achievement as measured by standardized exams, increases post-secondary education attendance, and reduces the incidence of risky behaviors such as criminal activity or teenage pregnancy (Hastings and Weinstein, 2008; Deming, 2011; Dobbie and Fryer, 2015). In addition, research using quasi-experimental methods has shown that increases in school funding have large impacts on academic achievement, educational attainment, and adult earnings and health outcomes for students from low-income families (Jackson, Johnson and Persico, 2016; Jackson and Mackevicius, 2021). In this vein, Laliberte (2021) finds that 50 percent or more of the gains in educational attainment from moving to a better neighborhood in Montreal is driven by increased access to higher-quality schools.

However, the findings from the Moving to Opportunity experiment and the Chicago public housing demolitions indicate that increased academic achievement as measured by standardized test scores was not a mediating factor for increases in college attendance and improved

adult incomes for younger children moving to lower-poverty areas (Jacob, 2004; Ludwig et al., 2013; Chyn, 2018). One possibility is that schools in more affluent neighborhoods may still play a role for less advantaged students through improvements in non-cognitive skills and non-academic schooling outcomes such as disciplinary infractions. Jackson (2018) finds strong evidence that teacher value-added in non-cognitive skills as measured by non-test score behaviors (absences, suspensions, course grades, and grade repetition) is distinct from test score effects and has substantial impacts on student longer-run outcomes. Childhood exposure effects from schools and broader neighborhood environments could also partially be mediated by factors associated with cultural adaptability, as suggested by the finding that moves to lower-poverty areas for younger Black children in Moving to Opportunity increased the use of Standard American English as compared to African American Vernacular English (Rickford et al., 2015).

Second, strong evidence on the impact of the influence of peers in one's community comes from studies of criminal behavior. Damm and Dustmann (2014) study a Danish natural experiment generated by a policy that quasi-randomly assigned refugee households to municipalities throughout the country: refugee children assigned to areas with higher shares of youth criminals are significantly more likely to have later-life criminal convictions. Billings, Deming and Ross (2019) study children within small neighborhood areas in North Carolina and show that their likelihood of being arrested together (i.e., being criminal partners) is higher when they attend the same school, especially for neighborhood peers who are the same race and gender.

Third, high-poverty neighborhoods typically have the greatest exposure to air pollution, water quality problems, and lead (Bernard and McGeehin, 2003; Colmer et al., 2020). For children, greater exposure to air pollution has negative impacts on early-life health (Chay and Greenstone, 2003; Currie and Walker, 2011), human capital (Heissel, Persico and Simon, 2020), and labor market outcomes (Isen, Rossin-Slater and Walker, 2017). Childhood expo-

sure to lead has negative effects on a wide range of outcomes (Aizer et al., 2018; Aizer and Currie, 2019). High-poverty and high-minority share neighborhoods (especially historically redlined areas) also have land surface features leading to higher temperatures and more extreme heat exposure for residents than more advantaged (and non-redlined) neighborhoods (Hoffman, Shandas and Pendleton, 2020). A growing literature indicates adverse impacts on children's learning and school performance from cumulative heat exposure (Park, Goodman, Hurwitz and Smith, 2020).

Fourth, exposure to neighborhood violence affects children. Sharkey (2010) studies the impact of local homicides using a difference-in-difference approach that relies on variation in the location and timing of homicides. He finds notable short-run effects for minority children: African American children recently exposed to homicides in their block group have lower scores on vocabulary and reading assessments. Ang (2020) uses a similar research design and shows hyperlocal exposure to violence in the form of killings by police during adolescence has longer-lasting impacts in the form of reduced rates of high school graduation and college enrollment.

Fifth, local public goods related to the criminal justice system have important impacts on long-run child outcomes. Derenoncourt (2020) finds that Northern cities that received more Black migrants during the twentieth century had lower rates of upward mobility for Black children born in the 1980s. As potential meditators driving this negative impact on mobility, she shows that Black migration also resulted in greater spending on police and higher rates of incarceration. Similarly, Baran, Chyn and Stuart (2020) provide complementary evidence suggesting that increases in county-level incarceration rates reduced rates of Black upward mobility between 1940 and 1990. More aggressive local policing behavior and increased incarceration risk could negatively affect children by reducing the incentive to invest in human capital (Lochner, 2004).

Finally, an important implication of recent housing mobility research is that causal child-

hood exposure effects from moving to higher opportunity areas are not driven by parental income gains. Studies of the Moving to Opportunity demonstration and Chicago public housing demolitions found no evidence that relocating to less distressed areas had impacts on the economic outcomes of adults, but both settings revealed large long-run gains for younger children (Ludwig et al., 2013; Chetty, Hendren and Katz, 2016b; Chyn, 2018).

8 Some Implications for the Design of Housing Voucher Policies

Policymakers have become increasingly concerned about the effects of neighborhoods, given persistently high and rising levels of residential segregation by income—particularly for households with children (Owens, 2016; Reardon et al., 2018). Rental vouchers and housing allowance programs for low-income households are major forms of assistance provided in developed countries (Priemus, Kemp and Varady, 2005). The Housing Choice Voucher program (previously known as the Section 8 program) is the largest form of housing aid for U.S. disadvantaged households and aids approximately 2.3 million low-income families annually (Collinson, Ellen and Ludwig, 2015). There are similarly large housing subsidy programs in the United Kingdom and Chile.

The latest generation of neighborhood effects studies suggest three lessons for housing voucher policies that provide portable rental support to low-income families. First, designing vouchers so that families are encouraged and helped to move to low-poverty or otherwise more advantaged areas is a crucial program feature. U.S. housing voucher recipients typically do not use their vouchers to move to high-opportunity areas (Collinson and Ganong, 2018). Evidence from the Moving to Opportunity demonstration, the Baltimore Regional Housing Program (DeLuca and Rosenblatt, 2017), and the more recent Creating Moves to Opportunity program in Seattle (Bergman et al., 2020) indicates that housing mobility counseling services that provide customized assistance and encouragement can notably increase the rate

at which voucher recipients move to higher-opportunity areas.[11]

Second, the social benefit-cost ratio (or the marginal value of public funds) for housing voucher programs are likely highest if the vouchers are targeted to families with young children (Hendren and Sprung-Keyser, 2020). Children who move to higher-opportunity areas at younger ages have longer potential childhood exposure, which consistently leads to improved long-run outcomes. This implies that the common use of voucher waitlists—where eligible families may wait years while their children age—may be ineffective relative to prioritizing families with younger children.

What are the estimated benefits and costs to targeting housing vouchers to families with young children and encouraging moves to better neighborhoods? Chetty, Hendren and Katz (2016b) provide an assessment of this question from the perspective of the public housing families that participated in the Moving to Opportunity experiment. They find that the experimental vouchers increased annual earnings by $3,477 for children whose families moved before they were age 13. Using relatively conservative assumptions, they estimate that using a voucher to move to a high-opportunity neighborhood for a typical public housing family with two young children would increase the children's lifetime earnings by $198,000 and tax revenue by $22,400 (in present value). On the cost side, their estimate is based on the cost of providing housing mobility counseling since the fiscal costs of housing vouchers are equivalent to or less than those of providing place-based public housing (Olsen, 2009). In the Moving to Opportunity program, the average cost of mobility counseling was $3,789 per family who took up a voucher (Goering et al., 1999). The findings suggest that the benefits

[11] Recent studies show that several alternatives to intensive mobility counseling (such as financial incentives or low-intensity counseling) are much less effective in increasing the share of voucher holders moving to high-opportunity neighborhoods (Bergman et al., 2020; Schwartz, Mihaly and Gala, 2017). For example, one prominent approach, termed Small Area Fair Market Rents (SAFMRs), is to encourage families to move to higher-opportunity areas by offering higher voucher payment standards in high-rent ZIP codes. Collinson and Ganong (2018) and Bergman et al. (2020) find that SAFMRs induced modest increases in moves to higher-quality neighborhoods in Dallas and in Seattle-King County, but not nearly as large an impact as when SAFMRs are combined with customized mobility counseling as in the Creating Moves to Opportunity demonstration.

substantially exceed the cost of providing a targeted voucher with mobility counseling instead of traditional public housing support both for taxpayers and for the low-income families with young children themselves.

Finally, a third lesson is that using vouchers to facilitate low-income households to move to higher-opportunity neighborhoods within the same metropolitan area is unlikely on its own to improve the economic outcomes of adults in the relocating households. Macroeconomic or regional policies that increase overall local economic activity and labor market tightness appear more promising. Much research has found that economic conditions at the commuting zone (or state) level have strong impacts on the employment outcomes of minorities and those with less-education (Hoynes, Miller and Schaller, 2012). Recent literature also uncovers persistent effects on employment outcomes from commuting zone-level recession shocks (Yagan, 2019), declines in manufacturing (Charles, Hurst and Schwartz, 2019), and international trade shocks (Autor, Dorn and Hanson, 2013). Policies that improve the human capital, occupational skills, and connections to employers of low-wage workers living in high-poverty areas also have potential. An experimental evaluation of the Jobs Plus program, an employment program operating in high-poverty public housing projects, found long-lasting positive impacts on earnings (Riccio, 2010).[12] In addition, some combination of better access to public transportation and housing opportunities could lower job search and commuting costs, thereby improving work outcomes for residents of disadvantaged neighborhoods. Holzer, Quigley and Raphael (2003) found such a pattern in the case of the expansion of BART in the San Francisco Bay Area.

[12]Sectoral employment programs also appear particularly promising for disadvantaged workers. Evidence from the WorkAdvance demonstration and the Year Up program show that providing training and placement into higher-wage occupations notably improves worker outcomes (Katz et al., 2020).

9 Discussion and Conclusion

In the past two decades, new experimental and quasi-experimental studies have pushed the frontier of research on neighborhood effects. The work surveyed indicates that residential neighborhoods within a metropolitan area matter for adult health and well-being but have little causal impact on contemporaneous adult labor market outcomes (at least for the heads of low-income households). Adult economic outcomes are shaped more by overall commuting zone or regional labor market opportunities. In contrast, the emerging consensus for children is that living in a higher-opportunity neighborhood has substantial beneficial causal impacts on a number of socioeconomic outcomes.

How do the results from the recent studies discussed in this essay change the interpretation of previous studies of neighborhood effects? There are two main implications. First, the findings strongly imply that traditional observational studies of the neighborhood effects are likely to suffer from substantial selection bias leading to overestimates of neighborhood influences on adult economic outcomes within a metropolitan area. For example, several studies have used non-experimental methods to study adult movers and found large effects on labor market outcomes (Fauth, Leventhal and Brooks-Gunn, 2004; Weinberg, Reagan and Yankow, 2004; Clampet-Lundquist and Massey, 2008). Although selection bias is not the only explanation for the discrepancy between earlier observational studies and more recent work based on experiments and plausible quasi-experiments, Harding et al. (2021) provide evidence suggesting that selection bias plays a large role in driving the findings of traditional non-experimental studies of neighborhood effects on adult economic outcomes.

Second, recent findings reshape our understanding of the nature of neighborhood effects for children. Specifically, the analyses by Chetty and Hendren (2018), Chetty, Hendren and Katz (2016b), and Chyn (2018) provide strong evidence that neighborhoods affect outcomes through childhood exposure effects. The Moving to Opportunity experiment generated ben-

eficial impacts on long-run economic outcomes of moves to higher-opportunity areas only for younger children who received a larger "dosage" of childhood exposure to improved neighborhood environments relative to their older counterparts. Disruption costs of moves across different types of neighborhoods could potentially outweigh the small exposure gains for older children.

We conclude by discussing several directions for further research. Future work related to mechanisms remains an ongoing research issue. For example, we know little about the relative importance of the different mechanisms that are typically "bundled" together within a neighborhood. In other words, how much does school quality matter relative to other characteristics of a local area such as peers or neighborhood safety? A better understanding of the weight of each of these neighborhood factors may improve policy responses. The deep integration of qualitative (ethnographic) research into experimental and quasi-experimental research designs, as in the Moving to Opportunity and the Creating Moves to Opportunity projects, also represents a promising direction to generate more nuanced and realistic insights into the mechanisms behind neighborhood effects (Clampet-Lundquist et al., 2011; Bergman et al., 2020).

More work is also needed to understand both the general equilibrium effects of scaling-up housing mobility policies and the impact of other policies that shape residential choice. For example, increases in the share of low-income to high-income residents in high-opportunity neighborhoods could generate aggregate gains since neighborhoods appear to matter less for outcomes of high-income children (Chetty et al., 2020a) and may be desirable on distributional grounds. Changes in the supply of housing might also occur in the long-run from shifts in housing demand across neighborhoods due to housing mobility programs. These general equilibrium effects could be quantified through research methods combining experimental and quasi-experiment sources of variation in neighborhood choices with more structural approaches as in Galiani, Murphy and Pantano (2015), Davis, Gregory and Hartley (2019),

Diamond and McQuade (2019), and Chyn and Daruich (2021). In addition, understanding the effects of local land-use regulations (e.g., restrictions on multi-family housing) and housing market discrimination on access to high-opportunity neighborhoods for low-income and minority families remains a crucial related research area (Glaeser, 2017; Rothstein, 2017).

A final frontier research area involves the estimation of the impact of place-based policies to improve low-income neighborhoods on the intended beneficiaries—the incumbent (pre-existing) adult residents and their children. Place-based policies focusing on business tax incentives such as Enterprise Zones and Opportunity Zones do not appear to be effective in improving job creation and economic opportunities in low-income areas (Bartik, 2020). Public housing redevelopment efforts via the federal HOPE VI program have improved the trajectories of high-poverty and racially segregated neighborhoods—but possibly by displacing poorer and nonwhite residents (Tach and Emory, 2017). More comprehensive and community-driven place-based investment policies such as the federal Empowerment Zones appear to have improved area economic outcomes in repeated cross-section analyses (Busso, Gregory and Kline, 2013), but it is less clear if the gains accrue to pre-existing residents or reflect changes in neighborhood sorting and accrue to in-migrants.

Newly available longitudinal administrative data sets should allow future research to examine effects of place-based policies on pre-existing residents. Haltiwanger et al. (2020) is a start in this direction specifically for understanding the impacts of place-based urban renewal programs such as the HOPE VI public housing demolitions. Similarly, Garin and Rothbaum (2020) link individuals from the 1940 Census of Population to their economic outcomes many years later in Social Security earnings data. They exploit quasi-experimental variation across counties in the construction of government-financed manufacturing plants for World War II, finding substantial positive impacts on local economic development and persistent gains in the adult earnings of children who lived in treated counties prior to the war. Further analyses of contemporary place-based policies and community development

programs using linked administrative data sets (from the U.S. Census Bureau and for many European countries) would be a valuable addition.

References

Abramitzky, Ran, Leah Platt Boustan, and Katherine Eriksson, "Europe's Tired, Poor, Huddled Masses: Self-Selection and Economic Outcomes in the Age of Mass Migration," *American Economic Review*, 2012, *102* (5), 1832–1856.

Agan, Amanda Y. and Sonja B. Starr, "Employer Neighborhoods and Racial Discrimination," 2020, *NBER Working Paper No. 28153, November.*

Aizer, Anna and Janet Currie, "Lead and Juvenile Delinquency: New Evidence from Linked Birth, School, and Juvenile Detention Records," *The Review of Economics and Statistics*, 2019, *101* (4), 575–587.

_ , _ , Peter Simon, and Patrick Vivier, "Do Low Levels of Blood Lead Reduce Children's Future Test Scores?," *American Economic Journal: Applied Economics*, 2018, *10* (1), 307–341.

Almond, Douglas and Janet Currie, "Chapter 15 - Human capital development before age five," in David Card and Orley Ashenfelter and David Card, eds., *Handbook of Labor Economics*, Vol. 4, Part B, Elsevier, 2011, pp. 1315–1486.

Ang, Desmond, "The Effects of Police Violence on Inner-City Students," *The Quarterly Journal of Economics*, 2020, *136* (1), 115–68.

Autor, David H., David Dorn, and Gordon H. Hanson, "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," *American Economic Review*, 2013, *103* (6), 2121–2168.

Baran, Cavit, Eric Chyn, and Bryan A Stuart, "The Great Migration and Educational Opportunity," 2020, *Working Paper.*

Barnhardt, Sharon, Erica Field, and Rohini Pande, "Moving to Opportunity or Isolation? Network Effects of a Randomized Housing Lottery in Urban India," *American Economic Journal: Applied Economics*, 2017, *9* (1), 1–32.

Bartik, Timothy J., "Using Place-Based Jobs Policies to Help Distressed Communities," *Journal of Economic Perspectives*, 2020, *34* (3), 99–127.

Bergman, Peter, Raj Chetty, Stefanie DeLuca, Nathaniel Hendren, Lawrence F Katz, and Christopher Palmer, "Creating Moves to Opportunity: Experimental Evidence on Barriers to Neighborhood Choice," 2020, *Working Paper.*

Bernard, S. M. and M. A. McGeehin, "Prevalence of Blood Lead Levels >=5 g/DL Among US Children 1 to 5 Years of Age and Socioeconomic and Demographic Factors Associated with Blood of Lead Levels 5 to 10 g/DL, Third National Health and Nutrition Examination Survey, 1988-1994.," *Pediatrics*, 2003, *112* (6), 1308–1313.

Billings, Stephen B., David J. Deming, and Stephen L. Ross, "Partners in Crime," *American Economic Journal: Applied Economics*, 2019, *11* (1), 126–150.

Black, Dan A., Seth G. Sanders, Evan J. Taylor, and Lowell J. Taylor, "The Impact of the Great Migration on Mortality of African Americans: Evidence from the Deep South," *American Economic Review*, 2015, *105* (2), 477–503.

Boustan, Leah Platt, *Competition in the Promised Land*, Princeton University Press, November 2016.

Brock, William A. and Steven N. Durlauf, "Discrete Choice with Social Interactions," *The Review of Economic Studies*, 2001, *68* (2), 235–260.

Brooks-Gunn, Jeanne, Greg J. Duncan, Pamela Kato Klebanov, and Naomi Sealand, "Do Neighborhoods Influence Child and Adolescent Development?," *American Journal of Sociology*, 1993, *99* (2), 353–395.

Bursztyn, Leonardo, Florian Ederer, Bruno Ferman, and Noam Yuchtman, "Understanding Mechanisms Underlying Peer Effects: Evidence From a Field Experiment on Financial Decisions," *Econometrica*, 2014, *82* (4), 1273–1301.

Busso, Matias, Jesse Gregory, and Patrick Kline, "Assessing the Incidence and Efficiency of a Prominent Place Based Policy," *American Economic Review*, 2013, *103* (2), 897–947.

Charles, Kerwin Kofi, Erik Hurst, and Mariel Schwartz, "The Transformation of Manufacturing and the Decline in US Employment," in Martin Eichenbaum and Jonathan A. Parker, eds., *NBER Macroeconomics Annual*, Vol. 33, The University of Chicago Press, 2019, pp. 307–372.

Chay, Kenneth Y. and Michael Greenstone, "The Impact of Air Pollution on Infant Mortality: Evidence from Geographic Variation in Pollution Shocks Induced by a Recession," *The Quarterly Journal of Economics*, 2003, *118* (3), 1121–1167.

Chetty, Raj and Nathaniel Hendren, "The Impacts of Neighborhoods on Intergenerational Mobility I: Childhood Exposure Effects*," *The Quarterly Journal of Economics*, 2018, *133* (3), 1107–62.

_ , John Friedman, Nathaniel Hendren, Maggie Jones, and Sonya Porter, "The Opportunity Atlas: Mapping the Childhood Roots of Social Mobility," 2020, *Opportunity Insights, Harvard University, January.*

_ , Michael Stepner, Sarah Abraham, Shelby Lin, Benjamin Scuderi, Nicholas Turner, Augustin Bergeron, and David Cutler, "The Association between Income and Life Expectancy in the United States 2001-2014," *JAMA*, 2016, *315* (16), 1750.

_ , **Nathaniel Hendren, and Lawrence F. Katz**, "The Effects of Exposure to Better Neighborhoods on Children: New Evidence from the Moving to Opportunity Experiment," *American Economic Review*, 2016, *106* (4), 855–902.

_ , _ , **Maggie R. Jones, and Sonya R. Porter**, "Race and Economic Opportunity in the United States: an Intergenerational Perspective," *The Quarterly Journal of Economics*, 2020, *135* (2), 711–783.

Chyn, Eric, "Moved to Opportunity: The Long-Run Effects of Public Housing Demolition on Children," *The American Economic Review*, 2018, *108* (10), 3028–3056.

_ **and Diego Daruich**, "The Equilibrium Effects of Neighborhood Interventions," 2021, *Working Paper.*

_ **and Kareem Haggag**, "Moved to Vote: The Long-Run Effects of Neighborhoods on Political Participation," 2019, *NBER Working Paper No. 26515.*

Clampet-Lundquist, Susan, Kathryn Edin, Jeffrey R. Kling, and Greg J. Duncan, "Moving Teenagers Out of High-Risk Neighborhoods: How Girls Fare Better than Boys," *American Journal of Sociology*, 2011, *116* (4), 1154–89.

Clampet-Lundquist, Susan and Douglas S. Massey, "Neighborhood Effects on Economic Self-Sufficiency: A Reconsideration of the Moving to Opportunity Experiment," *American Journal of Sociology*, 2008, *114* (1), 107–143.

Clemens, Michael A, "Why Do Programmers Earn More in Houston than Hyderabad? Evidence from Randomized Processing of US Visas," *American Economic Review*, 2013, *103* (3), 198–202.

Collins, William J. and Marianne H. Wanamaker, "Selection and Economic Gains in the Great Migration of African Americans: New Evidence from Linked Census Data," *American Economic Journal: Applied Economics*, 2014, *6* (1), 220–252.

Collinson, Robert and Peter Ganong, "How Do Changes in Housing Voucher Design Affect Rent and Neighborhood Quality?," *American Economic Journal: Economic Policy*, 2018, *10* (2), 62–89.

_ **, Ingrid Gould Ellen, and Jens Ludwig**, "Low-Income Housing Policy," in "Economics of Means-Tested Transfer Programs in the United States," Vol. 2, University of Chicago Press, 2015, pp. 59–126.

Colmer, Jonathan, Ian Hardman, Jay Shimshack, and John Voorheis, "Disparities in PM2.5 air pollution in the United States," *Science*, 2020, *369* (6503), 575–578.

Currie, Janet and Reed Walker, "Traffic Congestion and Infant Health: Evidence from E-ZPass," *American Economic Journal: Applied Economics*, 2011, *3* (1), 65–90.

Damm, Anna Piil and Christian Dustmann, "Does Growing Up in a High Crime Neighborhood Affect Youth Criminal Behavior?," *American Economic Review*, 2014, *104* (6), 1806–1832.

Davis, Morris A, Jesse Gregory, and Daniel A Hartley, "The Long-Run Effects of Low-Income Housing on Neighborhood Composition," 2019, *Working Paper.*

DeLuca, Stefanie and Peter Rosenblatt, "Walking Away From The Wire: Housing Mobility and Neighborhood Opportunity in Baltimore," *Housing Policy Debate*, 2017.

_ , Greg J. Duncan, Micere Keels, and Ruby M. Mendenhall, "Gautreaux Mothers and Their Children: An Update," *Housing Policy Debate*, 2010, *20* (1), 7–25.

Deming, David J., "Better Schools, Less Crime?," *The Quarterly Journal of Economics*, 2011, *126* (4), 2063–2115.

Derenoncourt, Ellora, "Can you move to opportunity? Evidence from the Great Migration," 2020, *Working Paper.*

Deryugina, Tatyana and David Molitor, "Does When You Die Depend on Where You Live? Evidence from Hurricane Katrina," *American Economic Review*, 2020, *110* (11), 3602–3633.

_ , Laura Kawano, and Steven Levitt, "The Economic Impact of Hurricane Katrina on Its Victims: Evidence from Individual Tax Returns," *American Economic Journal: Applied Economics*, 2018, *10* (2), 202–233.

Deutscher, Nathan, "Place, Peers, and the Teenage Years: Long-Run Neighborhood Effects in Australia," *American Economic Journal: Applied Economics*, 2020, *12* (2), 220–249.

Diamond, Rebecca and Tim McQuade, "Who Wants Affordable Housing in Their Backyard? An Equilibrium Analysis of Low-Income Property Development," *Journal of Political Economy*, 2019, *127* (3), 1063–1117.

Dobbie, Will and Roland G. Fryer, "The Medium-Term Impacts of High-Achieving Charter Schools," *Journal of Political Economy*, 2015, *123* (5), 985–1037.

Duflo, Esther and Emmanuel Saez, "The Role of Information and Social Interactions in Retirement Plan Decisions: Evidence from a Randomized Experiment," *The Quarterly Journal of Economics*, 2003, *118* (3), 815–842.

Durlauf, Steven N., "Chapter 50 Neighborhood effects," in J. Vernon Henderson and Jacques-François Thisse, ed., *Handbook of Regional and Urban Economics*, Vol. Volume 4 of *Cities and Geography*, Elsevier, 2004, pp. 2173–2242.

Fahle, Erin M., Benjamin R. Shear, Dementra Kalogrides, Sean F. Reardon, Belen Chavez, and Andrew D. Ho, *Stanford Education Data Archive: Technical Documentation (Version 3.0)* 2019. Retrieved from http://purl.stanford.edu/db586ns4974.

Fauth, Rebecca C., Tama Leventhal, and Jeanne Brooks-Gunn, "Short-Term Effects of Moving from Public Housing in Poor to Middle-Class Neighborhoods on Low-Income, Minority Adults' Outcomes," *Social Science & Medicine*, 2004, *59* (11), 2271–2284.

Galiani, Sebastian, Alvin Murphy, and Juan Pantano, "Estimating Neighborhood Choice Models: Lessons from a Housing Assistance Experiment," *American Economic Review*, 2015, *105* (11), 3385–3415.

Galster, George and Patrick Sharkey, "Spatial Foundations of Inequality: A Conceptual Model and Empirical Overview," *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 2017, *3* (2), 1–33.

Garin, Andrew and Jonathan Rothbaum, "Was the Arsenal of Democracy an Engine of Mobility? The World War II Industrial Expansion and the Roots of Mid-century Manufacturing Opportunity," 2020, *Working Paper.*

Glaeser, Edward, "Reforming Land Use Regulations," July 2017. The Brookings Institution.

Glaeser, Edward L., Bruce Sacerdote, and José A. Scheinkman, "Crime and Social Interactions," *The Quarterly Journal of Economics*, 1996, *111* (2), 507–548.

Goering, John, Joan Kraft, Feins Judith, Dennis McInnis, Mary Holin, and Huda Elhassan, "Moving to Opportunity for Fair Housing Demonstration Program: Current Status and Initial Findings," 1999.

Graham, Bryan S., "Identifying and Estimating Neighborhood Effects," *Journal of Economic Literature*, 2018, *56* (2), 450–500.

Haltiwanger, John C, Mark J Kutzbach, Giordano E Palloni, Henry Pollakowski, Matthew Staiger, and Daniel Weinberg, "The Children of HOPE VI Demolitions: National Evidence on Labor Market Outcomes," November 2020, *NBER Working Paper No. 28157, November.*

Harding, David J., Lisa Sanbonmatsu, Greg J. Duncan, Lisa A. Gennetian, Lawrence F. Katz, Ronald C. Kessler, Jeffrey R. Kling, Matthew Sciandra, and Jens Ludwig, "Evaluating Contradictory Experimental and Non-Experimental Estimates of Neighborhood Effects on Economic Outcomes for Adults," 2021, *NBER Working Paper No. 28454, February.*

Hastings, Justine S. and Jeffrey M. Weinstein, "Information, School Choice, and Academic Achievement: Evidence from Two Experiments," *The Quarterly Journal of Economics*, 2008, *123* (4), 1373–1414.

Heckman, James J. and Stefano Mosso, "The Economics of Human Development and Social Mobility," *Annual Review of Economics*, 2014, *6* (1), 689–733.

Heissel, Jennifer A., Claudia Persico, and David Simon, "Does Pollution Drive Achievement? The Effect of Traffic Pollution on Academic Performance," *Journal of Human Resources*, 2020, pp. 1218–9903R2.

Hendren, Nathaniel and Ben Sprung-Keyser, "A Unified Welfare Analysis of Government Policies," *The Quarterly Journal of Economics*, 2020, *135* (3), 1209–1318.

Hoffman, Jeremy S., Vivek Shandas, and Nicholas Pendleton, "The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas," *Climate*, 2020, *8* (1), 12.

Holzer, Harry J., "The Spatial Mismatch Hypothesis: What Has the Evidence Shown?," *Urban Studies*, 1991, *28* (1), 105–122.

_ , John M. Quigley, and Steven Raphael, "Public transit and the spatial distribution of minority employment: Evidence from a natural experiment," *Journal of Policy Analysis and Management*, 2003, *22* (3), 415–441.

Hoynes, Hilary, Douglas L. Miller, and Jessamyn Schaller, "Who Suffers During Recessions?," *Journal of Economic Perspectives*, 2012, *26* (3), 27–48.

Isen, Adam, Maya Rossin-Slater, and W. Reed Walker, "Every Breath You Take—Every Dollar You'll Make: The Long-Term Consequences of the Clean Air Act of 1970," *Journal of Political Economy*, 2017, *125* (3), 848–902.

Jackson, C. Kirabo, "Does School Spending Matter? The New Literature on an Old Question," 2018, *NBER Working Paper 25368, December.*

_ and Claire Mackevicius, "The Distribution of School Spending Impacts," 2021, *NBER Working Paper No. 28517, March.*

_ , Rucker C. Johnson, and Claudia Persico, "The Effects of School Spending on Educational and Economic Outcomes: Evidence from School Finance Reforms," *The Quarterly Journal of Economics*, 2016, *131* (1), 157–218.

Jacob, Brian A., "Public Housing, Housing Vouchers, and Student Achievement: Evidence from Public Housing Demolitions in Chicago," *The American Economic Review*, 2004, *94* (1), 233–258.

Jencks, Christopher and Susan E. Mayer, "The Social Consequences of Growing Up in a Poor Neighborhood: A Review," in Laurence Lynn, Jr. and Michael G. H. McGeary, eds., *Inner-City Poverty in the United States*, Washington, D.C: National Academies Press, 1990.

Johnson, Janna E. and Evan J. Taylor, "The Long Run Health Consequences of Rural-urban Migration," *Quantitative Economics*, 2019, *10* (2), 565–606.

Kain, John F., "Housing Segregation, Negro Employment, and Metropolitan Decentralization," *The Quarterly Journal of Economics*, 1968, *82* (2), 175.

Katz, Lawrence F., Jeffrey R. Kling, and Jeffrey B. Liebman, "Moving to Opportunity in Boston: Early Results of a Randomized Mobility Experiment," *The Quarterly Journal of Economics*, 2001, *116* (2), 607–654.

Katz, Lawrence F, Jonathan Roth, Richard Hendra, and Kelsey Schaberg, "Why Do Sectoral Employment Programs Work? Lessons from WorkAdvance," 2020, *Working Paper*.

Kaufman, Julie E. and James Rosenbaum, "The Education and Employment of Low-Income Black Youth in White Suburbs," *Educational Evaluation and Policy Analysis*, 1992, p. 13.

Kling, Jeffrey R., Jeffrey B. Liebman, and Lawrence F. Katz, "Experimental Analysis of Neighborhood Effects," *Econometrica*, 2007, *75* (1), 83–119.

Laliberte, Jean-William, "Long-term Contextual Effects in Education: Schools and Neighborhoods," *American Economic Journal: Economic Policy*, 2021, *13* (2), 336–377.

Lochner, Lance, "Education, Work, and Crime: A Human Capital Approach," *International Economic Review*, 2004, *45* (3), 811–843.

Loury, Glenn C., "A Dynamic Theory of Racial Income Differences," in Phyllis A. Wallace and Annette LaMond, eds., *Women, Minorities, and Employment Discrimination*, Heath, 1977, pp. 153–186.

Ludwig, Jens, Greg J. Duncan, Lisa A. Gennetian, Lawrence F. Katz, Ronald C. Kessler, Jeffrey R. Kling, and Lisa Sanbonmatsu, "Neighborhood Effects on the Long-Term Well-Being of Low-Income Adults," *Science*, 2012, *337* (6101), 1505–1510.

_ , _ , _ , _ , _ , _ , and _ , "Long-Term Neighborhood Effects on Low-Income Families: Evidence from Moving to Opportunity," *American Economic Review*, 2013, *103* (3), 226–231.

_ , Lisa Sanbonmatsu, Lisa Gennetian, Emma Adam, Greg J. Duncan, Lawrence F. Katz, Ronald C. Kessler, Jeffrey R. Kling, Stacy Tessler Lindau, Robert C. Whitaker, and Thomas W. McDade, "Neighborhoods, Obesity, and Diabetes — A Randomized Social Experiment," *New England Journal of Medicine*, 2011, *365* (16), 1509–1519.

Manski, Charles F., "Identification of Endogenous Social Effects: The Reflection Problem," *The Review of Economic Studies*, 1993, *60* (3), 531.

McKenzie, David, Steven Stillman, and John Gibson, "How Important is Selection? Experimental vs. Non-Experimental Measures of the Income Gains from Migration," *Journal of the European Economic Association*, 2010, *8* (4), 913–945.

Mendenhall, Ruby, Stefanie DeLuca, and Greg Duncan, "Neighborhood Resources, Racial Segregation, and Economic Mobility: Results from the Gautreaux Program," *Social Science Research*, 2006, *35* (4), 892–923.

Miller, Sarah and Cindy K. Soo, "Do Neighborhoods Affect the Credit Market Decisions of Low-Income Borrowers? Evidence from the Moving to Opportunity Experiment," *The Review of Financial Studies*, 2020, *34* (2), 827–863.

Nakamura, Emi, Jósef Sigurdsson, and Jón Steinsson, "The Gift of Moving: Intergenerational Consequences of a Mobility Shock," 2020, *Working Paper, UC Berkeley.*

Olsen, Edgar O., "The Cost-Effectiveness of Alternative Methods of Delivering Housing Subsidies," *University of Virginia, Working Paper*, 2009.

Oreopoulos, Philip, "The Long-Run Consequences of Living in a Poor Neighborhood," *The Quarterly Journal of Economics*, 2003, *118* (4), 1533–1575.

Owens, Ann, "Inequality in Children's Contexts: Income Segregation of Households with and without Children," *American Sociological Review*, 2016, *81* (3), 549–574.

Park, R. Jisung, Joshua Goodman, Michael Hurwitz, and Jonathan Smith, "Heat and Learning," *American Economic Journal: Economic Policy*, 2020, *12* (2), 306–339.

Pollack, Craig Evan, Amanda L. Blackford, Shawn Du, Stefanie Deluca, Rachel L. J. Thornton, and Bradley Herring, "Association of Receipt of a Housing Voucher With Subsequent Hospital Utilization and Spending," *JAMA*, 2019, *322* (21), 2115–2124.

Popkin, Susan J., James E. Rosenbaum, and Patricia M. Meaden, "Labor Market Experiences of Low-income Black Women in Middle-class Suburbs: Evidence from a Survey of Gautreaux Program Participants," *Journal of Policy Analysis and Management*, 1993, *12* (3), 556–573.

Priemus, Hugo, Peter A. Kemp, and David P. Varady, "Housing Vouchers in the United States, Great Britain, and the Netherlands: Current Issues and Future Perspectives," *Housing Policy Debate*, 2005, *16* (3-4), 575–609.

Reardon, Sean F., Kendra Bischoff, Ann Owens, and Joseph B. Townsend, "Has Income Segregation Really Increased? Bias and Bias Correction in Sample-Based Segregation Estimates," *Demography*, 2018, *55* (6), 2129–2160.

Riccio, James A., *Sustained Earnings Gains for Residents in a Public Housing Jobs Program: Seven-Year Findings from the Jobs-Plus Demonstration*, New York City: MDRC, 2010.

Rickford, John R., Greg J. Duncan, Lisa A. Gennetian, Ray Yun Gou, Rebecca Greene, Lawrence F. Katz, Ronald C. Kessler, Jeffrey R. Kling, Lisa Sanbonmatsu, Andres E. Sanchez-Ordoñez, Matthew Sciandra, Ewart Thomas, and Jens Ludwig, "Neighborhood Effects on Use of African-American Vernacular English," *PNAS*, 2015, *112* (38), 11817–11822.

Rosenbaum, James E., "Changing the Geography of Opportunity by Expanding Residential Choice: Lessons from the Gautreaux Program," *Housing Policy Debate*, 1995, *6* (1), 231–269.

Rothstein, Richard, *The Color of Law: A Forgotten History of How Our Government Segregated America*, New York: Liveright Publishing, 2017.

Sampson, Robert J., *Great American City: Chicago and the Enduring Neighborhood Effect*, Chicago, IL.: University of Chicago Press, 2012.

_ **and Patrick Sharkey**, "Neighborhood Selection and the Social Reproduction of Concentrated Racial Inequality," *Demography*, 2008, *45* (1), 1–29.

_ **, Jeffrey D. Morenoff, and Thomas Gannon-Rowley**, "Assessing "Neighborhood Effects": Social Processes and New Directions in Research," *Annual Review of Sociology*, 2002, *28* (1), 443–478.

Schwartz, Heather L., Kata Mihaly, and Breann Gala, "Encouraging Residential Moves to Opportunity Neighborhoods: An Experiment Testing Incentives Offered to Housing Voucher Recipients," *Housing Policy Debate*, 2017, *27* (2), 230–260.

Sharkey, Patrick, "The Acute Effect of Local Homicides on Children's Cognitive Performance," *PNAS*, 2010, *107* (26), 11733–11738.

_ **and Jacob W. Faber**, "Where, When, Why, and For Whom Do Residential Contexts Matter? Moving Away from the Dichotomous Understanding of Neighborhood Effects," *Annual Review of Sociology*, 2014, *40* (1), 559–579.

Solon, Gary, "Chapter 29 Intergenerational Mobility in the Labor Market," in Orley C. Ashenfelter and David Card, ed., *Handbook of Labor Economics*, Vol. 3, Part A, Elsevier, 1999, pp. 1761–1800.

Tach, Laura and Allison Dwyer Emory, "Public Housing Redevelopment, Neighborhood Change, and the Restructuring of Urban Inequality," *American Journal of Sociology*, 2017, *123* (3), 686–739.

Topa, Giorgio and Yves Zenou, "Neighborhood and Network Effects," in "Handbook of Regional and Urban Economics," Vol. 5, Elsevier, 2015, pp. 561–624.

Votruba, Mark Edward and Jeffrey R. Kling, "Effects of neighborhood characteristics on the mortality of black male youth: Evidence from Gautreaux, Chicago," *Social Science & Medicine*, 2009, *68* (5), 814–823.

Weinberg, Bruce A., Patricia B. Reagan, and Jeffrey J. Yankow, "Do Neighborhoods Affect Hours Worked? Evidence from Longitudinal Data," *Journal of Labor Economics*, 2004, *22* (4), 891–924.

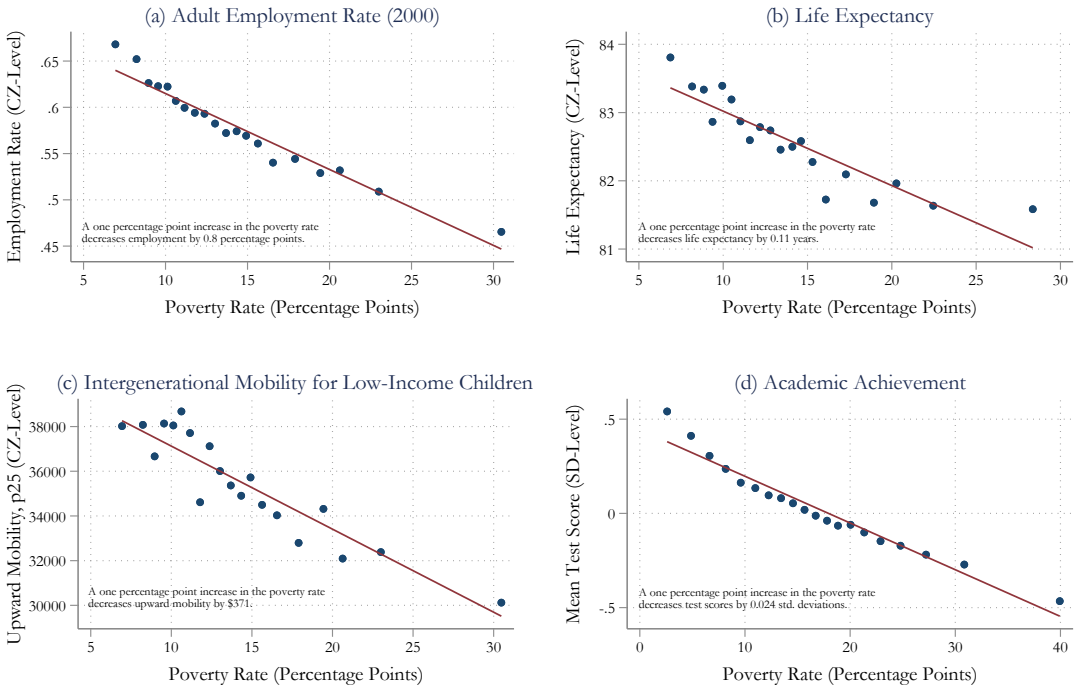
Wilson, William J., *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy*, University of Chicago Press, 1987.

Wodtke, Geoffrey T., David J. Harding, and Felix Elwert, "Neighborhood Effects in Temporal Perspective: The Impact of Long-Term Exposure to Concentrated Disadvantage on High School Graduation," *American Sociological Review*, 2011, *76* (5), 713–736.

Wood, David, Neal Halfon, Debra Scarlata, and Paul Newacheck, "Impact of Family Relocation on Children's Growth, Development, School Function, and Behavior," *Journal of the American Medical Association*, 1993, *270* (11), 1334–38.

Yagan, Danny, "Employment Hysteresis from the Great Recession," *Journal of Political Economy*, 2019, *127* (5), 2505–2558.

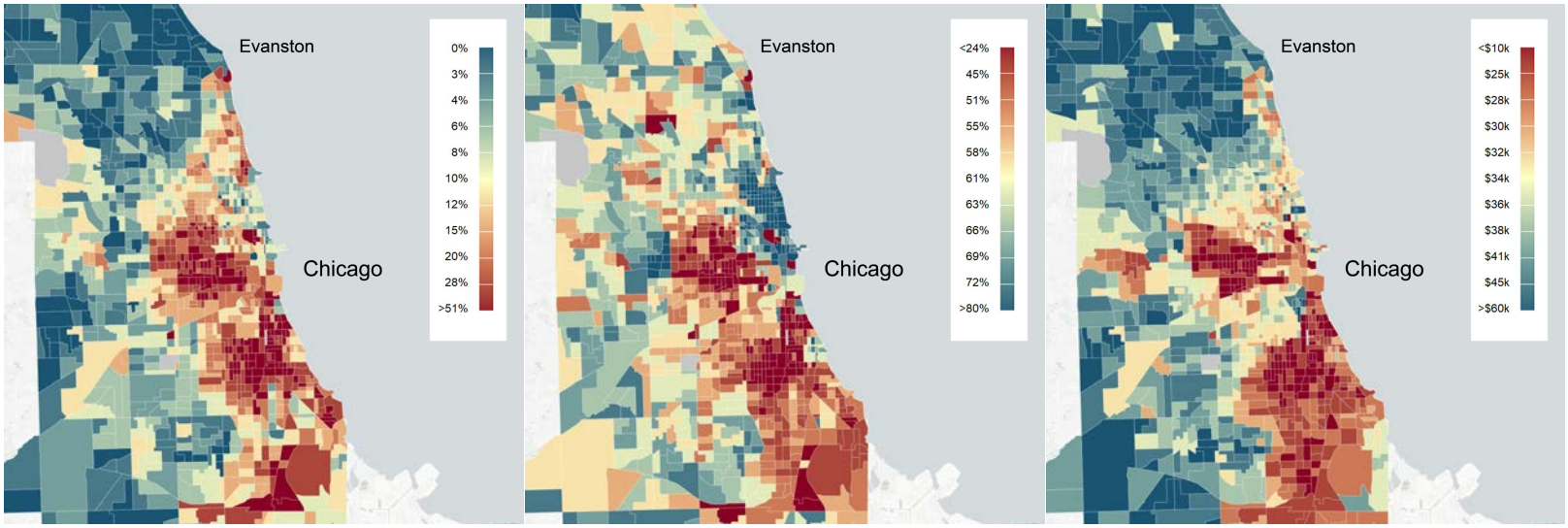
Figure 1: Associations between Adult and Child Outcomes and Neighborhood Poverty



Notes: This figure provides binned scatter plots of the relationship between the poverty rate and the following measures of average resident outcomes: employment rates, life expectancy, upward mobility and test scores. The unit of analysis in Panels A, B and C is a commuting zone. In Panel D, the unit of analysis is a school district. Details on data sources are provided in the notes to Table 1.

Figure 2: Within City Associations between Adult and Child Outcomes and Neighborhood Poverty, by Census Tract in Chicago

(a) Poverty Rate (2000) **(b)** Adult Employment Rate (2000) **(c)** Intergenerational Mobility for Low-Income Children



Notes: This figure provides maps of tract-level poverty rates in 2000 (Panel A), mean adult employment rates in 2000 (Panel B), and upward mobility for low-income children (Panel C) in Chicago. Details on data sources are provided in the notes to Table 1.

Table 1: Associations Between Adult and Child Outcomes and Neighborhood Poverty

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variables:	Adult Employment Rate (2000)	Life Expectancy	Upward Mobility, p25 Parents	Test-based Achievement	Adult Employment Rate (2000)	Upward Mobility, p25 Parents
Poverty Rate (Pct. Points)	-0.00821***	-0.109***	-371.5***	-0.0248***	-0.00524***	-384.3***
	(0.000)	(0.011)	(39.907)	(0.0003)	(0.0001)	(9.875)
N	741	595	741	12,601	72,416	71,923
Level of Analysis	CZ	CZ	CZ	School District	Tract	Tract
Controls	None	None	None	None	County FE	County FE
Mean	0.578	82.58	35,469	0.0245	0.594	34,455
R-squared	0.533	0.241	0.096	0.456	0.537	0.539

Notes: This table reports estimates from a regression model where the dependent variable is a measure of adult or child outcomes (specified in each column header) in a geographic area. Geographic areas are commuting zones (CZ), school districts, or Census tracts. The independent variable of interest is a location specific measure of the poverty rate (the fraction of residents living below the poverty line). Columns 1, 2, 3, 5, and 6 use poverty rates from the 2000 Decennial Census. Column 4 uses poverty rates averaged over 2007-2016 from the American Community Survey (combined files for the years 2007-2011 and 2012-2016). The dependent variables in columns 1 and 5 are measures from the 2000 Decennial Census. Column 2 uses the life expectancy measure from Chetty et al. (2016a) based on mortality data from Social Security Administration death records. Columns 3 and 6 use the "Upward Mobility" measure from the Opportunity Atlas (Chetty et al., 2020a) which is the mean later-life household income rank (measured at ages 31-37) for children whose parents were at the 25th percentile of the national income distribution. Column 4 uses the test-based achievement measure from the Stanford Education Data Archive (SEDA) which is an estimate of mean test scores on a cohort standardized scale. The test score means are constructed using data from the National Assessment of Educational Progress (NAEP) as detailed in Fahle et al. (2019). Standard errors are clustered at the county level in Columns 5 and 6. Statistical significance is denoted by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Online Appendix

Neighborhoods Matter: Assessing the Evidence for Place Effects

Eric Chyn and Lawrence F. Katz

June 16, 2021

A. Econometric Models of Neighborhood Effects

To aid our review of the empirical literature on neighborhood effects, we present formal econometric models of individual outcomes that allow for contemporaneous and developmental neighborhood effects and discuss identification issues. Let y_{it}^{j} denote outcome j (e.g., earnings or health status) of individual i in year t. Define the index $n(i)t$ to denote the neighborhood where individual i lives in year t, and let $c(i, a)$ represent the neighborhood in which individual i grew up at ages $a \in \{1, \ldots, A\}$. We assume $A < t$ and denote the years associated with childhood ages using the index $t(a)$. Let the vector $W_{n(i)t}$ have entries that contain indicators of neighborhood quality and other neighborhood characteristics measured in a given year. Finally, for current outcome j, let the term θ_i be the impact of family or individual background factors, such as family inputs or genetic endowments, and let the term ϵ_{it} represent time-varying idiosyncratic influences, such as household-level shocks.

A simple model assumes y_{it}^{j} is an additive function of neighborhood effects and other factors:

$$y_{it}^{j} = W_{n(i)t}\lambda' + \sum_{a=1}^{A} W_{c(i,a)t(a)}\mu_a' + \theta_i + \epsilon_{it}. \tag{1}$$

The contemporaneous effects of current neighborhood characteristics are captured by the coefficients contained in the vector λ. The possibility that neighborhoods have lasting exposure effects due to impacts on child development is captured by the coefficients contained in the age-specific vector μ_a. These effects may vary (i.e., $\mu_a \neq \mu_{a-1}$) which embodies the "critical age effects" hypothesis that some childhood ages may be more important than others. Note that Equation 1 assumes that there are no lingering effects from an individual's previous adult neighborhoods (residential locations in the years between childhood and t)—an assumption that is often tested in the empirical literature (e.g., Chetty and Hendren 2018).

The production function for current outcomes embodied in Equation 1 encompasses a range of models from the neighborhood effects literature. Theoretically, much attention has focused on a canonical linear-in-means model of social interactions that assumes the presence of only contemporaneous neighborhood effects (Manski 1993; Brock and Durlauf 2001). In this model, there are three sources of neighborhoods effects. First, endogenous peer effects arise due to the propensity for individual behavior to depend on the expected (mean) behavior of their neighborhood peers. Second, exogenous effects represent the possibility that individual behavior is shaped by a vector of average characteristics (e.g., socioeconomic background) of neighbor peers. Third, correlated effects refer to the fact that individuals within a neighborhood face the same institutional and physical environments (e.g., access to schools, law enforcement practices, temperature, or air pollution). As discussed in Manski (1993), it is typically not possible to separately identify endogenous effects from exogenous effects (or from unmeasured correlated effects) in the canonical linear-in-means model. Rather, a

reduced form can be examined and estimated to test for evidence of some form of contemporaneous neighborhood effects:

$$y_i^j = \alpha + x_i\gamma' + \overline{x}_n\beta' + z_n\gamma' + \epsilon_i, \tag{2}$$

where x_i is a vector for individual characteristics (e.g., socioeconomic background), $\overline{x}_n$ is a vector of the averages of the individual background characteristics for the residents of neighborhood n, z_n is a vector of other neighborhood characteristics (e.g., school resources), and ϵ_i is an error term. In this framework, the main coefficient of interest is the vector β as a measure of the reduced form impacts of both endogenous and exogenous neighborhood effects.

There has been much recent attention on models that focus solely on childhood neighborhood effects. Chetty and Hendren (2018) study the effects of moving a child to a new area where other children do well. They characterize neighborhoods in terms of the mean adult outcomes of children who spend their entire childhood in an area (those who are "permanent residents"). Since place effects may vary based on parent income and the child's birth cohort, Chetty and Hendren examine the impact of the mean outcome of children who are permanent residents of place n with parents at the percentile p of the income distribution in birth cohort s denoted as $\overline{y}^j_{nps}$. Formally, they focus on a restricted version of Equation 1 for children who moved across areas:

$$y_i^j = \alpha_m + \beta_m\overline{y}^j_{nps} + \theta_i, \tag{3}$$

where y_i^j is an adult-age outcome (e.g., income at age 24) for child i who moved to commuting zone n at age $m \in \{1, \ldots, A\}$ and stayed for the rest of their childhood, and θ_i is an error term. The coefficient of interest β_m represents the mean impact of spending year m of one's childhood onward in an area where permanent residents have better outcomes. In this model,

the exposure effect at age m is defined as $\gamma_m = \beta_m - \beta_{m+1}$.

Identification of neighborhood effect parameters is empirically challenging due to the non-random sorting of families into neighborhoods. Formally, the concern is that $cov(\overline{x}_n, \epsilon_i) \neq 0$ and $cov(\overline{y}^j_{nps}, \theta_i) \neq 0$ in Equations 2 and 3, respectively. In line with broader trends in economics and social science, the recent neighborhood effects literature has addressed self-selection using experimental and quasi-experimental approaches. As discussed in the main text, several studies rely on experimental data from the MTO demonstration, which provided housing vouchers to a randomly selected group of low-income households living in distressed public housing. For example, Kling, Liebman, and Katz (2007) use the MTO treatment group variable as an instrument for the neighborhood poverty rate and estimate a variant of Equation 2. The quasi-experimental approach in Chetty and Hendren (2018) studies movers and estimates exposure effects by assuming that selection effects for movers to different areas do not vary with the child's age at move. This allows for the possibility that families that move to better areas may differ from those that move to worse areas. This assumption implies that selection effects in the estimates from Equation 3 will cancel out when estimating the exposure effect.