



HHS Public Access

Author manuscript

AIDS Behav. Author manuscript; available in PMC 2018 July 01.

Published in final edited form as:

AIDS Behav. 2017 July ; 21(7): 2079–2092. doi:10.1007/s10461-017-1738-1.

The effects of housing status, stability and the social contexts of housing on drug and sexual risk behaviors

Julia Dickson-Gomez, Ph.D., Timothy McAuliffe, Ph.D., and Katherine Quinn, Ph.D.

Center for AIDS Intervention Research, Medical College of Wisconsin, Milwaukee, WI

Abstract

Research on the relationship between housing instability and HIV risk has often focused on two different conceptions of stability. In one conceptualization, housing stability is defined according to physical location with homeless or unstably housed individuals defined as those who reside in places not meant for human habitation or in emergency shelters. The other conceptualization has defined housing stability as individuals' degree of transience, often operationalized as the number of moves or evictions a person has had within a specified amount of time. Less studied has been the social context of living situation, e.g. living with other drug users, conflict over living expenses, or having to have sex in order to stay. This paper uses data from 392 low-income residents in Hartford, CT to explore how people in different housing situations—including those who are housed and homeless—experience housing stability, feelings of security in their homes, and the social context of their housing. We then explore how these varied measures of housing context affect drug use frequency and sexual risk. Results show that participants who are homeless feel more overall housing instability in terms of number of moves and negative reasons for moving. Those who were doubled up with family or friends were more likely to experience conflict over household expenses and more likely to live with drug users. Among homeless and housed, hard drug use was associated with experiencing violence in the place where they lived, perceiving greater housing stability, having moved for a positive reason, doubling up, and longer periods of homelessness, while number of moves and longer prison sentence predicted sexual risk. Among the housed, living with other drug users was associated with more hard drug use, while contributing money toward household expenses was associated with less hard drug use. Two significant interactions were associated with sexual risk among the housed. Those with longer prison sentences who lived with drug users had more sexual partners, and those with longer prison sentences who doubled up had more sex partners. Results of this study indicate that measures of housing status not often considered in the literature such as the social context of housing have significant effects on HIV risk.

Compliance with ethical standards.

Conflict of Interest: Julia Dickson-Gomez declares she has no conflict of interest. Timothy McAuliffe declares that he has no conflict of interest. Katherine Quinn declares she has no conflict of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional committee and with the 1964 Helsinki declaration and its later amendments of comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

INTRODUCTION

Much research has documented a strong link between homelessness and housing instability and HIV. The homeless are three to nine times more likely to become infected with HIV than their housed counterparts¹⁻⁵. Homelessness has been linked to a number of risk behaviors that increase individuals' risk of becoming infected with HIV, including injection drug use⁶⁻⁸, needle sharing⁹, exchanging sex⁹⁻¹² and unprotected intercourse^{10,13}.

Research on the relationship between housing instability and HIV risk has often focused on two different conceptions of stability. Much research defines housing stability according to physical location with homeless or unstably housed individuals defined as those who resided in places not meant for human habitation, or who resided in emergency shelters. Much early research used dichotomous measures of housing stability contrasting those who were literally homeless as defined above with those who were housed.

Other research created three categories, including homeless, those who were unstably housed by temporarily living with family, friends or acquaintances, and those who were stably housed in their own apartments. While this early research demonstrated a clear association between homelessness and HIV risk, many researchers argued that these definitions obscured important subgroup differentiation¹⁴⁻¹⁶. In contrast, Smereck and Hockman¹⁷ found significant differences in risk and HIV prevalence among on the street homeless drug users compared to those who resided in shelters or boarding houses. Other research has defined housing stability as individuals' degree of transience, often operationalized as the number of moves or evictions a person has had within a specified amount of time¹⁸⁻²³. In general, research has found that more residential instability is associated with more drug and sexual risk behaviors and may also independently contribute to HIV risk. For example, Reed and colleagues²⁰ found that greater residential instability among female sex workers in Andhra Pradesh, India was associated with greater sexual risk behaviors, including unprotected sex, recent STIs and physical and sexual victimization, and that instability remained significantly associated with recent STIs beyond the influence of violence and unprotected sex with clients. The authors suggest that frequent evictions may disrupt social networks and lead women to networks of clients with higher rates of HIV. In spite of these robust findings, however, one problem in this literature is that reasons for moving are generally not assessed which may decrease effect sizes in cases where moves are not desired. People may move because they are evicted by landlords or apartment lessees, in which case the move is not desired and may increase social instability, or they may move to better their living conditions which may act to lessen their risk behaviors¹⁸. This is in contrast to sociological research which has often assumed that urban residents move voluntarily. Recent research has confirmed that many urban low-income residents, particularly ethnic minorities, are forcibly removed from their residences and that court records underestimate the extent to which this happens²⁴. Forcible moves include formal evictions but also informal evictions in which a landlord tells the tenant to move but does not take it to court or simply changes the locks, foreclosures and housing being condemned.

Moreover, little research has carefully examined the social context of different housing situations. The category "housed" in early research obscures characteristics of housing that

may affect stability, and consequently risk, such as affordability, the relationships with persons with whom people live (such as whether they are drug users), access to supportive mental health, substance use and eviction prevention services, and perceived housing stability. Understanding the social context of housing is particularly salient for drug using populations as research has shown that substance use problems afflict anywhere from 28 to 67% of homeless individuals^{12,25–28}, and that substance abuse increases individuals' vulnerability to homelessness^{29,30}. These factors may affect drug use and injection and sexual HIV risk among those who would have been categorized as housed in earlier research^{16,31}. For example, an individual categorized as “housed” may reside in unaffordable housing and open up their homes to drug using acquaintances who pay a portion of the rent, utilities or food expenses^{32,33}. Living with other drug users may create a context in which drug and sexual risk increases. Rental subsidies, such as Housing Choice vouchers, may make housing more affordable to low-income inner-city residents and may therefore help decrease HIV risk^{34,35}. On the other hand, qualitative research has suggested that among drug users, even those who receive housing subsidies often have little or no income to pay their other necessities such as food or utilities. Drug users report engaging in a number of informal, illegal and bartering relationships with drug using and non-drug using friends and family in order to obtain income³², which may also increase their risk.

Perceived housing instability—individuals' perceptions that they are likely to lose their current source of housing—also may be related to HIV risk. Our previous qualitative research indicates that when drug users see eviction as a foregone conclusion, they often increase drug and sexual risk behaviors in part due to the stress of an imminent eviction, and in part because they stop paying rent they can't afford and spend the money on drugs³⁶. Supportive housing (permanent subsidized housing with supportive services attached) is designed to increase housing stability by intervening with residents to prevent evictions. The supportive services offered may decrease risk behaviors directly by providing substance abuse and mental health treatment, or indirectly by increasing housing stability.^{37–40}

Weir and colleagues¹⁶ tested the relationship between some of these more nuanced housing indicators and HIV risk behaviors, including temporal stability (the number of moves in the last 6 months), physical characteristics of housing and whose residence it was, perceptions of the stability of current residence, and perceptions of the need for housing services. Interestingly, in cross-sectional and longitudinal analyses, each risk indicator (hard drug use, needle sharing, sex exchange, and unprotected intercourse) was associated with multiple indicators of poor housing, but the patterns of association varied by risk behavior.

This paper uses data from 392 low-income residents in Hartford, CT to explore how people in different housing situations (including living on the street or in a shelter, “doubled up” or living temporarily with friends, family or sex partners, living in own apartment without a housing subsidy, living in a subsidized apartment, or living in supportive housing) experience housing stability, feelings of security in their homes, and the social context of their housing. First, we look at the associations of housing stability and the social context of housing by housing status to see whether these vary according to whether an individual is homeless, temporarily living in other people's apartment, in their own apartments without subsidies, or in their own apartments with subsidies or supportive housing. We hypothesized

that those in their own apartments, particularly those who received some housing subsidies, would experience and perceive greater housing stability than those who were doubled up or homeless as these are often considered transient and precarious housing situations. We further hypothesized that participants in their own apartments, especially those with housing subsidies, would experience fewer negative social interactions in the places they lived such as experiencing violence, having conflicts over expenses, having to have sex in order to stay, sharing drugs in order to stay and living with other drug users. We then used negative binomial and zero-inflated negative binomial regression models to test the impact of housing status and the social context of living situations on risk behaviors (drug use frequency, number of sex partners, and number of sex partners with whom had condomless sex). We hypothesized that those with more precarious housing statuses, doubling up or homeless, would show greater drug and sexual risk than those living in subsidized or unsubsidized apartments. Further, we hypothesized that greater housing instability (number of moves, particularly negative reasons for moves) would be associated with greater risk behaviors, as would living with other drug users, experiencing violence, having to have sex or share drugs in order to stay in the apartment, and having conflicts with roommates over household expenses. Finally, we hypothesized that less affordable housing, measured as the ratio between income and total rent, and perceived housing instability would predict greater risk behaviors as those who feared eviction might increase their drug and sexual risk behaviors.

METHODS

Study Population

Study participants were 392 low-income residents of Hartford and East Hartford recruited through a targeted sampling plan between October 2008 and August 2010. Formative research was conducted that reviewed: 1) 2000 census data to identify low-income block groups, 2) data from town property assessors, town planning departments and other sources to identify areas in each town that have experienced significant change in housing stock characteristics since the 2000 census, 3) windshield surveys in high poverty block groups to further identify changes in housing stock and identify recruitment locations, and 4) key informant interviews. These data were used to develop the targeted sampling plan to target recruitment in appropriate geographic areas and recruit a sample representative of low-income residents in the two study sites. Details of the recruitment plan have been published elsewhere⁴¹.

Measures

Current housing status was measured as the place that participants felt best described their current living situation and included: 1) doubling up with sex partner, friend, or family member defined as temporarily living in someone else's apartment; 2) living in own apartment with no rental subsidy; 3) living in own apartment with a rental subsidy (such as Section 8, Housing Plus Vouchers) or living in supportive housing, (housing that is paid for by a rental subsidy and includes supportive services); or 4) homeless (living in a shelter or on the street).

Social contextual housing factors measured included: whether the participant pays or contributes to rent (0=no, 1=yes); whether the participant contributes to other household expenses (0=no, 1=yes); whether he or she has conflicts with other people in the apartment over household expenses; the ratio of the amount of rent the participant pays to the amount of monthly income; number of total people with whom the participant lives; whether drug users live in the apartment (0=no, 1=yes); whether the participant has to give drugs in order to stay there (0=no, 1=yes); whether the participant has to have sex with someone in order to stay in the apartment (0=no, 1=yes); whether the participant lives with non-relatives in the apartment; and whether the participant experiences violence in the place they are staying (0=no, 1=yes).

We also measured participants' *perceived housing stability* by asking on a scale from 1 to 5 how likely they thought it was that they would be living in their current location in the next 3 months (1=not at all likely, 5=very likely, almost definitely). We measured participants' *transience* as the number of times they had moved in the last 6 months. Reasons for any move in the last 6 months were coded as positive (e.g., obtained a better apartment, received a rental subsidy), or negative (e.g., was evicted, apartment was uninhabitable). We then counted the number of negative and number of positive reasons for moving for use in analysis. We also created dichotomous variables, with participants having moved for any negative reason (0=no, 1=yes) or any positive reason (0=no, 1=yes). We measured participants' feeling safe in the place one lives (1=disagree strongly, 4=agree strongly) and perceived gang activity in neighborhood (0=never, 4=very often).

For those who had used drugs in the last 30 days, drug use frequency included number of times injected cocaine, heroin or speedball (heroin and cocaine combined); and number of times used crack in the last 30 days. For the entire sample, we measured frequency of alcohol use, the total number of sexual partners, and the number of different partners with whom they had had unprotected sex in the last 30 days.

Personal characteristics included ethnicity, gender, having a mental illness diagnosis, income from employment and income from welfare benefits. *Social instability* was measured as incarceration in the last 6 months, number of times homeless, longest duration of homelessness, and longest prison sentence received.

Analysis

Statistical Methods—We performed Chi-square analyses for categorical variables and Kruskal-Wallis analyses for ordinal variables to investigate the associations between housing status (see above) and personal characteristics, perceived and actual housing stability, perceived safety and the social context of participants' living situations. We used negative binomial and zero-inflated negative binomial regression models to test the impact of housing status and the social context of living situations on the frequencies of hard drug use and engagement in sexual risk behavior. We compared those living on the street or in a homeless shelter, those living with a family member, a sex partner or a friend, those living in their own apartments with a rental subsidy or supportive housing, and those living in their own apartments without a rental subsidy (reference group). Hard drug use frequency is defined as the number of times smoked crack, sniffed or injected heroin or cocaine in the last 30 days.

Engagement in sexual risk behavior is quantified by the number of sex partners and by the number of partners with whom one had sex without condoms in the past 30 days. Distributions of counts of hard drug use and sexual risk behavior are often characterized by having large counts as well as a large number of zero counts in excess of what is expected under a negative binomial distribution. We used zero-inflated negative binomial regression models to account for the existence of an excess of zero counts. Zero-inflated negative binomial regression simultaneously fits a negative binomial regression model to the risk behavior counts and a logistic regression model for the excess zero counts. The zero-count logistic regression model predicts no engagement in the risk behavior for the outcome. Covariates with statistically significant positive logistic regression coefficients are predictive of no engagement. The negative binomial regression model predicts the number of engagements in the risk behavior for the outcome. Covariates with statistically significant positive negative binomial regression coefficients are predictive of a greater number of risk events.

For each risk behavior, first we performed univariate negative binomial regressions to identify univariate predictors of risk behavior among the personal characteristics, arrest and incarceration, perceived housing stability, perceived safety of housing and neighborhood, and social contextual housing factors for housed individuals. Then, we performed the zero-inflated negative binomial multiple regression using a backward stepwise selection including variables significant in the univariate regression analysis at the 0.20 level for at least one of the primary outcomes. Although they were not significant at the 0.2 level, we also included longest time served in prison and longest time homeless in the final models because they have been shown to be important predictors in the literature. We investigated the significance of all potential two-factor interactions in the final stepwise regression models. We performed analogous regression analyses for all individuals as well as for only those who were housed. Social context of living situation variables were included in the stepwise selection process for regressions of housed individuals.

RESULTS

Demographic characteristics

A total of 293 of the 392 study participants were currently housed, another 99 were un-housed (i.e., lived in a shelter on the streets, in a half-way house or in a YMCA/hotel). The distributions of demographic characteristics for the 374 included participants (excluding 18 in half-way houses or hotels) are presented by housing status in Table I. The median age was 45 years [range 21–80 years]. The majority (n=243, 65%) of participants were male. Forty-five percent (n=170) self-identified as Latino, 35% (n=132) Black and 18% (n=67) White. Forty-four percent (n=165) had completed less than high school education. Most (n=361, 96%) had been tested for HIV. Half (n=187, 50%) reported having been told by a doctor that they have a mental illness diagnosis and 25% (n=93) that they have HIV/AIDS. The median monthly household income including all sources (i.e., welfare benefits, employment, etc.) was \$418. Fifty-seven percent (n=213) used crack, coke or heroin in the past 30 days. Forty-seven percent (n=171) drank alcohol in the past 30 days. Sixty-five percent (n=206) had been sexually active in the past 30 days—13% with more than one partner—and 30%

(n=113) had sex without using a condom. The longest prison sentence served by participants was calculated from the number of years, months or days reported truncated at 36 months, and was a median of 6 months (IQR, 36). Longest period of homelessness was similarly calculated and was a median of 6 (IQR 22).

Table 1 shows the associations between participants' personal characteristics based on the four different housing statuses described above. Those living on the street or in a shelter were less likely to be female, more likely to be White non-Latino and less likely to have an HIV diagnosis. They were more likely to use crack, coke or heroin and also tended to be more likely to use alcohol. Those who lived in their own apartment with a rental subsidy or in supportive housing were significantly less likely to use crack, coke, heroin or alcohol. Those currently homeless and those in subsidized or supportive housing have or have had the longest median period of homelessness (12 months).

Table 2 shows the associations between housing stability, safety, and social context of living situation and housing statuses. Those living on the street or in a shelter were significantly more likely to have moved in the last 6 months, to have had more than two moves, and to have moved for negative reasons. They were also less likely to report they were likely to be living in the same place in the next three months. They were significantly more likely to have experienced violence where they live and less likely to feel safe in the place they live. Those who were doubled up compared to other housed residents were more likely to contribute to household expenses and more likely to have conflicts over household expenses.. They also were more likely to live with another drug user.

Table 3A showed the results of univariate negative binomial analysis of the predictor variables on three risk outcomes: number of times used hard drugs in last 30 days; number of sex partners in last 30 days; and number of sex partners without condom use in last 30 days. All variables significant at the 0.20 level on one or more outcomes were included in the final outcome zero-inflated negative binomial multiple regressions reported in Table 3B. Longest period of homeless was also included although it did not reach the level of significance on any of the outcomes in univariate binomial regressions.

Table 3B presents results from regression analyses to predict counts of times used hard drugs, counts of number of sex partners, and counts of number of sex partners with whom condoms were not used for the full sample of homeless and housed individuals. Individuals who experienced violence where they live, who perceived they were more likely to live in the same place in the next three months, who reported having moved for a positive reason, who lived on the street or in a shelter, who lived with family, a sex partner or friend, or who had longer periods of homelessness were significantly more likely to report using crack, cocaine or heroin in the last 30 days. Being male and younger was also significantly associated with greater hard drug use. Individuals who perceived they were more likely to live in the same place in three months and who had longer prison sentences had more sex partners in the last 30 days. Age, doubling up with family, sex partner or friend, having a mental illness and feeling safe in the place one lives were not independent predictors of number of sex partners but had significant interactions with other variables on the number of sex partners in the last 30 days. Being older with a mental illness was associated with having

fewer sex partners, while having a mental illness and feeling safe in the place one lives was associated with having more sex partners. Having had a longer prison sentence and doubling up with family, friends or a sex partner was associated with having more sex partners, while having had a longer prison sentence and feeling safe in the place one lives was associated with having fewer sex partners. A zero-count logistic regression component was not fit because there was no evidence of an excess in number of zero counts for the number of sex partners in the last 30 days. Older individuals, those with less than a high school education, those who were told by a doctor that they have HIV/AIDS and those who have moved more times in the last six months were less likely to have had any condomless sex in the past 30 days. A negative binomial regression model component was not fit to the number of partners with whom had participants had condomless sex because there was an insufficient number of individuals who report having condomless sex with more than one partner in the last 30 days.

Table 4A presents results of univariate negative binomial regression analyses of the predictor variables on each of the three risk outcomes for the sample of housed individuals only. This table includes social contextual factors that were gathered only among housed individuals. Variables that were significantly associated with one or more of the outcomes at the 0.20 level were included in the final outcome zero-inflated negative binomial multiple regressions reported in Table 4A. As before, longest period of homeless was also included in the final model although it did not reach the level of significance in univariate binomial regressions.

Table 4B presents results from regression analyses to predict counts of times used crack, cocaine or heroin, counts of number of sex partners, and counts of number of different partners with whom participants had condomless sex for the sample of housed individuals only. Males, individuals with less than a high school education and those living with other drug users were more likely to have used hard drugs in the last 30 days. Those who were HIV positive and those living with a greater number of other people were less likely to have used hard drugs in the last 30 days. Among those who had used crack, cocaine or heroin in the last 30 days, male gender and doubling up with family friends or a sex partner was associated with more drug use, while having contributed money toward household expenses was associated with less hard drug use. Individuals who perceived they were more likely to live in the same place in 3 months, who contributed money towards household expenses, and younger individuals had more sex partners in the last 30 days. Doubling up with family, friends or a sex partner, living with other drug users and length of longest prison sentence were not independent predictors of the number of sex partners but had significant interactions with other variables on the number of sex partners in the last 30 days. Two significant interactions were found. Having longer prison sentences and living with other drug users was associated with having more sex partners. Having had longer prison sentences and doubling up with family, friends or a sex partner was also associated with having more sex partners. A zero-count logistic regression component was not fit because there was no evidence of an excess in number of zero counts for the number of sex partners in the last 30 days. Being older, having HIV/AIDS, and living with a greater number of people was associated with having condomless sex with fewer partners. Number of moves in the last six months was not an independent predictor of the number of partners with whom one had condomless sex but greater number of moves and older age interacted resulting in

having condomless sex with fewer partners. A zero-count logistic regression component was not fit because there was no evidence of an excess in number of zero counts for the number of partners with whom participants had condomless sex in the last 30 days.

DISCUSSION

Results from our study clearly show that the homeless live in extremely precarious situations. They were significantly more likely to have moved multiple times and for negative reasons than those in other housing situations. They were also more likely to have experienced violence in the place where they live. Also supporting our hypothesis, those who were doubled up were more likely to report negative aspects of their living context such as living with other drug users, having conflict over household expenses and contributing to household expenses than those living in their own apartments with or without subsidies. Also supporting our hypothesis, those with housing subsidies or supportive housing perceived greater housing stability than those in any other housing category.

These findings add to current sociological literature that finds that a significant number of low-income urban residents, particularly ethnic minorities, live in extremely precarious housing situations. Approximately on-half of poor renting households spend at least one-half of their income on housing costs, with one quarter dedicating more than 70% of their incomes to pay rents and utility costs. This housing crisis has been fueled by low-wage service jobs and a shortage of federal housing subsidies⁴². Federal housing subsidies have long waiting lists and there are twice as many households eligible for housing subsidies based on income as those who receive them⁴⁴.

Our results also confirm our hypothesis and previous research that those in more precarious housing situations had greater drug use frequency and sexual risk. Those who were homeless and those who were doubled up reported greater substance use. Similarly, housing stability was associated with risk behaviors, although the relationships varied depending on the measures used. Those with any positive reasons for moving used drugs more frequently in the past 30 days, while individuals who perceived that they were likely to be living in the same place in the next 30 days or longer prison sentences had a greater number of sexual partners and those with a greater number of moves in the last 6 months were more likely to have had condomless sex with a greater number of partners. However, since the current study is cross-sectional in design, causal relations cannot be inferred. It is not clear whether greater moves increased sexual risk behaviors, for example, by disrupting sexual networks or the increase in risky behavior was a symptom of greater overall instability in participants' lives, perhaps due to an increase in mental health symptoms. Longitudinal research is necessary to clarify causal relationships.

Results for the entire sample also show a number of interesting interactions, suggesting that the effects of complex living arrangements may be moderated by a number of personal and other characteristics. For example, age, feeling safe in their neighborhoods and perceived housing stability were not independently predictive of number of sex partners in the last 30 days. However, those who were diagnosed with a mental illness and older were less likely to have multiple sexual partners, while those diagnosed with a mental illness who felt safe in

their neighborhoods were more likely to have multiple sex partners. Those with longer prison sentences who felt safe in the place they lived were less likely to have multiple sex partners, while those with longer prison sentences who were doubled up had more sexual partners.

Finally, our results provide partial support for the hypothesis that negative social interactions may have large effects on people's risk behaviors. For those who were housed, living with drug users was associated with hard drug use and living with drug users interacted with longest prison sentence to predict total number of sex partners. Those with longer prison sentences who doubled up with family, sex partners or friends also had greater numbers of sexual partners. Extensive qualitative work with drug using populations in Hartford suggests that many families have multi-generational problems with substance use. Similarly, friends and sex partners with whom one is staying may or may not use drugs. Living with drug users regardless of your relationship to them may increase stress within the household, leading to substance use, and multiple sex partners. Contributing money to household expenses was associated with more hard drug use and more drug partners while having conflict over household expenses was associated with number of partners with whom participants had condomless sex. These variables suggest relatively stressful or coercive living situations in which participants felt pressured to contribute to expenses with money they may not have had. Doubling up with family and friends seemed to have a protective effect on hard drug use, while living with a greater number of people had a protective effect on total number of partners with whom had condomless sex. Living with greater numbers of people, particularly if these are doubled up situations, may decrease the opportunities for having sex within the apartment.

This study has some limitations which should be noted. First, as mentioned, the cross-sectional design precludes determining causal relationship between housing status and stability and sex and drug risk behaviors. All data were self-report, which may be subject to social desirability or recall biases, particularly for sexual and drug related behaviors. These biases may also be at work as participants report the complex social contexts in which they live.

CONCLUSIONS

Results from our research suggest that more nuanced measures of housing that include the relationships with the people with whom one is living, whether rental subsidies or supportive services are received, housing affordability, and housing stability explain more variability in risk behaviors than simple dichotomous measures of housing status. For example, our results suggest that living with drug users is associated with greater drug use and number of sexual behaviors. Different housing statuses were also associated with different measures of housing stability/instability. Together, these results suggest a need to increase availability of affordable housing and rental assistance to improve the lives and reduce HIV risk among low-income residents. However, numerous barriers to receiving affordable housing or rental subsidies exist, including laws that restrict access to or evict those convicted of drug or violent offenses from receiving rental subsidies. While some states ignore these laws, including Connecticut, in free market rental subsidies, residents must find fair market rental

housing and landlords routinely conduct criminal and credit background checks. These exclude many low-income residents the majority of whom in our project have had some criminal history and credit problems. While supportive housing has been proposed as a solution to these sorts of barriers, supportive housing is directed to the most vulnerable including the chronically homeless and those with mental health or other disabling conditions. This leaves many urban poor without viable housing options. There is a need to expand current housing options beyond efforts to end homelessness to increasing the housing stability and improving the living conditions of many urban poor, through expansion of low-income rental housing, mixed income housing units and other creative solutions. Improving access to affordable housing for all urban poor may help reduce many causes of health disparities.

Acknowledgments

Funding: The research presented in this paper was funded by grants from the National Institute on Drug Abuse (R01DA027299) and National Institute of Mental Health (P30MH57226).

References

1. Elifson KW, Sterk CE, Theall KP. Safe living: the impact of unstable housing conditions on HIV risk reduction among female drug users. *AIDS and Behavior*. 2007; 11:S45–S55.
2. Allen DM, Lehman S, Green TA, et al. HIV infection among homeless adults and runaway youth, United States, 1989–1992. *AIDS*. 1994; 8:1593–1598. [PubMed: 7848596]
3. Culhane DP, Gollub E, Kuhn R, Shpaner M. The co-occurrence of AIDS and homelessness: Results from the integration of administrative databases for AIDS surveillance and public shelter utilisation in Philadelphia. *Journal of Epidemiology and Community Health*. 2001; 55:515–520. [PubMed: 11413184]
4. Estebanez PE, Russel NK, Aguilar MD, Beland F, Zunzunegui MV. Women, drugs and HIV/AIDS: Results of a multicentre European study. *International Journal of Epidemiology*. 2000; 29:734–743. [PubMed: 10922353]
5. Zolopa AR, Hahn J, Gorter R, Miranda J, Włodarczyk D. HIV and tuberculosis infection in San Francisco's homeless adults. *Journal of the American Medical Association*. 1994; 272:455–461. [PubMed: 8040981]
6. Aidala A, Cross JE, Stall R, Harre D, Sumartojo E. Housing status and HIV risk behaviors: Implications for prevention and policy. *AIDS and Behavior*. 2005; 9(3):251–265. [PubMed: 16088369]
7. Wenzel SL, Tucker JS, Elliot MN, et al. Prevalence and co-occurrence of violence, substance use and disorder, and HIV risk behavior: a comparison of sheltered and low-income housed women in Los Angeles County. *Preventive Medicine*. 2004; 39:617–624. [PubMed: 15313103]
8. Susser E, Miller M, Valencia E, Colson P, Roche B, Conover S. Injection drug use and risk of HIV transmission among homeless men with mental illness. *Am J Psychiatry*. 1996; 153(6):794–798. [PubMed: 8633692]
9. Corneil TA, Kuyper LM, Shoveller J, et al. Unstable housing, associated risk behaviour, and increased risk for HIV infection among injection drug users. *Heath & Place*. 2006; 12:79–85.
10. Aidala A, Lee G, Garbers S, Chiasson MA. Sexual behaviors and sexual risk in a prospective cohort of HIV-positive men and women in New York City, 1994–2002: Implications for prevention. *AIDS Education and Prevention*. 2006; 18(1):12–32. [PubMed: 16539573]
11. Andia JF, Deren S, Kang SY, et al. Residential status and HIV risk behaviors among Puerto Rican drug injectors in New York and Puerto Rico. *The American Journal of Drug and Alcohol Abuse*. 2001; 27(4):719–735. [PubMed: 11727885]
12. Roysse D, Leukefeld C, Logan TK, et al. Homelessness and gender in out-of-treatment drug users. *American Journal of Drug and Alcohol Abuse*. 2000; 26(2):283–296. [PubMed: 10852361]

13. Surratt HL, Inciardi J. HIV Risk, Seropositivity and predictors of infection among homeless and non-homeless women sex workers in Miami, FL, USA. *AIDS Care*. 2004; 16(5):594–604. [PubMed: 15223529]
14. Argeriou M, McCarty D, Mulvey K. Dimensions of homelessness. *Public Health Reports*. 1995; 110:734–741. [PubMed: 8570828]
15. Marcus, A. *Where have all the homeless gone? The making and unmaking of a crisis*. New York: Berghan Books; 2006.
16. Weir BW, Bard RS, O'Brien K, Casciato CJ, Stark MJ. Uncovering patterns of HIV risk through multiple housing measures. *AIDS and Behavior*. 2007; 11:S31–S44.
17. Smereck GAD, Hockman EM. Prevalence of HIV infection and HIV risk behaviors associated with living place: On-the-street homeless drug users as a special target population for public health intervention. *American Journal of Drug & Alcohol Abuse*. 1998; 24(2):299–319. [PubMed: 9643467]
18. German D, Davey M, Latkin C. Residential Transience and HIV Risk Behaviors among Injection Drug Users. *AIDS and Behavior*. 2007; 11:S21–S30.
19. Davey-Rothwell MA, Latimore A, Hulbert A, Latkin C. Sexual networks and housing stability. *Journal of Urban Health*. 2011; 88(4):759–766. [PubMed: 21465331]
20. Reed E, Gupta J, Biradavolu M, Devireddy V, Blankenship KM. The role of housing in determining HIV risk among female sex workers in Andhra Pradesh, India: Considering women's life contexts. *Social Science & Medicine*. 2011; 72:710–716. [PubMed: 21306811]
21. Rosenthal D, Rotheram-Borus MJ, Batterham P, Mallett S, Rice E, Milbourn NG. Housing stability over two years and HIV risk among newly homeless youth. *AIDS and Behavior*. 2007; 11:831–841. [PubMed: 17497219]
22. German D, Latkin C. Social stability and HIV risk behavior: Evaluating the role of accumulated vulnerability. *AIDS and Behavior*. 2011 epub ahead of print.
23. Roy E, Robert M, Vaillancourt E, Boivin J-F, Vandermeerschen J, Martin I. Residential trajectory and high-risk behaviors among Montreal street youth--A reciprocal relationship. *Journal of Urban Health*. 2011; 88(4):767–788. [PubMed: 21494896]
24. Desmond M, Shollenberger T. Forced displacement from rental housing: prevalence and neighborhood consequences. *Demography*. 2015; 52:1751–1772. [PubMed: 26286885]
25. Fischer PJ, Breakey WR. The epidemiology of alcohol, drug, and mental disorders among homeless persons. *American Psychologist* Nov. 1991; 46(11):1115–1128.
26. Stahler GJ, Shipley TE, Bartelt D, Westcott D, Griffith E, Shandler I. Retention issues in treating homeless polydrug users: Philadelphia. *Alcoholism Treatment Quarterly*. 1993; 10(3–4):201–215.
27. Dennis, JL., Bray, RM., Iachan, R. Drug use and homelessness. In: Bray, RM., Marsden, ME., editors. *Comparative epidemiology: Examples from the DC Metropolitan Area Drug Study*. San Francisco: Sage; 1998. p. 79-123.
28. Lehman AF, Cordrey DS. Prevalence of alcohol, drug and mental disorder among the homeless: one more time. *Contemp Drug Problems*. 1993:355–386.
29. Johnson TP, Freels SA, Parsons JA, Vangeest JB. Substance abuse and homelessness: social selection or social adaptation? *Addiction*. 1997; 92(4):437–445. [PubMed: 9177065]
30. Spinner GF, Leaf PJ. Homelessness and drug abuse in New Haven. *Hospital and Community Psychiatry*. 1992; 43:166–168. [PubMed: 1572614]
31. Dickson-Gomez J, Hilario H, Convey M, Corbett AM, Weeks M, Martinez M. The relationship between housing status and HIV risk among active drug users: a qualitative analysis. *Substance Use & Misuse*. 2009; 44(2):253–281. [PubMed: 19142824]
32. Dickson-Gomez J, Convey M, Hilario H, Weeks M, Corbett AM. Hustling and housing: Drug users' strategies to obtain shelter and income in Hartford, CT. *Human Organization*. 2009; 63(3)
33. Dickson-Gomez J, Cromley E, Convey M, Hilario H. How much choice is there in housing choice vouchers? Neighborhood risk and free-market rental housing accessibility for active drug users in Hartford, Connecticut. *Substance Abuse Treatment, Prevention and Policy*. 2009; 4(5)
34. Wolitski RJ, Kidder DP, Pals SL, et al. Randomized trial of the effects of housing assistance on the health and risk behaviors of homeless and unstably housed people living with HIV. *AIDS and Behavior*. 2010; 14:493–503. [PubMed: 19949848]

35. Scott A, Ellen J, Clum G, Leonard L. HIV and housing assistance in four U.S. cities: Variations in local experience. *AIDS and Behavior*. 2007; 11:S140–S148.
36. Dickson-Gomez J, Convey M, Hilario H, Corbett AM, Weeks M. Structural and personal factors related to access to housing and housing stability among urban drug users in Hartford, Connecticut. *Contemp Drug Problems*. 2008; 35(1):115–152.
37. Tsemberis S, Gulcur L, Nakae M. Housing first, consumer choice, and harm reduction for homeless individuals with a dual diagnosis. *American Journal of Public Health*. 2004; 94(4):651–656. [PubMed: 15054020]
38. Hopper K, Barrow S. Two genealogies of supported housing and their implications for outcome assessment. *Psychiatric Services*. 2003; 54(1):50–54. [PubMed: 12509666]
39. Kessel ER, Bhatia R, Bamberger JD, Kushel MB. Public health care utilization in a cohort of homeless adult applicants to a supportive housing program. *Journal of Urban Health*. 2006; 83(5): 860–872. [PubMed: 16779686]
40. Buchanan D, Kee R, Sadowski LS, Garcia D. The health impact of supportive housing for HIV-positive homeless patients: a randomized controlled trial. *American Journal of Public Health*. 2009; 99(S3):S675–S680. [PubMed: 19372524]
41. Dickson-Gomez J, McAuliffe T, Convey M, Weeks M, Owczarzak J. Access to housing subsidies, housing status, drug use and HIV risk among low-income U.S. urban residents. *Substance Abuse Treatment, Prevention and Policy*. 2011; 6(31)
42. Desmond M. Eviction and the reproduction of urban poverty. *American Journal of Sociology*. 2012; 118:88–133.
43. Desmond M. *Unaffordable America: Poverty, housing, and eviction*. Fast Focus: Institute for Research on Poverty. 2015; 22:1–6.
44. Harvard University Joint Center for Housing Studies. *The state of the nation's housing 2007*. Cambridge, MA: Harvard University; 2007.

Table 1

Characteristics of low-income residents: Hartford and East Hartford, CT; 2008–2010.

Variable	On Street/In Shelter n=81	Family, friend or sex partner n=112	Own apartment with no subsidy n=48	Supportive housing or rent subsidy n=133	Chi-Sq.	p-value
Sociodemographic characteristics						
Age (years), median (IQR)	45.0 (11.0)	44.0 (11.0)	45.5 (13.8)	47.0 (15.0)	9.7 ³	0.01
Gender					16.2	0.005
Male, n(%)	68 (84)	67 (60) ¹	28 (58)	80 (60)		
Female, n(%)	13 (16)	44 (39) ¹	20 (42)	53 (40)		
Race/ethnicity					28.7 ²	<0.001
Black, n(%)	24 (30)	42 (38)	15 (31)	51 (38)		
White (non-Hispanic), n(%)	30 (37)	15 (13)	5 (10)	17 (13)		
Hispanic or Latino, n(%)	25 (30)	54 (48)	28 (58)	63 (47)		
Other, n(%)	2 (2)	1 (1)	0 (0)	2 (2)		
Education completed					16.2	0.013
Less than high school, n(%)	31 (38)	52 (46)	28 (58)	54 (41)		
High school or GED, n(%)	43 (53)	46 (41)	12 (25)	50 (38)		
Vocational, Tech, or some college, n(%)	7 (9)	14 (13)	8 (17)	29 (22)		
Total income per month (\$), median [IQR]	298 (319)	368 (488)	817 (448)	669 (617)	71.8 ³	<0.001
Less than \$200, n(%)	21 (26)	22 (20)	2 (4)	14 (10)		
\$200–\$399, n(%)	33 (41)	37 (33)	3 (6)	36 (27)		
\$400–\$599, n(%)	11 (14)	15 (13)	4 (8)	11 (8)		
\$600–\$799, n(%)	6 (7)	20 (18)	13 (27)	22 (16)		
\$800–\$999, n(%)	4 (5)	8 (7)	12 (25)	34 (26)		
\$1000 or over, n(%)	6 (7)	10 (9)	14 (29)	16 (12)		
Longest prison sentence (months) ⁴ , median (IQR)	6.0 (34.5)	6.0 (36.0)	5.0 (24.0)	7.0 (36.0)	1.1 ³	0.79
Longest homeless period (months) ⁴ , median (IQR)	12.0 (20.5)	6.0 (11.0)	3.0 (12.0)	12.0 (22.0)	17.5 ³	0.001
Health characteristics						
Mental illness diagnosis					14.7	.002

Variable	On Street/In Shelter n=81	Family, friend or sex partner n=112	Own apartment with no subsidy n=48	Supportive housing or rent subsidy n=133	Chi-Sq.	p-value
Yes, n(%)	40 (49)	44 (39)	20 (42)	83 (62)		
No, n(%)	41 (51)	68 (61)	28 (58)	50 (38)		
HIV/AIDS diagnosis					39.1	<0.001
Yes, n(%)	5 (6)	18 (16)	17 (35)	53 (40)		
No, n(%)	76 (94)	94 (84)	31 (65)	79 (60)		
Sexual risk behavior						
Number of different sex partners in the past 30 days, mean (range)	.7 (0 – 8)	1.5 (0 – 45)	.7 (0 – 3)	.6 (0 – 5)	10.4 ³	.015
Had any sex without a condom in the last 30 days					2.3	.50
Yes, n(%)	22 (27)	39 (35)	16 (33)	36 (27)		
No, n(%)	59 (73)	73 (65)	32 (67)	97 (73)		
Substance use						
Smoked crack, or sniffed/injected coke, or sniffed/injected heroin in the past 30 days					20.5	<0.001
Yes, n(%)	58 (72)	72 (64)	26 (54)	57 (43)		
No, n(%)	23 (28)	40 (36)	22 (46)	76 (57)		
Drank alcohol in the past 30 days					11.1	.011
Yes, n(%)	45 (56)	57 (55)	22 (46)	47 (36)		
No, n(%)	36 (44)	47 (45)	26 (54)	83 (64)		

Excludes 18 individuals currently in a half-way house or in a YMCA/hotel.

¹ One transgendered respondent.

² Excludes the race = "Other" category.

³ Kruskal-Wallis Chi-square test statistic

⁴ Longest prison sentences and longest homeless periods greater than 36 months are truncated at 36.

Table 2
 Social contextual housing factors of low-income residents (n=392): Hartford and East Hartford, CT; 2008–2010.

Variable	On Street/In Shelter N=81	Family, friend or sex partner N=112	Own apartment with no subsidy N=48	Supportive housing or rental subsidy N=133	Chi-Sq.	p-value
Times moved in last 6 months					65.8	<0.001
0, n(%)	22 (27)	83 (74)	38 (79)	85 (64)		
1, n(%)	36 (44)	19 (17)	7 (15)	42 (32)		
2 or more, n(%)	23 (28)	10 (9)	3 (6)	6 (4)		
Negative reasons for moves in last 6 months					21.5	0.011
0, n(%)	38 (47)	84 (75)	33 (69)	97 (73)		
1, n(%)	26 (32)	17 (15)	8 (17)	18 (14)		
2, n(%)	12 (15)	8 (7)	5 (10)	13 (10)		
3 or more, n(%)	5 (6)	3 (3)	2 (4)	5 (4)		
Positive reasons for moves in last 6 months					20.0	0.018
0, n(%)	46 (57)	88 (79)	34 (71)	91 (68)		
1, n(%)	16 (20)	11 (10)	8 (17)	27 (20)		
2, n(%)	15 (18)	11 (10)	5 (10)	7 (5)		
3 or more, n(%)	4 (5)	2 (2)	1 (2)	8 (6)		
Likelihood of being at the same place in 3 months					108.9	<0.001
Not at all likely, n(%)	23 (28)	8 (7)	5 (10)	6 (4)		
Somewhat unlikely, n(%)	7 (9)	7 (6)	0 (0)	3 (2)		
50/50 chance, n(%)	24 (30)	16 (14)	3 (6)	6 (4)		
Somewhat likely, n(%)	10 (12)	12 (11)	3 (6)	2 (2)		
Very likely, almost definite, n(%)	17 (21)	69 (62)	37 (77)	116 (87)		
Experienced violence at location					12.0	0.007
Yes, n(%)	16 (20)	9 (8)	1 (2)	14 (11)		
No, n(%)	63 (80)	103 (92)	47 (98)	118 (89)		
Housed residents only						
Have sex to stay at location (n=293)					0.48	0.78
Yes, n(%)	NA	14 (12)	5 (10)	13 (10)		

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Variable	On Street/In Shelter N=81	Family, friend or sex partner N=112	Own apartment with no subsidy N=48	Supportive housing or rental subsidy N=133	Chi-Sq.	p-value
No, n(%)	NA	98 (88)	43 (90)	120 (90)		
Other drug users live at location (n=290)					7.9	0.019
Yes, n(%)	NA	25 (22)	8 (17)	12 (9)		
No, n(%)	NA	87 (78)	40 (83)	118 (91)		
Share drugs to stay at location (n=286)					0.44	0.80
Yes, n(%)	NA	4 (4)	1 (2)	3 (2)		
No, n(%)	NA	107 (96)	47 (98)	124 (98)		
Conflict over household expenses (n=287)					7.5	0.024
Yes, n(%)	NA	15 (13)	3 (6)	5 (4)		
No, n(%)	NA	97 (87)	45 (94)	122 (96)		
Contribute \$ to household expenses (n=293)					16.2	<0.001
Yes, n(%)	NA	76 (68)	26 (54)	56 (42)		
No, n(%)	NA	36 (32)	22 (46)	77 (58)		

Table 3A

Univariate negative binomial regressions for HIV risk outcomes for individuals with housing and for homeless individuals living on the street or in a shelter.

Outcome	Number of times I used hard drugs in the last 30 days		Number of sex partners I had sex with in the last 30 days		Number of people having had sex with without condoms in last 30 days	
Variable	t	p-value	t	p-value	t	p-value
Male	3.35	<.001	-2.46	.01	-.53	.60
Black	-1.40	.16	.25	.80	.82	.41
Age	-2.21	.03	-3.41	<.001	-3.52	<.001
Have less than a HS education	1.51	.13	1.22	.22	-1.56	.12
Have a mental illness	-.92	.36	-2.66	.01	-.31	.76
I have been told I have HIV by a doctor	-2.58	<.001	-2.35	.02	-3.52	<.001
Likely to be in same place in 3 months	-1.31	.19	3.11	.002	1.20	.23
I feel safe where I live	-.26	.79	-2.89	.004	1.30	.19
Have gang activity where I live	.69	.49	-.51	.61	.03	.97
I have experienced violence where I live	1.34	.18	-.51	.61	.63	.53
Number of moves in the last 6 months	1.49	.14	-1.76	.08	-1.24	.21
Have any negative reasons to move	1.90	.06	-2.54	.01	-.58	.56
Have any positive reasons to move	1.71	.09	-2.21	.03	-.37	.71
Number of negative reasons to move	1.76	.08	-2.52	.01	-1.04	.30
Number of positive reasons to move	1.28	.20	-2.04	.04	-.83	.40
Longest prison sentence	1.13	.26	3.50	<.001	-.28	.78
Longest homeless period	.14	.89	-.54	.59	-0.75	.45
Homeless-live on street or in shelter	1.70	.09	-1.49	.14	.53	.60
Live with family, friend, or sex partner	1.37	.17	5.41	<.0001	1.07	.28
Live in subsidized or supportive housing	-2.38	.02	-3.35	<.001	-1.22	.22

Table 3B

Zero-inflated negative binomial regression for the count of risk exposures in the past 30 days for housed and homeless individuals.

Outcomes	Variable	Coefficient (SE)	Odds	t	p-value
Number of times used crack, coke or heroin in last 30 days Zero count logistic model	Experienced violence in the place I live	-0.89 (0.44)	0.41	-2.01	.044
	Likelihood of living in the same place in 3 months	-0.22 (0.10)	0.79	-2.21	.027
	Any positive reasons for moving	-0.75 (0.28)	0.47	-2.71	.007
	Living on the street/in shelter	-1.36 (0.39)	0.25	-3.48	<.001
	Living with family, sex partner of friend	-1.10 (0.29)	0.33	-3.80	<.001
	Longest homeless period (months)	-0.02 (0.01)	0.98	-2.55	.011
	Male	0.54 (0.18)		2.96	.003
	Age (years)	-0.03 (0.01)		-2.57	.010
	Total number of sex partners in last 30 days Positive count negative binomial model	Age (years)	-0.01 (0.01)		-0.63
Diagnosed with mental illness		0.52 (0.84)		0.62	.53
Feel safe in the place I live		-0.15 (0.12)		-1.26	.21
Likelihood of living in the same place in 3 months		0.19 (0.06)		3.31	<.001
Longest prison sentence		0.04 (0.01)		2.53	.011
Living with family, sex partner of friend		-0.02 (0.21)		-0.09	.93
Diagnosed with mental illness * Age		-0.05 (0.02)		-3.05	.002
Diagnosed with mental illness * Feel safe in the place I live		0.43 (0.14)		3.05	.002
Longest prison sentence * Feel safe in the place I live		-0.01 (.004)		-2.63	.008
Longest prison sentence * Living with family, sex partner of friend		0.03 (0.01)		2.82	.005
Number of different people having sex with without condoms in last 30 days Zero count logistic model	Age (years)	0.21 (0.07)	1.24	3.31	<.001
	Less than HS education	1.71 (0.82)	5.53	2.09	.037
	Ever told by a doctor that I have HIV/AIDS	2.82 (0.89)	16.84	3.16	.002
	Number of moves in the past 6 months	1.12 (0.44)	3.06	2.54	.011

Outcome variables: Number of times smoked crack, or sniffed/injected coke, or sniffed/injected heroin in the last 30 days (Fitted model: Likelihood Ratio Chi-square test=156.0, df=8; p<.0001); Schwarz Bayesian Criterion(SBC)=2556); Total number of sex partners in last 30 days (Fitted model: Likelihood Ratio Chi-square test=114.64, df=10; p<.0001; SBC=962); Number of different people having sex with without condoms in the last 30 days (Fitted: Likelihood Ratio Chi-square test=53.37, df=4; p<.0001; SBC=557).

SE = Standard Error of coefficient estimate.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Odds = Exponentiated coefficients of the logistic model for zero inflation represent the odds of a zero count.

Number of cases =374 (excludes 18 living in SRO or half-way houses).

Housing status groups: Living on street or in shelter; living with family, sex partner or friend; living in own apartment with a rental subsidy or supportive housing; living in own apartment without a rental subsidy (reference).

Predictors considered at beginning of the model: age (years); black race (y/n); male gender (y/n); less than HS education (y/n); diagnosed with mental illness (y/n); told by doctor that I have HIV/AIDS (y/n); feel safe in the place I live (scale); perceived gang activity in neighborhood (scale); experienced violence in the place I live (y/n); likelihood of living at the same place in 3 months (scale); number of moves in past 6 months; number of positive reasons for moving; number of negative reasons for moving; longest prison sentence (months); longest homeless period (months); living on the street or in a shelter (y/n); living with family, sex partner or friend (y/n); living in own apartment with a rental subsidy or in supportive housing (y/n).

¹ A zero countlogistic regression component was not fit because there is no evidence of an excess in number of zero counts for the number of sex partners in last 30 days

² There is an insufficient number of individuals who report having condomless sex with more than one partner in the last 30 days to enable fitting a negative binomial regression model to the count.

Table 4A
Univariate negative binomial regressions for HIV risk outcomes for individuals with housing.

Outcome	Number of times I used hard drugs in the last 30 days		Number of sex partners I had sex with in the last 30 days		Number of people having had sex without condoms in the last 30 days	
Variable	t	p-value	t	p-value	t	p-value
Male	2.79	.005	-2.31	.02	-0.19	.85
Black	-1.21	.23	-1.15	.25	-0.41	.68
Age	-1.32	.19	-3.64	<.001	-4.01	<.0001
Have less than a HS education	1.72	.08	0.94	.35	-1.18	.24
Have a mental illness	-1.24	.22	-2.74	.006	-0.07	.95
I have been told I have HIV by a doctor	-1.73	.08	-2.88	.004	-3.40	<.001
Likely to be in same place in 3 months	0.06	.95	2.25	.03	0.27	.78
I feels safe where I live	0.13	.89	-3.15	.002	0.84	.40
Have gang activity where I live	0.08	.93	-0.40	.69	0.48	.63
I have experienced violence where I live	0.24	.81	-0.73	.47	0.78	.44
Number of moves in the last 6 months	1.25	.21	-1.59	.11	-1.95	.05
Have any negative reasons to move	1.50	.13	-1.83	.07	-1.13	.26
Have any positive reasons to move	0.80	.42	-2.65	.008	-1.21	.23
Number of negative reasons to move	1.66	.10	-1.84	.07	-1.46	.15
Number of positive reasons to move	0.16	.87	-2.35	.02	-1.51	.13
Longest prison sentence	1.13	.26	3.66	<.001	-2.6	.79
Longest homeless period	.08	.93	-.92	.36	-0.02	.98
Live with family, friend, or sex partner	2.31	.02	5.24	<.0001	1.23	.22
Live in subsidized or supportive housing	-1.65	.10	-4.08	<.0001	-1.11	.27
Have rent paid by housing subsidies	-1.01	.31	-2.93	.003	-0.13	.90
I pay rent	-0.39	.70	-2.53	.01	-2.09	.04
Number of others who live at this location	-1.32	.19	-1.30	.20	-2.05	.04
I live with a non-relative	-0.46	.65	3.08	.002	0.44	.66
I live with other drug users	1.88	.06	6.08	<.0001	1.37	.17
Have conflicts over household expenses	-0.57	.57	-0.29	.77	2.32	.02
I contribute money towards household expenses	-1.30	.20	4.35	<.0001	0.65	.52

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Outcome	Number of times I used hard drugs in the last 30 days	Number of sex partners I had sex with in the last 30 days	Number of people having had sex without condoms in the last 30 days
Variable	t	t	t
	p-value	p-value	p-value
I have sex in order to have a place to stay	-0.62	-0.20	3.30
Ratio of rent I pay to my income	-0.05	-1.94	-0.43
	.54	.84	.001
	.96	.05	.67

Table 4B

Zero-inflated negative binomial regression for the count of risk exposures in the past 30 days for housed individuals.

Outcomes	Variables	Coefficient (SE)	Odds	t	p-value	
Number of times used crack, coke or heroin in last 30 days Zero count logistic model	Male	-1.14 (0.31)	0.32	-3.68	<.001	
	Less than HS education	-1.17 (0.32)	0.31	-3.71	<.001	
	Ever told by a doctor that I have HIV/AIDS	0.75 (0.32)	2.12	2.35	.019	
	Number of others live here	0.15 (0.05)	1.16	3.16	.002	
	Drug users live with you	-1.85 (0.65)	0.16	-2.86	.004	
	Male	0.39 (0.21)		1.86	.06	
	Contribute money to household expenses	-0.75 (0.21)		-3.61	<.001	
	Living with family, sex partner of friend	0.76 (0.21)		3.68	<.001	
	Total number of sex partners in last 30 days / Positive count negative binomial model	Age (years)	-0.03 (0.01)		-3.15	.002
		Likelihood of living in the same place in 3 months	0.18 (0.08)		2.41	.016
Contribute money to household expenses		0.33 (0.16)		2.00	.045	
Live with drug users		0.03 (0.30)		0.12	.91	
Longest prison sentence		-0.01 (0.01)		-1.43	.15	
Living with family, sex partner of friend		0.04 (0.23)		0.19	.85	
Live with drug users * Longest prison sentence		0.04 (0.01)		3.15	.002	
Living with family, sex partner of friend * Longest prison sentence		0.03 (0.01)		3.04	.002	
Number of different people having sex with/without condoms in last 30 days ² Positive count negative binomial model		Age (years)	-0.04 (0.01)		-3.32	<.001
		Ever told by a doctor that I have HIV/AIDS	-0.71 (0.30)		-2.39	.017
	Number of moves in the past 6 months	0.74 (0.47)		1.55	.12	
	Number of others live here	-0.12 (0.06)		-1.94	.052	
	Conflict over household expenses	0.84 (0.29)		2.87	.004	
	Age * Number of moves in the past 6 months	-0.03 (0.02)		-2.23	.026	

Outcome variables: Number of times smoked crack, or sniffed/injected coke, or sniffed/injected heroin in the last 30 days (Fitted model; Likelihood Ratio Chi-square test=137.98, df=8, p<.0001; Schwarz Bayesian Criterion(SBC)=1846); Total number of sex partners in last 30 days (Fitted model; Likelihood Ratio Chi-square test=113.39, df=8, p<.0001; SBC=754); Number of different people having sex with/without condoms in the last 30 days (Fitted; Likelihood Ratio Chi-square test=51.90, df=6, p<.0001; SBC=421).

SE = Standard Error of coefficient estimate.

Odds = Exponentiated coefficients of the logistic model for zero inflation represent the odds of a zero count.

Number of cases =293 (excludes 81 living on street or in shelter and 18 living in SRO or half-way houses).

Housing status groups: Living with family, sex partner of friend; living in own apartment with a rental subsidy or supportive housing; living in own apartment without a rental subsidy (reference).

Predictors considered at beginning of the model: age (years); black race (y/n); male gender (y/n); less than HS education (y/n); diagnosed with mental illness (y/n); told by doctor that I have HIV/AIDS (y/n); feel safe in the place I live (scale); perceived gang activity in neighborhood (scale); experienced violence at the location I live (y/n); likelihood of living at the same place in 3 months (scale); number of moves in the last 6 months; number of positive reasons for moving; number of negative reasons for moving; did you pay rent (y/n); housing paid for by subsidies (y/n); rent-to-income ratio; evicted (y/n); live with non-relatives (y/n); number of others who live here; contributes money toward household expenses (y/n); conflicts over household expenses (y/n); drug users live with you (y/n); shares drugs to stay at place I live (y/n); have sex to stay at place I live (y/n); longest prison sentence (months); longest homeless period (months); living with family, sex partner of friend (y/n); living in own apartment with a rental subsidy or in supportive housing (y/n).

¹ A zero count logistic regression component was not fit because there is no evidence of an excess in number of zero counts for the number of sex partners in the last 30 days.
² A zero count logistic regression component was not fit because there is no evidence of an excess number of zero counts for number of partners having condomless sex with in the last 30 days.