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NEIGHBORHOOD EFFECTS ON SUBJECTIVE WELL-BEING: EVIDENCE FROM A RANDOMIZED EXPERIMENT

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ABSTRACT

This study estimates the effects of randomized variation in neighborhood conditions on the subjective well-being (SWB) of low-income families using data from a large social experiment called Moving to Opportunity (MTO). Previous studies have not identified the causal influences of poor neighborhood environments on family behavior and well-being, which has raised questions about the value of policy efforts to reduce poverty concentrations of low-income families in poor neighborhoods. Using data collected 10-15 years after randomization, we find that MTO moves from high- to lower-poverty neighborhoods increase self-reported SWB by an amount equal in size to gap in SWB between blacks and whites, or between families with annual incomes that differ by as much as $45,000. Such moves also improve mental health. Evidence suggests that MTO's impacts on SWB is driven more by improved neighborhood safety than by improvements in housing quality or declines in neighborhood racial or economic segregation.

NEIGHBORHOOD EFFECTS ON SUBJECTIVE WELL-BEING: EVIDENCE FROM A RANDOMIZED EXPERIMENT

In 1662 John Graunt observed that people living with London's "Smoaks, Stinks and close Air" suffered worse health and higher mortality than people living with "Country Air" outside the city (as quoted in Macintyre and Ellaway, 2003, p. 20). Although many studies since then have supported the idea that living in an economically segregated or socially distressed neighborhood harms the life chances of poor families, recent studies employing stronger research designs to isolate the causal effects of neighborhood conditions yield more mixed results (Jencks and Mayer, 1990, Solon, Page, and Duncan, 2000, Kawachi and Berkman, 2003, Sampson, Morenoff and Gannon-Rowley, 2003, Oreopoulos, 2003, DeLuca et al., 2010, Burdick-Will et al., 2011). As Yale law professor Robert Ellickson argues (2009, p. 439), "Recently published studies have begun to destabilize the former consensus that a poor adult or child is significantly disadvantaged by residing among other poor people," and concludes that "the case for dismantling an entire poor neighborhood … is hardly so plain."

Disagreement about the potential for public policy to improve the well-being of poor families by changing neighborhood environments stems in part from disagreement about what constitutes well-being (Di Tella and MacCulloch, 2006, Olsen 2003). Are families better off if a new neighborhood offers more employment opportunities but at a cost of much longer commutes on public transportation, or more safety but with more expensive housing? While the goal of U.S. housing policy as articulated in the Housing Act of 1949 is to promote "the general welfare and security of the Nation," no previous research of which we are aware has examined the association between neighborhood environments and measures of the general welfare or overall well-being of low-income families.

This study uses randomized variation in neighborhood conditions to estimate effects on the subjective well-being (SWB) of low-income families. We draw on data from the 10-15 year follow-up survey of adult participants in a large social experiment called Moving to Opportunity (MTO). Since 1994 MTO has enrolled 4,604 low-income public housing families who were living in high-poverty urban neighborhoods at baseline, and then randomized them into one of three groups: i) the *Low-Poverty Voucher (LPV) group*, which received housing vouchers that subsidize private-market rents, but could only be used in census tracts with 1990 poverty rates below 10 percent; ii) the *Traditional Voucher (TRV) group***,** which received regular Section 8 vouchers without a relocation constraint; and iii) a *control group*, which received no assistance through MTO. MTO random assignment generates large, persistent differences in neighborhood and housing conditions across otherwise comparable groups of families (Kling, Liebman and Katz, 2007, Ludwig et al., 2008), and enables us to attribute differences in post-baseline outcomes across groups to the MTO mobility intervention itself.

A previous follow-up of participants in these three groups measured outcomes 4-7 years after the point of randomization. It found that MTO moves had significant beneficial impacts on some adult mental and physical health measures, but not on employment, family income and other economic outcomes (Kling, Liebman and Katz, 2007). This mixed pattern of impacts on different outcome domains is consistent with much of the rest of the neighborhood literature (see also Kling, Ludwig and Katz, 2005, Sanbonmatsu et al., 2006, Fortson and Sanbonmatsu, 2011), and

motivated the inclusion of a global assessment of well-being on the long-term 10-15 year follow-up survey. We focus in this paper on self-reports of SWB by MTO adult respondents to the long-term survey. Most are head of household and so presumably determine household mobility patterns during the study, and also incorporate well-being of the entire family unit in their SWB responses.

Results

Characteristics of the study sample. As might be expected from their residence in public housing in high-poverty neighborhoods, MTO families had multiple disadvantages at baseline (*SI Appendix,* Table S1). Almost all were female-headed and either African-American or Hispanic. Three-quarters of families received welfare at baseline, and fewer than 40% had completed high school. Perhaps the most striking finding from the baseline MTO survey is that more than 40% of program applicants reported that a household member had been victimized by a crime during the previous six months. Fully three-quarters of the heads of MTO families reported that getting away from gangs and drugs—that is, crime—was the first or second most important reason for enrolling in the program. As one would expect from properly-conducted random assignment, statistical tests confirm that the distribution of baseline characteristics is similar across randomized MTO groups.

Our primary measure of SWB is based on responses to the question: "Taken all together, how would you say things are these days – would you say that you are very happy, pretty happy, or not too happy?" We assume responses to this question can be represented on a linear scale, although show in the *SI Appendix* that our results are robust to various assumptions about the nature of the SWB scale. For ease of interpretation we present results that have been normalized into Z-scores using the control group's distribution of responses. To corroborate our SWB findings, we also examined MTO impacts on several measures of mental health.

MTO control group adults were much less likely than the average American adult to report high levels of happiness (*SI Appendix,* Table S2). However the average happiness level of MTO control group adults is generally comparable to that of other American adults with similar socio-demographic attributes. Whether the MTO offer to facilitate mobility to better housing and neighborhood conditions improved these low levels of SWB is the central question of this article.

Impacts on subjective well-being. The left-hand panel of Figure 1 shows the estimated effects of moving with a MTO voucher on SWB (see also *SI Appendix,* Tables S3 and S4). Because not all families assigned to a treatment group moved with a MTO voucher, there are two ways of expressing program impacts – for everyone *offered* the voucher or only for those families that moved in conjunction with the rules of their treatment group. Figure 1 show impacts for the movers; complete results are shown in the *SI Appendix*. LPV group adults who move with a MTO voucher experience an increase in our SWB measure of 0.17 standard deviations ($p<.05$). On a three-point SWB scale this is equal to a change of around 0.12 units. TRV group adults who move with a MTO voucher experience a gain in happiness of 0.21 standard deviations ($p<.05$), or about 0.15 units on a three-point scale. We cannot statistically reject the null hypothesis that these two treatment effects are the same.

[Figure 1 – Show TOT point estimate and 95% confidence interval for GSS happiness variable in Z-score form on left-hand side; show mental health index from KKL 2007 right hand panel].

Because "happiness" has no natural metric, one way to interpret the size of these impacts is to note that they are about the same as the gap in SWB between blacks and whites in the U.S., or about 40-50 percent of the gap in SWB between single and married people. The gap is also about as large as the difference in SWB between people living in families with annual incomes that differ by about $35,000 (for the Low-Poverty Voucher effect) or $45,000 (for the Traditional Voucher effect), even after statistically controlling for other factors that differ between higher- and lower-income people and contribute to self-reported happiness (*see SI Appendix for details*).

The right-hand panel of Figure 1 shows that our findings for MTO's impacts on SWB are corroborated by findings for an index of mental health measures, each of which has been scaled so that higher values represent better mental health and converted to Z-scores (Kling, Liebman and Katz, 2007). Moves with a LPV voucher improve mental health on this index by .15 standard deviations, while moves with a TRV voucher improve mental health by .11 standard deviations; for additional results see *SI Appendix,* Table S5).

The role of improved housing and neighborhood conditions. Policy makers hoped that MTO-related moves would improve a number of different features of families' housing and neighborhood environments. In an effort to identify which one mattered the most for improving SWB, we selected measures of housing problems, neighborhood economic and ethnic segregation and neighborhood crime. (Details are provided in the *SI appendix*).

[Figure 2 – show TOT point estimate and 95% confidence interval in z-score form for housing / neighborhood measures described above]

Figure 3 shows the dose-response relationship between each of these candidate mediators and SWB, by relating the pattern of MTO impacts across the five MTO demonstration sites on the mediator (shown on the x-axis as a Z-score) to the pattern for SWB. The dose-response relationship appears stronger (as revealed by a steeper regression line) for neighborhood safety than, for example, neighborhood poverty. This suggests that MTO's effects on SWB were driven more by MTO-induced changes in neighborhood safety than in housing quality or neighborhood income or racial integration. These results should be qualified by the observation that the quasi-experimental analysis in Figure 3 relies on additional assumptions beyond those required for our main findings above, and is somewhat sensitive to the choice of model specification. (See SI Appendix for details).

[Figure 3 – IV graph of neighborhood unsafe and SWB in left hand panel, and tract poverty w/ SWB in right hand panel]

Discussion

The question of whether neighborhood disadvantage affects the well-being of poor families has been a long-standing concern for social science, and is also important for public policy. While residential segregation by race has declined since 1970, segregation by income has been

increasing (Glaeser and Vigdor, 2003, Watson, 2009). The U.S. spends around $40 billion per year on means-tested housing programs that help shape the housing and neighborhood conditions that poor families experience (Ben-Shalom, Moffitt and Scholz, 2011). A growing body of research showing mixed impacts on different outcome domains has led to questions about the value of policies designed to reduce concentrated neighborhood disadvantage in the U.S.

Using new data from the Moving to Opportunity social experiment , we find that moving from a high-poverty to a lower-poverty neighborhood improves subjective well-being for low-income families. The fact that MTO-assisted moves improve self-reported SWB is perhaps not surprising in retrospect, given that MTO moves helped families move into safer neighborhoods. Three-quarters of all of the adults who volunteered for MTO reported that concerns about crime and drugs – that is, safety – were among the first or second most important reason for signing up for MTO, far more than any of the other reason.

The results presented here show that with respect to what MTO families were most concerned about, the program succeeded. MTO-induced moves lead families to live in neighborhoods that are safer and less economically disadvantaged, measured through 10-15 years after the time of random assignment using both self-reports from MTO adults and objective data sources.

The changes in SWB that result from MTO-induced neighborhood changes are large in magnitude, equal to about the size of the black-white gap in SWB in the U.S., or 40-50 percent of the gap in SWB between married and single people, or the gap in SWB between people whose family incomes differ by as much as $35,000 to $45,000 per year. The proper interpretation of self-reports about SWB remains the topic of some debate among social scientists. Previous studies show that different measures of self-reported SWB are correlated in expected ways with objective indicators of well-being such as life events, biological indicators such as smiling frequency or brain activity, and reports about the person's happiness from significant others (Kahneman and Krueger, 2006). We also corroborate our findings for SWB by examining the effects of MTO moves on several mental health measures.

Bearing in mind that the task of disentangling the specific mechanisms through which MTO improves SWB is challenging, our evidence provides tentative indications that MTO's effects on SWB may be driven more by neighborhood safety than by the other common targets of social policy, including housing conditions or affordability, or neighborhood economic or racial segregation. Our results are consistent with other findings that exposure to local violence has impacts on stress, physical and mental health, children's test scores and other outcomes (Buka, Stichick, Birdthistle and Earls, 2001, Eistenman et al., 2003, Sharkey, 2010). Understanding more about the role of safety as a pathway through which neighborhood environment influences the well-being of poor families should be a priority for future research.

Our findings are also relevant to ongoing debates about the proper objectives for public policy. For example, one recent review of American anti-poverty programs notes that their effectiveness depends "at least in part, on whether the programs do, in fact, reduce poverty" (Ben-Shalom et al., 2011, p. 12). By that standard, MTO-type policy efforts to improve the neighborhood conditions of poor families would not be part of an effective anti-policy strategy, since the program failed to produce detectable impacts on family income (Kling, Liebman and Katz,

2007). But if the goal instead is to improve the well-being of poor families, then policies that attempt to reduce the exposure of poor families to dangerous, distressed neighborhoods are worth further consideration.

Materials and Methods

The *SI Appendix* provides a more complete description of the data and analysis.

The Moving to Opportunity (MTO) baseline sample consisted of 4,604 adults who lived with at least one child under age 18 and living in public housing developments or project-based assisted housing in high-poverty areas in Baltimore, Boston, Chicago, Los Angeles, and New York. Study recruitment took place between 1994 and 1998. All participants expressed interest in moving in conjunction with the MTO housing voucher program and agreed to the random assignment.

The present paper reports on follow-up surveys carried out during 2008-10, or 10-15 years after the time of random assignment. The response rate for our surveys was equal to 90 percent and was very similar across randomly-assigned MTO groups.

Our measures of SWB, mental health, housing conditions and neighborhood safety are self-reported by adults. Measures of neighborhood economic and racial segregation come from Census Bureau data at the census tract level. Our main estimates for the effects of MTO moves on SWB do not rely on the assumption that census tracts are the relevant definition of "neighborhood" for influencing well-being, since MTO random assignment changes neighborhood conditions for families under almost every commonly-used definition of neighborhood (tract, ZIP code, etc.) (Ludwig et al., 2008).

The figures in the paper present the estimated effect of treatment on the treated (TOT), or the effects of making an MTO move for those who actually move with a MTO voucher. Our TOT estimates come from applying two-stage least squares to equations (1)-(3):

(1) $LPV\_Move_i = \alpha_{10} + \alpha_{11} LPV_i + \alpha_{12} TRV_i + \alpha_{13} X_i + \varepsilon_{1i}$
(2) $TRV\_Move_i = \alpha_{20} + \alpha_{21} LPV_i + \alpha_{22} TRV_i + \alpha_{23} X_i + \varepsilon_{2i}$
(3) $Y_i = \alpha_{30} + \alpha_{31} LPV\_Move_i + \alpha_{32} TRV\_Move_i + \alpha_{32} X_i + \varepsilon_{3i}$

Y_i is some outcome for MTO participant (i). LPV_i and TRV_i are indicators for random assignment to the LPV or TRV groups in MTO, LPV_Move_i and TRV_Move_i are indicators for having moved with a MTO voucher as part of either of those treatments, and X_i is a set of baseline characteristics of participant (i) included to improve statistical precision. Predicted values for LPV_Move and TRV_Move are calculated in the first-stage equations (1) and (2) and then substituted for the actual values in the second-stage equation (3). This TOT calculation assumes that treatment-group assignment has no effect on those adults who do not move through MTO. Our TOT estimates are essentially equivalent to dividing the intention-to-treat effect (the difference in average outcomes between all adults assigned to a treatment group vs. control group) by the share of the treatment group that moves through MTO. The *SI Appendix* shows that our results for TOT effects on SWB are qualitatively similar when we relax the functional

form assumption that responses to the standard GSS SWB question can be represented on a linear scale, consistent with what previous studies have found (Ferrer-i-Carbonell and Frijters, 2004).

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Supporting Information

Neighborhood effects on subjective well-being: Evidence from a randomized experiment

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Contents

I. Moving to Opportunity (MTO) demonstration design and study sample

The U.S. Department of Housing and Urban Development's (HUD) Moving to Opportunity (MTO) demonstration was authorized by the U.S. Congress in the Housing and Community Development Act of 1992 (for more background on MTO, see Goering et al., 1999, 2003). MTO enrolled families between 1994 and 1998 in five cities: Baltimore, Boston, Chicago, Los Angeles, and New York. To be eligible, families had to have at least one child under age 18 and live in public housing developments or project-based assisted housing in high-poverty areas (census tracts in which more than 40 percent of the population was living in poverty in 1990). The Public Housing Authorities in each city conducted outreach to all eligible households through fliers, tenant associations, and other means, and all those interested received the opportunity to apply for this special program. At orientation meetings families were told they would be randomly assigned to one of three groups if they applied. Those heads of households who remained interested after the briefing were screened for Section 8 housing voucher eligibility, completed the MTO baseline survey, signed an enrollment agreement and then were randomly assigned to one of the three MTO program groups.

A total of 4,604 eligible households enrolled in MTO, representing around one-quarter of the population of MTO-eligible families (Goering, Feins and Richardson, 2003; Goering et al., 1999). Eligible applicants were randomly assigned to one of three groups:

1. The *MTO Low-Poverty Voucher (LPV) group* received Section 8 rental assistance certificates or vouchers that they could use only in census tracts with 1990 poverty rates below 10 percent. In each city, a nonprofit organization under contract to the PHA provided mobility counseling to help experimental group families locate and lease suitable housing in a low-poverty area. Families who stayed in their new neighborhoods less than a year did not receive a new voucher. After one year, families were able to use their voucher to relocate without any special MTO-imposed constraints on their moves. Aside from this requirement, experimental group families were required to abide by all of the regular rules and requirements of the Section 8 certificate and voucher programs, including having a limited amount of time to search for housing and lease-up

before they lost the rights to their subsidy, being required to contribute 30 percent of their adjusted income toward rent (the same rent requirement as in public housing), and prohibitions on rental assistance to households that engage in certain types of criminal activity.

2. The *MTO Traditional Voucher (TRV) group* received regular Section 8 certificates or vouchers that they could use anywhere; these families received no mobility counseling.

3. The *MTO control group* received no certificates or vouchers, but continued to be eligible for project-based assistance and whatever other social programs and services to which families would otherwise be entitled.

Assignment rates within sites were adjusted during implementation of MTO to compensate for the fact that the lease-up rate for the MTO voucher groups turned out to be higher than had been anticipated. The sample weights used in the quantitative analyses presented in the text and below adjust for differences among sites and over time in the random assignment ratio (see below and Orr et al., 2003 for additional details).

II. Data sources

The HUD-sponsored evaluation included a baseline survey conducted just prior to randomization and an "interim MTO study," which gathered uniform data across all five sites and examined outcomes for MTO adults and youth at 4-7 years after random assignment (Fortson and Sanbonmatsu, 2009; Kling, Ludwig, and Katz, 2005; Kling, Liebman, and Katz, 2007; Orr et al., 2003; Sanbonmatsu et al., 2006).

More than a decade after randomization and the baseline survey, our research team was engaged by HUD to follow MTO families to assess a variety of outcomes, including subjective well-being and related measures such as mental health. These data were collected for our research team by the University of Michigan's Survey Research Center (SRC) from June 2008 to April 2010, on average 12.6 years after randomization (range 10.0 to 15.4). The sample frame included one woman from each family in the LPV and control groups. For budgetary reasons, we randomly sampled two-thirds of adults in the TRV group, who were also interviewed a few months later , on average, than the other groups.

Target respondents were traced and, when contacted, offered $50 to complete a survey about health, economic conditions, residential history, and other outcomes, drawing mostly on questions from existing national studies. (The full set of survey instruments are available at: www.mtoresearch.org). They were offered an additional $25 to provide physical and biological measures at the end of the survey. Written informed consent was obtained before beginning interviews. Trained interviewers using Computer-Assisted Personal Interviewing on laptop computers administered the two surveys primarily in the respondent's homes, with the session scheduled at the respondent's convenience. Interviewers were blinded to MTO group assignments. After 75-80% of the sample was interviewed in the initial phase of fieldwork, a probability subsample of 35% of remaining hard-to-reach cases were selected for further recruitment efforts (Groves, 2004). The latter interviews were up-weighted to adjust for the sub-sampling of hard-to-reach cases. A total of 4,142 adults were successfully interviewed.

To account for two-phase sampling, we calculated effective response rates.[22] Phase 1 and 2 response rates (R1 and R2) were calculated as the number of participants with data from each phase, divided by the sum from that phase of the numbers with data and with missing data (declines, incapacitated, deceased, or not contacted). Response rates were calculated using American Association of Public Opinion Research definition RR1w (AAPOR, 2011). If P1 and P2 equal the share of the total sample from phase 1 and 2, our response rate is equivalent to P1×R1 + P2×R2.

The "effective response rate" (ERR) for our long-term survey of MTO adults overall was 89.6 percent. The ERR equaled 90.8 percent for the LPV group, 86.6 percent for the TRV group, and 90.0 percent for the control group. We cannot reject the null hypothesis that the ERR for the LPV and control groups are the same, but the TRV group's ERR statistically differs from that of the control group's.

III. Baseline characteristics of the MTO sample

Table S1 displays descriptive characteristics by treatment group for our MTO study sample. Almost all of the households that signed up for MTO were female-headed, nearly two-thirds were African-American, and most of the rest were Hispanic. Three-quarters of household heads were on welfare at baseline, and less than 40% had completed high school.

[Table S1: Baseline characteristics by randomly assigned group.]

More than 40 percent of households that applied had a household member victimized by a crime during the previous six months. Three-quarters of MTO families report that getting away from gangs and drugs—that is, crime—was the first or second most important reason for enrolling in the program. More than half of the households said the first or second most important reason for signing up for MTO was so that that their children could attend a better school and about 45% indicated that getting a bigger or better apartment was their first or second reason. Only a small fraction of families (6%) indicated getting a job was one of their top reasons for signing up for MTO.

Table S1 also confirms that random assignment appears to have been correctly carried out in MTO, given the balance across randomized MTO groups in the distributions of the observed baseline characteristics. An omnibus F-test fails to reject the null hypothesis that the set of baseline characteristics shown in the table are similar for the LPV versus control group or TRV group versus controls.[1]

Some 48 percent of the adults assigned to the MTO LPV group and 63 percent of those assigned to the TRV group were able to lease-up and relocate using an MTO voucher (the MTO "compliance rate"). Families were given only a limited amount of time to search for a new unit, many housing units were not affordable under voucher program rules, and some landlords may discriminate against voucher holders. The voucher use rate in MTO is in line with what other studies have found -- equal to 65 percent in the Experimental Housing Allowance Program (Leger and Kennedy, 1990), and around 20 percent in the Gautreaux mobility program in

Chicago (Rubinowitz and Rosenbaum, 2000, p. 67). The compliance rate is higher for the TRV group presumably in part because their vouchers had no geographic restriction, unlike the vouchers that were offered to adults in the LPV group. The compliers within the MTO treatment groups are younger, more dissatisfied with their original neighborhoods, and have fewer children than the noncompliers (for details see Feins and Shroder, 2005; Shroder, 2002).

IV. Measures

Self-reported subjective well-being (SWB)

Our primary measure of subjective well-being (SWB) is based on responses to the question: "*Taken all together, how would you say things are these days – would you say that you are very happy, pretty happy, or not too happy*?" This question has a long history in the social sciences, having been included, for example, in the General Social Survey (GSS) since the 1970s.

Previous research shows that the responses to this or similar SWB questions has been found to be correlated in expected ways with self-reported positive and negative life events, including unemployment and income, physical and mental health outcomes, duration of genuine (or "Duchenne") smiles, blood pressure, and brain functioning (Blanchflower and Oswald, 2004, Urry, 2004, Di Tella and MacCulloch, 2006, Kahneman and Krueger, 2006, Stevenson and Wolfers, 2008). Some evidence that people have a common understanding of what "happiness" is comes from the fact that people are able to predict satisfaction levels of others (see Sandvik et al., 1993 and Diener and Lucas, 1999). Previous research also suggests that people seem to translate numerical happiness scales into similar verbal labels (see Van Praag 1991).[2]

Table S2 presents descriptive statistics on the distribution of happiness reports by our MTO control group compared to adults interviewed in the 2000-2006 waves of the GSS.[3] MTO control group adults are less likely than the average American adult to be very happy (22 versus 31 percent) and are more than twice likely to say they are not too happy (28 versus 12 percent). On the other hand, MTO control group adults are on average about as happy as other American adults with similar socio-demographic characteristics.[4]

[Table S2:]

Housing unit quality and affordability

The long-term MTO survey instrument replicated a number of questions about the respondent's current housing unit that were originally included on the MTO baseline survey, including a self-reported assessment of overall satisfaction with the unit: "Overall, how would you describe the condition of your current house or apartment? Would you say it was in excellent, good, fair, or poor condition?" We create an indicator variable for whether respondents report their housing units are in excellent or good condition.

Respondents were also asked to report about specific types of structural problems that might affect the unit, related to plumbing, heating, vermin, or broken locks or windows. We follow the

approach taken in the interim MTO study and aggregate responses to this last series of questions into a summary measure for the number of these problems the respondent reports afflicting their current unit. While ours is a standard check-list of housing problems, as Newman (2008) notes, little is currently known about the reliability or validity of these measures.

The long-term surveys also asked about families' out-of-pocket housing costs. To measure housing affordability, we compare households' monthly housing costs (current rent or mortgage plus gas and electricity utilities) with monthly income (primarily based on reports of last year's income). We define households as "cost-burdened" if they devote more than 30 percent of their income to housing costs and "severely cost-burdened" if the ratio exceeds 50 percent. We also examine whether the household is receiving any federal housing assistance.

One potential concern with relying on self-reports of housing conditions or affordability is reverse causation – perhaps happier people are just more inclined to say positive things about where they live. To address this concern, we also make use of information that was reported by the SRC interviewers about their assessment of the condition of the housing units and buildings within a half a block of the respondent's residence as: well kept, good repair, fair condition, poor condition, or badly deteriorated. These interviewer reports are based on questions developed for the Project on Human Development in Chicago Neighborhoods (Sampson, 2011).

Neighborhood socio-demographic composition

To measure neighborhood socio-demographic composition, HUD has tracked MTO respondents from baseline through the time of our long-term survey. Our long-term survey instrument itself also included a series of questions that reported back to respondents the data HUD collected about their residential histories and asked them to make any additions, deletions or corrections that might be necessary. We geo-coded the address histories of MTO program participants over the 10-15 year study period, linked them to tract-level data from the 1990 and 2000 decennial censuses and the 2005-9 American Community Survey, interpolated tract attributes for the years that fall between these Census Bureau data collections, and then calculated duration-weighted average tract characteristics for each participant's post-baseline address history. Tracts typically contain between 5,000 and 8,000 residents and were originally designed to capture relatively homogenous communities.

We measured tract characteristics at the time each family was living at the given address, linearly interpolating tract characteristics between the 1990 and 2000 census and the 2005-9 American Community Survey (ACS). We examine census tract poverty rates, the neighborhood measure that MTO was explicitly designed to change for program participants, as well as the share of tract residents who are members of racial or ethnic minority groups. We focus primarily on duration-weighted average tract characteristics, but also present sensitivity analyses that use information on the characteristics of the census tracts in which families reside at the time of the long-term surveys. Our sensitivity analyses examine other census tract socio-demographic characteristics.[5]

Neighborhood safety and disorder

The long-term MTO surveys asked respondents to self-report on their neighborhood environments, replicating questions that had been included on the baseline and interim MTO surveys. We focus on safety, the neighborhood attribute that the baseline data suggest is of greatest concern to families. Respondents were asked: "Now I would like to get a sense of how safe you think your neighborhood is. How safe do you feel on the streets near your home during the day?," with another question asking about safety at night, and response options being very safe, safe, unsafe or very unsafe. And: "In your neighborhood, how big of a problem is – police not coming when called?" As well as: "Have you seen people using or selling illegal drugs in your neighborhood during the past 30 days? How often have you seen this in the past 30 days?"

Perceptions of safety are potentially what matters the most in affecting a family's sense of well being, and are presumably based on some combination of respondent assessments of the nature of neighborhood life, as well as their own experiences with crime victimization. To measure neighborhood disorder, respondents were asked about problems in the neighborhood with litter, trash, graffiti, public drinking, abandoned buildings, loitering, and police not coming when called. The long-term MTO surveys also ask about neighborhood cohesion and capacity for informal social control, using questions related to "collective efficacy" from Sampson, Raudenbush and Earls (1997): "If a group of neighborhood children were skipping school and hanging out on a street corner, how likely is it that your neighbors would do something about it? Very likely, likely, unsure, unlikely, or very unlikely. If some children were spray-painting graffiti on a local building, how likely is it that your neighbors would do something about it?"

Other questions asked about actual experiences with crime victimization: "Please tell me if any of the following things has happened to you or anyone who (lives/ lived) with you in the past 6 months. Was anyone's purse, wallet or jewelry snatched from them? Was anyone threatened with a knife or gun? Was anyone beaten or assaulted? Did anyone try to break into your home? Was anyone stabbed or shot?" We note that respondents are not asked about where these offenses occur, so we cannot be sure whether they occur in the neighborhood in which the respondent is currently living, or someplace else.

To address potential concerns about reverse-causality with self-reports about neighborhood safety, we also collected administrative data on "local-area" crime rates. For MTO families living in any of the five original MTO demonstration cities, we use the lowest level of geographic aggregation the relevant city police departments would share with us. These areas vary in size across cities; for example, the Chicago Police Department provides crime data for each of the city's 279 police beats, while in Baltimore we can obtain data only at the level of the city's five police districts (see Ludwig and Kling, 2007). For MTO families living outside the five original demonstration cities, we obtain crime data at the municipality level. All of these crime data are subject to the well-known problem that many crimes never get reported to the police, and the willingness to report to the police could be affected by neighborhood conditions.

V. Analytic strategy

Estimating MTO's effects on SWB

We begin with simple comparisons of the average happiness of adults assigned to different MTO groups, known as the intent-to-treat (ITT) effect, which identifies the causal effect of offering families the services made available through the LPV or TRV treatments. Let Y_i represent responses to the happiness questions. In the text we assume that responses can be represented on a linear scale. In this appendix, we also estimate a series of ordinal representations of the responses using ordered probit or logit maximum likelihood models.

We estimate a model using pooled data from all three MTO groups with Z consisting of two separate indicators for assignment to the LPV and TRV groups. We calculate the ITT effects as the two elements of π_{31} in equation (S1) using ordinary least squares, conditioning on a set of (pre-random assignment) baseline characteristics (X), including site indicators (fixed effects).[6] All estimates in this paper are computed using the sample weights described above.

$$(S1) \quad Y_i = Z_i\pi_{31} + X_i\pi_{32} + e_{3i}$$

In practice the coefficients from applying ordinary least squares to dichotomous dependent variables are quite similar to the average marginal effects that come from probit or logit models (Angrist, 2001). Below we confirm that is true with our MTO data as well. In our application least squares regression has the advantage of facilitating calculation of the effects of treatment on the treated (TOT), or the effects of MTO moves on those who actually move through MTO. In our application, the "treatment" is defined as relocation through the MTO program. We use two-stage least squares with treatment group assignment as the instrumental variable for treatment take-up, as described by the methods section of our paper text. The TOT impact can be calculated as the ITT effect divided by the treatment take-up rate (Bloom 1984, Angrist, Imbens and Rubin, 1996). The standard error for the TOT effect is calculated the same way, by dividing the ITT standard error by the treatment take-up rate, so that the p-value for the ITT and TOT estimates will be the same under this method.

Estimating the mechanisms behind MTO's impacts on happiness

An understanding of the mechanisms through which MTO moves increase happiness is also of interest. Let M represent one or more measures of candidate mediating mechanisms through which MTO might influence happiness, such as the poverty rate for the census tracts in which MTO families are residing, while X represents the baseline control variables. The relationship between the candidate mediator(s) and happiness is summarized by the parameter(s) π_{21} in outcome equation (S2).

$$(S2) \quad Y_i = M_i\,\pi_{21} + X_i\pi_{22} + e_{2i}$$

For purposes of estimation of equation (S2) we view our measures of tract poverty rate as a summary measure of neighborhood economic disadvantage. Thus π_{21} should be viewed as the effect of moving to a neighborhood with a lower poverty rate and other aspects of neighborhood economic disadvantage that co-vary with tract poverty rates. We provide a similar interpretation with the other key mediating measures that we examine, namely the share of the census tract population that is minority, self-reports of housing quality, and measures of neighborhood safety.

Ordinary least squares estimation of (S2) may be biased by endogenous residential choices. Families that wind up living in lower-poverty tracts may be systematically different from those who live in high-poverty areas in ways that are difficult to measure in a social science dataset and directly affect happiness. We build on the approach of Kling, Liebman and Katz (2007), and use interactions between indicators for treatment group assignments (Z) and site indicators (S) as instrumental variables to isolate the experimentally-induced variation in some candidate mediating variable, M, across MTO demonstration sites and groups, as in equation (S3), where the main site effects are subsumed in X. The second-stage estimates (equation 2) thus isolate the variation in the mediating measure across the MTO sample that is due just to variation across the demonstration sites in treatment effects on the mediator.

$$(S3)\ M_i = Z_i{*}S_i\ \pi_{31} + X_i\pi_{32} + e_{3i}$$

The intuition behind this quasi-experimental instrumental variables (IV) design is to take advantage of the fact that in some sites, the MTO treatment may have generated relatively larger changes in (say) housing unit quality, while treatment assignments in other sites may have generated relatively larger changes in some measure of neighborhood environment such as the share of the census tract that is poor. The IV design asks whether the site and treatment group that experiences the relatively larger change in housing unit quality, or in tract poverty, shows the most pronounced change in happiness.

For each of our outcomes we first estimate equations (S2) and (S3) using two-stage least squares (2SLS). One limitation of 2SLS estimation is the assumption that responses to the GSS happiness question fall on a linear scale. As a sensitivity analysis we also relax this assumption and re-estimate equations (S2) and (S3) using instrumental variables ordered probit, following the control-function approach from Rivers and Vuong (1988). A different limitation with 2SLS estimating equations (S2) and (S3) is that for some of our candidate mediating measures M, the site-group instruments have relatively low explanatory power in equation (S3). This can cause the standard errors from 2SLS estimation to be too small, and hence lead to over-rejection of the null hypothesis that the mediator M has no effect on the outcome Y (see for example Murray, 2006). So we also re-estimate equations (S2) and (S3) using the limited information maximum likelihood approach from Fuller (1977).

VI. Results

MTO effects on SWB

Table S3 presents the distribution of responses by randomized MTO group on the GSS subjective well-being question, while Table S4 presents the regression-adjusted estimates for the ITT and TOT effects of MTO. About 23 percent of the control group reports being “very happy.” The ITT estimates in row (1) imply that those who are assigned to the LPV rather than control group are about 1 percentage point more likely than controls to report being “very happy” ($p>.05$). The TOT estimate for the LPV effect is about twice as large. The TRV ITT effect is about 5 percentage points while the TOT effect is nearly 9 percentage points ($p<.05$). The next row shows that the marginal effects of a probit model are very similar (the TOT results in that

case are calculated by dividing the ITT point estimate and standard error by the treatment group's MTO compliance rate).

[Table S3 – Distribution of happiness across MTO treatment groups. see appendix list of tables for more details]

[Table S4 – the ITT / TOT table that Mike made up showing the GSS happiness results in top panel, and results for different mental health measures in the subsequent rows]

The TOT estimates in the 3rd and 4th rows show that those who move through the LPV treatment are 9.5 percentage points more likely to report being either very happy or pretty happy compared to a control mean of 72.5 percent ($p<.05$). The TOT effect of the TRV treatment on "Very Happy or Pretty Happy" is equal to 6.1 percentage points and is not quite statistically significant.

Rows (5) through (8) of Table S4 shows the results of combining information about both of the happiness cut points (pretty happy versus not too happy, and very happy versus pretty happy) into a single measure, assuming cardinality using a three-point scale in row (5) and for ease of interpretation converting that same measure to a Z-score in row (6). The TOT estimates in row (6) indicate that moving through the LPV treatment increases happiness by 0.17 standard deviations ($p<.05$), and moving through the TRV treatment increases happiness by .21 standard deviations ($p<.05$). The results are qualitatively similar when we use an ordered probit or logit model as shown in rows (7) and (8).

While the GSS "happiness" question is the only measure on the MTO long-term surveys that was explicitly designed to provide a global self-assessment of subjective well-being, the remainder of Table S4 shows that our findings for SWB are corroborated by other measures that we would expect to be related to SWB. For example, LPV and TRV group movers are 19 and 13 percentage points more likely than controls to report being satisfied with their neighborhoods, compared to a control mean of around 52 percent. LPV and TRV movers are 7 or 8 percentage points less likely to meet clinical criteria for major depression, as measured by a fully structured assessment taken from the National Co-Morbidity Survey Replication designed to measure mental health disorders as defined by the Diagnostic and Statistical Manual, 4th edition (Kessler and Merikangas, 2004). These are very large changes in depression prevalence relative to the control mean of 20 percent. LPV and TRV group moves improve mental health by .15 and .11 standard deviations, as measured by an index of mental health questions that have been converted to Z-scores and scaled so that more positive values represent better mental health (the same measure analyzed in Kling, Liebman and Katz, 2007 using data from the 4-7 year MTO follow-up). LPV and TRV moves also reduce psychological distress as measured by a validated, six-question screening scale of psychological distress called the K6 (Kessler et al., 2002). Moves with a LPV voucher reduce K6 scores by 0.22 standard deviations, while moves with a TV voucher reduce K6 scores by .16 standard deviations. The only mental health measure in Table S4 not significantly impacted by MTO is an indicator for whether K6 scores are in the range indicating severe psychological distress.

Interpreting MTO's Impacts on SWB

Because subjective well-being or "happiness" has no natural metric, one way to interpret the size of MTO's impacts is to compare them in size to disparities in SWB that have been of social science or policy concern. Table S4 showed that the effects of moving with a LPV or TRV voucher on happiness measured using a three point scale, assuming cardinality, is equal to .12 and .15 units, respectively. Data from the nationally representative GSS survey for waves 2000-6 shows that the gap between blacks and whites on the same SWB scale is equal to .15. So the effect of MTO moves on SWB is about as large as the black-white gap. Another comparison is to the gap in SWB between married and single people in the GSS, which equals .32 units. So the effect of moving through MTO on SWB is equal to around 40 or 50 percent of the gap between married and single adults.

A different benchmark comes from the gradient in SWB found among people with different annual incomes. Previous research has found that the relationship between self-reported SWB and income seems to be linear in the natural log of income (for example Stevenson and Wolfers, 2008a,b). However MTO families have very low levels of annual income, on the order of $20,000 per year at the time of the long-term survey, and our inspection of the GSS data suggests that the relationship between income and SWB at these levels of income is steeper than the log-linear functional form implies. To estimate the relationship between income and SWB we use a spline functional form, controlling for other socio-demographic variables as indicated in Table S5. Our estimates from the GSS suggests that the effects of moving with a MTO voucher on SWB are of about the same magnitude as the difference in SWB between families that with annual incomes that differ by around $35,000 to $45,000. (It should be said that one of the reasons why such large changes in family income are required to increase SWB by as much as MTO moves is because the relationship between family income and happiness is surprisingly modest).

One natural question is to wonder about the degree to which these regression coefficients capture the *causal* effect of income on happiness. Pischke (2011) uses industry wage differentials as instruments for family income to try to overcome selection concerns, using the GSS as one of the datasets he examines, and concludes "IV [instrumental variables] estimates are similar to the OLS estimates suggesting that most of the association of income and well-being seems to be causal" (p. 1).[7]

MTO effects on candidate mediators: Housing and neighborhood conditions

Table S6 displays estimates of MTO effects on a wide-range of housing and neighborhood conditions. Everyone in MTO signed up for the program because they wanted to move out of their baseline public housing units. Nevertheless, the offer of a MTO housing voucher increased the total number of moves families made by 1 to 1.2 extra moves over the 10-15 year study period (the size of the TOT effects for both the LPV and TV treatments), compared to the control average of around 2.2 moves over this period.

[Table S6 could be just like our previous Table 6].

MTO moves improved the quality of housing that families experienced. For example, the LPV TOT effect on the likelihood of self-reporting that the family's housing conditions are excellent or good was about 11 percentage points, compared to a control mean of 57 percent.

Table S6 also shows that MTO moves accomplished their goal of helping families move into lower-poverty neighborhoods. One year after random assignment, the average control group family lived in a census tract that was about 50 percent poor, which is about 2.9 standard deviations above the mean in the national distribution for census tract poverty rates in the 2000 decennial census. The LPV TOT effect is equal to about 35 percentage points, enough to put LPV group movers at about the national average of the census tract poverty distribution. The TRV TOT effect on tract poverty rates measured 1 year after baseline is smaller than the LPV TOT (22 percentage points) but still sizable.

The difference across MTO groups in census tract poverty rates narrowed over time, due largely to declines over time in the tract poverty rates experienced by the control group. The control group trend is due more to control families moving into lower-poverty neighborhoods over time on their own, as opposed to control families living in neighborhoods that are gentrifying around them.[8] Ten to twelve years after baseline, the LPV TOT effect is about 10 percentage points, equal to about 0.8 standard deviations in the nationwide census tract poverty distribution in 2000. The (duration-weighted) average tract poverty rate for all addresses between random assignment and our long-term surveys was around 40 percent for the control group, with a LPV TOT effect of 18 percentage points and a TRV TOT effect of 11 points.

MTO moves also led families to live in census tracts that had slightly lower minority shares compared to controls, even if they were still mostly minority. MTO moves also helped families live in census tracts that were more affluent on other dimensions besides poverty such as share of households headed by a female, or share of adults who were college graduates.

A growing body of research suggests that more detailed measures of neighborhood social process may be better predictors of neighborhood influences on behavior than are measures of neighborhood socio-demographic composition (Sampson et al., 2002). Table S6 shows that MTO moves led families to live in neighborhoods where neighbors were more likely to intervene to prevent youth from spraying graffiti or skipping school (both measures of "collective efficacy"; see Sampson et al., 1997), increased the chances that MTO movers had at least one close friend who had a college degree.

MTO also led families to live in neighborhoods that provided more of the attribute they indicated at baseline they most wanted to improve through moving – safety. The Low-Poverty Voucher TOT effect on the chances of feeling safe in the neighborhood during the day is 7.3 percentage points, equal to 9 percent of the control mean of 80.4 percent; the LPV TOT effect on the likelihood of police not coming when called was negative 14 percentage points or 33 percent of the control mean of 42 percent; and reduced the chances of seeing drugs used or sold in the neighborhood by about 13 percentage points, equal to 42 percent of the control mean of 31 percent. The TRV group also experienced substantial improvements in self-reported safety.

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FIGURES AND TABLES

(Note: Notes come before figures. At this point it is easier to do the reverse)

Text figures

Figure 1: MTO TOT impacts on happiness in Z-score form, plus mental health index from KLK 2007

Figure 2: MTO TOT impacts on selected housing and neighborhood measures

Figure 3: IV graph of neighborhood unsafe and SWB in left hand panel, and tract poverty w/ SWB in right hand panel]

Appendix figures

None

Appendix tables

Table S1: Baseline characteristics by randomly assigned group.

Table S2: Happiness for MTO control group vs. GSS sample

Table S3: Distribution of happiness across MTO treatment groups *[three columns, one for each randomized MTO group, three rows, one for each possible response option on the GSS SWB question. presents the distribution of responses by randomized MTO group on the GSS subjective well-being question, About 23 percent of the control group reports being "very happy." The ITT estimates in row (1) imply that those who are assigned to the LPV rather than control group are about 1 percentage point more likely than controls to report being "very happy" ($p>.05$). The TOT estimate for the LPV effect is about twice as large. The TRV ITT effect is about 5 percentage points while the TOT effect is nearly 9 percentage points ($p<.05$). The next row shows that the marginal effects of a probit model are very similar (the TOT results in that case are calculated by dividing the ITT point estimate and standard error by the treatment group's MTO compliance rate).]*

Table S4: Regression models of happiness on MTO treatment group assignment (ITT, TOT)

Table S5: GSS spline regression of happiness against income and other covariates

Table S6: Regression models of potential mediators on MTO treatment group assignment (ITT, TOT)

ENDNOTES

[1] We conduct an omnibus F-test of the differences between the treatment and control group by estimating a seemingly unrelated regression where all of the characteristics listed in Table S1 are stacked as Y (outcome) variables and the only X variable is an indicator for treatment group status and a constant. This approach follows Jacob and Ludwig (forthcoming).

[2] Even if MTO respondents differ in the thresholds that they use to map experienced utility into happiness reports on the GSS question, this would not pose any problems for our analysis so long as the MTO treatment itself did not affect the happiness thresholds, because in that case the distribution of happiness thresholds would be similar across the three MTO groups by virtue of random assignment. The methodological challenge for our analysis comes from the possibility that the MTO treatment itself shifts the happiness thresholds people use for reporting, which we discuss further below.

[3] The version of the GSS data we use was downloaded from Justin Wolfers' website, used for Stevenson and Wolfers (2008b). http://bpp.wharton.upenn.edu/jwolfers/data.shtml

[4] We re-weighted the GSS sample to have similar socio-demographic characteristics to the MTO control group, specifically with respect to race / ethnicity, age, gender, marital status, family income, urban residence (versus suburban or rural residence), and educational attainment. Similarly, if use the GSS data to regress happiness against these socio-demographic characteristics, and then use the coefficients from this GSS regression to predict the happiness levels that MTO control group families should have based in their background factors, the predicted values are fairly similar to observed values.

[5] For example this includes the share of households with children in the tract that are headed by a female, share of tract adults with a high school education or college education, and share of adults who are employed in "high-status" jobs (such as professional or managerial occupations), which previous research suggests could have different types of effects from the presence or absence of disadvantaged neighbors. We also construct a concentrated disadvantage index based on Sampson, Sharkey and Raudenbush (2007), which is a weighted average of tract share on welfare, in poverty, unemployed, female-headed households, percent African-American, and percent of tract residents under 18, where the weights come from a principal component analysis.

[6] These include (besides site) survey measures of the socio-demographic characteristics of household members, and survey reports about youth experiences in school such as expulsions or enrollment in gifted and talented classes. In models where the outcome of interest comes from official arrest data, we also condition on a set of indicators for the number of pre-program arrests for violent, property, drug or other offenses. Because the distribution of pre-program characteristics should be balanced across treatment groups with random assignment, conditioning on these variables serves mainly to improve the precision of the treatment effect estimates.

[7] Pischke's IV estimates are roughly similar to our own GSS estimates. The dependent variable in Pischke's two-stage least squares (2SLS) estimation comes from transforming the categories in the GSS responses using the means implied by an ordered probit fit to the raw sample values (see Pischke, 2011, p. 10 and van Praag and Ferrer-i-Carbonell, 2008). While he fits results separately for men and women, the average coefficient for men and women together from his

Table 3 is .12 with OLS and .1765 with 2SLS. When we use our model specification with an ordered probit, the coefficient equals .XX, which fits quite comfortably alongside Pischke's estimates.

[8] We test this by reproducing the estimates shown in Table 3 measuring the share poor in each tract using just data from the 2000 decennial census, rather than interpolating each census tract's poverty rate at the time the MTO family was actually living in the tract. The estimates using 2000 tract poverty rates are fairly similar to those shown in Table 3, suggesting that most of the change in the control group's tract poverty rate over time occurs because control families are moving into lower-poverty areas, rather than because the control group is living in census tracts that are becoming less poor around them.

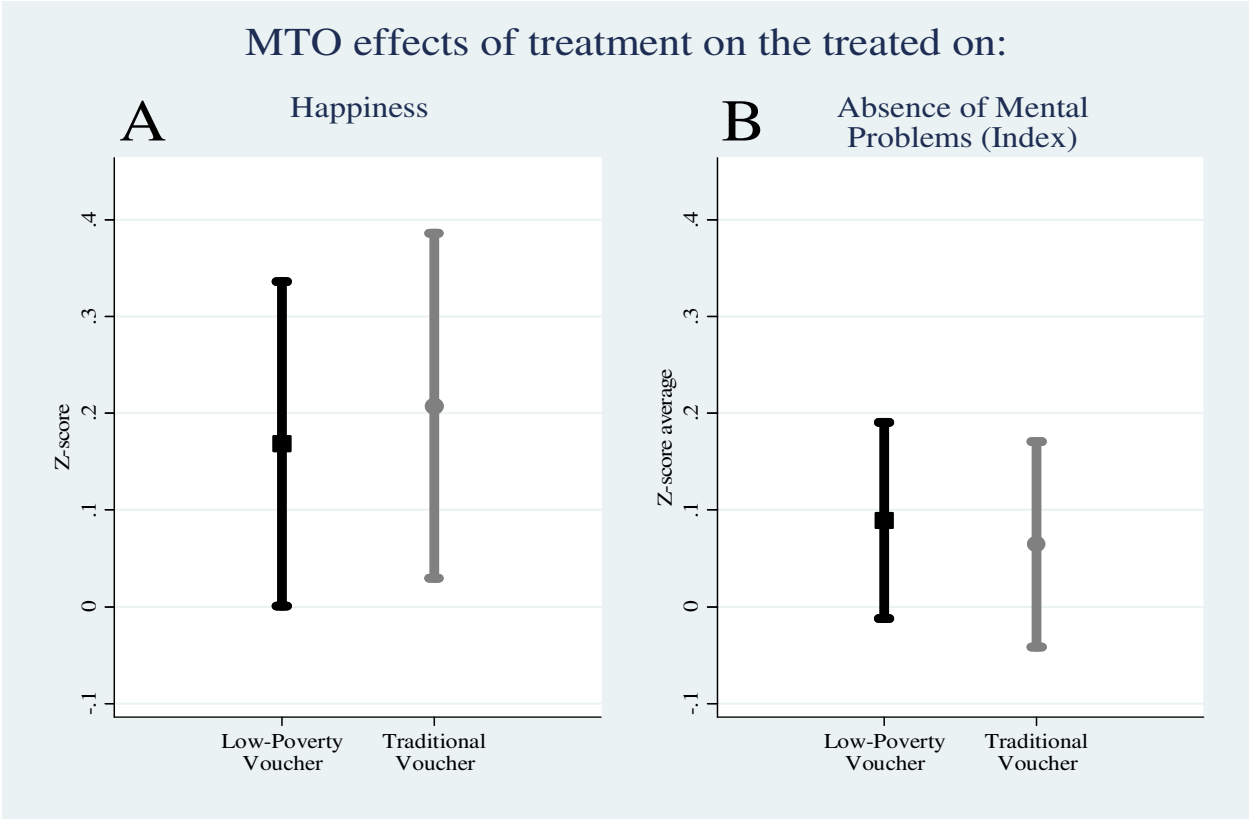


Figure 1. Impacts of moving using an MTO program voucher on z-scores of subjective well-being measures. Impacts are presented for the low-poverty voucher (LPV) and traditional voucher (TV) groups. Happiness refers to the 3-point ordered happiness score that has been standardized using the mean and standard deviation for the control group. The Absence of Mental Health Problems Index includes the K6 measure of psychological distress in the past 30 days, major depressive disorder during the past 12 months, generalized anxiety disorder during the past 12 months, and feeling calm and peaceful in the past 30 days, and sleeping between seven and eight hours in the past night. The K6 measure consists of 6 items: so sad that nothing could cheer them up, nervous, restless, hopeless, worthless, and that everything was an effort. To construct the mental health index, each item is standardized by the control mean and standard deviation, and then averaged. The bars represent the estimated impact for each treatment group while the whiskers below and above the rectangles represent the 95th percent confidence interval around the estimate. The estimated impact on happiness (N=3266) of moving using a low poverty voucher (LPV) is 0.168 (SE=0.086, P=0.050) and the estimated impact on moving using a traditional voucher is 0.207 (SE=0.091, P=0.023). On the Absence of Mental Problems Index (N=3266), the impact for LPV movers is 0.089 (SE=0.052, P=0.085) and for TV movers is 0.065 (SE=0.054, P=0.234).

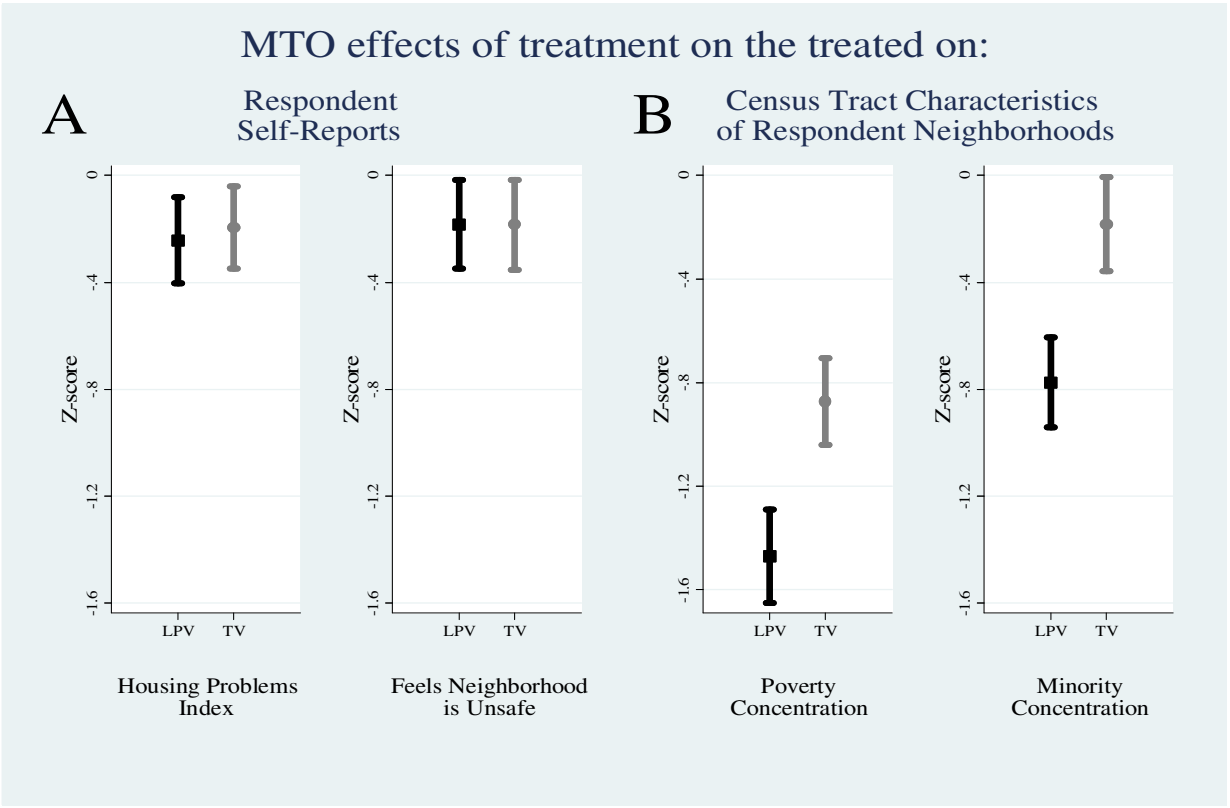
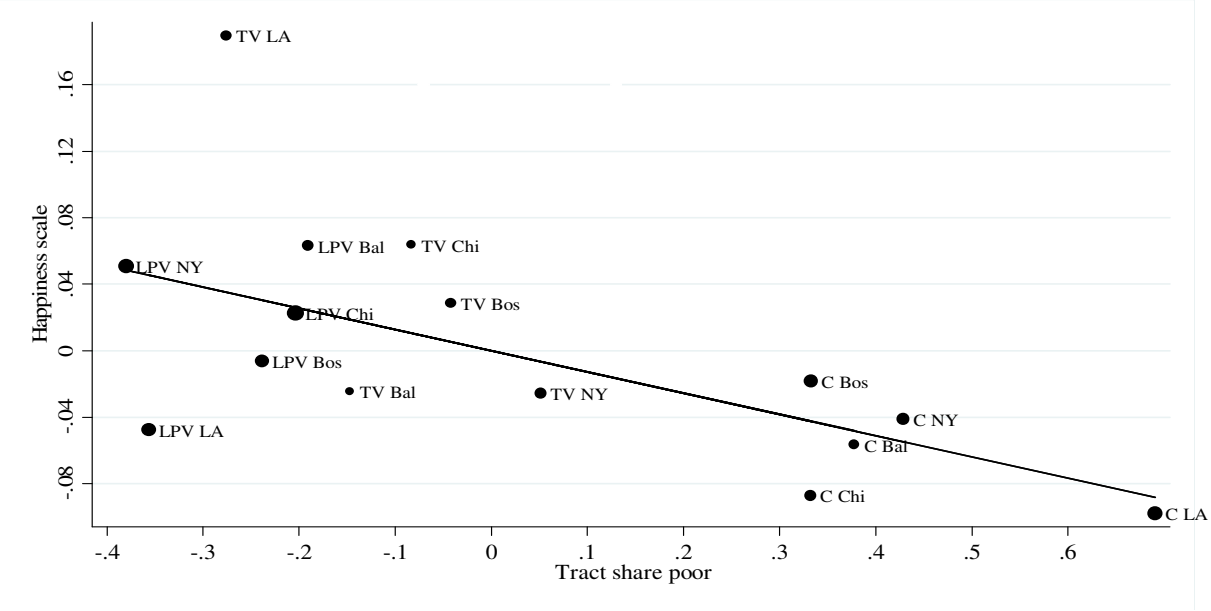


Figure 2. Impacts of MTO program moves on z-scores of housing and neighborhood measures, by treatment group. Number of household problems and feeling unsafe in their neighborhood during the day are self-reports collected from the final survey. Census tract characteristics are linearly interpolated from the 1990 decennial census, 2000 decennial census, and 2005-2009 American Community Survey and represent the average across all of the respondents addresses since random assignment, weighted by the amount of time the respondent spent at each address. Measures are expressed as z-scores and are standardized by the control group mean and standard deviation. The bars represent the impacts for each treatment group while the whiskers below and above the bars represent the 95th percentile confidence interval around the estimates. The impact of moving with a low poverty voucher (LPV) on housing problems (N=3264) was -0.242 standard deviations (SE=0.083, P=0.003) relative to the control group and the impact for the traditional voucher (TV) movers was -0.195 standard deviations (SE=0.078, P=0.013). In terms of feeling unsafe in their neighborhoods during the day (N=3259), the impact of LPV movers was -0.183 (SE=0.085, P=0.031) and of TV moves was -0.184 (SE=0.086, P=0.032). For census tract poverty concentration (N=3263), LPV movers are -1.470 standard deviations (SE=0.093, P <0.001) relative to the control mean and TV movers are -0.873 standard deviations (SE=0.086, P<0.001) relative to the control mean. In terms of census tract minority concentration (N=3263), the impact of LPV movers was -0.774 standard deviations (SE=0.086, P<0.001) and TV movers are -0.183 standard deviations (SE=0.090, P=0.041).

A Ordered happiness measure and duration-weighted tract poverty



B Ordered happiness measure and self-reported neighborhood safety

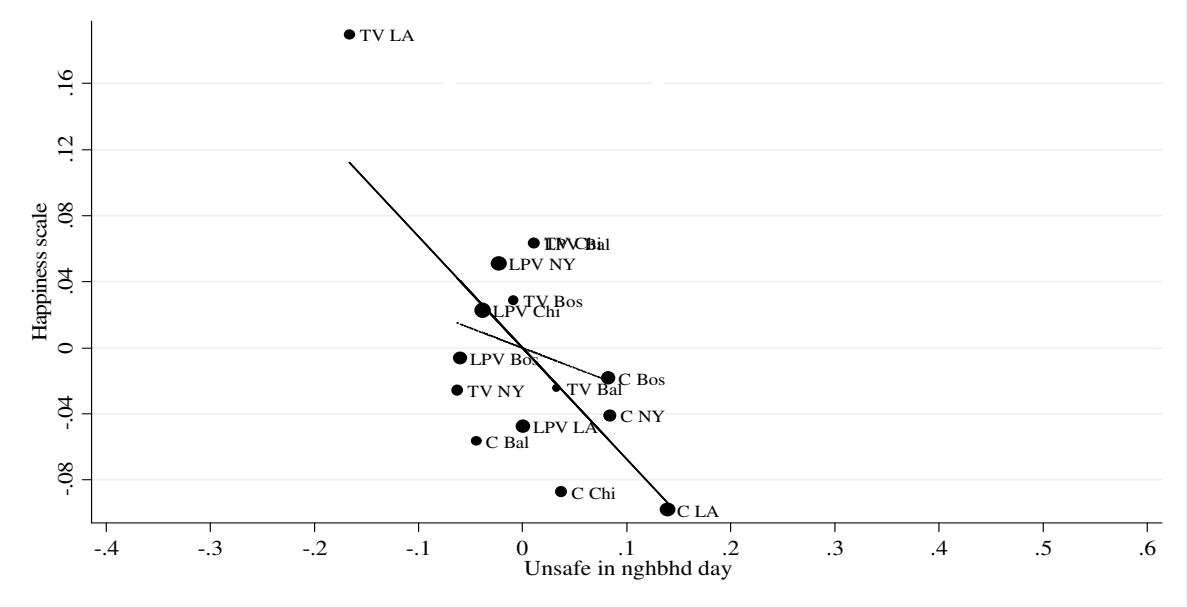


Figure 3. Partial regression leverage plots for the relationship between ordered happiness measure and duration-weighted tract poverty (panel A) and safety (panel B). The y-axis is a 3-point ordered happiness score (1=not too happy, 2=pretty happy, 3=very happy) that is expressed in standard deviation units relative to the control group overall standard deviation for each variable. The x-axis in panel A is average duration-weighted tract poverty over the 10-15 year MTO study follow-up period, also expressed in standard deviation units. The x-axis in Panel B. comes from self reports from the long-term MTO surveys of feeling unsafe in one's neighborhood during the day, also expressed in standard deviation units. The line passes through the origin with the slope from 2SLS estimation of equations (4) and (5) of the happiness outcome on concerns about poverty (or in panel b on neighborhood safety) using group-by-site interactions as instrumental variables. The points are from a partial regression leverage plot of the group outcome means on the group neighborhood safety means, conditional on site main effects, as described in the text. The size of each point is proportional to the sample size of that group and, correspondingly, to the weight each point receives in the 2SLS regression. The dashed line in the figure represents the 2SLS relationship that is calculated excluding data from the LA demonstration site.

Supplemental Table 1
Baseline Characteristics

	Low Poverty Voucher	Traditinal Voucher	Control
	N=1455	N=673	N=1138
Female	0.988 ~	0.977	0.978
Age as of December 31, 2007			
≤ 35	0.146	0.133	0.144
36-40	0.212	0.238	0.230
41-45	0.236	0.226	0.233
46-50	0.185	0.201	0.175
> 50	0.221	0.202	0.219
Race and Ethnicity			
African-American	0.652	0.639	0.665
Other Non-White	0.279	0.274	0.266
White	0.068	0.087	0.069
Hispanic Ethnicity	0.315	0.340	0.304
Other Demographic Characteristics			
Never Married	0.625	0.629	0.639
Parent Before 18	0.250	0.280	0.246
Working	0.271	0.267	0.244
Enrolled In School	0.162	0.173	0.167
High School Diploma	0.382	0.343	0.361
GED	0.160 *	0.181	0.198
Receiving Aid to Families with Dependent Children (AFDC)	0.763	0.745	0.765
Site (share)			
Baltimore	0.134	0.142	0.135
Boston	0.202	0.205	0.204
Chicago	0.205	0.211	0.205
Los Angeles	0.231	0.212	0.226
New York	0.228	0.230	0.229
Neighborhood Characteristics[a]			
Household Member Was Crime Victim in Last Six Months	0.435	0.417	0.416
Streets Unsafe At Night	0.494	0.521	0.512
Very Dissatisfied w/ Neighborhood	0.479	0.474	0.466
Lived in Neighborhood 5+ Years	0.598	0.618	0.608
Very Likely to Tell Neighbor About Child Getting Into Trouble	0.557	0.521	0.554
Primary or Secondary Reason for Moving			
To Get Away from Drugs and Gangs	0.788	0.746	0.780

Baseline Characteristics

	Low Poverty Voucher	Traditinal Voucher	Control
Better Schools for Children	0.489	0.553 *	0.481
Table 1 (continued)	**Experimental**	**Section 8**	**Control**
To Get a Bigger or Better Apartment	0.442	0.440	0.457
To Get a Job	0.063	0.051	0.069

Notes: * = p<.05, ~ = p<.10 on pairwise t-test with probability weights.

All values represent shares. Shares are calculated using sample weights to account for changes in random assignment ratios across randomization cohorts and for subsample interviewing. Sample is adults with valid self-reported happiness.

[a] The baseline head of household reported on the neighborhood characteristics listed here. An omnibus F-test fails to reject the null hypothesis that the set of baseline characteristics reported above are the same across MTO sample random assignment groups (p-value for the low-poverty housing voucher vs. control comparison is p=.90; p-value for the traditional housing voucher vs. control comparison is p=.69).

Supplemental Table 2

Comparison of MTO happiness responses to General Social Survey (GSS) responses

	MTO control group	GSS adults	Reweighted GSS US adults
	N=1138	N=8311	N=6276
Very happy	0.228	0.336	0.175
Pretty happy	0.497	0.559	0.558
Not too happy	0.275	0.106	0.267
Ordered happiness	1.953	2.230	1.908

Source: Author calculations from MTO data, and from General Social Survey, adjusting for sampling weights. GSS results are pulled from the 2000, 2002, 2004, and 2006 waves. The last column represents the GSS sample when it's reweighted to look more like the MTO sample with respect to race/ethnicity, age, gender, marital status, family income, urban residence, and educational attainment.

Supplemental Table 3
Distribution of Happiness

	Low Poverty Voucher	Traditional Voucher	Control
	N=1455	N=673	N=1138
Very happy	0.237	0.273	0.228
Pretty happy	0.531	0.488	0.497
Not too happy	0.232	0.239	0.275

Source: Author calculations from MTO data, adjusting for sampling weights.

Table S4
MTO Effects on Happiness and Mental Health Measures

	Control Mean	Low-poverty voucher vs. Control ITT		Low-poverty voucher vs. Control TOT		Traditional voucher vs. Control ITT		Traditional voucher vs. Control TOT		N
Happiness Measures										
Very Happy	0.228	0.012		0.024		0.054	*	0.086	*	3266
		(0.018)		(0.037)		(0.025)		(0.040)		
Very Happy or Pretty Happy	0.725	0.046	*	0.095	*	0.038		0.061		3266
		(0.019)		(0.038)		(0.025)		(0.039)		
Happiness Scale	1.953	0.058	*	0.119	*	0.092	*	0.147	*	3266
		(0.029)		(0.061)		(0.040)		(0.064)		
Z-scored happiness scale	0.000	0.082	*	0.168	*	0.130	*	0.207	*	3266
		(0.042)		(0.086)		(0.057)		(0.091)		
Ordered Probit	1.953	0.095	*	0.195	*	0.150	*	0.239	*	3266
		(0.048)		(0.099)		(0.066)		(0.105)		
Ordered Logit	1.953	0.163	*	0.335	*	0.250	*	0.399	*	3266
		(0.082)		(0.169)		(0.114)		(0.181)		
Neighborhood satisfaction										
Neighborhood satisfaction dummy	0.515	0.093	*	0.191	*	0.083	*	0.132	*	3262
		0.022		0.044		0.028		0.045		
Z-scored neighborhood satisfaction	0	0.175	*	0.358	*	0.177	*	0.282	*	3262
		0.042		0.086		0.054		0.086		
Major Depression with Hierarchy										
Dummy for ever depressed	0.203	-0.032	~	-0.065	~	-0.048	*	-0.076	*	3266
		(0.017)		(0.035)		(0.021)		(0.034)		
Mental Health (Absence of Problems)										
Z-scored mental health index	0.000	0.073	~	0.151	~	0.069		0.109		3266
		(0.043)		(0.088)		(0.058)		(0.092)		
K-6 Index										
K-6 serious dummy (K-6 score above 12)	0.133	-0.002		-0.004		-0.012		-0.019		3266
		(0.014)		(0.030)		(0.019)		(0.031)		
Z-scored K-6 index	0.000	-0.110	*	-0.226	*	-0.093	~	-0.148	~	3266
		(0.042)		(0.086)		(0.056)		(0.090)		
Z-scored K-6 3 item index (sad, worthle	0.000	-0.108	*	-0.222	*	-0.107	~	-0.170	~	3266
		(0.042)		(0.085)		(0.055)		(0.088)		
Z-scored K-6 sadness rating	0.000	-0.105	*	-0.215	*	-0.109	*	-0.174	*	3265
		(0.042)		(0.086)		(0.055)		(0.088)		
Z-scored K-6 hopelessness rating	0.000	-0.084	~	-0.172	~	-0.062		-0.099		3257
		(0.043)		(0.089)		(0.058)		(0.092)		
K-6 worthless rating	0.000	-0.092	*	-0.190	*	-0.105	~	-0.166	~	3256
		(0.042)		(0.086)		(0.054)		(0.086)		

Notes: * = p<.05, ~ = p<.10 on two-tailed t-test. Robust standard errors shown in parentheses. ITT = Intent-to-Treat or estimated impact of being offered an MTO housing voucher; TOT = Treatment-on-Treated or estimated impact of moving using an MTO housing voucher. The control mean is unadjusted.

Model: Experimental and Section 8 impacts were weighted estimates controlling for baseline covariates and field release and all standard errors are robust. The K-6 index is a sum of five point likehert responses asking how much of the time in the past 30 days respondents felt: so sad that nothing could cheer them up, nervous, restless, hopeless, worthless, and that everything was an effort. The Mental Health Index includes the K-6 index, dummies for having depressive disorder and generalized anxiety disorder, each in the past 12 months, whether the respondent felt calm and peaceful, and if the respondent slept between seven and eight hours in the past night.

Data source and sample: Adult final survey. All adults with who self-reported happiness.

Table S5

Happiness Model Including Cubic Splines of Income, GSS Data Years 2000-2006

Explanatory Variable		
Income Splines		
S1	-0.029	
	(0.009)	
S2	39.777	
	(1.343)	
S3	-76.665	
	(3.089)	
S4	39.313	
	(2.007)	
S5	-2.282	
	(0.317)	
Gender and Age		
Female	0.027	*
	(0.016)	
Age	-0.360	***
	(0.003)	
Age-Squared	0.351	***
	(0.000)	
Work Status		
Temporarily not working	-0.026	*
	(0.055)	
Unemployed	-0.034	*
	(0.050)	
Retired	0.034	*
	(0.033)	
Currently in school	0.011	
	(0.048)	
Keeping house	-0.018	
	(0.028)	
Marital Status		
Widowed	-0.111	***
	(0.034)	
Divorced	-0.136	***
	(0.023)	
Separated	-0.097	***
	(0.047)	
Never Married	-0.171	***
	(0.024)	
Race		
Black	-0.025	
	(0.026)	
Other	-0.037	*

	(0.031)
R^2	0.098
N	7248

Notes: * = p<.05, ~ = p<.10 on two-tailed t-test. Robust standard errors shown in parentheses.

Data Sources and Sample: General Social Survey. Re-weighted to look more like the MTO sample with respect to race/ethnicity, age, gender, marital status, family income, urban residence, and educational attainment.

Measures: Happiness scale refers to the ordered happiness categories (1-"not too happy", 2-"pretty happy", 3-"very happy").

Model: Weighted ordinary least squares. Cubic spline of income includes the following internal knots: $10,000; $20,000; $40,000; $75,000.

Supplemental Table 6

MTO Effects on Housing and Neighborhood conditions, 10-15 Years After Random Assignment

	Control Mean	Low-poverty voucher vs. Control ITT	Low-poverty voucher vs. Control TOT	Traditional voucher vs. Control ITT	Traditional voucher vs. Control TOT	N
Number of Moves After Random Assignment	2.160	0.570 *	1.173 *	0.632 *	1.008 *	3266
		(0.073)	(0.150)	(0.097)	(0.154)	
Housing						
Condition Excellent	0.213	0.003	0.006	0.030	0.049	3264
		(0.018)	(0.037)	(0.024)	(0.038)	
Condition Excellent or Good	0.570	0.052 *	0.106 *	0.031	0.050	3264
		(0.021)	(0.044)	(0.029)	(0.046)	
Number of Housing Problems (1-7)	0.836	-0.172 *	-0.353 *	-0.178 *	-0.284 *	3264
		(0.059)	(0.120)	(0.071)	(0.114)	
Z-Score of Number of Housing Problems (1-7)	0.000	-0.118 *	-0.242 *	-0.122 *	-0.195 *	3264
		(0.040)	(0.083)	(0.049)	(0.078)	
Interviewer Rated Building Condition on Respondent's Block as Fair	0.836	0.021	0.043	0.035 ~	0.055 ~	3192
		(0.016)	(0.032)	(0.021)	(0.032)	
Interviewer Rated Building Condition On respondent's Block as Well-Kept	0.347	0.025	0.053	0.011	0.018	3192
		(0.021)	(0.044)	(0.028)	(0.045)	
Interviewer Observation of Neighborhood Problems, raw value	0.317	-0.019 ~	-0.039 ~	-0.006	-0.010	3200
		(0.011)	(0.022)	(0.014)	(0.022)	
Interviewer Observation of Neighborhood Problems, z-score	0.000	-0.075 ~	-0.156 ~	-0.026	-0.041	3200
		(0.043)	(0.089)	(0.056)	(0.088)	
Received any Housing Assistance	0.621	0.024	0.050	0.051 ~	0.082 ~	3266
		(0.021)	(0.043)	(0.027)	(0.043)	
Total Monthly Housing Cost	$678.73	19.80	40.17	-6.49	-10.37	3177
		(23.34)	(47.36)	(30.74)	(49.10)	
Household Is Rent-Burdened	0.676	0.010	0.021	0.020	0.032	3166
		(0.020)	(0.041)	(0.027)	(0.043)	
Household Is Severely Rent-Burdened	0.426	-0.002	-0.004	0.016	0.025	3166
		(0.021)	(0.043)	(0.029)	(0.046)	
Tract Poverty at Baseline						
Share	0.531	-0.004	-0.008	-0.005	-0.008	3220
		(0.005)	(0.009)	(0.006)	(0.009)	
Z-Score on US Tracts	3.174	-0.032	-0.066	-0.038	-0.061	3220
		(0.037)	(0.076)	(0.046)	(0.073)	
Z-Score on MTO Controls	0.000	-0.027	-0.055	-0.032	-0.051	3220
		(0.031)	(0.063)	(0.038)	(0.061)	
Tract Poverty 1 Year Post-Random Assignment						
Share	0.500	-0.170 *	-0.351 *	-0.141 *	-0.224 *	3217
		(0.008)	(0.016)	(0.009)	(0.014)	
Z-Score on US Tracts	2.921	-1.381 *	-2.847 *	-1.146 *	-1.818 *	3217
		(0.062)	(0.128)	(0.072)	(0.115)	

MTO Effects on Housing and Neighborhood conditions, 10-15 Years After Random Assignment

	Control Mean	Low-poverty voucher vs. Control ITT	Low-poverty voucher vs. Control TOT	Traditional voucher vs. Control ITT	Traditional voucher vs. Control TOT	N
Tract Crime Duration Weighted						
Property Crime	4908.64	-154.970	-318.290	-250.849 *	-399.434 *	3259
		(105.83)	(217.37)	(107.65)	#######	
Violent Crime	2421.93	-421.788 *	-866.303 *	-354.088 *	-564.625 *	3260
		(44.525)	(91.448)	(53.174)	(84.791)	

Table 6 (continued)	Control Mean	Low-poverty voucher vs. Control ITT	Low-poverty voucher vs. Control TOT	Traditional voucher vs. Control ITT	Traditional voucher vs. Control TOT	N
Tract Poverty 1 Year Post-Random Assignment (contin.)						
Z-Score on MTO Controls	0.000	-1.053 *	-2.170 *	-0.873 *	-1.386 *	3217
		(0.047)	(0.097)	(0.055)	(0.087)	
Tract Poverty 5 Years Post-Random Assignment						
Share	0.400	-0.100 *	-0.204 *	-0.070 *	-0.111 *	3201
		(0.007)	(0.015)	(0.009)	(0.015)	
Z-Score on US Tracts	2.113	-0.808 *	-1.653 *	-0.566 *	-0.902 *	3201
		(0.060)	(0.123)	(0.076)	(0.121)	
Z-Score on MTO Controls	0.000	-0.607 *	-1.241 *	-0.425 *	-0.678 *	3201
		(0.045)	(0.093)	(0.057)	(0.091)	
Tract Poverty 10-12 Years Post-Random Assignment						
Share	0.330	-0.046 *	-0.094 *	-0.040 *	-0.064 *	3189
		(0.007)	(0.014)	(0.009)	(0.014)	
Z-Score on US Tracts	1.548	-0.371 *	-0.764 *	-0.323 *	-0.518 *	3189
		(0.056)	(0.115)	(0.071)	(0.114)	
Z-Score on MTO Controls	0.000	-0.285 *	-0.587 *	-0.248 *	-0.398 *	3189
		(0.043)	(0.088)	(0.055)	(0.088)	
Duration-Weighted Census Tract Characteristics						
Share Poor	0.397	-0.090 *	-0.184 *	-0.069 *	-0.109 *	3263
		(0.006)	(0.012)	(0.007)	(0.011)	
Share Minority	0.880	-0.061 *	-0.125 *	-0.019 *	-0.030 *	3263
		(0.007)	(0.014)	(0.009)	(0.015)	
Share Single Female-Headed Households	0.542	-0.077 *	-0.159 *	-0.058 *	-0.092 *	3263
		(0.006)	(0.011)	(0.007)	(0.011)	
Share College Graduates	0.161	0.042 *	0.087 *	0.018 *	0.029 *	3263
		(0.004)	(0.008)	(0.005)	(0.008)	
Collective Efficacy: Very Likely/Likely to Report						
Kids Spraying Grafitti	0.589	0.074 *	0.154 *	0.042	0.068	3252
		(0.021)	(0.043)	(0.028)	(0.045)	
Kids Skipping School	0.346	0.030	0.061	0.074 *	0.117 *	3247
		(0.021)	(0.043)	(0.028)	(0.045)	
Social Networks						
1+ Friend with College Degree	0.532	0.071 *	0.145 *	0.006	0.009	3201
		(0.021)	(0.044)	(0.029)	(0.046)	

MTO Effects on Housing and Neighborhood conditions, 10-15 Years After Random Assignment

	Control Mean	Low-poverty voucher vs. Control ITT	Low-poverty voucher vs. Control TOT	Traditional voucher vs. Control ITT	Traditional voucher vs. Control TOT	N
No Close Friends	0.145	-0.018	-0.037	0.042 ~	0.066 ~	3262
		(0.015)	(0.030)	(0.022)	(0.034)	
Medical Care						
Place to Go for Routine Care (Not ER)	0.935	-0.012	-0.025	0.011	0.017	3261
		(0.011)	(0.022)	(0.012)	(0.020)	
Safety						
Feel Safe During Day	0.804	0.035 *	0.073 *	0.046 *	0.073 *	3259
		(0.016)	(0.034)	(0.021)	(0.034)	
Feel Safe During Night	0.596	0.041 *	0.085 *	0.074 *	0.118 *	3243
		(0.021)	(0.043)	(0.027)	(0.043)	
Police Don't Respond	0.420	-0.068 *	-0.141 *	-0.075 *	-0.118 *	3143
		(0.021)	(0.044)	(0.028)	(0.045)	
Safety (contin.)						
Saw Drugs Used/Sold Last 30 Days	0.310	-0.062 *	-0.126 *	-0.058 *	-0.091 *	3246
		(0.019)	(0.039)	(0.025)	(0.040)	
Household Crime Victimization (Last 6 Months)						
Any Crime	0.184	-0.024	-0.050	0.027	0.042	3238
		(0.016)	(0.033)	(0.022)	(0.035)	
Assault	0.074	-0.017	-0.035	-0.004	-0.006	3235
		(0.010)	(0.022)	(0.014)	(0.022)	
Break-In/Attempted Break-In	0.043	-0.003	-0.007	0.016	0.025	3239
		(0.009)	(0.019)	(0.013)	(0.021)	
Snatched Purse/Wallet/Jewelry	0.077	-0.005	-0.010	0.008	0.012	3231
		(0.011)	(0.023)	(0.014)	(0.023)	
Stabbing/Shooting	0.029	-0.009	-0.018	-0.007	-0.011	3238
		(0.007)	(0.014)	(0.008)	(0.013)	
Threatened with Knife/Gun	0.066	-0.007	-0.015	0.001	0.001	3233
		(0.010)	(0.021)	(0.013)	(0.021)	

MTO Effects on Housing and Neighborhood conditions, 10-15 Years After Random Assignment

	Control Mean	Low-poverty voucher vs. Control ITT	Low-poverty voucher vs. Control TOT	Traditional voucher vs. Control ITT	Traditional voucher vs. Control TOT	N

Notes: * = p<.05, ~ = p<.10 on two-tailed t-test. Robust standard errors shown in parentheses. ITT = Intent-to-Treat or estimated impact of being offered an MTO housing voucher; TOT = Treatment-on-Treated or estimated impact of moving using an MTO housing voucher. The control mean is unadjusted.

Model: Experimental and Section 8 impacts were estimated jointly using an OLS regression model controlling for baseline covariates and field release, weighted, and clustering on family.

Data source and sample: Adult final survey. All adults with valid self-reported happiness.

Outcome notes: Housing problems include peeling paint, broken plumbing, rats, roaches, broken locks, broken windows, and broken heating system. Interviewer-observed neighborhood problems include abandoned buildings, cigarette or cigar butts on the sidewalk/gutter, "For Sale" signs, metal bars on windows above the basement level, fair or poor street conditions, and moderate to heavy amount of litter on the streets. Households are defined as "rent-burdened" if their monthly housing costs are greater than or equal to 30% of their monthly household income. A household is "severely rent-burdened" if monthly housing costs are greater than or equal to 50% of their monthly household income.

Table ?
Instrumental Variables Estimates, Including Fuller Models, Controlling for Neighborhood Safety Simultaneously with Other Candidate Mediating Measures

	Very happy				Very or pretty happy			
	2 SLS	Fuller(1)	Fuller(2)	Fuller(4)	2 SLS	Fuller(1)	Fuller(2)	Fuller(4)
Housing and Safety Model (N=3258)								
Number of housing problems, z-score	-0.037	0.297	0.122	0.012	-0.052	0.084	0.025	-0.030
	(0.219)	(1.520)	(0.781)	(0.395)	(0.215)	(0.628)	(0.447)	(0.285)
Neighborhood unsafe during day, z-score	-0.215	-0.575	-0.413	-0.292	-0.254	-0.424	-0.360	-0.290
	(0.197)	(1.249)	(0.651)	(0.340)	(0.193)	(0.531)	(0.383)	(0.250)
P-value of equality test	0.648	0.751	0.705	0.669	0.597	0.655	0.633	0.609
Poverty and Safety Model (N=)								
Duration-weighted tract poverty, z-score	-0.006	0.047	0.028	0.009	-0.041	-0.030	-0.034	-0.038
	(0.036)	(0.117)	(0.081)	(0.052)	(0.035)	(0.057)	(0.049)	(0.039)
Neighborhood unsafe during day, z-score	-0.223	-0.610	-0.474	-0.332	-0.157	-0.242	-0.214	-0.178
	(0.186)	(0.795)	(0.532)	(0.317)	(0.178)	(0.368)	(0.301)	(0.221)
P-value of equality test	0.309	0.468	0.408	0.347	0.569	0.613	0.601	0.583
Minority and Safety Model (N=3256)								
Duration-weighted tract minority, z-score	0.059	0.084	0.078	0.069	-0.033	-0.023	-0.026	-0.030
	(0.055)	(0.075)	(0.070)	(0.062)	(0.053)	(0.065)	(0.061)	(0.057)
Neighborhood unsafe during day, z-score	-0.300 *	-0.475	-0.432 ~	-0.367 ~	-0.256 ~	-0.345	-0.321	-0.283 ~
	(0.152)	(0.296)	(0.256)	(0.201)	(0.147)	(0.234)	(0.209)	(0.172)
P-value of equality test	0.049	0.103	0.087	0.066	0.209	0.241	0	0

Table ?
Instrumental Variables Estimates, Including Fuller Models, Controlling for Neighborhood Safety Simultaneously with Other Candidate Mediating Measure

	Happiness scale, z-score				Happiness scale				
	2 SLS	Fuller(1)	Fuller(2)	Fuller(4)	2 SLS	Fuller(1)	Fuller(2)	Fuller(4)	Ordered probit
Housing and Safety Model (N=3258)									
Number of housing problems, z-score	-0.126	0.277	0.099	-0.059	-0.089	0.196	0.070	-0.042	-0.142
	(0.520)	(1.718)	(1.176)	(0.721)	(0.368)	(1.216)	(0.832)	(0.510)	(0.532)
Neighborhood unsafe during day, z-score	-0.662	-1.168	-0.978	-0.776	-0.469	-0.827	-0.693	-0.549	-0.771
	(0.468)	(1.440)	(1.002)	(0.633)	(0.332)	(1.020)	(0.709)	(0.448)	(0.482)
P-value of equality test	0.562	0.642	0.612	0.579	0.562	0.642	0.612	0.579	0.507
(N=)									
Duration-weighted tract poverty, z-score	-0.066	-0.005	-0.026	-0.051	-0.047	-0.003	-0.018	-0.036	-0.078
	(0.082)	(0.165)	(0.133)	(0.099)	(0.058)	(0.117)	(0.094)	(0.070)	(0.090)
Neighborhood unsafe during day, z-score	-0.537	-0.989	-0.837	-0.654	-0.380	-0.700	-0.593	-0.463	-0.615
	(0.429)	(1.081)	(0.835)	(0.576)	(0.304)	(0.765)	(0.591)	(0.407)	(0.463)
P-value of equality test	0.338	0.424	0.394	0.359	0.338	0.424	0.394	0.359	0.313
Minority and Safety Model (N=3256)									
Duration-weighted tract minority, z-score	0.037	0.076	0.065	0.048	0.026	0.054	0.046	0.034	0.043
	(0.130)	(0.166)	(0.155)	(0.140)	(0.092)	(0.117)	(0.110)	(0.099)	(0.128)
Neighborhood unsafe during day, z-score	-0.786 *	-1.088 ~	-1.005 ~	-0.876 *	-0.556 *	-0.770 ~	-0.711 ~	-0.620 *	-0.909 *
	(0.360)	(0.598)	(0.527)	(0.425)	(0.255)	(0.423)	(0.373)	(0.301)	(0.364)
P-value of equality test	0.058	0.096	0.084	0.068	0.058	0.096	0	0.068	0.030

Table ?

Instrumental Variables Estimates, including LIML and Fuller Models, for Effects of Specific Housing and Neighborhood Attributes on Subjective Well-being

	Very happy					Very or pretty happy				
	2SLS	LIML	Fuller(1)	Fuller(2)	Fuller(4)	2SLS	LIML	Fuller(1)	Fuller(2)	Fuller(4)
Number of housing problems,[a]	-0.197	-0.665	-0.531	-0.445	-0.340	-0.243 ~	-0.462	-0.410	-0.370	-0.314
z-score	(0.138)	(0.926)	(0.624)	(0.465)	(0.304)	(0.145)	(0.427)	(0.347)	(0.292)	(0.222)
Duration-weighted tract poverty,	-0.036	-0.037	-0.037	-0.037	-0.037	-0.063 *	-0.063 *	-0.063 *	-0.063 *	-0.063 *
z-score	(0.023)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.025)	(0.025)	(0.025)	(0.024)
Duration-weighted tract minority,	0.019	0.024	0.024	0.024	0.023	-0.068	-0.073	-0.073	-0.072	-0.071
z-score	(0.043)	(0.051)	(0.050)	(0.050)	(0.049)	(0.043)	(0.048)	(0.047)	(0.047)	(0.046)
Neighborhood unsafe during day,	-0.237 ~	-0.477	-0.427	-0.388	-0.329	-0.285 *	-0.399 ~	-0.373 ~	-0.350 ~	-0.314 *
z-score	(0.132)	(0.360)	(0.304)	(0.262)	(0.206)	(0.134)	(0.230)	(0.206)	(0.186)	(0.157)

Table ?

Instrumental Variables Estimates, including LIML and Fuller Models for Effects of Specific Housing and Neighborhood Attributes on Subjective Well-being

	Happiness scale, z-score					Happiness scale					
	2SLS	LIML	Fuller(1)	Fuller(2)	Fuller(4)	2SLS	LIML	Fuller(1)	Fuller(2)	Fuller(4)	Ordered pro
Number of housing problems,[a]	-0.621 ~	-1.384	-1.196	-1.059	-0.872	-0.440 ~	-0.979	-0.847	-0.750	-0.617	-0.719
z-score	(0.331)	(1.295)	(0.995)	(0.803)	(0.578)	(0.234)	(0.916)	(0.704)	(0.569)	(0.409)	(0.356)
Duration-weighted tract poverty,	-0.140 *	-0.142 *	-0.142 *	-0.142 *	-0.142 *	-0.099 *	-0.101 *	-0.101 *	-0.100 *	-0.100 *	-0.163
z-score	(0.054)	(0.055)	(0.055)	(0.055)	(0.055)	(0.038)	(0.039)	(0.039)	(0.039)	(0.039)	(0.062)
Duration-weighted tract minority,	-0.069	-0.073	-0.073	-0.073	-0.072	-0.049	-0.052	-0.052	-0.051	-0.051	-0.081
z-score	(0.098)	(0.115)	(0.114)	(0.113)	(0.111)	(0.069)	(0.081)	(0.081)	(0.080)	(0.078)	(0.113)
Neighborhood unsafe during day,	-0.737 *	-1.082 ~	-1.004 ~	-0.938 *	-0.833 *	-0.522 *	-0.766 ~	-0.711 ~	-0.664 *	-0.589 *	-0.855
z-score	(0.319)	(0.587)	(0.519)	(0.465)	(0.385)	(0.226)	(0.415)	(0.367)	(0.329)	(0.273)	(0.324)

	z_happy123_ad	d_happy_ad	nsatisflag_ad	b_nsatisf_ad	leph_evr_ad	_mh_idx_ad	h_k6_ser_ad	_k6_raw_ad	tem_raw_ad	sad_raw_ad	less_raw_ad	less_raw_ad
Z-scored happiness scale	1.000	0.815	0.198	0.269	-0.162	0.358	-0.268	-0.389	-0.397	-0.371	-0.353	-0.284
Very Happy or Pretty Happy	0.815	1.000	0.171	0.236	-0.158	0.363	-0.300	-0.393	-0.415	-0.369	-0.369	-0.319
Neighborhood satisfaction dummy	0.198	0.171	1.000	0.858	-0.064	0.163	-0.105	-0.156	-0.151	-0.131	-0.133	-0.122
Z-scored neighborhood satisfaction	0.269	0.236	0.858	1.000	-0.082	0.187	-0.132	-0.184	-0.177	-0.157	-0.158	-0.135
Dummy for ever depressed	-0.162	-0.158	-0.064	-0.082	1.000	-0.434	0.230	0.283	0.266	0.233	0.235	0.212
Z-scored mental health index	0.358	0.363	0.163	0.187	-0.434	1.000	-0.546	-0.727	-0.677	-0.595	-0.588	-0.546
K-6 serious dummy (K-6 score above 12)	-0.268	-0.300	-0.105	-0.132	0.230	-0.546	1.000	0.723	0.722	0.541	0.663	0.649
Z-scored K-6 index	-0.389	-0.393	-0.156	-0.184	0.283	-0.727	0.723	1.000	0.893	0.776	0.787	0.716
Z-scored K-6 3 item index (sad, worthless, hopeless)	-0.397	-0.415	-0.151	-0.177	0.266	-0.677	0.722	0.893	1.000	0.843	0.880	0.835
Z-scored K-6 sadness rating	-0.371	-0.369	-0.131	-0.157	0.233	-0.595	0.541	0.776	0.843	1.000	0.599	0.527
Z-scored K-6 hopelessness rating	-0.353	-0.369	-0.133	-0.158	0.235	-0.588	0.663	0.787	0.880	0.599	1.000	0.647
K-6 worthless rating	-0.284	-0.319	-0.122	-0.135	0.212	-0.546	0.649	0.716	0.835	0.527	0.647	1.000

Variable	mean
Happiness scale	1.998
Very Happy or Pretty Happy	0.754
Neighborhood satisfaction dummy	0.579
Major Depression with Hierarchy	0.177
K-6 serious dummy (K-6 score above 12)	0.132