The Aftermath of Public Housing Relocation: Relationship to Substance Misuse

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Abstract

Introduction—Several cross-sectional studies have examined relationships between neighborhood characteristics and substance misuse. Using data from a sample of African-American adults relocating from US public housing complexes, we examined relationships between changes in exposure to local socioeconomic conditions and substance misuse over time. We tested the hypothesis that adults who experienced greater post-relocation improvements in local economic conditions and social disorder would have a lower probability of recent substance misuse.

Methods—Data were drawn from administrative sources to describe the census tracts where participants lived before and after relocating. Data on individual-level characteristics, including binge drinking, illicit drug use, and substance dependence, were gathered via survey before and after the relocations. Multilevel models were used to test hypotheses.

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Results—Participants (N=172) experienced improvements in tract-level economic conditions and, to a lesser degree, in social disorder after moving. A one standard-deviation improvement in tract-level economic conditions was associated with a decrease in recent binge drinking from 34% to 20% (p=0.04) and with a decline in using illicit drugs weekly or more from 37% to 16% (p=0.02). A reduction in tract-level alcohol outlet density of >3.0 outlets per square mile predicted a reduction in binge drinking from 32% to 18% at p=0.05 significance level.

Discussion—We observed relationships between improvements in tract-level conditions and declines in substance misuse, providing further support for the importance of the local environment in shaping substance misuse. These findings have important implications for public housing policies and future research.

1. INTRODUCTION

Although research on the relationships of neighborhood characteristics and health has advanced in its scope, design, and statistical sophistication over the past two decades, most studies have treated people's exposure to places as constant. People, however, are mobile and may move to geographic areas that differ from the one surrounding their original home. In this study, we examine whether migrations prompted by a public housing relocation initiative are related to changes in migrants' patterns of substance misuse over time.

1.1 Neighborhood Characteristics and Substance Misuse

To date, research on neighborhood characteristics and substance misuse has primarily focused on two exposures: economic disadvantage and social disorder. Cross-sectional studies have found positive associations between local economic disadvantage and current substance misuse (Boardman et al., 2001; Jones-Webb et al., 1997; Williams and Latkin, 2007). Williams and colleagues, for example, have found that the odds of recent heroin, crack, or cocaine use were 52% higher among residents of high-poverty census tracts than among residents of lower poverty tracts (Williams and Latkin, 2007). Cross-sectional studies also suggest that residents of more socially disordered neighborhoods are more likely to report current substance misuse (Hill and Angel, 2005; Latkin et al., 2005, 2007; Schroeder et al., 2001).

People, however, may move to new neighborhoods and so an individual's exposure to economic disadvantage, social disorder, and other place characteristics can change over time. A growing line of inquiry has explored whether geographic mobility has consequences for substance misuse. In a cohort study of opioid users studied between 1966–1981, Maddux and Desmond found that 17% of relocations were followed by a period of abstinence lasting >1 year (Maddux and Desmond, 1982). More recently, Rachlis et al.'s analysis of drug injectors in Vancouver (2010) concluded that participants who moved outside of the Greater Vancouver area experienced greater declines in the frequency with which they injected heroin and cocaine than did other injectors. Migrations may take people to neighborhoods where drugs are less available, as are drug-using friends, and may also remove people from cues to use; alternatively, people may decide to move in order to support their efforts to cease or reduce their drug use (Maddux and Desmond, 1982; Rachlis et al., 2010).

A recent paper highlights the importance of considering not just relocations, but the *qualities* of the geographic areas of origin and of the areas to which people move. Genberg and

colleagues (2011) found that relocations were associated with a 55% increase in the likelihood of long-term injection cessation, and that this relationship was stronger for people who moved from highly economically deprived neighborhoods to less deprived neighborhoods.

1.2 Public Housing Relocations and Substance Misuse

The US is experiencing a paradigm shift in public housing policy that is precipitating mass migrations of poor urban residents in many cities (Goetz, 2003); at issue in this analysis is whether one such public housing migration affects migrants' substance misuse. Where once public housing policies sought to concentrate poor households into spatially-dense public housing complexes (e.g., high-rises, campuses; Keating and Flores, 2000), they now seek to disperse these households across neighborhoods (Goetz, 2003). Several factors prompted this policy shift, including concerns about the impact of concentrated poverty on public housing residents and on the communities that surrounded the complexes, and gentrification efforts in central cities (Popkin et al., 2004). Enacting this policy shift has required moving tens of thousands of residents out of public housing complexes, often to voucher-subsidized rental units in the private market.

Atlanta, Georgia has been at the forefront of this policy shift, and between the mid-1990s and 2010 the city eliminated all of its "severely distressed" or "obsolete" public housing complexes using the federal "Housing Opportunities for People Everywhere" (HOPE VI) initiative and Section 18 of the amended federal Housing Act (Boston, 2005; Popkin et al., 2012; Ruel et al., In press). One of HOPE VI's goals is to relocate all residents of severely distressed public housing complexes to voucher-subsidized rental units in the private market; complexes are then demolished and replaced by mixed income housing; the surrounding area is revitalized (Popkin et al., 2004). Complexes are classified as "severely distressed" if they have high rates of crime or poverty; contribute to local socioeconomic decline; or are in extreme disrepair (Popkin et al., 2004). In Atlanta, as elsewhere, HOPE VI relocations tended to move people from distressed complexes to rental units that were located in safer, less impoverished neighborhoods with less drug activity (Boston, 2005; Popkin et al., 2004). Between the mid-1990s and 2004 the Atlanta Housing Authority (AHA) used HOPE VI to relocate all residents of 13 complexes (Popkin et al., 2012; Ruel et al., In press). AHA used Section 18 to undertake the final wave of relocations in 2007–2010, affecting thousands of public housing residents (Oakley et al., 2011; Popkin et al., 2012). Section 18 permits the demolition of complexes that are "obsolete as to physical condition, location, or other factors" and beyond reasonable repair (Department of Housing and Urban Development). AHA classified these complexes as socially dysfunctional sites of "government-sponsored concentrated poverty, crime, and low educational attainment" (Atlanta Housing Authority, 2008). As with HOPE VI relocations, Atlanta's Section 18 relocations moved all residents from the targeted complexes and residents used housing vouchers to move into rental units in the private market; residents were able to choose their new homes, provided they met specific AHA standards (e.g., no overcrowding, <40% of units in multifamily communities be supported by Sections 8 or 9; Atlanta Housing Authority, 2013). The vacated complexes were demolished. In Atlanta, as elsewhere, the vast majority (>90%) of relocaters are African-American (Boston, 2005; Popkin et al., 2004), though most people receiving housing assistance in the USA are White.

Several studies have found that public housing relocations are related to changes (usually improvements) in several dimensions of relocaters' physical and mental health (del Conte and Kling, 2001; Fauth et al., 2008; Kling et al., 2004; Kramer et al., 2012; Leventhal and Brooks-Gunn, 2003). Only one study, however, has explored the impact of public housing relocations on substance misuse among adults: Fauth et al's (2004a) cross-sectional analysis found that people who were relocated from public housing complexes in Yonkers, NY had

lower rates of alcohol dependence than people who remained in these complexes; rates of illicit drug use were the same across groups. The Yonkers study, however, did not explore which *dimensions* of neighborhood change (e.g., changing exposure to poverty versus changing exposure to violent crime) were related to changes in substance misuse. There are several reasons to expand research on public housing relocations and health to include substance misuse. The prevalence of substance misuse appears to be substantially higher among public housing residents than it is in the general population (Digenis-Bury et al., 2008; Fauth et al., 2004b; Sikkema et al., 1995; Williams and Adams-Campbell, 2000). In addition, as noted above, relocations appear to alter migrants' exposure to local socioeconomic disadvantage and social disorder, two neighborhood characteristics that cross-sectional studies suggest predict substance misuse. Here, we test the hypothesis that improvements in census-tract level socioeconomic disadvantage and social disorder are inversely associated with substance misuse among African-American adults who lived in one of the public housing complexes targeted by Atlanta's final wave of relocations, undertaken in 2007–2010.

2. METHODS

2.1 Recruitment and Sampling

We sampled both public housing complexes and residents of these complexes. Complexes were included in the study if they were one of seven severely distressed public housing complexes targeted by Section 18 in Atlanta Georgia in 2007–2010. Individuals were eligible to take part in the study if they had lived in one of these complexes for at least one year before the screening; self-identified as non-Hispanic African-American/Black; were 18 years old; had been sexually active in the past year; and did not live with an individual who was already enrolled in the study. We chose to restrict the sample to non-Hispanic African-American/Black residents because past research suggests that the relationship between place characteristics and substance misuse may vary across racial/ethnic groups (Jones-Webb et al., 1997) and we knew a priori that there were too few members of other racial/ethnic groups living in the complexes to generate a sufficiently diverse sample in which to study race/ethnicity as an effect modifier.

We could not use probability-based sampling methods to create the sample because relocations had started before we began recruiting, and there was no accurate sampling frame of residents who remained in each complex on any given day; moreover, no sampling frame would have described resident substance misuse patterns. We, therefore, used non-probability-based quota sampling methods to develop the sample. To allows us to study changes in substance misuse over time (including the initiation of misuse) and to support future analyses of whether baseline substance misuse status moderates relationships between changing tract conditions and sexual behaviors, we created a sample in which 25% of participants met screening criteria for drug or alcohol dependence; 50% misused substances but were not dependent (i.e., self-reported recent use of illicit drugs or alcohol misuse); and 25% did not misuse substances (i.e., no illicit drug use in the past five years and no recent binge drinking).

We used a variety of recruitment methods to generate this sample. We received permission from the local housing authority to recruit in each complex, and varied recruitment days and times at each site to reach residents with different activity patterns. To build trust with residents, we hosted free lunches onsite to allow residents to socialize informally with study staff and learn about the study in a low-key setting. Local community-based organizations (including drug treatment and HIV prevention programs) and churches shared information about the study with their clients and parishioners. Participants were also invited to recruit their peers to take part in screenings.

2.2 Data collection and Measures

2.2.1 Individual-Level Data Collection and Measures—Survey data were collected at Waves 1 and 2 using computer-assisted personal interview methods; to reduce social desirability bias (Perlis et al., 2004), audio computer-assisted self-interviewing methods were used to ask about sensitive items, such as substance use. Wave 1 data were gathered before individuals relocated, though 13 participants had recently moved at the time of the baseline interview (median number of days living in new home: 4; 25th and 75th percentiles: 3, 9). Given that we conducted Wave 1 interviews while relocations were underway in each complex, and that relocations in a participant's complex might alter several aspects of his/her life, Wave 1 items querying time-varying phenomena captured the time period just <u>before</u> the relocations had begun in each participant's complex, rather than just prior to the interview. Wave 2 interviews were conducted a median of nine months after baseline.

Three substance-related outcomes were of interest: substance dependence, the frequency of illicit drug use, and binge drinking. We used the previously validated Texas Christian University Drug Screen (TCUDS) to screen for substance dependence and to assess the frequency of illegal substance use (Peters et al., 2000). Consonant with TCUDS guidelines, participants who responded affirmatively to 3 items were classified as meeting screening criteria for dependence during the six-month reporting period (TCU Institute of Behavioral Research, 2006). Substance use frequency during the six-month reporting period was assessed for each of 11 types of illegal substances using a five-category ordinal scale. Based on the distributions of responses, we dichotomized the measure into use of any illegal drug less than weekly vs. weekly or more. The frequency of binge drinking in the 30-day reporting period was assessed using sex-specific items from the Behavioral Risk Factor Surveillance System (Centers for Disease Control and Prevention, 2007). The frequency of binge drinking was recorded using a six-category ordinal scale. Based on the distribution of responses we dichotomized binge drinking frequency into less than twice vs. twice or more during the 30-day reporting period. Several individual-level predictors were considered possible confounders of the relationship between neighborhood characteristics and substance misuse: gender, age, household income, employment status, marital status, and self-reported HIV status.

2.2.2 Measures of Census Tract Characteristics—We analyzed existing data to describe the poverty rates, median household income, educational attainment, alcohol outlet density (defined as the number of outlets per square mile), and violent crime rates in the census tracts where participants lived before and after they relocated. Participants were linked to the census tracts where they lived at Wave 1 and at Wave 2 via their home address at each time point. 2010 census tract boundaries were used for Wave 1 and Wave 2.

Wave 1 data on tract-level median income and rates of poverty and high-school graduation were drawn from the Longitudinal Tract Database (Logan et al., 2012), which calculated Census 2000 population estimates for 2010 tract boundaries. The Decennial Census stopped gathering data on economic status in 2010, and so Wave 2 data on these tract characteristics were drawn from the American Community Survey's five-year tract-level estimates (2006–2010).

Alcohol outlet density was measured at each wave using databases acquired from the Georgia Department of Revenue on the locations of businesses that had an off-premises alcohol license at baseline and at Wave 2. Outlet addresses were geocoded to census tracts, and we calculated the number of outlets per square mile for each tract. Census tract boundaries often run along the middle of streets, placing one side of the street in one tract and the other side in another tract. To allow outlets that were just across the street from a

tract boundary to be included in that tract's density measure, we created a 100-foot buffer around each tract and included outlets within that buffer in the tract's density calculation.

We obtained data on the locations of all violent crimes reported to the police each year from the police departments that had jurisdiction over the places where participants lived. Consonant with FBI definitions (Federal Bureau of Investigation, 2011), violent crimes include homicide, non-negligent manslaughter, forcible rape, robbery, and aggravated assault. Offense locations were geocoded and we calculated the violent crime rate per 1000 residents for each tract each year; as with the alcohol outlet density calculation, offenses committed within a 100-foot buffer of the tract were included in that tract's violent crime rate calculation.

Because measures of tract characteristics were highly correlated, we performed principal components analysis with orthogonal rotation (varimax) on tract characteristics over time. The principal components analysis was performed on Wave 1 and Wave 2 data to allow us to define change in pre-/post-relocation exposure to tract characteristics. We identified two components with eigenvalues>1.0, which accounted for 86% of the total variance (Table 1): "economic disadvantage" (poverty rate, median household income, and high-school graduate rate) and "social disorder" (alcohol outlet density and violent crime rate). Principal component scores were extracted for each participant and used as predictors in models. Scores were standardized, and so a one-point difference in a component represents a difference of one standard deviation from the average component value for the sample.

2.3 Retention

We developed an intensive retention strategy to keep attrition low and random between waves of data collection. Strategies include monthly calls to each participant and $5 incentives for each successful contact; monthly calls to hard-to-reach participants' network members; and searches of a Lexus/Nexis Accurint database using participant social security numbers.

2.4 Analysis

Hypotheses about the relationship of tract-level characteristics to substance misuse were tested using a generalized linear mixed model (GLMM) which adjusted for clustering at both the tract and the participant level. Measures of tract characteristics were centered at their Wave 1 values (Singer and Willett, 2003), such that one variable represented the Wave 1 value and the other represented change since Wave 1. Potential individual-level confounders were tested simultaneously to determine their association with each outcome. Predictors with p-values<0.10 when controlling for other individual-level covariates were included in each final model (data not shown). Sociodemographic characteristics (e.g., income, marital status) showed little change across waves and were treated as fixed baseline predictors.

2.5 Ethics

Protocols were approved by Emory University's Institutional Review Board. A federal certificate of confidentiality was obtained to protect participant data.

3. RESULTS

We recruited 172 people into the study. Despite mass relocations and high levels of substance misuse in the sample, 96% of these participants (N=162) took part in Wave 2 data collection. More than half of the participants were women, and the mean age was 43 (Table 2). The sample was deeply impoverished at baseline: two thirds reported a household

income of <$9,999 in the past year and almost 90% were unemployed. There was virtually no change between Waves 1 and 2 in potentially time-varying sociodemographic characteristics (e.g., marital status, income).

Participants' substance misuse, however, did change between Waves 1 and 2. At baseline, 38.6% of the sample reported binge drinking twice or more during the 30-day reporting period; this figure dropped to significantly 26.8% at Wave 2 (p<0.01). The percent of the sample screening positive for drug or alcohol dependence declined substantially, from 21.3% to 10.7% (p<0.01), though declines in the percent of the sample reporting using illegal drugs weekly or more declined only slightly, from 28.7% to 25.2%.

At baseline, all participants lived in one of the seven census tracts containing one of the public housing complexes targeted by the 2007–2010 relocations. At Wave 2, participants had dispersed to new homes in 72 tracts; no participants moved to another public housing complex. The median distance between each participant's housing complex and their new home was 5 miles along the local road network. In the main, these relocations brought participants to census tracts that were qualitatively different from the tracts where they started. The tracts where the public housing complexes were located were economically disadvantaged: the mean poverty rate was 47% (SD:10) and on average across tracts the median annual household income was just $15,871 (SD:$4537). Post-relocation, the mean poverty rate was 29% (SD:13), still high but substantially lower than 47%, and the average median annual household income was $34,527 (SD:$17,671). The average violent crime rate dropped by 40%, from 36 incidents per 1000 residents (SD:16) at baseline to 21 incidents per 1000 residents (SD: 17) at Wave 2. The mean tract-level density of off-premises alcohol outlets dropped by 33%, from 9 outlets per square mile (SD:8) to 6 outlets per square mile (SD:5). On average, participants experienced more than a one standard deviation improvement in economic conditions over time (mean:–l.l SD, range –4.1 to 1.1 SD). Mean declines in social disorder across the sample were more modest (mean:–0.4 SD, range –3.3 to 3.1 SD), with some participants experiencing declines in exposure to violent crime and others (mainly those whose baseline tracts had lower violent crime rates) experiencing no change or slight increases. Drug/alcohol dependent and non-dependent participants experienced the same magnitudes of changes in tract-level economic disadvantage and social disorder.

Bivariate analyses indicated that improvements in tract-level economic conditions were associated with reductions in both binge drinking and illicit drug use frequency (Table 3). Improvements in tract-level social disorder were nominally associated with reductions in binge drinking. There were no significant associations between tract-level phenomena and dependence on alcohol or other drugs.

Examinations of the raw data associations suggested that the relationships between changes in tract-level exposures and the outcomes might be nonlinear, and so we dichotomized the change scores using a cutpoint of one standard deviation decline in each component. For reference, this defined change in economic conditions as an average decline in the poverty rate of 17%, an average decline of 21% in the percent of adults who did not have a high-school diploma, and an average increase in median income of $20,418 between waves.

In multivariate models using these dichotomous measures of change in tract-level phenomena, we found that the relationships between changes in economic conditions and both binge drinking and illegal drug use remained significant after adjusting for relevant individual level covariates (Models A–C in Table 4). A one standard deviation improvement in economic conditions was associated with a decrease from 34% to 20% in binge drinking twice or more in the 30-day reporting period, and with a decline from 37% to 16% in using

illicit drugs weekly or more. The social disorder component was not significantly associated with any outcome. As in bivariate analyses, there was no relationship between tract-level characteristics and dependence on alcohol or other drugs.

Given that re-/post-relocation changes in the social disorder component were associated with binge drinking in bivariate analyses at p=0.09 (Table 3), we pursued further analyses to determine whether either of this component's constituent predictors (i.e., alcohol outlet density or violent crime) was the source of this association by putting both predictors in the model separately, along with the component score for economic conditions. Continuous change scores for these two predictors were nominally associated (p<0.10) with binge drinking, but the presence of violent crime in the model removed the association between economic disadvantage and the outcome, indicating collinearity. Further examination indicated that the violent crime rate was indeed highly correlated with the constituent parts of the economic disadvantage component, and therefore could not be included in models that also contained economic disadvantage. In a model that included the economic disadvantage component and alcohol outlet density we found that a reduction in tract-level outlet density of >3.0 outlets per square mile predicted a reduction in binge drinking from 32% to 18% at the p=0.05 significance level (Model D in Table 4).

4. DISCUSSION

Our analyses indicate that Atlanta's 2007–2010 relocations moved participants to census tracts that had better economic conditions and somewhat less social disorder than their original tracts, and that participants who experienced greater improvements in select tract-level conditions reported reduced probability of recent substance misuse post-relocation. Specifically, a one standard deviation improvement in economic conditions was associated with a decrease from 34% to 20% in recent binge drinking, and with a decline from 37% to 16% in using illicit drugs weekly or more. A reduction in tract-level outlet density of >3.0 outlets per square mile predicted a reduction in binge drinking from 32% to 18% at the p=0.05 significance level. Neither our measure of social disorder nor our measure of economic disadvantage was associated with dependence.

Our study adds to the body of cross-sectional research on neighborhoods and substance misuse by investigating whether *changes* in exposure to specific characteristics of the local environment are related to drug or alcohol consumption among adults over time. Our conclusion that improved economic conditions are associated with reduced probability of binge drinking and illicit drug use echo results of cross-sectional studies (Boardman et al., 2001; Jones-Webb et al., 1997; Williams and Latkin, 2007). Notably, these relationships were evident in our sample despite the fact that relocations often took participants to census tracts that were still quite economically disadvantaged. Drawing on past cross-sectional work, we posit that possible mechanisms driving these relationships in our sample may include reduced exposure to social stressors and reduced psychological distress (Boardman et al., 2001). Indeed, past research with "Moving to Opportunity" relocaters suggests that moving to less distressed areas is associated with reductions in depression (Sanbonmatsu et al., 2011). Likewise, our finding that reduced spatial access to off-premises alcohol outlets was related to lower odds of binge drinking is consonant with results of several cross-sectional studies of outlet density and alcohol consumption (Campbell et al., 2009; Connor et al., 2011; Huckle et al., 2008; Kavanagh et al., 2011; Kuntsche et al., 2008; Popova et al., 2009; Schonlau et al., 2008; Scribner et al., 2000; Theall et al., 2009), and may perhaps be explained by reduced access to alcohol and by changing exposure to local social norms concerning alcohol use. Past research indicates that relocaters' networks change substantially after they move (Clampet-Lundquist, 2004). Our future research will explore

whether these changes occurred in our sample, and whether they may act as mechanisms through which changing environmental conditions relate to substance misuse.

In contrast to past cross-sectional research, neither binge drinking nor illicit drug use was associated with changes in the social disorder component. We note that all but one of the papers found on social disorder and substance misuse measured social disorder subjectively (Hill and Angel, 2005; Latkin et al., 2005, 2007). Possibly, the focal exposure should be *perceived* social disorder, rather than an objective measure of this construct, as was used here. Relatedly, the effect of changes in social disorder may be delayed: it may take time, for example, for relocaters to perceive that their new neighborhood is less violent than their last neighborhood. Future analyses will explore this possibility.

While our sample experienced substantial declines over time in substance dependence, these changes were unrelated to changes in tract-level phenomena in our sample. Past cross-sectional research has found associations between neighborhood characteristics and patterns of drug and alcohol consumption, but not dependence (Boardman et al., 2001; Hill and Angel, 2005; Jones-Webb et al., 1997; Latkin et al., 2005, 2007; Schroeder et al., 2001; Williams and Latkin, 2007). Unlike binge drinking or illicit drug use, substance dependence is a psychiatric disorder and may thus be less rapidly affected by changes in the local environment. This study's longitudinal design will allow us to learn whether changes in the local environment eventually affect dependence.

This paper also contributes to the growing line of research on public housing relocations and health, an important topic, given that the US has been undergoing a paradigm shift in public housing policy and that public housing residents tend to be in poorer mental and physical health than other populations. Specifically, our findings deepen understanding of the possible effects of these relocations on relocaters' substance misuse patterns. Fauth et al's (2004a) cross-sectional analysis concluded that relocaters reported lower rates of problematic alcohol use but not problematic illicit drug use. We were able to build on these findings by identifying the changes in exposure to *specific* tract-level characteristics that were related to substance misuse outcomes (i.e., economic conditions and alcohol outlet density but not the social disorder component).

We caution, however, that these results do not contribute directly to important debates about whether distressed public housing should be demolished and residents dispersed or whether distressed public housing should be revitalized and communities preserved. Key concerns for the latter position are that relocations are a form of forced migration of a predominately Black/African-American group that disregards the value of the existing communities and continues the history of serial displacement of Black/African-American communities. This is a vital discussion, but studying the question of demolition vs. revitalization would have required a comparison group of residents of distressed communities that were revitalized, and no such communities existed in our study site at the time of data collection.

As noted, we could not use methods designed to generate probability-based samples to create the cohort because the relocations were underway when the study began. The extent to which our findings are generalizable to the underlying populations of relocaters (i.e., those who are dependent, misusing substances but not dependent, and non-misusers) is unknown. We note, however, that our sample's characteristics are similar to those of the underlying population of residents in each of the seven complexes, as reported by the Department of Housing and Urban Development (Department of Housing and Urban Development, 2000); its composition is also similar to that of a multi-site Urban Institute study of HOPE VI relocaters (Tables 5a and 5b). In some instances, our sample had a higher proportion of 25–61 year olds than the HUD sample, a difference that may reflect real

differences between the age composition of substance misusing residents and that of the underlying resident population. In addition, the Urban Institute study oversampled households with children, which may have produced a larger median household size and higher proportion of 25–34 year olds.

Since we could not randomize relocaters to census tracts it is possible that the relationships we found between changes in tract economic disadvantage and substance misuse are a product of "sorting" into tracts according to baseline substance misuse status. Arguing against this interpretation, we found there were no differences in the magnitudes of pre-/post-relocation changes in tract conditions by baseline substance misuse status.

We could not create a true comparison group for this study: no severely distressed or obsolete complexes remain in Atlanta and the non-distressed/obsolete complexes had very different resident compositions from the complexes targeted by Section 18 and were located in qualitatively different neighborhoods. We therefore cannot rule out the possibility that the changes in substance misuse observed here were driven by participant aging or by other historical changes in the city that were contemporaneous with the relocations and affected patterns of substance misuse. As is the case with all pre-/post-intervention designs, we cannot partition pre-/post-relocation differences in substance misuse into true change and measurement error. Additionally, because the Census Bureau shifted from using the Decennial Census to the ACS to gather data on economic indicators, we had to use ACS data rather than Decennial Census data to estimate tract-level economic disadvantage at Wave 2. This shift may have affected our estimates of changes in economic disadvantage in unknown ways. We note, however, that changes in substance-related outcomes were systematically associated with specific changes in tract-level phenomena in ways supported by past cross-sectional research, suggesting that they are not merely artifacts of these threats to validity.

Data on substance misuse patterns were derived from participant self report rather than from biosamples. We suspect, however, that any bias that self-reported data might have introduced would have driven our findings to the null. Because of the rules governing public housing occupancy, participants would have had greater incentive to under-report substance misuse at baseline, when they were still living in the public housing complexes, rather than post-relocation, when they were living in private rental units scattered across Atlanta. Notably, despite this likely bias we still detected a substantial decline in self-reported substance misuse across waves. Our use of audio-computer assisted self-interview methods to query substance misuse may have reduced social desirability bias somewhat at baseline (and at Wave 2; Perlis et al., 2004).

If substantiated by future research, our findings have implications for relocation policies. First, public housing authorities could encourage relocaters to move to voucher-subsidized housing located in neighborhoods that are not seriously economically disadvantaged. Since voucher-subsidized rental units are disproportionately located in economically disadvantaged areas (Devine et al., 2003), this may require creating new incentives for landlords in less impoverished areas to accept vouchers. Second, given that relocations appear to coincide with reductions in substance misuse, housing authorities could provide opportunities for local health departments and drug/alcohol treatment programs to identify relocaters who were interested in reducing or ceasing their substance misuse and link them to care.

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Table 1

Results of a principal components analysis of five census tract characteristics at Wave 1 and Wave 2.[1]

Measure	Economic Disadvantage	Social Disorder
Poverty rate	0.913	0.185
Median household income	−0.893	−0.242
Percent of residents without a high-school diploma	0.899	−0.037
Density of alcohol outlets per square mile	−0.045	0.963
Violent crime rate	0.527	0.764

[1]Standardized coefficients represent the correlation between the measure and the corresponding factor.

Table 2

Distributions of individual- and census-tract level characteristics at baseline in a sample of 172 African-American adults relocating from public housing complexes targeted bv HOPE VI.

Characteristic of participants and census tracts	Wave 1 % (N) or Mean (SD)	Wave 2 % (N) or Mean (SD)
Participant Characteristics		
Gender		
Woman *	56.4% (97)	58.9% (96)
Man	43.6% (75)	41.1% (67)
Age	43.1 (13.9)	43.8 (13.8)
Married or living as married	8.7% (15)	9.8% (16)
Unemployed	89.5% (154)	85.9% (140)
Annual Household Income		
$0–$4,999	30.8% (53)	30.1% (49)
$5,000 – $9,999	34.9% (60)	29.5% (48)
$10,000 – $14,999	14.5% (25)	15.3% (25)
$15,000 – $19,999	7.0% (12)	6.8% (11)
$20,000	9.8% (17)	12.3 (20)
Refused/Missing	2.9% (5)	6.1% (10)
HIV positive (self report)	8.7% (15)	9.8% (16)
Binge drinking twice or more (30 day reporting period)	38.6% (64)	26.8% (42)
Use of illicit drugs weekly or more (6 month reporting period)	28.7% (48)	25.2% (40)
Met screening criteria for dependence on alcohol or other drugs (6-month reporting period)	21.3% (36)	10.7% (17)
Census tract characteristics		
Median household income	$15,870.6 ($4537.3)	$34,526.7 ($17,670.7)
Poverty rate	45.9% (9.6)	29.4% (12.9)
Percent of adults (25 years) with a high school diploma	67.1% (13.4)	50.5% (18.5)
Violent crime rate (per 1000)	35.9 (16.4)	21.4 (16.5)
Density of alcohol outlets per square mile	9.3 (8.0)	6.2 (5.0)
Economic Component	0.54 (0.56)	−0.58 (1.05)
Social Disorder Component	0.22 (1.15)	−0.23 (0.74)

*
Women included three individuals who were transgendered (male to female).

Table 3

Bivariate relationships between each individual- and tract-level predictor and each substance misuse outcome in a sample of 172 African-American adults relocating from seven HOPE VI public housing complexes. Relationships were modeled using generalized linear mixed models.

Measures	Drug/alcohol dependence Odds Ratio (p-value)	Frequency of binge drinking[2] Odds Ratio (p-value)	Frequency of illegal drug use[3] Odds Ratio (p-value)
Interview wave	0.29 (0.004)	0.42 (0.007)	0.68 (0.30)
Individual characteristics			
Age	1.02 (0.43)	1.02 (0.36)	0.93 (0.007)
Gender	2.91 (0.04)	1.03 (0.95)	1.81 (0.37)
Household Income	0.90 (0.43)	0.85 (0.19)	1.13 (0.35)
Employment status	0.08 (0.05)	0.31 (0.09)	0.15 (0.08)
Marital status	0.88 (0.87)	1.19 (0.79)	1.40 (0.69)
HIV positive (self reported)	0.24 (0.19)	0.18 (0.06)	0.89 (0.92)
Census tract characteristics			
Economic Disadvantage			
Baseline	0.73 (0.50)	2.17 (0.06)	3.24 (0.12)
Change since baseline	0.95 (0.88)	1.66 (0.06)	2.01 (0.04)
Social Disorder			
Baseline	1.16 (0.53)	0.94 (0.79)	0.85 (0.74)
Change since baseline	0.96 (0.88)	1.55 (0.09)	0.99 (0.96)

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[2]The frequency of binge drinking was operationalized as binge drinking once or less vs. twice or more in the past 30 days.

[3]The frequency of illegal drug use was operationalized as using less than weekly vs. weekly or more in the past six months.

Table 4

Multivariate relationships between individual- and tract-level predictors and each substance misuse outcome in a sample of 172 African-American adults relocating from seven HOPE VI public housing comDlexes. RelationshiDS were modeled using generalized linear mixed models.

Measures	Model A: Frequency of illegal drug use[4] Odds Ratio (p-value)	Model B: Drug/alcohol dependence Odds Ratio (p-value)	Frequency of binge drinking[5] Odds Ratio (p-value)	
			Model C	Model D
Intercept	3.78 (0.34)	0.08 (0.000)	0.38 (0.009)	0.32 (0.02)
Interview wave	1.50 (0.46)	0.27 (0.05)	0.82 (0.66)	1.18 (0.72)
Individual Characteristics				
Age	0.92 (0.008)	--	--	--
Gender	--	3.28 (0.05)	--	--
Employment status	0.12 (0.06)	0.07 (0.05)	--	--
HIV positive (self reported)	--	--	0.19 (0.06)	0.17 (0.05)
Census Tract Characteristics				
Economic Disadvantage				
Baseline	1.92 (0.34)	0.92 (0.87)	1.96 (0.10)	2.17 (0.06)
1 standard deviation Improvement since baseline	0.18 (0.02)	0.99 (0.87)	0.32 (0.04)	0.30 (0.03)
Social Disorder				
Baseline	1.23 (0.58)	1.14 (0.98)	0.96 (0.86)	--
1 standard deviation improvement since baseline	1.44 (0.67)	1.14 (0.88)	0.62 (0.50)	--
Off-premises alcohol outlet density per square mile	--	--	--	
Baseline	--	--	--	1.01 (0.68)
>3 point decrease				0.29 (0.05)

[4]The frequency of illegal drug use was operationalized as using less than weekly vs. weekly or more in the past six months.

[5]The frequency of binge drinking was operationalized as binge drinking once or less vs. twice or more in the past 30 days.

Table 5

a. Comparison of study sample characteristics and characteristics of the underlying populations of residents in each of the seven HOPE VI communities in Atlanta, Georgia (Department of Housing and Urban Development, 2000)

Characteristics	Complex A		Complex B		Complex C		Complex D		Complex E		Complex F		Complex G	
	AHA	Sample	AHA	Sample	AHA	Sample	AHA	Sample	AHA	Sample	AHA	Sample	AHA	Sample
Median income ($)	8,200	7,500	7,500	7,500	7,500	2,500	7,700	7,500	7,200	10,000	7,500	7,500	7,100	7,500
Mean household size	4.1	4.1	3.5	4.0	3.2	5.1	2.4	2.7	3.1	4.0	1.0	1.2	1.0	1.0
Percent age…														
24 years	20	13	29	28	29	27	34	21	23	22	0	0	0	0
25–50 years	68	78	58	64	56	60	44	54	68	72	31	32	29	35
51–61 years	7	9	13	8	11	13	22	25	3	6	23	42	28	50
62 years	6	0	0	0	8	0	10	0	5	0	45	26	43	14

b. Comparing the study sample to the Urban Institute Multisite Sample (Popkin et al., 2002)

Characteristics	Urban Institute Multisite Sample	Study Sample
Median Income ($)	**7,500**	**7,500**
Percent of adults age…		
18–24	10	12
25–34	27	18
35–49	37	35
50–61	14	27
62	11	8
Median household size	3–4 people	2 people
Percent Married	10	10