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Black Male Youth: Evidence from Gautreaux**

Mark E. Votruba, Case Western Reserve University

Jeffrey R. Kling, The Brookings Institution

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**EFFECTS OF NEIGHBORHOOD CHARACTERISTICS
ON THE MORTALITY OF BLACK MALE YOUTH:
EVIDENCE FROM GAUTREAUX**

Mark E. Votruba
Case Western Reserve University

and

Jeffrey R. Kling
The Brookings Institution

Abstract: We estimate the effect of neighborhood characteristics on the mortality of poor black male youth in families relocated through the Gautreaux Assisted Housing Program, a residential mobility program implemented in Chicago in 1976. Within our sample (N=2850), post-placement mortality rates were substantially higher than national rates for black male youth and primarily consisted of deaths due to violence (homicides and suicides). Mortality rates were substantially lower among those relocating to Census tracts with higher fractions of residents with college degrees, which suggests that relocating to more advantaged neighborhoods can ameliorate the mortality risks faced by this population. The estimated effect declines over the post-placement period, a result consistent with evidence that Gautreaux families routinely relocated following their initial placement. A causal interpretation of these findings is undermined somewhat by evidence of neighborhood self-selection, however the estimated effect is very robust to inclusion of covariates predictive of placement tract characteristics. Mortality effect estimates relating to Census tract measures of socioeconomic deprivation other than education were weaker in magnitude and generally insignificant, suggesting that neighborhood levels of human capital more strongly affect the mortality risks faced by this population than racial composition or neighborhood poverty.

Key words: Neighborhood health effects, residential relocation, Gautreaux

Author Information:

Mark E. Votruba
Economics Department
Weatherhead School of Management
11119 Bellflower Road
Cleveland, OH 44106
mark.votruba@case.edu

Jeffrey R. Kling
The Brookings Institution
1775 Massachusetts Ave, NW
Washington, DC 20036
jkling@brookings.edu

1. Introduction

There is widespread acceptance among health economists and health services researchers that the impact of medical care on population health is fairly modest when compared to other contributing factors, such as health behaviors, genetic endowment, and social and environmental factors (e.g., McGinnis and Foege, 1993; Lurie et al., 2003). In particular, a large literature based on observational evidence documents strong correlations between the characteristics of places and health outcomes, including all-cause mortality, self-reported health status, incidence of specific diseases, mental illness, incidence of injury, and adverse birth outcomes.¹ The general finding in this literature is that residents of disadvantaged neighborhoods suffer worse health outcomes than those in more advantaged neighborhoods, and that these differences cannot be fully explained by variation in individual-level characteristics.

If the correlations between neighborhood characteristics and health outcomes represent causal relationships, it suggests that housing policies can have important implications for individual health. It also suggests that residential segregation by income, class, or race could be a contributing factor to the well-documented gradient between health and socio-economic status (e.g., Deaton, 2001). However, issues of omitted variable bias cast doubt on the causal interpretation often applied to the estimated correlations (Oakes, 2004). Residential location is largely a matter of household choice, the determinants of which are imperfectly observed by researchers. As a result, the documented correlations might represent

¹ Pertinent citations include: Haan et al. (1987), Lynch et al. (1998), Waitzman and Smith (1998a, 1998b), Ross et al. (2000), and Bosma et al. (2001) for all-cause mortality; Malmstrom et al. (1999) and Subramanian et al. (2001) for self-reported health status; Armstrong et al. (1998), LeClere et al. (1998), Casper et al. (1999), Diez-Roux et al. (2001), Zierler et al. (2000), Barr et al. (2001), and Acevedo-Garcia (2001) for incidence of specific diseases; Aneshensel and Sucoff (1996), Yen and Kaplan (1999), and Ross (2000) for mental illness; Durkin et al. (1994), Reading et al. (1999), and Cubbin et al. (2000) for incidence of injury; Collins and David (1997), Matteson et al. (1998), and Gorman (1999) for adverse birth outcomes.

a causal relationship, omitted variable bias, or some combination of the two. As Jencks and Mayer (1990) note in reviewing the literature on neighborhood characteristics and child outcomes “...the most fundamental problem confronting anyone who wants to estimate neighborhoods’ effects on children is distinguishing between neighborhood effects and family effects... This means that children who grow up in rich neighborhoods would differ to some extent from children who grow up in poor neighborhoods even if neighborhoods had no effect whatever” (page 119).

The problem of omitted variable bias potentially explains the more modest neighborhood health effects documented in studies of the Moving to Opportunity (MTO) demonstration projects, which have operated in five cities since 1994.² Under MTO, low-income public housing families were randomly assigned to either the control group or one of two intervention groups offering housing vouchers to move to neighborhoods with lower poverty rates. Analyses of MTO participants indicate the neighborhood effects on health are less comprehensive than suggested by observational studies. Kling, Liebman, and Katz (2007) find that adults in the experimental group demonstrate significantly better mental health and significantly lower obesity levels than control group adults, but find no significant differences in four other aspects of physical health (general health, asthma, physical limitations, and hypertension). Looking at the health of MTO youth, they find that female youth in the experimental group experienced improvements in mental health and were less likely to engage in risky activities, with no significant improvements in physical health. However,

² In MTO, the “experimental” group received housing vouchers that could only be used to lease housing in census tracts with 1990 poverty rates of less than 10 percent. The “Section 8” group received standard Section 8 vouchers with no constraints on the relocation area. The random assignments led to substantial variation in neighborhood characteristics across the three groups, with experimental families generally residing in census tracts having more advantaged socioeconomic characteristics and control families residing in tracts with poorer socioeconomic characteristics. See Goering, Feins, and Richardson (2002) for a detailed description of the MTO experiments and a review of findings current to its publication date.

male youth in the experimental group were *more* likely to engage in risky activities (e.g., alcohol and tobacco use) and more likely to experience serious physical injuries requiring medical attention. In sum, the MTO results suggest that neighborhood characteristics play a modest role in determining health outcomes, one largely constrained to effects on mental health, and indicate that the health effect of more advantaged neighborhoods on poor male youth may in fact be negative.

We contribute to the existing literature by investigating the link between neighborhood characteristics and the mortality of black male youth who participated in the Gautreaux Assisted Housing Program, a predecessor to MTO that operated in Chicago from 1976 to 1998. Gautreaux was designed with the intention of moving black public housing residents into city and suburban neighborhoods where the black population was less than 30 percent. While Gautreaux was not a planned social experiment, analysts have referred to placements under Gautreaux as “quasi-random” due to elements of randomness in the way participants were matched to available rental units (e.g., Rosenbaum, 1992; Popkin et al., 1993; Rosenbaum, 1995; Rosenbaum and DeLuca, 2000; Rosenbaum and Rubinowitz, 2001; DeLuca and Rosenbaum, 2003). If placements were truly random, occurring without regard to family characteristics and preferences, Gautreaux provides an ideal opportunity for investigating the impact of neighborhood characteristics on health (and other) outcomes.

Our focus on the mortality of black male youth was directed by both statistical issues and real-world relevance. Since our outcome measure is derived from administrative records (state death certificates), we are able to overcome potential problems of attrition bias that plagued early analyses of Gautreaux (e.g., Rosenbaum, 1992; Popkin et al., 1993;

Rosenbaum, 1995). Moreover, black male youth have notoriously high mortality rates.³ The mortality outcomes of male youth also hold particular interest given the estimated negative effect that more advantaged neighborhoods had on the male youth in MTO.

Our empirical analysis was designed to estimate the independent contribution of specific neighborhood characteristics in predicting post-placement mortality rates. Colinearity of placement neighborhood characteristics impeded attempted to measure the marginal contribution of individual neighborhood characteristics. Nevertheless, the information we provide could be useful to policymakers attempting to structure voucher programs to encourage relocations to neighborhoods possessing characteristics that facilitate better outcomes (health or otherwise). Understanding which neighborhood characteristics are most strongly related to better health outcomes could also inform hypotheses regarding the underlying mechanisms through which neighborhoods matter.

A paramount concern in our analysis is whether the estimates produced reflect a causal neighborhood effect and not a spurious correlation due to neighborhood self-selection. In fact, our analysis indicates that claims of “quasi-randomness” in the Gautreaux placement process are overstated. Characteristics of a family’s placement neighborhood were found to be significantly related to both family characteristics and characteristics of the family’s intake (pre-placement) neighborhood, suggesting some degree of neighborhood self-selection on behalf of participating families. Nonetheless, our mortality results are strongly suggestive of substantial neighborhood effects. In particular, youth placed in neighborhoods with higher rates of college-educated residents had substantially lower post-placement mortality rates, and the estimated effect is strongly robust to inclusion of covariates predictive of placement to

³ The national mortality rate for black males ages 15 to 24 was 180.6 per 100,000 in 2001, more than 67 percent higher than the rate for white males in the same age group (Arias et al., 2003).

more highly-educated neighborhoods. Moreover, the effect diminishes over time, consistent with evidence that Gautreaux families often relocated after their initial placement (Keels et al., 2005; DeLuca and Rosenbaum, 2003). Other placement neighborhood characteristics also suggest mortality improvements from placement to more advantaged neighborhoods, but these associations are weaker in magnitude and generally insignificant.

The remainder of this paper is structured as follows. Section 2 provides background on the Gautreaux program. Section 3 describes the dataset constructed for this analysis. Section 4 presents the empirical results including evidence of neighborhood selection by Gautreaux participants. Section 5 discusses the implications of these findings and concludes. The Data Appendix includes additional technical details on our data construction process.

2. Background

The Gautreaux Assisted Housing Program resulted from a consent decree originating from a 1966 housing discrimination lawsuit against the Chicago Housing Authority (CHA) and the U.S. Department of Housing and Urban Development (HUD). The suit alleged that black public housing residents were denied opportunities to live in integrated areas in the Chicago metropolitan area. In 1976, a U.S. district court decreed that HUD set aside 7000 Section 8 slots to assist families in the plaintiff class to move to metropolitan area neighborhoods with black populations of less than 30 percent.⁴ In 1981, this was amended to allow relocations into revitalizing minority neighborhoods (Davis, 1993).

⁴ The Section 8 program, now known as Housing Choice Vouchers, is a federal housing assistance program providing vouchers that can be used to rent housing in the private rental market with a tenant contribution towards rent of about 30 percent of monthly income. Under Section 8, HUD determines the “fair market rent” (FMR) in cities and towns. For Section 8 “certificates,” HUD subsidizes rent up to the FMR rent ceiling. For Section 8 “vouchers,” which over time have become the predominant form of assistance, the FMR determines HUD’s contribution to the rent. The value of the voucher would typically be the difference between the FMR and 30 percent of household monthly income, without a specific ceiling on rent for the unit.

The Gautreaux program was administered by the Leadership Council for Metropolitan Open Communities, a not-for-profit agency sponsored by local leadership organizations and charged with addressing housing segregation in Chicago. From Gautreaux's inception until 1989, the Leadership Council employed a full-time real estate staff that played the primary role in identifying landlords willing to participate in the program (Keels et al., 2005). As units were identified, they were offered to families "on the basis of their rank order on the waiting list, regardless of any expressed preferences for city or suburban locations" (Popkin et al., 1993). Popkin et al. (1993) noted that although "participants are allowed to refuse two housing offers for any reason without jeopardizing their assistance, 95 percent accept the first offer they receive because it is uncertain that there will be any others." These observations are noteworthy since they suggest apartments identified by the real estate staff were assigned without regard to family preferences, although participating families were also permitted to search for their own units at least as early as the mid-1980s (Keels et al., 2005) and were free to turn down units offered to them.

By 1990, the rental housing market was strong enough that the Leadership Council eliminated its real estate staff (Keels et al., 2005). Participating families were largely responsible for identifying their own units from this time forward. As a result, previous analyses of Gautreaux have generally focused on placements occurring before 1990 on the assumption that pre-1990 placements were exogenous with respect to family characteristics or neighborhood preferences. In contrast, a similar argument could not be made about post-1990 placements.

In our sample period of 1976 to 1994, Gautreaux assisted a relatively homogenous group of low-income black Chicago residents in relocating to a wide variety of neighborhoods

throughout the Chicago metropolitan area. The family characteristics associated with these placement outcomes are discussed in detail in section 4.

3. Data Description

Data on the families participating in Gautreaux were created by the Leadership Council and provided by the U.S. Department of Housing and Urban Development for the purpose of this study. These data included participants' date of intake and placement, intake and placement addresses, identifying information for each member in the participating household (name, sex, date-of-birth, and social security number), as well as additional characteristics of the family.⁵ Intake and placement addresses were geocoded to determine the Census tract of residence at intake and placement. Data from the 1990 Census were then merged to the household records and used to construct characteristics of the intake and placement neighborhood for each family.

Our observations consist of participating males who were age 25 or younger at the time of placement and who had reached age 13 or older by 12/31/1999, the latest date for which mortality records were obtained. The resulting dataset consists of 2850 male youth in 2033 families placed before 1995.

Mortalities among the sample of male youth were identified to age 30 using the National Death Index (NDI), a national computerized index of death record information maintained by the National Center for Health Statistics (NCHS). Identifying information (name, date-of-birth, and social security number) for the sample was submitted to the NCHS and matched against the NDI to identify potential mortalities. Death certificates were obtained

⁵ A complete description of the data creation and verification steps is provided in the Data Appendix, but omitted here for brevity.

directly from the State vital statistics offices to verify mortalities where matches against the NDI were inconclusive.⁶

Table 1 reports summary statistics for the post-placement mortalities identified in our sample. Over the ages 13 to 30, a total of 52 post-placement mortalities were identified in our sample, representing a mortality rate of 2.42 mortalities per 1000 years of post-placement observation time.⁷ Consistent with the low socioeconomic status of our subjects, this mortality rate is substantially higher than the national mortality rate for black male youth over this period.⁸ Of the 52 observed deaths, more than half (30) were the result of homicide. Eight deaths were the result of suicide while 10 were the result of an automobile or other accident. Thus, the variation in mortalities across neighborhoods analyzed in the following section primarily reflects variation in the risk of violent or accidental death as opposed to variation in exposure to environmental toxins or other health hazards.

Table 2 reports summary statistics of household and individual characteristics for the dataset of male youth. About 70 percent of the male youth resided in households headed by an unmarried female with another 17.6 percent recorded as headed by a married female. The head of household was generally quite young (mean age of 31.0) and only 24.4 percent of household heads were working at intake. The annual employment income of working heads of household was generally low (\$12,487 in 1989 dollars). Reported monthly incomes in

⁶ We had anticipated some difficulty in identifying mortalities in cases with less than perfect matches against the NDI, but individual inspection comparing information on the death certificates (e.g., birthdate, name of spouse, address) against the Gautreaux records left little doubt which of the NDI matches were “true” and which were not. Nonetheless, the number of mortalities identified in the sample is potentially understated. It is well known that matching against the NDI typically misses some percentage of actual mortalities, with higher error rates for blacks. Comparing NDI match results against a dataset of cancer patients with known mortality outcome, Calle and Terrell (1993) found that black male mortalities were correctly identified 95 percent of the time that a social security number was available and 86 percent of the time that no social security number was available, compared to 97 percent and 87 percent for the sample as a whole. In our sample of Gautreaux male youth, 30 percent were missing social security numbers.

⁷ Only one mortality was identified among male youth younger than age 13, a suicide at age 6.

households without a working head were even lower (\$441 in 1989 dollars).⁹ The number of bedrooms requested, determined by the Leadership Council based on the sex and age composition of the family, was 2.7 on average, and the mean age of the male youth at placement was 9.8 years old.

Table 3 describes the 1990 Census tract characteristics for the intake and placement addresses of the sample, with analogous characteristics provided for the entire population of Cook County.¹⁰ As expected, substantial differences exist between the intake and placement neighborhoods. It is noteworthy that the judicial intent behind the Gautreaux program appears to have been satisfied. Our sample of males relocated from intake neighborhoods that were impoverished and overwhelmingly minority to placement neighborhoods that more closely reflected Cook County as whole. The majority of these moves were outside of the Chicago city limits, though nine percent of the males were already residing in a Chicago suburb prior to participating in the program. As might be expected, the various characteristics of placement neighborhoods were highly correlated (see Appendix Table A1). In general, our sample relocated to addresses that were fairly distant from their intake address, with a mean linear distance of 17 miles between the two.

⁸ The national average mortality rate for black males ages 15 to 24 over the 1980s was 192.8 per 100,000 (NCHS, 2003). Over a similar age range, our sample had a post-placement mortality rate 44.5 percent higher.

⁹ Total monthly household income was not consistently recorded for families with a working head. In our regression models, total income is only included as an interaction with an indicator for having a non-working head.

¹⁰ The Chicago MSA consists of six counties. Cook County is the most populous of these and encompasses the City of Chicago.

4. Empirical Analysis

4.1 Neighborhood Selection Analysis

Most previous analyses of the outcomes of Gautreaux participants regarded neighborhood placements as essentially random, at least during the period in which the Leadership Council employed a full time real estate staff to assist with placements (before 1990).¹¹ To test this assertion, we estimated the following OLS regression model over the sample of male youth:

$$(1) \quad PlacePctWhite_i = \alpha_{yr} + \beta IntakePctWhite_i + \delta X_i + e_i$$

where $PlacePctWhite_i$ captures the percent of white residents in the youth's placement tract, $IntakePctWhite_i$ captures the percent of white residents in the youth's intake tract, and X_i represents a vector of individual and family characteristics. Regression intercepts were allowed to vary by year of placement, with standard errors corrected for clustering across males in the same household.

The results of this analysis are presented in Table 4. Columns 1 and 2 estimate the model with and without inclusion of the individual and family covariates. As shown, the percent white in the youth's intake tract is a significant determinant of the percent white in the placement tract – a finding that is robust to the inclusion of the individual and family covariates. $PlacePctWhite$ also increases significantly for families headed by a married female and those owning cars, and has a significant convex relationship with number of bedrooms requested.

¹¹ An exception is Keels et al. (2005), who report changes in program administration around 1990 and find a number of correlations between family and placement neighborhood characteristics despite their restricted focus on pre-1990 placements. Both mother's age and number of children were found to be significantly correlated

The fact that car ownership and number of bedrooms requested affect placement comes as little surprise, as the Leadership Council likely collected such data to assist housing counselors in finding suitable housing for Gautreaux families. This finding indicates the importance of controlling for such household characteristics when analyzing the effect of placement neighborhood characteristics on participant outcomes, as they potentially affect male youth mortality rates.

The characteristics of intake neighborhoods are the clearest revelation of the residential preferences of participating families. If placements were truly made without respect to families' residential preferences, we would expect no relationship between the percent white in the intake and placement tracts. Instead, our results strongly suggest that participating families self-selected into placement neighborhoods where they felt more comfortable.

Given changes that occurred to the Gautreaux program over time, we re-estimated our model separately for families relocating before and after 1990 to investigate whether evidence of neighborhood self-selection increased when the Leadership Council's real estate staff was eliminated. The results in columns 3 and 4 of Table 4 provide no evidence that neighborhood self-selection based on racial composition was less pronounced in the pre-1990 period. In fact, just the opposite appears to be true, with the coefficient on *IntakePctWhite* twice as large in the pre-1990 regression.

Similar analyses were conducted for each of the other placement neighborhood characteristics, with the coefficients on the corresponding intake tract characteristics presented in Table 5. These findings are generally consistent with those in Table 4. Using the

with characteristics of the placement neighborhood, and numerous characteristics of families' intake neighborhoods were found to be significantly correlated with placement neighborhood characteristics.

full sample, we find that the intake neighborhood characteristic is a significant predictor of the corresponding placement neighborhood characteristic for six of the eight characteristics considered. When the analyses were conducted separately for pre- and post-1990 placements, we find little indication of diminished self-selection in the pre-1990 period.

4.2 *Estimation Model for Mortality Analysis*

Our primary empirical specification analyzes the effect of placement neighborhood characteristics on the post-placement mortality rates of male youth using the following Cox Proportional Hazard specification:

$$(2) \quad \lambda(\text{Age}_i, X_i) = \lambda_0(\text{Age}_i) \exp(\beta_1 \text{PlaceChar}_i + \beta_2 X_i + \beta_3 \text{IntakeChars}_i)$$

where $\lambda_0(\text{Age}_i)$ represents the (nonparametric) baseline mortality hazard at a particular age, PlaceChar_i represents a particular placement tract characteristic, X_i represents characteristics of the youth's family at intake, and IntakeChars_i represents characteristics for the youth's intake tract. Each Cox regression includes a single placement neighborhood characteristic.

To improve interpretation of our results, each placement tract covariate was standardized in two ways. First, each measure was modified as necessary so that higher values correspond to more-advantaged neighborhoods. For example, the poverty rate characteristic was modified to reflect the share of non-elderly residents with incomes *above* the poverty line. Second, each measure was divided by the standard deviation for that characteristic over Cook County as a whole. Thus, each β_j can be interpreted as the estimated proportional effect on the baseline mortality rate of a one standard deviation “improvement” in a given placement tract characteristic.

The findings of our selection analysis (above) suggest some caution be applied in interpreting these estimates, as these estimates are potentially confounded by the effect of unobservable family characteristics. The inclusion of family characteristics and intake tract characteristics can help address this source of bias, as both appear to be significant predictors for the type of neighborhood a male youth relocated to. Therefore, an important aspect of our analysis is the extent our estimates are robust to inclusion of these observable determinants of neighborhood selection.

A second issue that arises in interpreting the estimation results under model (2) is the potential for families to relocate after their initial placement. After residing in one's placement address for one year, Gautreaux families were free to relocate without restrictions and still retain their housing voucher. Therefore, the actual neighborhood of residence for a given youth may have changed over the analysis period, especially if Gautreaux families felt uncomfortable in their original placement neighborhoods (Clark, 1991). DeLuca and Rosenbaum (2003) and Keels et al. (2005) find that large fractions of Gautreaux families did relocate after their initial placement. While these studies found that families generally relocated to neighborhoods similar to their original placement neighborhood, the frequency of post-placement relocations represents a potential source of attenuation bias. Over the post-placement period, placement tract characteristics become an increasingly noisy proxy for the actual characteristics of the neighborhoods in which the male youth actually resided.

To investigate this source of bias, alternative versions of model (2) were estimated, including time-varying characteristics to determine if the mortality effect of placement neighborhood characteristics changed over time. Specifically, three time-varying covariates were included: a set of dummy covariates representing calendar year, a covariate capturing

years since original placement, and a covariate interacting years since original placement with the relevant placement tract characteristic. For estimating our model, the value of the each of these was updated at the start of each calendar year. Our primary interest among these time-varying covariates is the interaction term. If placement in more advantaged neighborhoods improves mortality rates but families relocate over time, we would expect to the negative mortality effect to diminish over time.

4.3 *Results for Mortality Analysis*

Table 6 presents the results of this analysis focusing on the percent of placement tract residents with a college degree. Column 1 includes no additional covariates, adjusting only for the (non-parametric) effect of age over the post-placement period. The estimate is marginally significant and suggests that a one standard deviation increase in percent with college degree decreased post-placement mortality rates by 28 percent. Controlling for family covariates (column 2) and intake tract characteristics (column 3) had only a minor effect on these estimates, which tends to undermine concerns of substantial self-selection bias. Indeed, controlling for both sets of covariates increases the mortality effect modestly, suggesting a 33 percent reduction in post-placement mortality rates, significant at conventional levels. Columns 4 and 5 incrementally add the time-varying covariates. Controlling for calendar year and years since placement (column 4) had minimal effect on our coefficient of interest. Adding the covariate interacting percent with college degree and years since placement, the resulting coefficients are consistent with families relocating post-placement: the “level effect” of percent with college degree is substantially larger than before, while the interaction term indicates this effect diminishes over time.

Due to the large fraction of violent deaths observed in our sample, we re-estimated a subset of these specifications restricting attention to suicide and homicide mortalities (in columns 6 and 7) and homicide-only mortalities (in columns 8 and 9). For the purpose of estimating these regressions, excluded types of mortalities were treated as censoring events. The estimates are very similar to those observed in the all-cause mortality models, though the models suffer from diminished power.

Table 7 replicates the main all-cause mortality models for the other placement neighborhood characteristics we analyzed. Panel A replicates the model including family and intake tract characteristics, while Panel B also includes the time-varying covariates. While the pattern of estimates suggests that placements in more advantaged neighborhoods reduced mortality rates, the results were generally insignificant and all smaller in magnitude than those for percent with college degree. The placement tract characteristics demonstrating the most similar effect magnitudes – percent of workers in white collar occupations and (to a lesser extent) mean family income – were the characteristics most highly correlated with percent with college degree.

5. Conclusion

Since the first evaluations of Gautreaux appeared more than a decade ago, there has been increased attention on the role that housing policy can play in improving outcomes for families receiving housing assistance, particularly with regard to policies compelling families to reside in neighborhoods possessing certain characteristics. Our findings support the hypothesis that relocating to more advantaged neighborhoods has a substantial impact on the mortality risks faced by poor black male youth. To gauge the magnitude of these results,

results from Table 6 (specifically, those in columns 3 and 8) were used to construct counterfactual predictions for the number of mortalities and homicides that would have been predicted if percent with college degree had been unchanged from participants' intake neighborhood. Holding the total amount of followup time constant, our estimates suggest 68.8 lives would have been lost (in contrast to the 52 observed mortalities), including 43.4 due to homicide (instead of 30). In other words, moving to more advantaged neighborhoods is estimated to have saved almost 17 lives within our sample of male youth, with almost 80 percent of these the result of reduced homicides.

Our finding of substantial mortality effects contrasts somewhat with MTO findings regarding the neighborhood health effects on poor male youth. Kling, Liebman, and Katz (2007) document a negative effect of relocating to a more advantaged neighborhood on the physical health of male youth, and a positive effect on the likelihood of engaging in risky behaviors (e.g., alcohol, tobacco, and marijuana use). Kling, Ludwig, and Katz (2005), while finding a short-term reduction in the number of violent arrests among male youth relocating to more advantaged neighborhoods, find an increase in non-violent arrests and self-reported behavioral problems. MTO and Gautreaux were implemented in different cities and at different times, so we cannot rule out the possibility that findings from our analysis (or, for that matter, the MTO analyses) are specific to location and time period. Yet, aside from the short-term reduction in violent arrests, these findings might have led one to expect increased mortality rates among Gautreaux male youth relocating to more advantaged neighborhoods. Instead, we find the opposite. Even if moving to more advantaged neighborhoods leads to increased behavioral problems and more injuries, it appears that such neighborhoods shield poor black male youth from the mortality risks they face, especially the risk of homicide.

Indeed, this is consistent with another finding from the MTO experiments: adults relocating to lower-poverty neighborhoods reported substantial increases in their perception of safety and large reductions in their likelihood of observing or being victims of crime (Kling, Liebman, and Katz, 2007).

Our findings are also notable for what they say about which neighborhood characteristics are the most important independent predictors of mortality rates for black male youth. In contrast to the goals of Gautreaux (relocating black families to “whiter” neighborhoods) and MTO (relocating families to lower poverty neighborhoods), percent of residents with college education stood out as the most powerful independent predictor of reduced mortality. While limited power prevents us from drawing firm conclusions, the results suggest that neighborhood characteristics relating to human capital are most strongly associated with post-placement mortality rates, while neighborhood poverty rates, racial composition, and female headship rates demonstrate negligible, insignificant associations.

While male youth mortality is only one outcome that policymakers might consider in formulating housing policies, it is clearly an important one. Additional research in this vein can hopefully better illuminate which neighborhood characteristics deserve the most attention in developing housing programs for the poor.

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Appendix: Data Construction Technical Details

Electronic and paper files pertaining to all Gautreaux participants were created by the Leadership Council and provided by the U.S. Department of Housing and Urban Development for the purpose of this study. Existing electronic datasets created by the Leadership Council contained participants' dates of intake and placement, addresses (intake and placement), and identifying information for each member in the participating household (name, sex, date-of-birth, and social security number). The data in these computerized files were verified against the original paper files for accuracy. In addition, the following additional variables were constructed from the paper files:

- Marital status (from intake sheet)
- Number of bedrooms required (intake sheet)¹²
- Automobile ownership (intake sheet)
- Employment status (intake sheet)
- Total monthly income (intake sheet)
- Annual employment income (from HUD Form 50059¹³)

The verification of the electronic data and construction of additional variables was performed under contract by Microsystems, Inc. of Evanston, IL. In all, the original Gautreaux dataset consisted of 5374 families with 5393 recorded relocation events. Dropping participants with multiple recorded placements (19 relocation records¹⁴) and restricting the sample to those placed between 1976 and 1994 (to allow for sufficient follow-up time) left a remaining sample of 5256 participating families, each with a single relocation record.

¹² Calculated by Leadership Council staff based on the age and sex composition of the household.

¹³ Also known as the *Owner's Certification of Compliance with HUD's Tenant Eligibility and Rent Procedures*.

¹⁴ A total of 17 families were recorded as having two Gautreaux-related relocations and another family was recorded as having three relocations.

Intake and placement addresses were geocoded using Etak® Geocoding Software to determine address latitude and longitude and 1990 Census tract. The longitude and latitude of each address was used to calculate linear distance between intake and placement addresses. Eight records were dropped, either for a missing intake address (1) or an intake zip outside of IL (7). Another 87 records were dropped because of missing placement addresses (86) or placement zips outside of IL (1). Another 111 families were dropped because their intake or placement addresses could not be successfully matched to addresses in the Etak® database. For 289 intake addresses and 532 placement addresses, matching the address to an address in the Etak® database required making a small modification to the address, usually a spelling correction or minor adjustment to the street address number.

In 156 cases, the placement tract was identical to the intake tract, and in 104 of these the intake and placement addresses were identical. Since it seems unlikely that participating in Gautreaux affected the placement tract in which these families resided, all 156 were dropped, reducing the sample to 4895 participating families. Selecting families containing a male age 25 or younger at the date of placement created a sample of 2474 families with 3580 male youth. Further selection of males age 13 or older at some point during the post-placement followup period (i.e. prior to 12/31/1999) yielded our final analytic sample.

Table 1
Post-Placement Mortality Rates by Age

<u>Age</u>	<u>At-risk years</u>	<i>Mortality Rate per 1000 at-risk years (count)</i>		
		<u>All-cause</u>	<u>Homicide+Suicide</u>	<u>Homicide</u>
13	2096.0	0.48 (1)	0.00 (0)	0.00 (0)
14	2066.3	1.94 (4)	1.45 (3)	0.97 (2)
15	2011.4	0.50 (1)	0.50 (1)	0.50 (1)
16	1918.8	1.04 (2)	1.04 (2)	1.04 (2)
17	1816.8	2.75 (5)	1.65 (3)	1.65 (3)
18	1674.4	7.17 (12)	5.37 (9)	4.18 (7)
19	1525.0	1.97 (3)	1.97 (3)	1.97 (3)
20	1355.8	5.90 (8)	5.16 (7)	3.69 (5)
21	1192.9	4.19 (5)	3.35 (4)	3.35 (4)
22	1055.7	1.89 (2)	0.00 (0)	0.00 (0)
23	939.4	1.06 (1)	1.06 (1)	1.06 (1)
24	870.9	1.15 (1)	1.15 (1)	1.15 (1)
25	786.1	1.27 (1)	1.27 (1)	0.00 (0)
26	703.0	0.00 (0)	0.00 (0)	0.00 (0)
27	595.3	0.00 (0)	0.00 (0)	0.00 (0)
28	494.3	8.09 (4)	6.07 (3)	2.02 (1)
29	401.4	4.98 (2)	0.00 (0)	0.00 (0)
<i>Total</i>	21503.3	2.42 (52)	1.77 (38)	1.40 (30)

Notes: N=2850. Sample consists of males placed before age 26 and age 13 or older at end of post-placement followup time (see text for details). At-risk years is sum of post-placement observation time over sample. Raw count of observed mortalities are presented in parentheses.

Table 2
Family and Individual Characteristics

Characteristic	<i>Percent / Mean (st.dev.)</i>
Family headed by married female	17.6 %
Family headed by married male	10.9 %
Family headed by single male	1.5 %
Age of family head	31.0 (7.4)
Family head working	24.4 %
Annual employment income if head working ^{a,c}	12487 (5008)
Total monthly income if head not working ^{b,c}	441 (154)
Family owns car	24.6 %
Number of persons in family	3.7 (1.3)
Bedrooms requested	2.7 (0.7)
Placement age of male youth	9.8 (5.9)

Notes: N=2850. Sample consists of males placed before age 26 and age 13 or older at end of post-placement followup time (see text for details).

^a Calculated over males in families with working head (N=694).

^b Calculated over males in families with non-working head (N=2156).

^c Converted to 1989 dollars using Consumer Price Index (based on intake year).

Table 3
1990 Census Tract Characteristics

Tract Characteristic	<i>Percent / Mean (st.dev.)</i>		
	Intake Address	Placement Address	Cook County
Suburban	9.3 %	57.3 %	45.5 % ^a
Percent white, non-hispanic	8.6 (19.4)	54.0 (33.4)	57.3 (36.7)
Percent adults w/ college degree	8.5 (10.2)	21.1 (15.0)	21.5 (17.9)
Percent workers white collar	39.7 (10.0)	46.4 (13.0)	47.2 (15.0)
Percent labor force employed	71.5 (16.8)	90.5 (8.5)	90.7 (8.9)
Mean family income (1989 \$1000s)	23.4 (14.7)	44.4 (27.2)	47.9 (27.4)
Percent non-elderly in poverty	46.9 (27.9)	17.4 (17.7)	14.3 (16.2)
Percent HHs on gov't assistance	38.5 (22.9)	11.7 (13.2)	10.7 (13.4)
Percent families female-headed	67.3 (21.3)	32.7 (23.7)	28.3 (21.6)
Distance from intake address (miles)	--	17.0 (12.8)	--

Notes: N=2850. Sample consists of males placed before age 26 and age 13 or older at end of post-placement followup time (see text for details). Statistics for Cook County based on entire county population.

^a Calculated as percent of Cook County residents residing in Chicago municipality.

Table 4
Association of Percent White in Placement and Origin Neighborhoods

	<i>Dependent Variable = Percent White Race (placement)</i>			
	(1)	(2)	(3)	(4)
Percent white (intake)	.13 (4.46)**	.12 (3.92)**	.15 (3.42)**	.07 (1.96)**
Head married female		5.29 (2.80)**	5.46 (2.26)**	5.77 (2.15)**
Head married male		3.46 (1.21)	4.79 (1.36)	-1.22 (-.26)
Head single male		-1.05 (-.22)	-2.90 (-.42)	1.11 (.26)
Bedrooms required		-16.39 (-2.35)**	-10.65 (-1.23)	-28.92 (-1.91)*
Bedrooms required sqrd		3.00 (2.53)**	2.30 (1.61)	4.35 (1.56)
Owns car		6.69 (3.71)**	8.66 (3.74)**	1.61 (.63)
Head works		20.91 (.68)	39.59 (1.03)	-35.11 (-.79)
Log earnings		-.96 (-.37)	-3.89 (-1.23)	5.66 (1.63)
Log income		2.57 (.77)	1.49 (.34)	2.47 (.47)
<i>Included Covariates</i>				
Age and family size	No	Yes	Yes	Yes
Placement year	Yes	Yes	Yes	Yes
<i>R-squared</i>	.239	.264	.228	.272
<i>F test (p-value)</i>	--	<.0001	<.0001	.0095
<i>Sample</i>	Full	Full	Pre-1990	Post-1990
<i>N</i>	2850	2850	2072	778

Notes: OLS regression coefficients reported. Robust t-statistics reported in parentheses corrected for clustering across multiple observations from same household. Log earnings set to zero for households with non-working head. Log income set to zero for households with working head and censored from below at \$160/month for others. Results omitted for the following covariates: indicator for censored log income; age of household head at placement (quadratic); age of male youth at placement (quadratic), family size (quadratic); and set of indicators for placement year. *F test* reports p-value for test of joint significance for covariates other than intake tract characteristics and placement year indicators.

* = p-value <.10. ** = p-value <.05

Table 5
Association of Placement and Origin Neighborhood Characteristics

	<i>Dependent Variable (Placement Tract Characteristic)</i>						
	<i>Percent w/ College Degree</i>	<i>Employment Rate</i>	<i>Percent White Collar</i>	<i>Mean Family Income</i>	<i>Poverty Rate</i>	<i>Pct HHs on Gov't Assistance</i>	<i>Pct Families Female- Headed</i>
<u>Panel A: Full Sample (N=2850)</u>							
Corresponding Intake Tract Characteristic	.12 (2.87)**	.02 (1.97)**	.03 (.94)	.02 (.33)	.05 (3.10)**	.04 (3.32)**	.09 (4.06)**
<i>R-squared</i>	.146	.243	.109	.142	.267	.254	.259
<u>Panel B: Pre-1990 Placements (N=2072)</u>							
Corresponding Intake Tract Characteristic	.11 (2.02)**	.03 (1.93)*	-.03 (-.70)	.02 (.23)	.06 (2.98)**	.06 (3.49)**	.13 (4.08)**
<i>R-squared</i>	.172	.215	.124	.146	.222	.217	.217
<u>Panel C: Post-1990 Placements (N=778)</u>							
Corresponding Intake Tract Characteristic	.14 (2.71)**	.01 (.37)	.18 (3.59)**	.01 (.23)	.01 (.79)	-.00 (-.14)	.01 (.46)
<i>R-squared</i>	.095	.251	.121	.144	.276	.255	.216

Notes: Panels A, B, and C report OLS results comparable of columns 2, 3 and 4 (respectively) in the first row of Table 4, with the placement and corresponding intake tract characteristic varying in each column (instead of being percent white race as in Table 4). See Table 4 Notes for details. T-statistics reported in parentheses. * = p-value <.10. ** = p-value <.05

Table 6
Effect of Placement Tract Characteristics on Post-Placement Mortality Rates
Percent with College Degree

	All-Cause Mortality				Suicide+Homicide		Homicide Only		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pct w/ college degree	.72 (-1.74)*	.69 (-1.89)*	.67 (-1.97)**	.65 (-2.03)**	.23 (-2.79)**	.69 (-1.52)	.26 (-2.00)**	.59 (-1.74)*	.24 (-1.46)
Yrs since placement				1.00 (-.07)	.89 (-1.47)		.91 (-.95)		.97 (-.29)
Interaction					1.12 (2.33)**		1.11 (1.62)		1.10 (1.01)
<i>Included Covariates</i>									
Family chars	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intake tract chars	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar year	No	No	No	Yes	Yes	No	Yes	No	Yes
<i>Annualized Rate</i>	.00244	.00244	.00244	.00244	.00244	.00177	.00177	.00140	.00140

Notes: N=2850. Post-placement mortality rates estimated over ages 13-30 under Cox Proportional Hazard specification. Baseline non-parametric hazard defined by age. See text for additional description of empirical model. Z-statistics reported in parentheses. *Family covariates* include controls for sex and marital status of head (indicators), age of head (quadratic), bedrooms requested (quadratic), family size (quadratic), car ownership (indicator), head working (indicator), log employment income (if head working), and log total income (if head non-working). *Intake tract covariates* include (quadratic) controls for percent non-white, percent with less than college degree, percent workers in white collar jobs, employment rate, mean family income, non-elderly poverty rate, percent households receiving public assistance, and percent households headed by a female, and an indicator for suburban intake address. Time-varying covariates (calendar year indicators, years since placement, interaction term) updated at start of each calendar year.

*p-value<.10; **p-value<.05.

Table 7
Effect of Placement Tract Characteristics on Post-Placement All-Cause Mortality Rates
Other Characteristics

	<i>Percent White Race</i>	<i>Employment Rate</i>	<i>Percent White Collar</i>	<i>Mean Family Income</i>	<i>Poverty Rate</i>	<i>Pct HHs on Gov't Assist.</i>	<i>Pct Families Fem-Headed</i>	<i>Distance Moved</i>
<u>Panel A: Constant Effect Models</u>								
Placement tract char	.84 (-1.07)	.81 (-1.68)*	.73 (-1.78)*	.74 (-1.30)	.83 (-1.54)	.82 (-1.54)	.87 (-1.16)	.99 (-.05)
<u>Panel B: Time-Dependent Effect Models</u>								
Placement tract char	.57 (-1.46)	.66 (-1.37)	.32 (-3.01)**	.30 (-1.95)*	.67 (-1.37)	.55 (-1.91)*	.80 (-.73)	.77 (-.73)
Interaction	1.04 (1.03)	1.02 (.65)	1.10 (2.49)**	1.10 (1.61)	1.02 (.70)	1.04 (1.26)	1.01 (.20)	1.03 (.75)

Notes: N=2850. Panels A and B report Cox Proportional Hazard estimates comparable to columns 3 and 5 (respectively) in Table 6. See Table 6 Notes for details.

*p-value<.10; **p-value<.05.

**Appendix Table A1
Placement Tract Characteristic Correlations**

	Percent White Race	Percent w/ College Degree	Percent White Collar	Employment Rate	Mean Family Income	100 - Poverty Rate	100 - Percent on Govt Asst.
Percent with College Degree	.54						
Percent White Collar	.52	.86					
Employment Rate	.85	.59	.41				
Mean Family Income	.58	.71	.62	.55			
100 - Poverty Rate	.86	.49	.36	.88	.54		
100 - Percent HHs on Govt Assistance	.86	.53	.35	.91	.53	.95	
100 - Percent families Female-Headed	.89	.46	.24	.85	.53	.89	.89

Notes: N=2850. All correlations are significant with p-values < .0001.