Linking Residents to Opportunity: Gentrification and Public Housing

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Abstract: This paper documents that most public housing in New York City, which was originally built decades ago in low-income areas, is now surrounded by neighborhoods with relatively high average household incomes. Higher neighborhood income is associated with improved neighborhood indicators—developments surrounded by increasing- and high-income neighborhoods have lower violent crime rates and are zoned for public elementary schools with higher standardized test scores than developments surrounded by low-income neighborhoods. Additionally, NYCHA residents in developments with increasing- and high-income surrounding neighborhoods are more often employed, earn $1,675 and $3,500 more annually, respectively, after controlling for observable characteristics, and have higher adult educational attainment. To be sure, the benefits are not unqualified; our qualitative research shows that while public housing residents appreciate improvements in the surrounding neighborhoods (especially improved safety), they can also feel alienated when the neighborhoods around them change, and face challenges as day-to-day living expenses increase, even if rents are held steady.

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1. Introduction

In recent decades, partly in response to the perceived failures of the public housing program, affordable housing programs in the United States have increasingly embraced the goal of deconcentrating poverty, or at least aimed to avoid deepening existing concentrations of poverty. These efforts have taken on renewed urgency with the emergence of new research demonstrating the long-run benefits that children glean from moving to low poverty neighborhoods when young (Chetty, Hendren, and Katz, 2016). Federal housing programs have aimed both to improve high-poverty neighborhoods and to increase access to neighborhoods with lower poverty rates and better indicators of opportunity. Beginning in the early 1990s, for example, HUD's HOPE VI and Choice Neighborhoods programs have sought to reshape public housing by tearing down the most physically distressed traditional public housing projects, many of which were isolated, extremely high poverty complexes, and replacing them with mixed-income developments (Schwartz, 2014). More recently, in selected metropolitan areas, the Department of Housing and Urban Development (HUD) has begun calculating the fair market rents (FMR) used to determine the amount of rental assistance provided through the housing choice voucher program for each ZIP code instead of the much larger metropolitan area. The new FMRs "are designed to enable HCVP tenants to access more units in neighborhoods of opportunity…[and] discourage HCVP tenants from locating in neighborhoods of concentrated poverty (Kahn and Newton, 2013)."

Few have considered how these efforts may be shaped by the current wave of gentrification, which is bringing higher-income, college-educated households into many high-poverty, central city neighborhoods. As a result, some of the subsidized housing developments that were created in racially concentrated areas of high-poverty are now seeing increases in incomes, educational levels and white population shares in their surroundings. This paper examines the degree to

which residents of public housing, the most permanent form of subsidized housing, are able to benefit from rising household incomes in the areas surrounding their developments.

This paper explores this question in New York City. We show that after the recent wave of neighborhood changes, two-thirds of New York City Housing Authority (NYCHA) public housing units were located in developments surrounded by census block groups with an average household income that was above the City-wide median income in 2010. Further, we find that higher surrounding neighborhood average household income is associated with improved indicators—developments surrounded by increasing- and high-income neighborhoods have lower violent crime rates and are zoned for public elementary schools with higher standardized test scores than developments surrounded by low-income neighborhoods. Examining NYCHA resident outcomes using novel administrative data sources, we find that, when compared to NYCHA residents in developments surrounded by low-income neighborhoods, NYCHA residents in developments with increasing- and high-income surrounding neighborhoods are more often employed, earn $1,675 and $3,500 more annually, respectively, after controlling for observable characteristics, and have higher adult educational attainment. In companion qualitative work, we find a more mixed story, however, with residents expressing not only appreciation for some of the changes around them but also concerns.

Our findings contribute to an ongoing literature exploring the relationship between the characteristics of neighborhoods in which low-income households live and their subsequent life outcomes. Unlike previous work, we study these effects in the context of gentrification, offering suggestive evidence that income gains in central city neighborhoods can bring benefits to low-income residents living in subsidized housing. The companion qualitative research suggests that

the benefits of this change are not unqualified, however, and that efforts to help connect residents to growing opportunities may be critical.

To be sure, New York City may not be fully representative of the experience of other cities. But its large stock of public housing and the income gains that many of its low-income neighborhoods have seen (NYU Furman Center, 2015), offers a large sample size and a window into what residents of many public housing developments around the country may experience in the future as their cities see an influx of young, college-educated workers in neighborhoods around public housing.

We proceed by briefly reviewing relevant literature in section 2 and then introducing our approach to classifying NYCHA developments based on surrounding neighborhood income and for comparing resident outcomes across surrounding neighborhood types in section 3. Section 4 presents our empirical findings and various robustness analyses, while Section 5 summarizes findings from the companion qualitative work. We conclude in section 6 with a discussion of the implications of our findings for both housing policy and future research.

2. Literature Review

Most of the research on the consequences of gentrification examines the question of residential displacement – or specifically whether low-income renters are displaced as a result of neighborhood changes. The research generally finds little evidence of direct displacement, suggesting that many low-income residents are managing to stay in neighborhoods as incomes and rents rise (Vigdor, Massey, and Rivlin, 2002, Freeman and Braconi, 2004, Ellen and O'Regan, 2011, Ding, Hwang, and Divringi, 2015). To be sure, qualitative research highlights some of the tensions that can occur as neighborhoods change (Freeman 2006, Howell 2015), and it remains unclear whether gentrification can lead to economically integrated neighborhoods in

the longer-term. But the research on gentrification suggests that many low-income households are at least staying for a while as their neighborhoods change, raising the question of whether or not they can benefit from the rising fortunes around them.

Much of the best research on neighborhood effects examines data from the Moving to Opportunity (MTO) Demonstration Program. MTO was a large experiment that provided housing vouchers to a randomly selected group of individual families living in distressed public housing. Half of the families receiving vouchers were randomly assigned to the treatment group, which could only use their vouchers in low-poverty neighborhoods. The evaluation of the demonstration tracked an array of outcomes for both household heads and children. The early work on the effects of this experimental demonstration program found large effects on adult physical and mental health, little effects on labor market outcomes, and mixed effects on children, depending on their gender (Ludwig, et al, 2013). More recently, Chetty, Hendren, and Katz (2016) examine longer-term outcomes for MTO participants using administrative datasets and show that, for younger children, exposure to lower poverty neighborhoods increases earnings in adulthood, increases college attendance, and decreases the likelihood of teenage births.

Research growing out of the MTO demonstration has become the benchmark for research about neighborhood effects on low-income families. Yet, as others have noted, the MTO treatment necessarily involved both a change in neighborhood and a potentially disruptive move, such that "the disruption of social networks under MTO could be an important explanation for why the program showed no improvements in labor market outcomes (Ross 2009)."

Our research complements this earlier research, but our interest lies instead in whether families who remain in public housing can benefit from reductions in poverty and increases in incomes in the neighborhoods surrounding their developments. In other words, rather than

examining the effects of moving families to lower-poverty neighborhoods, we ask what happens as *neighborhoods* evolve, with residents remaining in place. In this sense, our paper is related to the literature on gentrification that traces how neighborhoods change and evolve over time. Our paper also connects to the literature on neighborhood effects because we study how otherwise similar public housing residents fare in neighborhoods that have experienced different economic trajectories.

Our paper builds most directly on Oreopoulos (2003), which examines outcomes of adults whose childhood families were assigned to public housing projects in Canada through a quasi-random waiting list process. The resulting variation in surrounding neighborhood characteristics and project characteristics to which residents are exposed allows Oreopoulos to examine how neighborhood context affects a variety of long-term outcomes. He finds that 10-20 years later, adult earnings, employment, and welfare participation outcomes do not differ based on surrounding neighborhood characteristics of the public housing projects to which families were assigned.

Our paper differs from the Oreopoulos (2003) paper in a number of important ways. First, we explore a context with much more dynamic neighborhood environments. Many of the neighborhoods surrounding public housing in New York City underwent substantial changes in average household incomes between 1990 and 2010. By contrast, in Oreopoulos' setting in Canada, "neighborhood variation by socioeconomic characteristics by census tract and enumeration area changes very little across the 1981, 1986, 1991, and 1996 censuses income levels." Second, we observe much more variation in the conditions of neighborhoods surrounding public housing. In Oreopoulos' sample "the largest contrast in neighborhood quality obtainable within the public housing program is between youths who grew up in the poorest

areas in the city and those who grew up in moderately low- to middle-income neighborhoods." In contrast, some public housing developments in our sample are surrounded by neighborhoods that transitioned to the higher end of the neighborhood income distribution decades ago (e.g. Chelsea, one of the representative neighborhoods in a companion qualitative study (Jefferson, 2015)). Third, the architecture and size of the public housing we study is similar across all types of neighborhoods. In Oreopoulos' sample, by contrast, the public housing developments in moderately low to middle-income neighborhoods are much smaller in size than the typically large developments found in low-income neighborhoods. Finally, our quantitative work is accompanied by companion qualitative research in New York City that adds nuance to our understanding of how changes in the conditions and population of surrounding neighborhoods affect public housing residents.

3. The Neighborhoods Surrounding NYCHA Public Housing Developments

New York City has far more public housing than any city in the country. NYCHA currently owns approximately 180,000 units of public housing, which amounts to about 15 percent of all public housing units in the country. New York has more public housing in part because more traditional public housing units were originally built in the city, but also because virtually no units have been demolished.[1] Today, these units are located in a diversity of neighborhoods.

To assess the conditions and changes in neighborhoods surrounding public housing developments, we use census block groups to construct two key geographies: *NYCHA core areas* and the *surrounding neighborhood.* We define a NYCHA core area to be any block group in New York City in which at least 70 percent of the housing units are in a NYCHA public housing

1 See Bloom (2008) for a thorough history of public housing in New York City.

development.[2] Each NYCHA core area is paired with its surrounding neighborhood, defined as all census block groups that border the NYCHA core area.[3] Figure 1 depicts two NYCHA core areas, which happen to be adjacent. As such, each is included in the other's surrounding neighborhood. NYCHA core areas contain, on average, 1,162 households, with 80 percent containing between 485 and 1,950 households. The paired surrounding neighborhoods are composed of an average of seven block groups, housing an average of 3,513 households.

We characterize NYCHA core areas on the basis of income levels and trends in the surrounding neighborhood over recent decades. We classify surrounding neighborhoods into three categories based on neighborhood average household income:[4]

- *High-income* neighborhoods are those with average household income above the NYC median in each of 1990, 2000, and 2010.[5]
- *Increasing income* neighborhoods are those that had average household income above the city median in 2010 but incomes below the NYC median in either 1990 or 2000.[6]

[2] In many instances, block group geographical boundaries differ in 1990, 2000, and 2010. As necessary, we combine multiple adjacent block groups in one decade to align with the boundaries of a block group in a different decade. As a result our NYCHA core areas are geographically consistent over time and contain, on average, just under two 2010 block groups.

[3] Note that the surrounding neighborhood can include other public housing units.

[4] We use average household incomes for the classifications because the surrounding neighborhood average can be calculated by combining data from the multiple census block groups that constitute a surrounding neighborhood. The NYC-wide median income is used for comparison as an intuitive reference amount that results in comparably sized groups of surrounding neighborhood types.

[5] Three of the 54 surrounding neighborhoods which we classify as high income actually had average household incomes in 2010 that were slightly below our threshold, while meeting the criteria that 1990 and 2000 average household incomes were above the threshold. Our results are qualitatively the same when dropping the three NYCHA core areas with these surrounding neighborhoods.

- *Low-income* neighborhoods are those with average household income below the city median in each of 1990, 2000, and 2010.[7]

Average household incomes for 1990 and 2000 are combined at the census block from the respective Decennial Censuses. We use the 2008-2012 American Community Survey (ACS) to generate income estimates for 2010. The NYC median income (in 2012 dollars) is $51,898, $52,427, and $50,256 in 1990, 2000, and 2010, respectively.

Table 1 reports our sample size of NYCHA core areas and the number of NYCHA residents and households living in developments in each classified type. In total, we analyze 137 NYCHA core areas, with over 125,000 households living in public housing. A total of 49 NYCHA core areas are classified as being surrounded by low-income neighborhoods. The median of our average household income measure for these low-income surrounding neighborhoods was just under $39,500 in 2010. Surprisingly, perhaps, 88 NYCHA core areas, or nearly two thirds, were surrounded by block groups that had average household incomes above the city median in 2010. Thirty-four NYCHA core areas were classified as being surrounded by increasing-income neighborhoods. The median of average household income in these increasing-income surrounding neighborhoods was just over of $58,000 in 2010. Fifty-four NYCHA core areas were classified as being surrounded by high-income neighborhoods. The median of average household income in these surrounding neighborhoods was just under $75,500 in 2010. Some

[6] The 34 surrounding neighborhoods in the increasing classification all had average household incomes that were above the median income in 2010 but had average household incomes below the median income in at least one earlier year.

[7] In seven of the 49 surrounding neighborhoods which we classify as low income, average surrounding neighborhood income is slightly above our threshold in either 1990 or 2000, but is well below our threshold in 2010. Our results are qualitatively the same when dropping the NYCHA core areas with these surrounding neighborhoods. The remaining 42 surrounding neighborhoods had average household incomes below our threshold in all three decades.

public housing developments were surrounded by neighborhoods with far higher incomes. Consider that the block groups adjacent to the Chelsea-Elliot development had a mean income of over $129,000 in 2008-2012. Figure 2 maps the location of surrounding neighborhood types across New York City. While the Bronx has a concentration of developments with low-income surrounding neighborhoods, all three classification types are spread across the city.

3.1 Variation in Surrounding Neighborhoods

To gain a richer understanding of the variation in the neighborhoods surrounding public housing, we compare several additional indicators. Panel A of Figure 2 compares the educational attainment of adults living in the neighborhoods surrounding the NYCHA core areas in 2008-2012 by income classification and shows that educational attainment was greatest for adults living in surrounding neighborhoods classified as high income: 36 percent of adults living in high-income surrounding block groups had a bachelor's degree in 2008-2012, compared to 28 percent of adults living in neighborhoods with increasing income and just 12 percent of adults living in low-income neighborhoods surrounding NYCHA developments. Panel B shows the racial and ethnic composition of the residents of neighborhoods surrounding NYCHA developments by income classification. The surrounding neighborhoods classified as low-income had a greater black and Hispanic share (40 percent and 45 percent, respectively) than those counted as high-income (30 percent and 31 percent). As shown in Panel C, about 30 percent of the housing units in high-income neighborhoods were owner-occupied, compared to just over 10 percent in low-income neighborhoods. Finally, Panel D shows that surrounding neighborhoods classified as low-income had a serious housing code violation rate nearly three times as high as the rate in high-income neighborhoods: 95.1 serious housing code violations per 1,000 rental units compared to 32.5 per 1,000 rental units.

We also note that the poverty rate in surrounding neighborhoods varies with surrounding neighborhood classification. Those surrounding neighborhoods classified as low-income had an average poverty rate of 40 percent, while those classified as high income had an average poverty rate of 21 percent. As a frame of reference, Chetty, Hendren, and Katz (2016) report that children whose families used the experimental voucher in the MTO experiment lived in census tracts with poverty rates 22 percentage point lower than the census tracts lived in by those in the control group on average."

Overall, the surrounding neighborhoods classified as high-income have characteristics very similar to citywide averages. They are clearly advantaged communities and have significantly more educated and higher income residents and a far better maintained housing stock than the other neighborhoods surrounding public housing, but they are typically not among the highest income and most privileged neighborhoods in the city.

3.2 Variation in Neighborhood Context, Services, and Amenities

Higher income neighborhoods tend to offer a richer set of amenities and opportunities. This is generally true for the neighborhoods surrounding public housing in New York. In Figure 3, we present four indicators of neighborhood context, services, and amenities available to NYCA residents. Panel A shows the share of NYCHA units whose residents are zoned to attend a public school in the bottom quartile of math proficiency, as classified by the income level of the surrounding neighborhood. Seventy-two percent of households in NYCHA developments surrounded by low-income neighborhoods were zoned to attend public schools in the bottom quartile of proficiency in 2012. By contrast, only a minority of households in increasing- and high-income neighborhoods were zoned for schools with such low proficiency rates. This stark

contrast suggests that children growing up in public housing surrounded by higher income neighborhoods reach a much more enriching set of schools.

Public housing developments located in higher income neighborhoods also offer significantly safer environments. To capture the level of violence to which NYCHA residents are exposed on a daily basis, we measured the violent crime rate in NYCHA core neighborhoods and their surrounding neighborhoods together. Panel B shows the number of violent crimes reports in 2010 per 1,000 residents. While residents living in developments surrounded by all three types of neighborhoods faced a higher violent crime rate than the average New York City resident, the violent crime rate for developments surrounded by low-income neighborhoods (8.3 violent crimes per 1,000 residents) was substantially higher than the rate for developments surrounded by high-income neighborhoods (5.7 violent crimes per 1,000 residents). Other research shows that such variations in exposure to violent crime can powerfully affect children's test scores and cognitive functioning (Sharkey 2010; Sharkey et al. 2014).

Perhaps surprisingly, Panels C and D suggest that public housing residents living in developments surrounded by lower income neighborhoods have somewhat greater access to parks and transit. Panel C shows that 63 percent of units in NYCHA developments surrounded by low-income neighborhoods are within a half-mile of a subway station entrance (about a 10 minute walk) as compared to 56 percent of units surrounded by high-income neighborhoods. This echoes a pattern across the city as a whole, as many lower-income neighborhoods in the city have better access to subway stations than higher-income neighborhoods (NYU Furman Center, 2012).

Similarly, Panel D shows that more units in NYCHA developments surrounded by low-income neighborhoods are within a quarter-mile of a park (about a five minute walk) than those

in high-income neighborhoods. This finding is again consistent with the overall pattern of parks access throughout the city: half of neighborhoods in the top quartile of parks access are in the bottom quartile of the income distribution (NYU Furman Center, 2012). Of course these statistics reveal nothing about the relative quality of the parks accessible to residents in different types of neighborhoods.

In sum, public housing residents living in developments surrounded by higher income neighborhoods are likely to live somewhat further away from parks and transit, but a high percentage of all residents live close to both. And more importantly, public housing residents in higher income neighborhoods enjoy higher performing local schools and safer streets, arguably the two most critical measures of a neighborhood's environment.

4. Resident outcomes within the NYCHA core

Our key interest lies in whether public housing residents fare better when living in a development surrounded by a higher income community. In this section, we explore this question, examining how resident economic outcomes vary across our surrounding neighborhood classifications.

4.1 NYCHA resident economic outcomes

We analyze labor market outcomes of public housing residents using a unique administrative dataset that contains information from NYCHA's annual income verifications. This dataset includes individual-level income, earnings, and disability status reported annually for each year between 2008 and 2013, along with some additional information including length of tenure and basic demographic characteristics for all household members included on the lease. In analyzing labor market outcomes, we limit our sample to households with a non-disabled head of household between 25 and 61 years old and to nondisabled individuals between 25 and 61 years

old.[8] This sample includes just fewer than 68,000 households and approximately 100,000 individuals each year for the six years in our sample. We adjust all incomes to 2013 dollars.

Table 2 reports results of our analysis of income by source and shows substantial differences in employment outcomes among NYCHA residents based on surrounding neighborhood type. Median household income in developments surrounded by high-income neighborhoods was $2,100 higher (nearly 11 percent) over our six-year sample period than in developments surrounded by low-income neighborhoods, and $950 higher (nearly 5 percent) than in developments surrounded by increasing-income neighborhoods.[9] To be sure, public housing residents have low incomes and employment rates relative to New York City as a whole, but these differences are substantial.[10]

When limiting the comparison to earned income (employment, self-employment, and business earnings), the disparity increases, with a $4,550 difference (18 percent) in median earnings among households in developments surrounded by high- and low-income neighborhoods. In addition to enjoying higher earnings, non-disabled, working age adults in

[8] Not all residents in the NYCHA core are included in NYCHA administrative data. Because we only observed individual-level income data as reported to NYCHA, our findings should be interpreted as relevant to individuals registered as residents with NYCHA.

Disability status is self-reported in the NYCHA data. This limit is imposed so that assessed employment status and earnings are not confounded with resident's retirement decisions or capability or eligibility for employment.

[9] Total income reported to NYCHA during annual income reviews is comprehensive. Income from employment, self-employment, owned businesses, unemployment, public assistance, social security, supplemental security income (SSI), veterans assistance, pensions, child support, or other sources.

[10] As reported in the Furman Center's *State of New York City's Housing and Neighborhoods in 2013,* median household earnings in New York City in 2012 was $51,750. As additional context, $2,100 approximates the difference between the 52nd and 48th percentiles of the resident income distribution. For comparison, Chetty, Hendren, and Katz (2016) find intent to treat gains of $1,624 on a control group mean of $11,270 for adults in their mid-twenties who were children younger than 13 in MTO treatment families.

developments surrounded by increasing- and high-income neighborhoods were more likely to be working and earning income. These findings on differences in earnings and income are consistent whether the analysis is done at the household or individual level. The gaps are also not only apparent at the medians by neighborhood type. Table 5 in Appendix 1 reports distribution percentiles by each neighborhood type that show that this finding is robust, particularly above the 25th percentile.

The differences in income and earnings are robust to including a variety of controls for observable resident and household characteristics. Table 3 presents regression results for our primary indicator of household economic outcomes, the level of household earned income. The sample for this regression is non-disabled adults age 25 to 61 with some positive earnings in a year.[11] The first "no controls" specification simply regresses average earnings on dummies for surrounding neighborhood type (with low-income omitted). Average earnings in the low-income surrounding neighborhood reference category are just over $30,300. Households in developments surrounded by increasing income and high-income neighborhoods earn $2,200 and $3,700 more, respectively, than their counterparts in low-income neighborhoods.

The second specification includes a full set of household level controls. The coefficients on the household characteristics mostly conform to expectations. The head of household's age and

[11] Unpublished results, available from the authors on request, find similar patterns for total household income from all sources, individual income, and individual earnings. We note that whether a household has some positive earnings varies across neighborhood types as reported in Table 2. However, differences in the presence of any positive earnings do not appear to be driving the observed differences in earned income. The distribution of earnings in Table 5 (Appendix 1) shows that the increase in average earnings occurs at the 25th percentile of earnings and above, rather than being driven by some smaller subset of the population. Additionally, section 4.3 below reports that we see only small differences in observable characteristics across our sample, suggesting that selection into neighborhood type based on unobservable earning power of differing individuals is also not likely to be driving the observed earnings differences.

an age quadratic have coefficients of $1,755 and -$420, which are consistent with standard earnings regressions. The coefficients on the variables describing household composition (large household with more than four members; single parent or grandparent, minor children in home, and the number of working age adults) have large and statistically significant coefficients. The coefficients on the self-reported race and ethnicity indicator variables are large and statistically significant as well. A black head of household is associated with higher income than the reference category of Hispanic, while a white or Asian/other head of household is associated with significantly lower earned income.

Most relevant for our purposes, the coefficients on our key surrounding neighborhood variables are robust to these additional controls. Households in developments surrounded by increasing income and high-income neighborhoods have earned incomes that are $1,678 and $3,479 higher, respectively, than their counterparts in low-income neighborhoods, after controlling for a variety of observable household characteristics.

4.2 Educational outcomes in the NYCHA core

While the NYCHA administrative dataset does not include educational attainment, we are able to use census data to observe educational outcomes for the NYCHA resident population in cases where the NYCHA core areas are composed entirely of public housing units.[12] Of the NYCHA units in our analysis in developments surrounded by low-, increasing, and high- income neighborhoods, 62, 82, and 68 percent, respectively are in NYCHA core areas that include only NYCHA developments. Figure 4 presents the distribution of educational attainment for adult

[12] We included all census block groups with at least 70 percent NYCHA share of units in our analysis. This figure is limited to census block groups with 100 percent NYCHA share. Results are similar, but with more pronounced differences (greater share with higher education in developments with increasing and high income), when the analysis includes NYCHA core geographies which include up to 30 percent non-NYCHA housing units.

residents living in census block groups composed entirely of NYCHA residents, averaged for each surrounding neighborhood type and shows that adult educational attainment is greater for NYCHA residents surrounded by high- and increasing-income neighbors. Whereas 32 and 30 percent of residents in high and increasing surrounding income types respectively have completed some education beyond high school, only 26 percent of adults have completed any education beyond high school in developments surrounded by low-income neighborhoods.

These differences in educational attainment are likely the result of a variety of factors, including differences in the quality of local public schools and in the range of youth services available, which may mean fewer young adults are prepared for college. As reported in Figure 3 above, units in developments surrounded by low-income neighborhoods are more often zoned to public schools with schools with lower standardized test scores than developments than units in developments surrounded by increasing and high-income neighborhoods. Dastrup et al (2015) also reports that individual students in developments surrounded by increasing and high-income neighborhoods scored on average two to four percent of a standard deviation higher in reading and one to three percent of a standard deviation higher in math, after controlling for observable student characteristics. While these differences are relatively small in magnitude, they suggest a link between surrounding neighborhood characteristics and student performance.

It is also possible that neighborhoods differ in access to post-secondary educational opportunities. Another possible mechanism, of course, is increased sorting – with residents more apt to pursue education finding their way into developments surrounded by higher-income neighbors. We address this possibility next.

4.3 Are these results causal?

A key question is whether these differences in income are caused by the environments or whether they are due to selection. The key assumption needed for our regression estimates to be interpreted as causal is that residents in developments surrounded by different neighborhood types do not differ on unobservable characteristics related to their economic outcomes. Threats to this assumption arise if more motivated public housing residents with higher earnings potential seek out and sort into developments surrounded by higher income neighborhoods, or if more economically successful public housing residents are more likely to stay in public housing when it is located in higher income areas. We cannot claim that households are randomly assigned to different neighborhoods, but we do not see evidence of extensive sorting or selection.

The NYCHA application and transfer processes allow some room for sorting. Applicants accepted based on "working family" criteria have somewhat more choice in selecting a development—they select a development from a list of developments projected to have available units—than do applicants accepted based on emergency need who simply choose a borough and are then offered the next available unit in that borough. That said, the turnover rate in NYCHA buildings is extremely low (less than five percent of households exit the NYCHA data from one year to the next, indicating a turnover rate of over twenty years), so the households who are accepted into public housing based on the working family criteria have limited room for choice.

As for transfers, the official process for a household to transfer from one development to another requires a documented need for a transfer, but often allows a specific development to be requested. Individuals may also transfer developments informally by leaving one household and joining another.[13] The ability of residents to gain access to specific developments through transfers is again limited by the low turnover rate, and transfers are relatively rare (less than two

[13] Details on the application and transfer process are described at http://www.nyc.gov/html/nycha/downloads/pdf/TSAPlan.pdf.

percent of individuals per year move from one development to another). Further, we see little to no difference in household length of residency in NYCHA across development types (see Table 4 discussion below). Still, transfers could contribute to sorting of households with more earnings potential into higher income neighborhoods.

While we cannot definitively test for such sorting, we can examine the degree to which the observable characteristics of households living in public housing developments vary across surrounding neighborhood types. Table 4 reports on a series of simple regressions that characterize the population means of observed head of household characteristics for the sample of households used in our earnings regressions above. Each row represents a separate regression. For example, the first row reports on the intercept and coefficients on increasing and high income neighborhood indicator variables in a regression of household age on neighborhood type. It suggests that the average head of household for a household with a non-disabled, working-age adult is 43 years old in public housing developments surrounded by low income neighborhoods (omitted category). The average age is 0.3 years older in developments surrounded by high-income neighborhoods.

Across the full set of characteristics, we see some statistically significant difference between household heads in developments surrounded by different types of neighborhoods, but they are generally small, and the statistical significance is not surprising in light of our large sample size. Households in increasing and high income neighborhoods are three and four percentage points less likely to have more than four people in the household, two percentage points less likely to be headed by a single parent, and four to five percentage points more likely to have minor children at home. And household heads in developments with low income surrounding neighborhoods are more often Hispanic and less often black and slightly less often white and Asian/other.

Importantly, the earnings differences we note above persist after we control for these observable characteristics. Still, the difference in observable characteristics that we observe, while mostly small in magnitude, suggest there may also be unobservable characteristics of the residents living in developments in different types of neighborhoods. Future work is needed to determine the degree to which these differences we find in economic outcomes are due to sorting or are in fact caused by the variation in opportunities provided by surrounding neighborhoods.

5. Companion qualitative analysis findings

To accompany our quantitative analysis, we also conducted qualitative research in three public housing developments in New York. It is worth briefly summarizing the findings here. (For more in-depth discussion, please see Dastrup et al., 2015). We selected one neighborhood with low incomes, Morris Heights in the Bronx (Sedgwick Houses), one with rapidly increasing incomes, Long Island City in Queens (Queensbridge North and South Houses), and one with high incomes, Chelsea in Manhattan (Elliott-Chelsea and Fulton Houses). Our team conducted stakeholder interviews in each community, and we partnered with a community-based organization in each development to hire public housing residents as Community Ethnographers. The Community Ethnographers observed interactions in the public spaces in their neighborhoods, conducted resident interviews, and helped to conduct focus groups and interviews with residents and other community stakeholders, all of which helped us gain a richer sense of how residents were actually experiencing the neighborhoods around them.

Our research suggests that the residents of Chelsea and Long Island City described fairly dramatic changes in the communities around them. They generally appreciated the new amenities and improved conditions (particularly the reduction in crime and the improvement in local parks), but they felt somewhat alienated from them, believing that they were designed to

serve the higher income residents that lived in the community. Residents reported that they felt a divide between their public housing campuses and the broader neighborhood outside. When asked about their community, residents pointed to their public housing campus, not the broader neighborhood.

While the quantitative evidence pointed to greater labor market success, residents did not perceive growing job opportunities arising from the new businesses opening up nearby. Even in Chelsea, NYCHA residents reported frustration win the lack of local job opportunities. Residents in Long Island City also expressed concern with the lack of enrichment and skill-building programs for young people; in Chelsea, many participated in the youth programs run by the Hudson Guild, a community-based nonprofit that serves low- and moderate-income residents of the neighborhood. Finally, many residents in both Chelsea and Long Island City expressed concern about the rising cost of living in their neighborhood. Even though their rents were fixed, they said that they struggled with day-to-day living expenses like groceries and laundry.

6. Policy implications

The most important take-away from this work may simply be the fact that public housing residents in New York experience a wide variety of neighborhood environments. Indeed, a majority of public housing campuses in New York City are surrounded by neighborhoods with incomes above the citywide median. In many cases, these neighborhoods have seen significant increases in income in recent years, belying the common belief that higher income residents avoid living near to public housing. This work shows that public housing can provide a way for residents to remain in neighborhoods as they gentrify.

The public housing residents living in developments surrounded by neighborhoods classified as high and increasing income also enjoy neighborhoods with significantly more educated

neighbors, a far better maintained housing stock, higher-performing schools and lower crime than public housing residents surrounded by lower income areas. Our work cannot prove that these environmental factors make a difference in families' lives, but it shows that public housing residents living in higher income neighborhoods enjoy better labor market and educational outcomes than other public housing residents, and at least some of this association may be causal. Further, the lesson from the recent research on the Moving to Opportunity Program suggests that we might see far larger impacts on the long-run outcome of children who grow up in public housing surrounded by higher opportunity areas.

While this work is limited to New York City, the papers in this volume highlight a growing gentrification trend in cities around the country. This broader trend suggests that public housing developments in other cities might also be situated in neighborhoods undergoing similar gains in income, improvements in schools, and reductions in crime. Further research is needed to investigate the patterns. But our research at least challenges the widely accepted view that public housing isolates poor families in distressed areas that offer limited opportunities for advancement. While this may remain sadly true in many cities, in areas seeing gentrification, public housing, and place-based subsidized housing more generally, can be a critical tool to allow residents to remain in high opportunity neighborhoods that they wouldn't otherwise be able to afford and to lock-in some economic diversity over the longer-run.

To be sure, the benefits are not unqualified; our qualitative research shows that while public housing residents appreciate improvements in the surrounding neighborhoods (especially improved safety), they can also feel alienated when the neighborhoods around them change, and face challenges as day-to-day living expenses increase, even if rents are held steady. Most fundamentally, public housing residents typically described their core neighborhood as being

their public housing campus, and many reported that they felt a divide between their developments and the surrounding neighborhood. Community organizations can potentially play an important role in helping to break down those divisions and build bridges between public housing campuses and the surrounding neighborhoods, helping to alleviate tensions and allowing residents to take full advantage of any growing opportunities.

Figures and Tables

Figure 1: Illustration of NYCHA core area and surrounding neighborhood geography definition

Source: NYU Furman Center analysis
Note: Dark solid shapes depict the footprint of NYCHA buildings. Darker blue shaded areas are NYCHA Core analysis units. The surrounding lighter blue shaded areas are the surrounding neighborhoods for each core (each composed of multiple block groups). The geography depicted is of the Ravenswood Houses, a public housing development in Astoria, Queens.

Figure 2: Map of neighborhood classifications in NYC

	Low	Increasing	High
Developments	49	34	54
NYCHA units	40,879	32,999	52,027
Surrounding neighborhood average income (2010)	$39,452	$58,153	$75,465

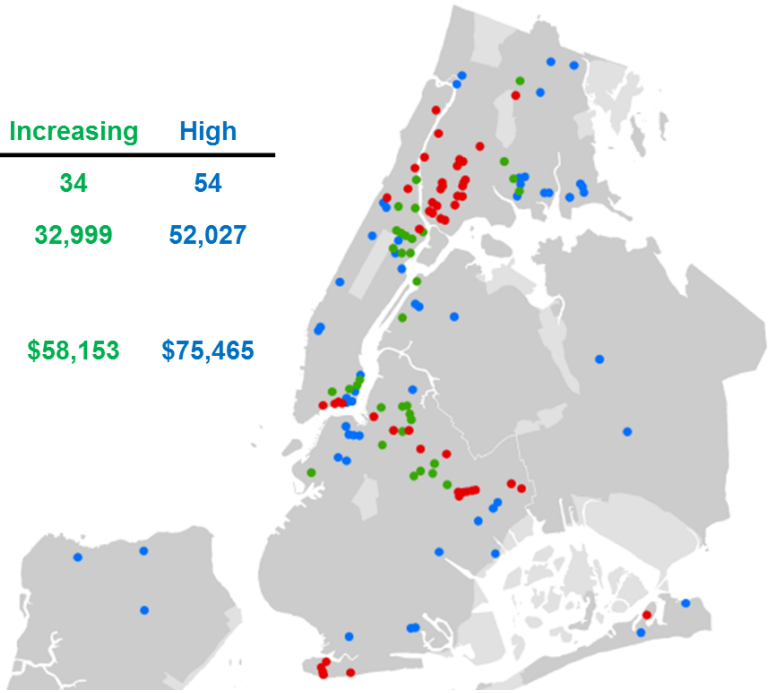
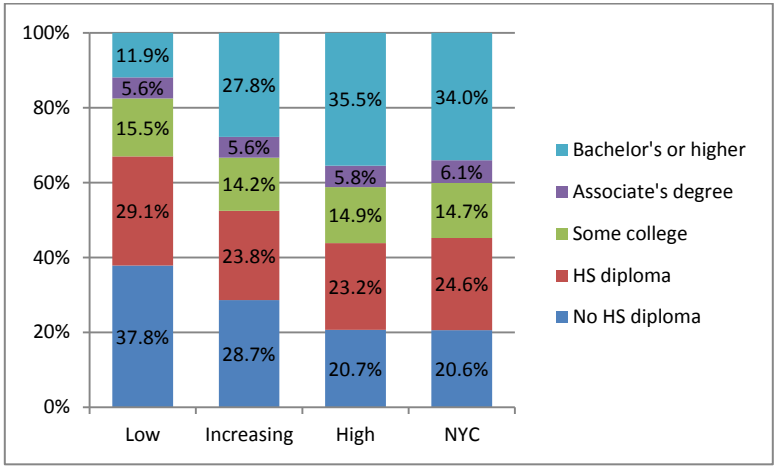


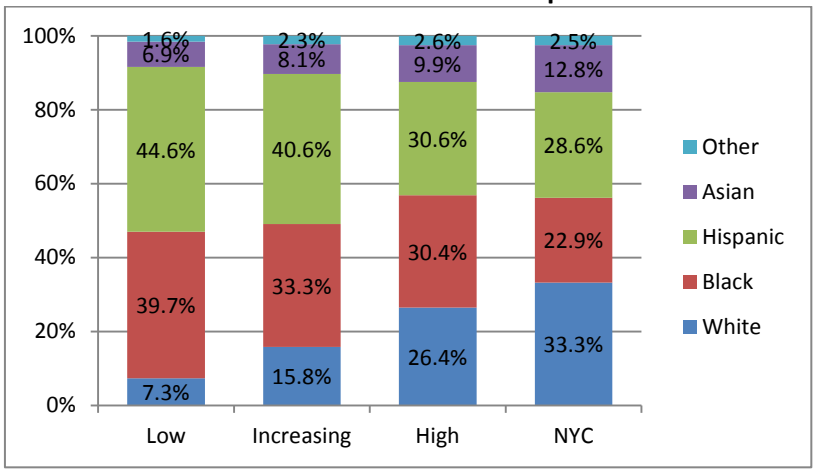
Figure 3: Characteristics of the residents and housing stock of neighborhoods surrounding NYCHA developments in 2008-2012

Panel A: Adult educational attainment



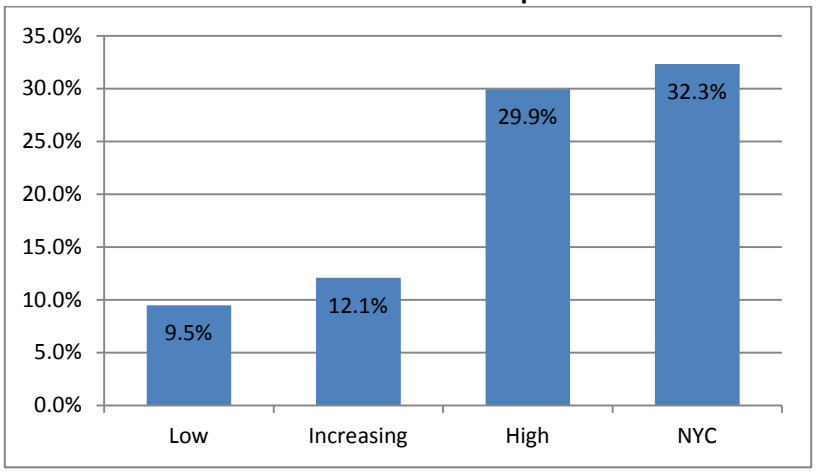
Source: American Community Survey, 2008-2012

Panel B: Racial and ethnic composition



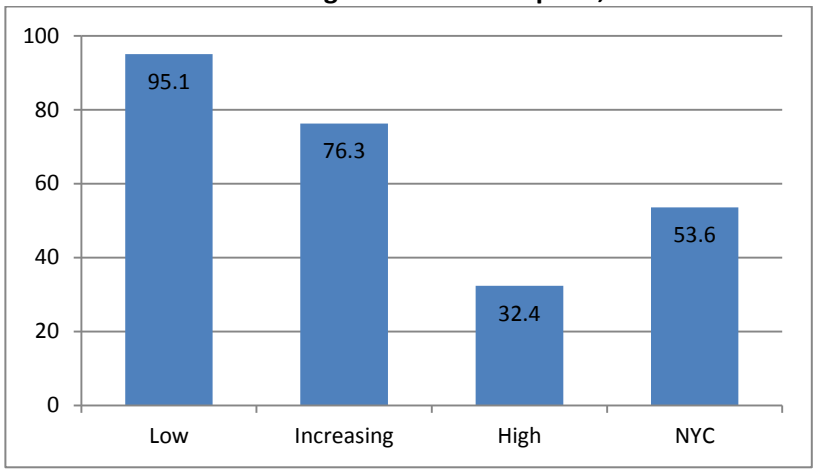
Source: American Community Survey, 2008-2012

Panel C: Homeownership rate



Source: American Community Survey, 2008-2012

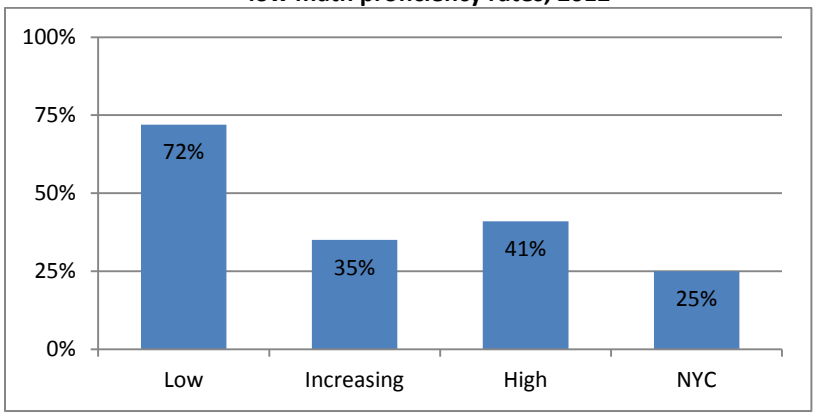
Panel D: Serious housing code violations per 1,000 rental units



Source: New York City Department of Housing Preservation and Development, American Community Survey, Furman Center

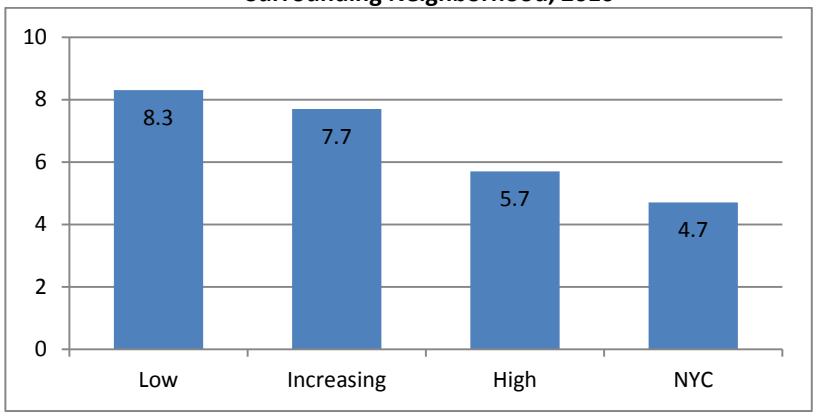
Figure 4: Neighborhood context, services, and amenities available to NYCHA residents

Panel A: Share of NYCHA units zoned for attendance at a public school with low math proficiency rates, 2012



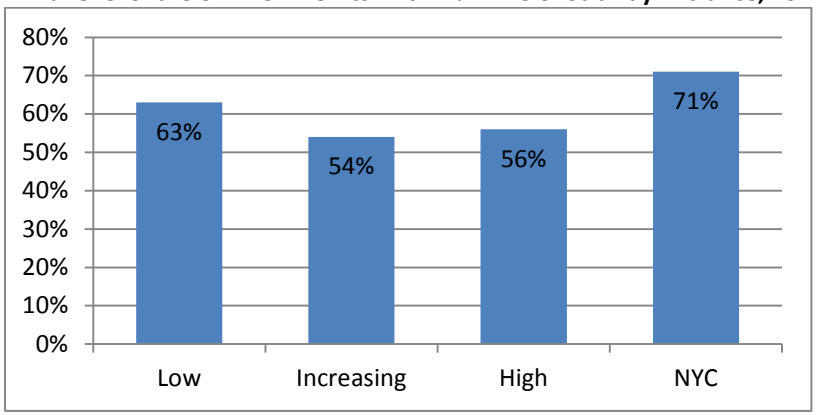
SOURCE: NYC Department of Education, NYCHA, Furman Center
NOTE: Low proficiency defined as in the bottom quartile of all NYC schools

Panel B: Violent Crime Rate per 1,000 Residents, NYCHA Campus and Surrounding Neighborhood, 2010



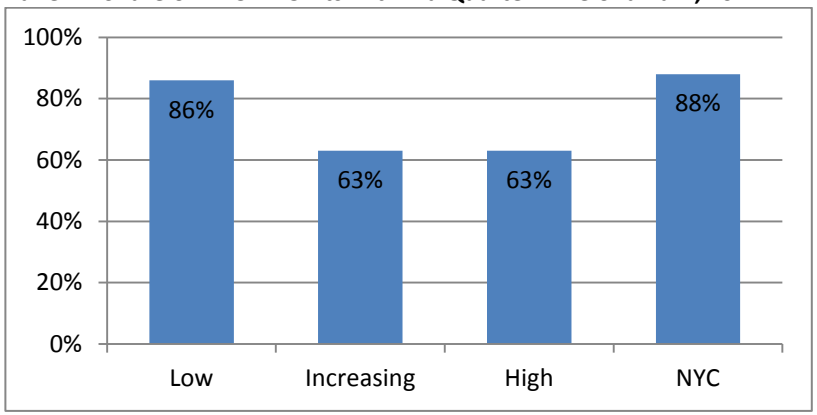
SOURCE: New York City Policy Department, American Community Survey 2008-2012, Furman Center

Panel C: Share of NYCHA Units Within ½ Mile of Subway Entrance, 2011



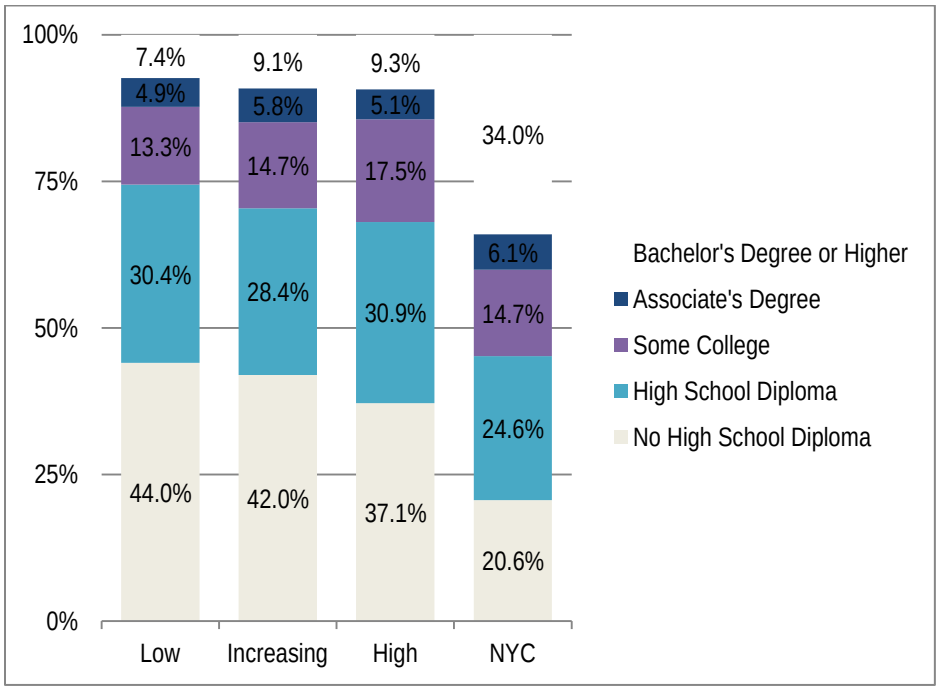
SOURCE: NYC Department of Transportation, NYCHA, NYC Department of Planning, Furman Center
NOTE: NYC includes all residential units

Panel D: Share of NYCHA Units within a Quarter-Mile of a Park, 2011



SOURCE: New York City Department of Parks and Recreation, New York City Housing Authority, Furman Center
NOTE: NYC includes all residential units

Figure 5: Adult education attainment in NYCHA core areas that are 100% NYCHA units



SOURCE: 2008-2012 ACS, Adults aged 25 years and older

NOTE: NYCHA core areas made up entirely of NYCHA developments represents 62, 82, and 68 percent of the units, respectively, of NYCHA units in our analysis surrounded by low-, increasing, and high-income neighborhoods

Table 1: NYCHA core areas sample and surrounding neighborhood income by classification

Count	Classification based on surrounding neighborhood income			
	Low	Increasing	High	Total
NYCHA core areas	49	34	54	137
NYCHA residents (2013)	97,010	76,724	118,254	291,988
NYCHA households (2013)	40,879	32,999	52,027	125,905
Income in surrounding neighborhoods in 2010				
25th percentile	$34,370	$52,114	$62,068	
Median	$39,452	$58,153	$75,465	
75th percentile	$43,830	$66,778	$92,272	

SOURCE: Furman Center analysis; NYCHA administrative data; calculations from 2008-2012 ACS
NOTE: Income percentiles reported here are means of the respective income percentiles over all block groups adjacent to the NYCHA core areas of each type, weighted by the number of housing units in each adjacent block group

Table 2: NYCHA resident economic outcomes by surrounding neighborhood income classification

NYCHA resident outcome	Classification based on surrounding neighborhood income		
	Low	Increasing	High
Median household annual income *Household/year observations*	$19,500 *129,620*	$20,698 *105,736*	$21,648 *169,079*
Median household annual earnings (when > $0) *Household/year observations*	$25,199 *84,456*	$28,167 *68,785*	$29,702 *111,233*
Residents with any earned income	54.6%	55.2%	56.5%
Residents receiving SSI (disability)	6.9%	6.8%	6.2%
Residents receiving SSI among residents reporting a disability	73.6%	70.9%	67.6%
Median net rent	$434	$452	$464

Source: NYCHA administrative records.
Note: Calculated over annual household or individual observations from 2008-2013, with all years adjusted to 2013 dollars. Median annual income calculated for households with a non-disabled, working age (24 to 62) member.

Table 3: Regression results—NYCHA resident household earnings

Outcome: Household earned income (> 0)	Model			
	No controls		Full controls	
	Coeff	Std Err	Coeff	Std Err
Surrounding neighborhood type				
Low income	-	-	-	-
Increasing income	2,194**	115	1,678**	112
High income	3,709**	105	3,479**	99
Demographics				
Age			1,755**	38
Age^2			-20**	0.45
HH yrs in NYCHA			385**	12
HH yrs in NYCHA^2			-3.2**	0.25
HH size > 4			-2,117**	155
Single (grand)parent			-2,113**	185
Children at home			-658**	193
Number of adults			11,235**	128
Black			3,754**	90
White			-3,299**	284
Asian/other			-6,398**	171
Bronx/Queens/Staten Island			-929**	90
Year indicators			Included	
Constant	30,304**	76	-23,792**	816
N	264,474		264,474	
R^2	0.005		0.13	

Source: NYCHA Administrative Records.
Note: Analysis was restricted to households with a head of household ages 25 to 61 with no reported disability and some positive earned income. Low income and Hispanic are reference categories. ** p<0.01, * p<0.05

Table 4: Comparison of NYCHA household characteristics by surrounding neighborhood type

NYCHA head of household characteristic (left-hand-side variable in regression)	Surrounding neighborhood classification		
	Low income Intercept (Std error)	Increasing income Coefficient (Std error)	High income Coefficient (Std error)
Age	43.44 (0.07)	0.14 (0.10)	0.34** (0.09)
Years in NYCHA	13.60 (0.09)	0.33* (0.13)	0.30* (0.12)
HH size > 4	0.16 (0.003)	-0.030** (0.004)	-0.043**,++ (0.003)
Single parent	0.47 (0.004)	-0.023** (0.005)	-0.024** (0.005)
Minor children at home	0.64 (0.003)	-0.036** (0.005)	-0.054**,++ (0.005)
Working age adults	1.36 (0.004)	0.002 (0.006)	-0.006 (0.006)
Race			
Hispanic	0.48 (0.003)	-0.035** (0.005)	-0.088**,++ (0.005)
Black	0.42 (0.004)	0.018** (0.005)	0.057**,++ (0.005)
White	0.030 (0.001)	-0.002 (0.002)	0.005**,++ (0.002)
Asian/other	0.066 (0.002)	0.019** (0.003)	0.026**,+ (0.003)
Number of households (all models) = 59,030	18,979	15,310	24,741

Source: NYCHA Administrative Records.

Note: Each row of the table reports coefficients from a regression of the form $Char = \beta_L + \beta_I Increasing + \beta_H High + \varepsilon$. The estimated β_L coefficient is then the mean of the characteristics for NYCHA household heads living in core areas with surrounding areas classified as low incomes. The β_I and β_H coefficients then measure the difference in mean characteristics for household heads in developments with surrounding areas classified as increasing and high income areas. Analysis was restricted to households with a head of household ages 25 to 61 with no reported disability and some positive earned income. Statistically significance for $\beta_I$and β_H is denoted with ** p<0.01, * p<0.05 and indicates a difference in the means of each of the increasing and high group relative to the low group. Note that reported p-values are not adjusted for multiple comparisons. Results of an F-test of $\beta_I = \beta_H$ are reported in the high income column, with $^{++}$ p<0.01, $^{+}$ p<0.05.

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Appendix 1

Table 5: NYCHA household income and earning percentiles, 2013

Indicator	Percentile	Low	Increasing	High	Unclassified
Household annual income (2013)	10%	$6,888	$6,888	$6,916	$6,888
	25%	$10,113	$10,400	$10,608	$10,524
	50%	$18,385	$19,500	$20,165	$19,815
	75%	$33,157	$36,016	$37,090	$36,248
	90%	$49,603	$52,475	$54,842	$54,436
Household earnings (when > 0, 2013)	10%	$8,418	$8,986	$8,834	$8,759
	25%	$13,462	$14,711	$14,869	$14,706
	50%	$22,880	$25,833	$26,843	$26,180
	75%	$37,420	$40,606	$41,890	$40,870
	90%	$52,991	$56,093	$59,212	$58,425