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Unprotected Sex of Homeless Women Living in Los Angeles County: An Investigation of the Multiple Levels of Risk

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INTRODUCTION

One of the leading causes of death for women of reproductive age is acquired immunodeficiency syndrome (AIDS).¹ Certain groups of women are disproportionately affected by HIV/AIDS, including women of color and homeless women.^{2, 3} The greatest cause of these infections among women is high-risk heterosexual sex, which is estimated at 80 percent of reported cases.⁴ Women are at higher risk of contracting HIV from heterosexual intercourse than men because of their greater likelihood of engaging in unprotected sex with an infected partner.⁵ Impoverished women, in particular homeless women, are at even greater risk due to high rates of risky sexual behavior and substance abuse.⁶⁻⁸ In a recent probability sample of sheltered homeless women in Los Angeles County, 19% engaged in unprotected sex with casual partners, 31% drank heavily, and 48% used illicit drugs in the past year.⁹

The elevated risk of becoming infected by HIV for impoverished women through heterosexual sex emphasizes the importance of continued research that uncovers and explains factors leading to homeless women's use and non-use of male condoms. A focus on impoverished women's use of male condoms is important because condoms remain the most effective method against the spread of HIV and heterosexual intercourse is the primary means of HIV transmission for women.¹⁰ Understanding the factors that contribute to greater condom use among impoverished women is needed in order to design interventions that are successful at increasing condom use in this population and ultimately slowing the spread of the HIV epidemic.

Factors that predict unprotected sex have been studied for decades, in many populations, using a variety of analytic approaches and focusing on a broad range of different types of variables.¹¹ Some of the most commonly studied predictors of unprotected sex that may be particularly relevant to impoverished women include perceptions of the riskiness of partners,¹² psychological factors, such as positive or negative attitudes about condoms¹¹, and perceived susceptibility of getting HIV.¹³ The potential influence of drug and alcohol use on risky sexual behavior is another active area of study, although results have been mixed. Some studies suggest that alcohol misuse or drug use increases the likelihood of high-risk sexual behavior by reducing behavioral inhibitions and risk perceptions.¹⁴⁻¹⁷ Alternatively, alcohol or drugs may deliberately be used prior to sex to provide an excuse for engaging in high-risk behavior or to reduce conscious awareness of risk,¹⁸⁻²⁰ or because these substances are believed to

enhance sexual arousal and performance.^{14, 18, 21, 22} Other studies have found no association between alcohol use and condom use.²³⁻²⁵

A growing area of study is the effect of interpersonal relationships on the use or non-use of condoms in heterosexual sex. Recent research has shown an association between unprotected sex and social network factors. For example, the perception of risky sexual behavior as normative and a lack of communication about HIV and condom use among social network members have been shown to result in ignorance about protective behaviors and subsequent engagement in risky sex.²⁶ Latkin and colleagues also have shown that more connections among social network members (density) is, by itself, a predictor of unprotected sex.²⁶ They argue that this finding suggests that density contributes to a “spiral of silence” in which discussion or adoption of novel behaviors is discouraged because they are perceived as threatening and disruptive. Other studies of sexual relationships have found associations between consistent condom use and the risky characteristics of the sex partner, such as injection drug use, having had sex with men, and being HIV+,²⁷ characteristics of the relationship such as age difference between women and their sex partners and the type of relationship with the partner (casual vs. primary),²⁸ the level of commitment to the relationship,²⁹ and the amount of violence and sexual coercion that women experience in their sexual relationships with men.^{9, 30} Several studies have discussed the need to better understand the association between romantic partnership relationship dynamics and condom use, especially the contradiction between desires for close, intimate partnerships which require assumptions about trust and fidelity, and protective behaviors, which imply distrust and infidelity.³¹⁻³³

Although a growing number of studies have focused on the relationship aspect of unprotected sex, most of the research on risky sexual behavior has investigated risky sex as a characteristic of individuals. Even studies that have focused on relationships often explore associations between variables that summarize an individual’s multiple relationships or focus on one relationship at a time.²⁹ However, unprotected sex is an aspect of relationships and characteristics of these relationships influence condom use. Also, individuals have a variety of numbers and types of relationships. Therefore, summarizing data across relationships or focusing on one partner at a time suggests a loss of information that may be essential in understanding variation in unprotected sex. Despite this loss of information, investigations of unprotected sex are dominated by analysis designs that focus on individuals. This emphasis on the individual level of analysis is common throughout social science despite the fact that many research questions are actually about relationships between individuals rather than independent individuals. Kenny and colleagues suggest that one possible explanation for this limited analytic approach to relationship centered research is that traditional research methods used in the social sciences, such as ANOVA or multiple regression, make an independence assumption.³⁴ Therefore, in order to use these methods, researchers must either summarize relationship information on the individual level, which loses information, or they must analyze relationships, which would break the independence assumption because multiple relationships would be nested within individuals.

Kenny and colleagues also recommend methodological alternatives to either ignoring non-independence or losing analytic power by summarizing information at the individual level.³⁴ One recommendation is to use multi-level modeling (MLM) to estimate data that come from multiple dyads nested within individuals. MLM allows for investigation of variables at different levels of analysis. This approach has had limited use in the condom use literature. For example, Sherman and Latkin investigated condom use among drug users and their sex partners.³⁵ They found that condom use differed based on characteristics of relationships between members of a sexual dyad (financial inter-dependence, living together) as well as characteristics of individuals (being HIV+). Another study of women attending urban clinics used an MLM approach to demonstrate the relationship between partner type (regular and

intimate partnerships) and unprotected sex.¹⁶ To the best of our knowledge, no prior study has used an MLM design to explore factors associated with consistent condom use among homeless women and their partners.

In this study, we address the need for greater understanding of the factors that predict unprotected sex between impoverished homeless women living in Los Angeles County, California, and the sex partners that they identified through a social network interview that generates personal network data for a sample of focal individuals.³⁶ We use a one-to-many analysis design to account for the “assortive mating” type of non-independence that is inherent in data collected through personal networks.³⁷ We use these data collection and analytic techniques to address the following hypotheses generated through our review of the literature on factors that predict unprotected heterosexual sex. First, we expect that characteristics of women’s attitudes about condoms and HIV will be associated with their engagement in unprotected sex: if women believe that condoms are effective and that they are in danger of becoming infected by HIV,^{11, 27} they will be more likely to use condoms consistently. Perception of the riskiness of their partners is expected to be associated with women’s condom use: if women perceive their partners as being risky, they will be more likely to use condoms.²⁷ In addition, we expect that relationship characteristics will play a part in women’s unprotected sex with these partners: more commitment to the relationship,²⁹ the existence of violence in the relationship,^{30, 33, 38} receipt of tangible support,³⁹ lengthy relationships,^{5, 40, 41} age difference between women and their partners,¹⁶ frequency of co-occurrence of drugs or alcohol and sexual intercourse by either the women or their partners^{14, 15, 17, 28} and higher frequency of sex with the partner⁴² are each expected to be associated with a higher likelihood of unprotected sex. Finally, we expect that characteristics of women’s social networks will play a role in influencing their risky behavior: women are expected to be less likely to use condoms consistently with their partner if risky sex is normative among their network members,²⁶ if women are not discussing HIV with their social networks,²⁶ and if these networks are very densely connected.²⁶

METHODS

Participants

Participants in this study were 445 women who were randomly sampled and interviewed in temporary shelter settings in the central region of Los Angeles County for a study of the social context of substance use and sexual risk.⁴³ Women were eligible if they were at least age 18, had vaginal or anal sex with a male partner in the past 6 months, spoke and understood English as their primary language, and did not have significant cognitive impairment. A small number of the women who were screened were found to be ineligible due to language (18 out of 1080 women sampled). Of the 472 women who screened eligible for the study, 451 women were interviewed. Of these 451 women, 5 women were later found to be ineligible because they reported having had only oral sex with a partner in the past 6 months, and one woman had completed only half of the interview. Six women were therefore excluded, leaving a sample size of 445 women and a response/completion rate of 94% (445/472). Of these 445 interviewed, 16 women did not report having a recent casual or primary sex partner. Because many of the survey items and hypotheses were only relevant to recent casual or primary partners, these cases were excluded from this study resulting in a sample size of 429. Individual computer-assisted face-to-face structured interviews were conducted by trained female interviewers. On average, interviews lasted one hour and 15 minutes. Women were paid \$20 for their participation. The research protocol was approved by the institutional review board of RAND and a Certificate of Confidentiality was obtained from the U.S. Department of Health and Human Services.

Sampling Strategy

Women were sampled from facilities with a simple majority of homeless residents (persons who would otherwise live in the streets or who sleep in shelters and have no place of their own to stay). Because of the difficulty in measuring homelessness – in particular measuring it with a point-prevalence indicator – women sampled from these facilities were not initially screened for homelessness on an individual basis.⁴⁴ Our goal was to achieve a sample of women representative of those with precarious housing situations living in the diverse array of temporary shelter settings available within Los Angeles County. For the purposes of this study, we consider these women homeless. Seventy-Three percent of the women sampled indicated that they currently did not have a regular place to stay (e.g., own house, apartment, or room, or the home of a family member or friend) and 90% indicated that they had previously stayed in a homeless setting (e.g., mission or homeless shelter, the street) because they had no regular place to stay.

Potentially eligible settings were those that provided temporary shelter: emergency shelters; transitional living facilities; detox centers; rehabilitation centers; mental health facilities; and HIV/AIDS transitional homes in the study area. We excluded facilities that limit services to persons less than 18-years-old, facilities that only serve men, domestic violence shelters, SRO and board-and-care hotels, facilities whose population was not majority homeless and whose average resident length of stay was more than one year. Women were drawn from 52 eligible facilities in Los Angeles County and selected by means of a stratified random sample, with shelters serving as sampling strata. Half (26) of these facilities were transitional housing programs, 27% (14) were emergency shelters, 17% (9) were residential substance abuse treatment facilities and 6% (3) were transitional housing sites that offered limited emergency shelter services. A strict proportionate-to-size (PPS) stratified random sample (i.e., sampling a fixed proportion of the population from every facility) would have been overly burdensome on the larger facilities. Thus, small departures were made from PPS and corrected with sampling weights.

Study Design: Personal Networks

The analysis for this study was conducted on a sample of recent sexual relationships which was generated through a personal network interview with the sampled women. One of the primary goals of the study was to understand the social factors that contributed to homeless women's risk behaviors through the collection and analysis of detailed personal network data. Social networks are naturally occurring groups within which members (also termed, "alters") may influence each other's behaviors through social comparison processes, social sanctions and rewards, information exchange, and socialization of new members.^{45, 46} A "network" formally refers to the ties that connect a specific set of alters.⁴⁷⁻⁴⁹ Personal networks encompass the ties that surround a single focal individual, in this case, a homeless woman.^{36, 50} Homeless women's personal networks and, in particular, the alters who were determined to be recent sex partners, are the focus of this paper.

We followed established procedures for conducting personal network interviews.^{36, 50, 51} Personal network interviews are typically divided into three sections: questions designed to generate the names of people in the respondent's social network (network alter), questions about each alter (network composition), and questions about the relationships between each unique pair of network alters (network structure). First, in the Alter Name Generation Section, we asked respondents to name, by first name or nickname only, 20 individuals that they knew, who knew them, and with whom they had contact sometime during the past year or so. Contact could be face-to-face, by phone, mail or e-mail. We asked respondents to name only adults age 18 or older. These names were then used in the second section, Alter Composition, which required women to answer a series of questions about each alter, including their background

characteristics, behaviors, and relationship with the respondent. Third, in the Network Structure section, for each unique pair of network alters, we asked how often these two people interacted with each other. To reduce respondents' burden,^{52, 53} most of the questions in the Alter Composition section were asked of 12 alters selected via a stratified probability sample from the 20 named alters. The Network Structure section was asked only for the 12 sampled alters. The 20 named alters were stratified into sex partners and non-sex partners, and sex partners were sampled with a higher probability (or with certainty if the respondent reported 4 or fewer sex partners). We stratified by sex partners to accommodate goals of the project, which included obtaining an understanding of sexual risk behaviors.⁴³ The composition and structure measures that are computed on the 12 selected alters are weighted to account for the differential sampling probabilities.⁵²

These personal network interview procedures provided data for a multi-level analysis of sexual risk behaviors. In order to measure the inherent relationship characteristic of unprotected sex, while also recognizing the individual level contributions to consistent condom use, we analyzed data at two levels of analysis. At the highest level (level 2, respondent level), we analyzed variables measuring the woman's demographic characteristics, attitudes about condoms and HIV, and social network composition and structure. At the lowest level (level 1, partner/relationship level) we analyzed variables measuring partner characteristics and characteristics of the relationship between the woman and her partner. Also at the lowest level is the dependent variable, unprotected sex with a particular partner.

MEASURES

Level 1 Variable: Partnership/Relationship Variables

Unprotected sex with the individual partner, the dependent variable in the multi-level logistic analyses, was derived from an item asking how frequently women used male condoms when they had sex with the partner during the past 6 months (never, less than half the time, about half the time, more than half the time, always). Responses were dichotomized as: 0 = always used condoms vs. 1 = ever engaged in unprotected sex.

Perceived partner risk was assessed by three separate items asking whether the partner had ever injected drugs, been told he was HIV positive, or had sex with a man. If a woman said yes to one of these items, the variable was given a value of 1. If she said either no or did not know, the variable was given a value of 0. Women were also asked their age and the age of each partner in order to construct a variable indicating if the partner was older than the woman (0 = no, 1 = yes).

Partner characteristics were assessed in terms of partner type, relationship length (in months), support and conflict, and emotional closeness. Women were asked whether the partner was a current sex partner (yes, no) and whether they would describe the partner as primary ("like a husband, boyfriend, or other 'steady' partner"), casual ("not steady like a boyfriend or husband, but instead is more casual, like once-in-a-while, 'in the moment,' or maybe 'just for fun'"), or need-based ("someone a woman has sex with because she needs money, food, a place to stay, drugs, or something else"). Partners who were classified as need-based were not included in this study because many of the relationship variables were missing. Support provision during the past 6 months was assessed by an item, adapted from a measure developed by Sherbourne and Stewart,⁵⁴ which has been used in previous studies of homeless persons^{55, 56}; how often he provided her with needed food, money, clothes or a place to stay (tangible support). Relationship conflict was measured by a single item asking how often the respondent had gotten into arguments with, or gotten angry or upset with, the partner during the past 6 months. The support and conflict items were rated on a 4-point scale (1 = never to 4 = often).

Frequency of intercourse with the partner during a typical month (in the past 6 months) was rated on a 7-point scale: never, once a month or less, 2-3 times per month, once a week, 2-3 times per week, 4-6 times per week, every day. This value was converted to the number of days per month on which they had sex (using 0, 1.1, 2.6, 5.5, 12.2, 21.7, 28.8 respectively) according to procedures used in previous work on the sexual behavior of homeless women.²⁹

Relationship commitment was assessed with a five-item relationship commitment scale used in previous work with homeless women²⁹ ($\alpha = .85$). Women were asked how much they agreed or disagreed (strongly disagree = 1, strongly agree = 4) with a series of statements characterizing their relationships. Statements included, “Your life would be (was) very disrupted if (when) this relationship ended,” and “You are (were) extremely committed to this relationship.” This scale was developed by Castañeda⁵⁷ and used in modified form in previous studies of romantic relationships.^{58, 59}

Relationship abuse was assessed in terms of whether physical or psychological abuse had ever been perpetrated by the partner. Based on items from the Revised Conflict Tactics Scale,⁶⁰ women were asked a single question about whether the partner had ever: punched or hit her with something that could hurt like a fist or other object, choked or burned her, beat her up, kicked or bit her, used a knife or gun on her, threw her against the wall, or something like that (yes/no). Psychological violence was assessed using five items from the Psychological Maltreatment of Women Inventory⁶¹ asking whether the partner had ever treated her as stupid or inferior, swore at her, made her feel unsafe, or tried to keep her from doing things to help herself, or made her tell him where she had been and what she had been doing (yes/no). After exploratory analyses revealed that most relationships with physical abuse also had psychological abuse, and there was no variance in the outcome variable in the small number of relationships with physical abuse but *not* psychological abuse, two dichotomous relationship abuse variables were constructed to act as dummy variables in the multivariate analyses: physical abuse (1 = yes, 0 = no) and non-physical psychological abuse (1 = yes, 0 = no). In multivariate models, these dummy variables were compared to the reference group of relationships with neither physical nor psychological abuse.

Ability to refuse unwanted sex was assessed by three items, modified from the Refusal Assertiveness subscale of the Sexual Assertiveness Scale,⁶² that ask women how likely it would be that they could refuse to have sex with their partner in situations where he wanted to have sex, but she did not ($\alpha = .87$). A 3 on this scale indicates that the woman always considered it unlikely that she would have sex with this partner when she did not want to have sex with him while a 9 indicated that she always considered it very likely.

Substance use before or during sex together in the past 6 months was assessed with four items: how frequently she used drugs, he used drugs, she drank alcohol, and he drank alcohol (1 = “never” to 5 = “always”) prior to or during sex between the respondent and the partner.

Level 2 Variables: Respondent Level Variables

Demographic variables included age (continuous), high school graduate or GED (vs. not), race and ethnicity, currently employed (vs. not), and currently pregnant or tried to become pregnant in the past six months (vs. not).

HIV-related attitudes included attitudes toward condoms and perceived susceptibility to HIV. Condom attitudes were assessed using an 8-item scale adapted by Bogart and colleagues⁶³ from the condom attitude scale originally developed by Brown.⁶⁴ Each item was rated on a 4-point scale (1 = *strongly disagree* to 4 = *strongly agree*; $\alpha = .73$), with higher scores indicating more positive beliefs about condoms. Perceived susceptibility to HIV was assessed

with a single item: “It would be easy for you to get the HIV infection or AIDS” (1 = *strongly disagree* to 4 = *strongly agree*).⁶⁵

Network characteristics—We assessed women’s perceptions of normative behaviors, lack of communication about undesirable behaviors, and densely connected networks because these have been associated with risky sexual behavior in previous research.²⁶ To measure normative risky behavior in the women’s social networks, women rated how likely each of their network alters were to have done any of the following things in the past 6 months: had multiple sex partners, had sex with someone they did not know, or did not use a condom with a new partner (1 = unlikely, 2 = somewhat likely, 3 = very likely). To address communication about HIV and AIDS, women were asked, for each sampled alter, if they had talked with that person about the risk of getting HIV or AIDS during the past 6 months. From this information we calculated for each respondent the percent of non-sex partner alters who were perceived to be somewhat likely or very likely to have engaged in risky sex, and the percentage of non-sex partner alters with whom the respondent had discussed the risk of getting HIV/AIDS.

To address the amount of connections among network alters, we calculated the density of the network of alters based on the respondent answering “yes” or “no” to a question about whether each unique alter-alter pair had contact with each other in the past year. Density is an index that represents the proportion of ties that exist in a network relative to the total number of possible ties, and varies from 0 to 1. Thus, for a binary sociomatrix X (of size $g \times g$), where each (i, j) cell represents the presence or absence of a relationship between network member i and network member j , density is the sum of all entries in the matrix divided by the total number of cells in the matrix, minus the elements/cells/entries on the diagonal:

$$\Delta = \frac{\sum_{i=1}^g \sum_{j=1}^g x_{ij}}{g(g-1)}$$

When applied to respondents’ overall personal networks, this measure provides information about the degree of interconnectedness among the alters in a network.

Data Analysis

The goal of the data analysis was to produce a logistic multi-level model predicting a dichotomous measure of unprotected sex with the one-to-many personal network design described in Snijders, et al.³⁷ and Kenny, et al.³⁴ In order to reduce the large number of potential predictors of unprotected sex into a parsimonious model to test our hypotheses, we conducted preliminary exploratory analyses prior to constructing a full multi-level model of risky sexual behavior. We first constructed a list of potential predictor variables at the individual and partner/relationship level. We ran correlation tests among variables at the same level to explore associations and eliminated some potential predictor variables because they were highly correlated with other predictor variables. We then explored the strength of association between variables at the same level of analysis and unprotected sex. We used the “gllamm” procedure in Stata 9.2⁶⁶ with a binomial family, and a logit link to test two different models using the dichotomous unprotected sex variable as the outcome variable. One model included all of the respondent level variables as predictor variables and the other included all of the relationship/partner level variables as predictor variables. We dropped variables that did not have an association with unprotected sex at $p < .10$ from future models.

Once we developed a more parsimonious list of variables, we constructed additional gllamm models that retained demographic variables as controls. We explored significant associations between blocks of similar variables and unprotected sex. The five blocks of variables included

variables measuring characteristics of the partner, characteristics of the relationship between the respondent and the partner, variables measuring drug and alcohol co-occurrence during sex between the respondent and the partner, respondent level attitudes about condoms and HIV, and respondent level social network variables. Once each of these models was run, a final gllamm model was constructed from the blocks of variables that had at least one variable associated with unprotected sex at $p < .05$.

RESULTS

Table I describes the characteristics of the women interviewed in this study, as well as the number of cases with data for the variables listed. Any variation in sample size is due to missing values for the particular variables. The women were on average 36.5 years old and were ethnically mixed (41% African American, 23% Hispanic, 26% White, and 10% another ethnic group or identified with multiple groups). Two-thirds of the women had a high school diploma or GED, 27% were employed during the past 6 months, and 17% were pregnant or tried to become pregnant in the past 6 months. In general, women tended to have positive attitudes towards condoms (averaging 3.1 on the 4 point condom attitudes scale) and 38% strongly or somewhat agreed that it would be easy for them to become infected with HIV/AIDS. Nearly 4% of women had been told or had other reason to believe that they had HIV or AIDS. On average, the women's social networks had a density of .29 (with potential scores ranging from 0 to 1), 27% of their network members were perceived as engaging in risky sex, and 10% of their network members had discussed the risk of getting HIV or AIDS with the respondent.

The 429 women who were interviewed and had at least one recent, non-need based partner discussed a total of 610 recent casual or primary sex partners. Sixty-seven percent (289) had one of these types of partners while 33% discussed from 2 to 5 different partners. Table II describes the characteristics of their primary and casual partners and their relationships with them. The majority (61.6%) of recent non-need based partners were considered primary partners while the remaining were classified by women as casual partners. Over half of the partners were older than the women and a low percentage of partners were either HIV+, injection drug users, or had sex with a man. The majority of partners provided women with tangible support at least some of the time. Women had frequent arguments with 23.8% of their partners and had experienced physical abuse from 16% of these partners. In 95% of the relationships with physical abuse, women were also psychologically abused. Women reported being psychologically abused but not physically abused in 31% of all relationships. On average, women had sex with these partners 6.2 times in a typical month and partners rated an average of 5.1 on the sexual refusal scale. Women's relationships lasted, on average, 2.27 years and women rated their relationships an average of 12.2 on the 20 point relationship commitment scale. In most of the relationships, women indicated that they and their partners "never" drank or used drugs prior to or during sex. However, there were many relationships in which both the women and their partners "always" drank (11.8% and 14.6% respectively) or used drugs prior/during sex (18.8% and 18.7% respectively).

Table III shows the results of the preliminary multilevel models with blocks of similar variables. Each block was run as a set of predictors of unprotected sex with a particular partner, controlling for a set of the respondent's demographic characteristics (age, race/ethnicity, years of education, employment status, and pregnancy status). Variable blocks measuring substance use prior to sex and partner characteristics did not produce any variables that were significantly associated with unprotected sex. Variable blocks measuring relationship characteristics, HIV and condom attitudes, and social network characteristics each had at least two different variables that were significantly associated with unprotected sex. Because no variables in the partner characteristic block or the co-occurrence of drug/alcohol use and sex block had a p -value below .05, these blocks were dropped from further analysis.

Table III also shows the results of the final multivariate model containing each of the blocks with significant variables from the initial analyses. There are several variables that predict unprotected sex with a particular partner. At the relationship level, unprotected sex was significantly more likely with partners who had been physically abusive and with whom the respondent reported a higher level of relationship commitment. At the individual level, both holding less positive beliefs about condoms and feeling more susceptible to becoming infected with HIV were associated with higher likelihood of unprotected sex with a particular partner. The only social network characteristic that was a significant predictor of unprotected sex was the percentage of the respondent's social network with whom the respondent had discussed the risk of getting HIV or AIDS. The more people the respondent spoke with about HIV/AIDS, the lower the probability that she engaged in unprotected sex with a partner. Frequency of conflict with the partner and network density were no longer significantly associated with unprotected sex in this final model.

DISCUSSION

Our findings show that there are likely multiple influences on unprotected sex and that these influences occur at the level of the relationship, the individual, and the social network. These findings have implications for those who design public health programs that aim to reduce unprotected sex among homeless women. It is important to understand the various levels of influence in combination in order to make decisions on where and how to direct resources towards reducing unprotected sex for this population. Evaluating the multi-level findings of this study in conjunction helps us to view this complicated issue of unprotected sex from various perspectives to develop a three dimensional picture of why homeless women may be at risk for being infected by HIV. For example, on the individual level, we hypothesized that cognitive precursors of condom use were believing that HIV was a threat and believing that condoms were useful in counteracting this threat. Confirming earlier research, we found support for the hypothesis that a belief in the effectiveness of condoms is negatively associated with unprotected sex.¹¹ However, we also found that women who felt that they could be easily infected by HIV were actually more likely to engage in unprotected sex. These findings are similar to another study of risky sexual behavior of homeless women in which greater perceived susceptibility was significantly associated with more risky behavior (multiple sex partners).³⁸ On the relationship level, we hypothesized that women would be more likely to engage in safer sexual practices if they knew their partners were engaging in risky behaviors. In contrast to previous studies,⁶⁷ none of the partner risk variables predicted risky sex. The implication of these findings is that women who are engaging in unprotected sex with risky partners appear to realize that they are at risk from their partners while women who are using condoms believe that they are protecting themselves against HIV. This finding is important because it suggests that making homeless women more aware of risky behaviors or risky characteristics of partners may be necessary but not sufficient components of interventions aimed at reducing unprotected sex. It is important to better understand why homeless women have unprotected sexual relationships when they realize the risks associated with this behavior.

A key to understanding unprotected sex appears to be a better understanding of the association between condom use and relationship commitment. Our data supported our hypothesis that greater relationship commitment would be associated with unprotected sex, confirming a number of previous studies.^{29, 33} Findings from prior qualitative research with low-income women about unprotected sex may shed some light on the association between relationship commitment and unprotected sex. In a pilot phase of this study, we conducted semi-structured interviews about sexual events with a sample of 28 homeless women in Los Angeles (Reference removed for double-blind review). Women interviewed in this preliminary study described recent sexual events in which they engaged in unprotected sex. When probed for explanations of why they did not use condoms in these situations, women described feeling strong emotional

bonds with their partners and sometimes said that they had enough trust in their partners' fidelity to not use condoms, even when they had no specific justification for that trust and admitted that they were taking a risk. On the other hand, women also said that using condoms was sometimes a sign that they either did not trust the men or that they themselves were not trustworthy. These findings are similar to another recent study of low income women who described reasons for unprotected sex in focus groups³² The women interviewed in this study described unprotected sex as related to their fears of losing a relationship with men on whom they depended and about whom they were "obsessed." They also described not wanting to think about the possibility that their partners were unfaithful and how asking them to use condoms would make them acknowledge this as a possibility. This description of denial of risk fostering risky sexual behavior is confirmed by other research that has demonstrated an association between risky sex and avoidant coping among homeless women³⁸ as well as men who have sex with men.⁶⁸ These findings suggest that an important ingredient in the engagement of risky sex behavior while understanding the potential consequences is that individuals actively avoid thinking about the connection between their behavior and risk.

Our analysis did not support our hypothesis that women who received substantial tangible support from their partners would be more likely to engage in unprotected sex, which confirmed the findings of previous research.³⁹ We also found no support for our hypotheses that women engaged in unprotected sex with partners because of the combination of sex and alcohol and/or drug use. Our analysis did confirm our hypothesis that physical violence in a relationship is associated with unprotected sex and supports earlier research on the association between violence and condom use.^{30, 33, 38} We did not find a significant association of psychological abuse alone (i.e. in the absence of physical abuse) with unprotected sex, indicating an important link between physical violence and condom use. We did not find support for our hypothesis that there would be a significant association between women's self reported ability to refuse sex with a particular partner and unprotected sex with the partner. Violence may be an important factor in unprotected sex for homeless women but the association goes beyond an association between condom use and coercive sex due to violence or economic vulnerability.

A broader understanding of these women's relationship dynamics within the context of their lives as homeless women is important to better understand the association between violence, risky sexual behavior, and avoidant coping. Although the association between risky behavior and avoidant coping is not unique to homeless women, there are aspects of their lives that may make this association particularly strong. In addition to living with extreme poverty, homeless women also have more problems with drugs and alcohol than other women, including women with low incomes but who are not homeless.⁶⁹ Homeless women are also more likely to be victimized by physical and sexual violence, and there is greater likelihood of co-occurrence among HIV risk behavior, substance use and disorder, and violence among homeless women than among low-income housed women.⁹ Analysis of women's descriptions of their experiences with substance use and mental illness suggest that many homeless women may be dealing with post-traumatic stress disorder (PTSD),⁷⁰ which, for some, may be a common link to their diverse array of problems. Avoidant coping is likely to be common for homeless women because it is a means of dealing with stressful situations such as violence, extreme poverty, homelessness, and substance addiction³⁸ as well as a common symptom of PTSD.⁷¹

Homeless women's problems with violence often extend beyond their current circumstances. A large number of homeless women also report experience with emotional, physical, or sexual abuse as children.^{72, 73} This experience with childhood sexual abuse is linked to a variety of enduring lifelong problems for homeless and low income women, such as mental health problems, substance abuse, and chronic homelessness.^{74, 75} Other studies have shown that impoverished women who experience childhood sexual abuse tend to develop an avoidant coping style, which may seem helpful in dealing with stress in the short term but is maladaptive

in the long term.^{76, 77} Women who experience sexual abuse, low social support and high conflict in their early home lives and develop an avoidant coping style are likely to experience depression and difficulty developing healthy relationships, which lead to increased likelihood of further victimization.⁷⁷⁻⁷⁹

Childhood experiences with abuse often have long lasting effects on their adult romantic relationships through the development of anxious attachment styles.^{77, 80} Anxious attachment styles have been shown to be linked to increased risky sexual behavior. In one study of attachment styles and unprotected sex, Feeney et al.⁸¹ found that an anxious romantic attachment style predicted lower rates of condom use. They concluded that having an anxious/ambivalent attachment style may lead individuals to “give in” to wishes of partners out of fear of losing their relationships and they may fear speaking about HIV because it would hurt or possibly end their relationships. Attachment researchers have found that individuals with this style of attachment have intense desires for extreme closeness with their partners, have negative views of themselves, are insecure about being unloved and fear being abandoned by relationship partners.⁸⁰ Those who have secure attachment styles are able to communicate more effectively about condom use and safe sex because of their decreased fear of abandonment and greater conflict resolution skills.

The relationship between attachment style and unprotected sex suggests that including a focus on fostering improved romantic relationships in HIV prevention interventions may be a key to fostering greater rates of protected sex among homeless women⁸². Relationship based HIV interventions are relatively new but some have demonstrated successful behavior change with women in heterosexual relationships up to 12 months after initial intervention⁸³. However, relationship focused interventions also have risks because, as our analysis shows, abuse within a relationship is also a predictor of unprotected sex. This fact complicates intervention designs that focus on having both members of a partner involved in the intervention together. Some women may not be able to include their partner in an intervention out of fear that their partner may react violently. However, the intervention described by El-Bassel and colleagues,⁸³ which addressed relationship factors that acted as barriers to condom use, was successful if the women received the intervention alone or with a partner. This suggests that there is potential for successful relationship-based interventions for homeless women who engage in unprotected sex with risky partners. Interventions that have been developed for homed women and that have been successful with that population may need to be adapted to meet the needs of homeless women, including sensitivity to the day-to-day risks and hassles unique to a homeless existence.⁹ These interventions may also need to incorporate techniques that have been shown to be successful at resolving experiences with childhood sexual abuse that may continue to affect the adult relationships of women who have been abused.⁷⁹

Besides the increased likelihood of experience with victimization, mental illness, and substance abuse, structural factors that limit homeless women’s options for romantic partners may require that relationship-based interventions be extensively modified to meet those unique circumstances of homeless women. For example, homeless women and other women living in extreme poverty may be faced with the need to survive from income earned through sexual relationships. These need-based relationships are likely to affect women’s options for non-need-based romantic relationships. In addition, homeless women are likely to be limited to romantic partners who are also dealing with the challenges of extreme poverty and incarceration. Dealing with shared financial problems and challenges related to incarceration should be an important component of a relationship-based intervention with homeless women. This is likely to be especially important for women of color because drug policies mandating harsh sentences for drug related offenses have disproportionately affected African American women and men.⁸⁴ Incarceration exposes individuals to risky behaviors, such as unprotected sex and injection drug use, and has long term effects on HIV risk through increased economic

vulnerability due to reduced earning potential. Incarceration also changes in relationship with family, social network, and sexual relationships by increasing network ties to risky individuals while weakening family and romantic relationships. These structural factors are likely to be pervasive in the lives of homeless women and interventions that aim to help them reduce exposure to HIV risk in their sexual relationships would need to address these factors directly.

Our study also indicates the need for a better understanding of the social network context of unprotected sex. We confirmed our hypothesis that greater discussion of HIV among a woman and the alters in her personal network would be negatively associated with unprotected sex. This confirms earlier research demonstrating the association between lack of communication about safe sex and HIV and unprotected sex.²⁶ However, we did not find support for the hypothesis that high density among network alters and normative unprotected sex among network alters would be related to unprotected sex among women. It is possible that the direction of causation between discussion of HIV among a woman and her alters and unprotected sex is reversed; that is, perhaps those women who engage in unprotected sex not only avoid thinking about the consequences of their risky behavior but also avoid discussing HIV among friends and family. It might be possible to affect risky sexual behavior through greater discussion among network members about the risks of HIV if this discussion leads to greater consideration of the effects of risky behavior. However, as discussed earlier, the desire to maintain a relationship may be too strong to overcome and attempts to counteract active denial of the risks of HIV through network based intervention might be futile.

Several notable study limitations should be mentioned. The primary limitation is the cross-sectional nature of the data collection design, which precludes us from drawing firm conclusions regarding the determinants of unprotected sex among homeless women. Another limitation is that the study relied exclusively on women's self-reports of their sexual behavior, as well as partner and relationship characteristics. Collecting comparable data from the male partners, although outside the scope of this study, would have allowed us to examine the extent to which women-report and partner-reported data yielded similar findings. Further, it is important to keep in mind that the network data reflect women's perceptions of the composition and structure of their network. For example, women's perceptions of whether a network member engages in risky sex may not accurately reflect this network member's actual behavior; however, it is likely that women's perceptions have a stronger impact on their own sexual behavior than what the network members actually do in private. Another limitation is that the study excluded non-English speaking respondents. Homeless women in Los Angeles who do not speak English may have individual, social network, or relationship characteristics that are associated with unprotected sex in different ways than English speaking women. Because of this limitation, we do not know how well the findings from this study match the experiences of non-English speaking homeless women. However, the percentage of women approached for interviews who did not meet the language requirement was less than 2%. Women who speak only Spanish or some other non-English language may not use temporary housing services as much as English speaking homeless women in Los Angeles.

Despite these limitations, there are several notable strengths of our study. Analyses were conducted with a sizable probability sample of homeless women, thus allowing us to generalize results to a population of homeless women in the large urban setting of Los Angeles. Our study found that there are multiple factors at play resulting in unprotected sex among homeless women. We found that unprotected sex is related to characteristics of relationships, individual attitudes, and interactions among members of personal networks. Our study improves on previous work that has explored these same issues because of our use of both personal network data collection and multi-level model analysis. This is the first study to incorporate relationship characteristics, partner characteristics, personal network characteristics and personal characteristics into one model predicting condom use by a highly vulnerable population. This

approach was necessary to capture the multi-dimensional influences on risky sexual behavior of homeless women. Our findings demonstrate the multi-faceted context of HIV risk for impoverished women and indicate that interventions and services should also be multi-faceted and comprehensive.³⁸ Interventions that focus on one factor at a time or ignore personal relationships are likely to have limited success at influencing safer sexual behavior or may lead to additional problems in the lives of homeless women, such as increased risk for violence.

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REFERENCES

- Centers for Disease Control and Prevention. HIV/AIDS surveillance report, 2005. Vol. 17. US Department of Health and Human Services, CDC; Atlanta: 2007. Rev. ed.
- Forney JC, Lombardo S, Toro PA. Diagnostic and other correlates of HIV risk behaviors in a probability sample of homeless adults. *Psychiatr. Serv* Jan;2007 58(1):92–9. [PubMed: 17215418]
- Kilbourne AM, Herndon B, Andersen RM, Wenzel SL, Gelberg L. Psychiatric symptoms, health services, and HIV risk factors among homeless women. *J. Health Care Poor Underserved* Feb;2002 13(1):49–65. [PubMed: 11836913]
- Centers for Disease Control and Prevention. HIV/AIDS in the United States. Centers for Disease Control and Prevention; Atlanta, GA: 2008.
- Tortu S, McMahon JM, Hamid R, Neaigus A. Drug-using women's sexual risk: An event analysis. *AIDS Behav* 2000;4:329–40.
- McDonnell KA, Gielen AC, O'Campo P. Does HIV status make a difference in the experience of lifetime abuse? Descriptions of lifetime abuse and its context among low-income urban women. *J. Urban Health* 2003;80(3):494–509. [PubMed: 12930886]
- Nyamathi, A. Health promotion among homeless women at risk of AIDS. National Institute of Mental Health; Rockville, MD: 1994.
- Sikkema KJ, Heckman TG, Kelly JA, Anderson ES, Winett RA, Solomon LJ, et al. HIV risk behaviors among women living in low-income, inner-city housing developments. *Am. J. Public Health* Aug; 1996 86(8):1123–8. [PubMed: 8712272]
- Wenzel SL, Tucker JS, Elliott MN, Hambarsoomians K, Perlman J, Becker K, 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. *Prev. Med* Sep;2004 39(3):617–24. [PubMed: 15313103]
- Seal DW, Ehrhardt AA. HIV-prevention-related sexual health promotion for heterosexual men in the United States: Pitfalls and recommendations. *Arch. Sex. Behav* Jun;2004 33(3):211–22. [PubMed: 15129040]
- Sheeran P, Abraham C, Orbell S. Psychosocial correlates of heterosexual condom use: A meta-analysis. *Psychol. Bull* Jan;1999 125(1):90–132. [PubMed: 9990846]
- Hader SL, Smith DK, Moore JS, Holmberg SD. HIV infection in women in the United States - Status at the millennium. *JAMA* Mar;2001 285(9):1186–92. [PubMed: 11231749]
- Snelling D, Omariba DWR, Hong S, Georgiades K, Racine Y, Boyle MH. HIV/AIDS knowledge, women's education, epidemic severity and protective sexual behaviour in low- and middle-income countries. *J. Biosoc. Sci* May;2007 39(3):421–42. [PubMed: 16854252]
- Cooper ML. Alcohol use and risky sexual Behavior among college students and youth: Evaluating the evidence. *J. Stud. Alcohol* Mar;2002 :101–17.
- Fromme K, D'Amico EJ, Katz EC. Intoxicated sexual risk taking: An expectancy or cognitive impairment explanation? *J. Stud. Alcohol* Jan;1999 60(1):54–63. [PubMed: 10096309]

16. Macaluso M, Cheng H, Akers R. Birth control method choice and use of barrier methods for sexually transmitted disease prevention among low-income African-American women. *Contraception* Jul; 2000 62(1):5–13. [PubMed: 11024222]
17. MacDonald TK, MacDonald G, Zanna MP, Fong GT. Alcohol, sexual arousal, and intentions to use condoms in young men: Applying alcohol myopia theory to risky sexual behavior. *Health Psychol* May;2000 19(3):290–8. [PubMed: 10868774]
18. Dermen KH, Cooper ML, Agocha VB. Sex-related alcohol expectancies as moderators of the relationship between alcohol use and risky sex in adolescents. *J. Stud. Alcohol* Jan;1998 59(1):71–7. [PubMed: 9498318]
19. McKirnan DJ, Venable PA, Ostrow DG, Hope B. Expectancies of sexual “escape” and sexual risk among drug and alcohol-involved gay and bisexual men. *J. Subst. Abuse* 2001;13(1-2):137–54. [PubMed: 11547615]
20. National Institute on Alcohol Abuse and Alcoholism. Alcohol and HIV. *Alcohol Alert* 2002;57:1–4.
21. Dermen KH, Cooper ML. Inhibition conflict and alcohol expectancy as moderators of alcohol’s relationship to condom use. *Exp. Clin. Psychopharmacol* May;2000 8(2):198–206. [PubMed: 10843303]
22. George WH, Stoner SA, Norris J, Lopez PA, Lehman GL. Alcohol expectancies and sexuality: a self-fulfilling prophecy analysis of dyadic perceptions and behavior. *J. Stud. Alcohol* 2000;61(1):168–76. [PubMed: 10627112]
23. Fortenberry JD, Orr DP, Katz BP, Brizendine EJ, Blythe MJ. Sex under the influence - A diary self-report study of substance use and sexual behavior among adolescent women. *Sex. Transm. Dis* Jul; 1997 24(6):313–9. [PubMed: 9243736]
24. Leigh BC, Stall R. Substance use and risky sexual-behavior for exposure to HIV - issues in methodology, interpretation, and prevention. *Am. Psychol* Oct;1993 48(10):1035–45. [PubMed: 8256876]
25. Weinhardt LS, Carey MP, Carey KB, Maisto SA, Gordon CM. The relation of alcohol use to HIV-risk sexual behavior among adults with a severe and persistent mental illness. *J. Consult. Clin. Psychol* Feb;2001 69(1):77–84. [PubMed: 11302280]
26. Latkin C, Forman V, Knowlton A, Sherman S. Norms, social networks, and HIV-related risk behaviors among urban disadvantaged drug users. *Soc. Sci. Med* 2003;56(3):465–76. [PubMed: 12570967]
27. Morrill AC, Ickovics JR, Golubchikov VV, Beren SE, Rodin J. Safer sex: Social and psychological predictors of behavioral maintenance and change among heterosexual women. *J. Consult. Clin. Psychol* Aug;1996 64(4):819–28. [PubMed: 8803373]
28. Macaluso M, Demand MJ, Artz LM, Hook EW. Partner type and condom use. *AIDS* Mar;2000 14(5):537–46. [PubMed: 10780716]
29. Tucker JS, Elliott MN, Wenzel SL, Hambarsoomian K. Relationship commitment and its implications for unprotected sex among impoverished women living in shelters and low-income housing in Los Angeles county. *Health Psychol* Sep;2007 26(5):644–9. [PubMed: 17845116]
30. Kalichman SC, Williams EA, Cherry C, Belcher L, Nachimson D. Sexual coercion, domestic violence, and negotiating condom use among low-income African American women. *J. Womens Health* Apr; 1998 7(3):371–8. [PubMed: 9580917]
31. Cabral RJ, Pulley L, Artz L, Brill I, Macaluso M. Women at risk of HIV/STD: the importance of male partners as barriers to condom use. *AIDS Behav* 1998;2(1):75–85.
32. Jones R, Oliver M. Young urban women’s patterns of unprotected sex with men engaging in HIV risk behaviors. *AIDS Behav* Nov;2007 11(6):812–21. [PubMed: 17160484]
33. Misovich SJ, Fisher JD, Fisher WA. Close relationships and elevated HIV risk behavior: evidence and possible underlying psychological processes. *Rev. Gen. Psychol* 1997;1(1):72–107.
34. Kenny, DA.; Kashy, DA.; Cook, WL. *Dyadic data analysis*. The Guilford Press; New York, NY: 2006.
35. Sherman SG, Latkin CA. Intimate relationship characteristics associated with condom use among drug users and their sex partners: a multilevel analysis. *Drug Alcohol Depend* 2001;64(1):97–104. [PubMed: 11470345]
36. McCarty C. Measuring structure in personal networks. *JoSS* 2002;3(1)

37. Snijders T, Spreen M, Zwaagstra R. The use of multilevel modeling for analysing personal networks: networks of cocaine users in an urban area. *J Quant Anthropol* 1995;5(2):85–105.
38. Wenzel SL, Tucker JS, Elliott MN, Hambarsoomians K. Sexual risk among impoverished women: Understanding the role of housing status. *AIDS Behav* Nov;2007 11(6):S9–S20.
39. Sobo EJ. Finance, romance, social support, and condom use among impoverished inner-city women. *Hum. Organ* 1995 Sum;54(2):115–28.
40. Marin BV, Tschann JM, Gomez CA, Gregorich S. Self-efficacy to use condoms in unmarried Latino adults. *Am. J. Community Psychol* Feb;1998 26(1):53–71. [PubMed: 9574498]
41. St Lawrence JS, Eldridge GD, Reitman D, Little CE, Shelby MC, Brasfield TL. Factors influencing condom use among African American women: Implications for risk reduction interventions. *Am. J. Community Psychol* Feb;1998 26(1):7–28. [PubMed: 9574496]
42. Williams M, Ross MW, Bowen AM, Timpson S, McCoy HV, Perkins K, et al. An investigation of condom use by frequency of sex. *Sex. Transm. Infect* Dec;2001 77(6):433–5. [PubMed: 11714942]
43. Wenzel, SL. Alcohol use and HIV risk among impoverished women (R01 AA015301). National Institute on Alcohol Abuse and Alcoholism; Bethesda, MD: 2005.
44. Burt, M. Homelessness, definitions and estimates. In: Levinson, D., editor. *Encyclopedia of Homelessness*. Sage Publications; Thousand Oaks, CA: 2004.
45. Fisher JD. Possible effects of reference group-based social influence on AIDS risk behavior and AIDS prevention. *Am. Psychol* Nov;1988 43(11):914–20. [PubMed: 3214003]
46. Latkin C, Mandell W, Oziemkowska M, Celentano D, Vlahov D, Ensminger M, et al. Using social network analysis to study patterns of drug use among urban drug users at high risk for HIV/AIDS. *Drug Alcohol Depend* Apr;1995 38(1):1–9. [PubMed: 7648991]
47. Mitchell, JC. The concept and use of social networks. In: Mitchell, JC., editor. *Social Networks in Urban Situations*. Manchester University Press; Manchester: 1969. p. 1-50.
48. Scott, J. *Social network analysis: a handbook*. Sage Publications; London: 1991.
49. Wasserman, S.; Galaskiewicz, J., editors. *Advances in social network analysis: Research in the social and behavioral sciences*. Sage; Thousand Oaks, CA: 1994.
50. Campbell KE, Lee BA. Name generators In surveys of personal networks. *Social Netwks* Sep;1991 13(3):203–21.
51. McCarty C, Bernard HR, Killworth PD, Shelley GA, Johnsen EC. Eliciting representative samples of personal networks. *Social Netwks* Oct;1997 19(4):303–23.
52. Golinelli D, Ryan G, Green HD, Kennedy DP, Tucker JS, Wenzel SL. Sampling to reduce respondent burden in personal network studies. *Field Methods*. Accepted for Publication.
53. McCarty C, Killworth PD, Rennell J. Impact of methods for reducing respondent burden on personal network structural measures. *Social Netwks* May;2007 29(2):300–15.
54. Sherbourne CD, Stewart AL. The Mos Social Support Survey. *Soc. Sci. Med* 1991;32(6):705–14. [PubMed: 2035047]
55. Koegel, P.; Burnam, MA. *Course of homelessness among the seriously mentally ill*. National Institute of Mental Health; Bethesda, MD: 1991.
56. Wenzel, SL. *Drug Abuse, Violence, and HIV/AIDS in Impoverished Women* (R01 DA 11370). National Institute on Drug Abuse; Bethesda, MD: 1999.
57. Castañeda D. The close relationship context and HIV/AIDS risk reduction among Mexican Americans. *Sex Roles* Apr;2000 42(7-8):551–80.
58. Drigotas SM, Rusbult CE. Should I stay or should I go - a dependence model of breakups. *J. Pers. Soc. Psychol* Jan;1992 62(1):62–87.
59. Rusbult CE, Johnson DJ, Morrow GD. Predicting satisfaction and commitment in adult romantic involvements - an assessment of the generalizability of the investment model. *Soc. Psychol. Q* Mar; 1986 49(1):81–9.
60. Straus MA, Hamby SL, BoneyMcCoy S, Sugarman DB. The revised Conflict Tactics Scales (CTS2) - Development and preliminary psychometric data. *J. Fam. Issues* May;1996 17(3):283–316.
61. Tolman RM. The validation of the Psychological Maltreatment of Women Inventory. *Violence Vict* 1999;14(1):25–37. [PubMed: 10397624]

62. Morokoff PJ, Quina K, Harlow LL, Whitmire L, Grimley DM, Gibson PR, et al. Sexual assertiveness scale (SAS) for women: Development and validation. *J. Pers. Soc. Psychol* Oct;1997 73(4):790–804. [PubMed: 9325594]
63. Bogart LM, Kral AH, Scott A, Anderson R, Flynn N, Gilbert ML, et al. Condom attitudes and behaviors among injection drug users participating in California syringe exchange programs. *AIDS Behav* Dec;2005 9(4):423–32. [PubMed: 16249946]
64. Brown IS. Development of a scale to measure attitude toward the condom as a method of birth-control. *J. Sex Res* 1984;20(3):255–63.
65. Gibson, DR.; Lovelle-Drache, J.; Young, MT.; Chesney, M. HIV risk linked to psychopathology in IV drug users; International Conference on AIDS; Amsterdam. 1992;
66. StataCorp, LP. Stata Statistical Software. 9.2 ed.. StataCorp LP; College Station, TX: 2007.
67. Morrill AC, Noland C. Interpersonal issues surrounding HIV counseling and testing, and the phenomenon of “testing by proxy”. *J. Health Commun* Mar;2006 11(2):183–98. [PubMed: 16537287]
68. Martin JJ, Pryce JG, Leper JD. Avoidance coping and HIV risk behavior among gay men. *Health Soc. Work* August;2005 3(3):193–201. 2005. [PubMed: 16190295]
69. Tuten M, Jones HE, Svikis DS. Comparing homeless and domiciled pregnant substance dependent women on psychosocial characteristics and treatment outcomes. *Drug Alcohol Depend* Jan;2003 69(1):95–9. [PubMed: 12536070]
70. Padgett DK, Hawkins RL, Abrams C, Davis A. In their own words: Trauma and substance abuse in the lives of formerly homeless women with serious mental illness. *Am. J. Orthopsychiatry* Oct;2006 76(4):461–7. [PubMed: 17209714]
71. American Psychiatric Association. Diagnostic and statistical manual of psychiatric disorders. 4 th ed.. American Psychiatric Association; Washington, DC: 1994. ed.
72. Browne A. Family violence and homelessness - the relevance of trauma histories in the lives of homeless women. *Am. J. Orthopsychiatry* Jul;1993 63(3):370–84. [PubMed: 8372904]
73. Browne A, Bassuk SS. Intimate violence in the lives of homeless and poor housed women: Prevalence and patterns in an ethnically diverse sample. *Am. J. Orthopsychiatry* Apr;1997 67(2):261–78. [PubMed: 9142360]
74. Banyard VL. Childhood maltreatment and the mental health of low-income women. *Am. J. Orthopsychiatry* 1999;69(2):161–71. [PubMed: 10234382]
75. Stein JA, Leslie MB, Nyamathi A. Relative contributions of parent substance use and childhood maltreatment to chronic homelessness, depression, and substance abuse problems among homeless women: mediating roles of self-esteem and abuse in adulthood. *Child Abuse Negl* Oct;2002 26(10):1011–27. [PubMed: 12398858]
76. Rayburn NR, Wenzel SL, Elliott MN, Hambarsoomians K, Marshall GN, Tucker JS. Trauma, depression, coping, and mental health service seeking among impoverished women. *J. Consult. Clin. Psychol* Aug;2005 73(4):667–77. [PubMed: 16173854]
77. Shapiro DL, Levendosky AA. Adolescent survivors of childhood sexual abuse: The mediating role of attachment style and coping in psychological and interpersonal functioning. *Child Abuse Negl* Nov;1999 23(11):1175–91. [PubMed: 10604070]
78. Anderson DG, Rayens MK. Factors influencing homelessness in women. *Public Health Nurs* Jan-Feb;2004 21(1):12–23. [PubMed: 14692985]
79. Wright MO, Emily C, Sebastian K. Positive resolution of childhood sexual abuse experiences: The role of coping, benefit-finding and meaning-making. *J. Fam. Violence* 2007;22(7):597–608.
80. Hazan C, Shaver PR. Romantic love conceptualized as an attachment process. *J. Pers. Soc. Psychol* 1987;52(33):511–24. [PubMed: 3572722]
81. Feeney JA, Kelly L, Gallois C, Peterson C, Terry DJ. Attachment style, assertive communication, and safer-sex behavior. *J. Appl. Soc. Psychol* Sep;1999 29(9):1964–83.
82. Hammer JC, Fisher JD, Fitzgerald P, Fisher WA. When two heads aren’t better than one: AIDS risk behavior in college-age couples. *J. Appl. Soc. Psychol* Mar;1996 26(5):375–97.
83. El-Bassel N, Gilbert L, Wu E, Go H, Hill J. HIV and intimate partner violence among methadone-maintained women in New York City. *Soc. Sci. Med* Jul;2005 61(1):171–83. [PubMed: 15847970]

84. Blankenship KM, Smoyer AB, Bray SJ, Mattocks K. Black-White disparities in HIV/AIDS: the role of drug policy and the corrections system. *J. Health Care Poor Underserved* 2005;16(4):140–56. [PubMed: 16327113]

Table I

Respondent-Level Descriptive Statistics for Main Study Variables

Variable	N	Mean (SD)	%
Age	427	36.5 (0.59)	
Race			
White/Other	156		36.1
Black	168		40.9
Hispanic	103		23.0
High school degree or GED	283		66.4
Employed in past 6 months	113		26.9
Pregnant (or tried to become) in past 6 months	73		16.6
Positive condom beliefs	426	3.1 (3.06)	
Perceived HIV susceptibility			
Strongly disagree	214		50.7
Somewhat disagree	47		11.0
Somewhat agree	63		14.6
Strongly agree	100		23.7
Respondent believes she is HIV-positive	17		3.7
Overall network density	420	0.3 (0.01)	
Percent of non-sexual partners likely to engage in risky sex	427	26.7 (1.28)	
Percent of non-sexual partners that talked to respondent about risk of HIV/AIDS	427	10.5 (1.02)	

Table II
Dyad-Level Descriptive Statistics for Main Study Variables

Variable	Mean (SE)	%
	(n=610)	
Primary partner (vs. casual)		61.6
Partner older than respondent		58.3
Partner ever told he is HIV positive		0.8
Partner ever injected drugs		9.4
Partner ever had sex with a man		3.2
Tangible support from partner in past 6 months		
Never		30.1
Rarely		13.0
Sometimes		18.4
Often		38.5
Arguments with partner in past 6 months		
Never		28.9
Rarely		23.8
Sometimes		23.5
Often		23.8
Physical and psychological abuse		15.2
Physical abuse but not psychological abuse		0.8
Psychological abuse but not physical abuse		31.0
Frequency of sex in typical month	6.2 (0.33)	
Length of relationship (months)	2.27 (0.12)	
Relationship commitment	12.2 (0.21)	
Ability to refuse unwanted sex	5.1 (1.0)	
Partner used alcohol before/during Sex		
Never		62.2
Less than half the time		14.5
About half the time		4.9
More than half the time		3.9
Always		14.6
Respondent used alcohol before/during sex		
Never		70.0
Less than half the time		10.0
About half the time		4.7
More than half the time		3.5
Always		11.8
Partner used drugs before/during sex		
Never		65.6
Less than half the time		6.0
About half the time		5.4
More than half the time		4.4

Variable	Mean (SE)	%
	(n=610)	
Always		18.7
Respondent used drugs before/during sex		
Never		66.4
Less than half the time		4.8
About half the time		4.6
More than half the time		5.4
Always		18.8

Table III

Logistic Regression Models Predicting Whether Respondent Engaged in Unprotected Sex with a Particular Partner

	Each of the Five Variable Blocks Examined Separately
	OR (95% CI), p-val
Partner Characteristics	
Older Partner	1.75 (.97, 3.17), p=.06
Partner has been told he is HIV+	.41 (.01, 11.05)
Partner has injected drugs	2.31 (.66, 8.06)
Partner has had sex with a man	1.46 (.19, 10.93)
Relationship Characteristics	

Each of the Five Variable Blocks Examined Separately	
OR (95% CI), p-val	
Average frequency of sex in a typical month	1.05 (.99, 1.12)
How long woman has known partner	1.06 (.94, 1.12)
Frequency of partner's tangible support	1.16 (.83, 1.61)
Frequency of arguments with partner	1.42 (1.01, 2.01), p=.04
Partner has been physically abusive (vs. no abuse)	5.80 (1.64, 20.53), p=.006
Partner has been psychologically abusive but not physically abusive (vs. no abuse)	2.05 (.87, 4.81)
Woman's relationship commitment	1.11(1.00, 1.22), p=.04
Woman's ability to refuse unwanted sex	.95 (.80, 1.13)
Drug/Alcohol Use with Partner Prior/During Sex	

Each of the Five Variable Blocks Examined Separately	
OR (95% CI), p-val	
Partner drank alcohol before/during sex with her	.93 (.70, 1.21)
She drank before/during sex with her partner	.98 (.76, 1.26)
Partner used drugs before/during sex with her	1.23 (.94, 1.61)
She used drugs before/during sex with her partner	1.00 (.80, 1.26)
HIV and Condom Attitudes	
Positive attitudes towards condoms	.20 (.10, .36), p < .001
Higher HIV susceptibility	1.29 (1.00, 1.65), p = .04
Social Network Characteristics	
Percentage of non-sex partner alters perceived as engaging in risky sex	.99 (.98, 1.00)
Percentage of non-sex partner alters with whom she has discussed HIV/AIDS	.98 (.96, .99) p = .01
Network density	7.62 (1.17, 49.63), p = .03

Note. All models control for women's race/ethnicity, age, education, employment status, and whether pregnant or tried to become pregnant in past 6 months. Additional models were run to test for associations between type of recruitment site and the dependent variable and there were no significant changes to the findings.