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Prediction of HIV Sexual Risk Behaviors among Disadvantaged African American Adults using a Syndemic Conceptual Framework

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Abstract

The focus of this paper is on HIV sexual risk taking among a community-based sample of disadvantaged African American adults. The objective is to examine multiple factors associated with sexual HIV risk behaviors within a syndemic conceptual framework. Face-to-face, computer-assisted, structured interviews were conducted with 1,535 individuals in Atlanta, Georgia. Bivariate analyses indicated a high level of relationships among the HIV sexual risks and other factors. Results from multivariate models indicated that gender, sexual orientation, relationship status, self-esteem, condom use self-efficacy, sex while the respondent was high, and sex while the partner was high were significant predictors of condomless sex. Additionally, a multivariate additive model of risk behaviors indicated that the number of health risks significantly increased the risk of condomless sex. This intersection of HIV sexual risk behaviors and their associations with various other behavioral, socio-demographics, and psychological functioning factors helps explain HIV risk-taking among this sample of African American adults and highlights the need for research and practice that accounts for multiple health behaviors and problems.

Keywords

Syndemic Conceptual Framework; Disadvantaged African American Adults; HIV Sexual Risk Behaviors

INTRODUCTION

The HIV/AIDS epidemic remains a significant global public health concern, including in the U.S. Here we note the disproportionate impact of the HIV/AIDS epidemic on African Americans, especially those who live in disadvantaged inner-city neighborhoods and who themselves are vulnerable as well. Recent data show the incidence rate for HIV among African Americans to be 8.6 times greater than the rate among whites.(1) Currently, African Americans also have the highest lifetime rates of being diagnosed with HIV, being diagnosed as stage 3 (AIDS), and mortality from HIV/AIDS of all ethnic groups.(1) The highest rates of new infections of HIV occur in the southeastern United States. The state of

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Georgia has the fourth highest rate of new HIV infections in this region, with an incidence rate that is 50.2% higher than for the Southeast as a whole.(1) Within the state of Georgia, African Americans comprised 69.6% of HIV incidence. Incidence rates for HIV within Atlanta mirror those for the state as a whole, and cluster in Atlanta's disadvantaged neighborhoods.(1–3)

Studies have shown that condomless sex currently is the dominant mode of HIV transmission among African Americans.(4) Other HIV sexual risk behaviors include having multiple sex partners, sex with at-risk partners, men who have sex with other men, the lack of proper or consistent condom use, and sex in high-risk settings or while under the influence of alcohol or other drugs.(5–13) HIV sexual risk behaviors also vary by type of partner and setting;(14–18) with well-known differences between main and casual, including paying partners.(19, 20) Findings from studies among women show condomless sex to be more common with main partners,(21) which is contrary to findings among men where condomless sex seems more common with casual partners.(22, 23) Individual factors (e.g., unaware of partner's HIV status, condom attitudes, concurrent sexual partnerships);(24), sex partner characteristics (e.g., partner's HIV status, partners' drug use), and contextual issues (e.g., stigma, discrimination, access to HIV testing) all contribute to the need for programs promoting condom use.(25) However, regardless of the correlates, what may be the most important prevention strategy to reduce HIV transmission among is the promotion of consistent condom use.(26) In spite of progress toward other means of HIV prevention, condom use currently remains the primary tool for effective prevention of sexual HIV transmission.(27–31) Considering this, research has focused on factors that promote or inhibit correct condom use among at-risk African Americans.(32, 33)

Research has identified several factors that influence condom use among at-risk African American women, including partner communication, training in the negotiation of safe sex, (32) fear of partner communication because of perceptions of possible partner violence and coercion,(34–36) feelings of self-control and negotiation of condom use,(37, 38) beliefs about long-term relationships and monogamy,(39) and social norms about condom use.(40–42) Among at-risk African American men different factors were found to influence condom use. Namely, communication and partner communication factors seem less important and other concepts such as machismo and structural factors such as poverty, health care disparities, and incarceration may be more important.(33)

Due to the increasing recognition of the complexity of many public health and social problems, more comprehensive approaches to understanding the underlying dynamics are gaining support. The main thesis in the syndemic conceptual framework is that multiple epidemics co-occur, that various risk factors interact with one another, and that each of these worsens the effects of the others.(43, 44) That is, health problems may be linked so they interact and contribute to the overall disease burden in populations in which they co-occur. (44–49) This conceptualization of disease burden also recognizes that disease does not occur in isolation from other conditions, health behaviors, and social problems. These intersections often have magnifying effects on health problems in both individuals and communities.(49)

The focus of this paper is on a conceptual framework to predict HIV sexual risk behaviors with other behaviors including illicit drug use, binge drinking, and depressive symptoms. These behaviors, along with socio-demographics, childhood maltreatment, and psychological functioning factors are hypothesized to intersect and have an additive effect on the degree to which African American adults from disadvantaged communities engage in HIV sexual risk behaviors. Often these conditions have been found to occur in populations that have faced health inequities. Singer (2006) argued that syndemic features may be key factors in racial health disparities in the U.S.(45) Singer and his team (2003; 2009) also pointed out that health behaviors have the potential to interact at multiple levels of influence (e.g., individual, interpersonal, community) to decrease health status and increase morbidity and mortality.(44–46) There are several types of syndemic conceptual frameworks described in the literature that have related specifically to HIV/AIDS risks. Most informative and appropriate for the current study are the substance abuse, violence, AIDS (SAVA) (43, 50), mental health and HIV/AIDS,(51) and drug use and crack cocaine use syndemic conceptual frameworks.(52) Across each of these hypothesized frameworks there is much commonality in that the effects of each of the key factors (e.g. substance use, context, other health behaviors, and HIV/AIDS) intertwine and combine to increase disease burden.(43) The impact of a syndemic is likely to be more profound among vulnerable groups such as those without access to healthcare, those living in poverty, or racial and ethnic minorities.(44, 53) Syndemic conceptual frameworks have been shown to provide a better understanding of HIV risk behaviors such as sexual compulsivity, childhood sexual abuse, depressive symptoms and intimate partner violence.(54–56)

Increasingly, researchers have applied syndemic conceptual frameworks to investigate HIV risk among men-who-have-sex-with-men (MSM).(49, 51, 56–59) Inquiries using these frameworks have commonly explored co-occurring substance abuse, depressive symptoms, and victimization experiences and their relationship to HIV sexual risk behaviors.(48, 56) This research has identified risk factors such as alcohol use, illicit drug use, intimate partner violence, childhood maltreatment, sexual risks such as unprotected anal sex, and sex with HIV-positive partners as inter-related and additive.(49, 51, 56–59) Most specific to this paper, Klein (2011) found a syndemic conceptual framework to be important in describing the complex relationships between behavioral and psychosocial factors which influence the proportion of sex acts that involved the use of protection.(49) Across these studies, those reporting higher numbers of these HIV risk behaviors and negative psychosocial characteristics have been associated with greater odds of HIV seropositivity.(51, 56, 58, 60)

Singer has examined the syndemic conceptual framework among his various studies including reviews of the literature and primary data collections of disadvantaged African Americans. For instance, a study of young African American heterosexual men found that condom use is often related to disparities in social conditions and intersections with other health problems within the individual and community.(45) Likewise, a review of the literature pertaining to African American women and their HIV risk revealed intersecting and additive behaviors and conditions which contribute to HIV vulnerability among this group.(61) Most specific to this study, a recent paper with a majority African American sample recruited from an urban sexually transmitted infection (STI) clinic examined relations among childhood sexual abuse, depressive symptoms, binge drinking, marijuana

use, intimate partner violence, sexual risk behavior, and STI diagnosis.(47) Results indicated interrelations among HIV risk behaviors in the sample, and that persons with greater numbers of HIV risk behaviors were more likely to have multiple sex partners and to be diagnosed with an STI.(47) However, because participants for this study were recruited from a single STI clinic, results may have limited generalizability to other African Americans recruited from other venues, particularly nonclinical sites.

In this study we examine the associations between HIV sexual risk behaviors and binge drinking, depressive symptoms, socio-demographics, childhood maltreatment, and psychological functioning factors, their co-occurrence, and how a combination of these may correspond with an increase in HIV sexual risk behaviors. In addition to investigating HIV sexual risk behaviors through the study of these particular outcome measures, we also contribute to the literature by applying a syndemic conceptual framework based upon domains from the literature which are hypothesized to affect engagement in risk behaviors: socio-demographic characteristics, childhood maltreatment experiences, and psychosocial functioning. The HIV sexual risk behaviors measures are included in this study to assess their intersections and to determine if the associations are consistent across domains. Based on previous research linking HIV sexual risk behavior outcomes within the syndemic conceptual framework, which emphasizes the interconnected nature of these behaviors, we hypothesize that the HIV sexual risk behaviors under consideration will exhibit interconnectedness so that increasing the frequency of these risk factors will in turn be associated with increases in condomless sex.

METHODS

Data for this paper were collected as part of a larger study, *Be Healthy*, a longitudinal observational study of people's perceptions of how their neighborhood impacted their daily lives and actions.(62) This paper focuses on baseline data, collected between January 2010 and October 2011. *Be Healthy* eligibility criteria included: being 18 years or older, self-identifying as African American or black, and having lived in the study area; a disadvantaged area of Atlanta, GA,(63–65) for at least 12 months prior to the interview phase. Active street outreach (based on ethnographic information and interviews done with key informants) and passive strategies (e.g., posting flyers in public places such as telephone poles, message boards inside of local bars, and message boards inside of some local stores as well as referrals made by previous study participants) were used to recruit 1,535 participants from 61 census block groups (CBGs). The census blocks chosen for inclusion in the study were selected based on neighborhood structural characteristics as reported in the 2000 U.S. Census Data and based on data from the Atlanta Police Department. Consistent with the study's conceptual framework and previous research findings (66, 67) the neighborhood structural characteristics were selected on the basis of seven specific criteria: (1) the percentage of household incomes that were reported to be more than 20% above or below the federal poverty level, (2) the percentage of adults who had not completed high school or its equivalent, (3) the percentage of female-headed households, (4) the percentage of people who were unemployed or not in the labor force, (5) the percentage of one-unit housing structures, (6) the percentage of owner-occupied households, and (7) the percentage of vacant housing. Within the selected census block groups, a non-probability sampling frame

was designed to ensure sufficient variability by gender, age (specifically, persons who were under the age of 35 and those aged 35 or older, to facilitate analytical comparisons based on younger versus older adults), and drug use (i.e., persons who had not used any illegal drugs during the previous 90 days versus those who had). In this context, a “drug user” was defined as someone who had used powder cocaine, crack cocaine, and/or heroin at least once during the previous week and at least four times during the 90 days prior to interview. These criteria were imposed so that people designated as drug users for the purposes of this research were active, ongoing users of the illegal drugs in question, as opposed to one-time experimenters or casual, infrequent users of these substances. Conversely, in order to be considered a nonuser for this study, people had to report no use of these same drugs during the five years prior to interview. The criteria for being a non-drug user were selected based upon previous research that support using the five-year time frame as a proxy for the length of time it takes to develop a drug-free lifestyle (68–70). Beyond ceasing drug use, this also considers a shift away from a drug use-associated lifestyle (e.g., greater involvement in mainstream social roles). In order to be considered eligible for participation, respondents had to self-identify as African American, be at least 18 years of age, and have lived in that same neighborhood or census block group continuously for at least one year. People were considered ineligible for the study if they: (1) were in a drug treatment program or any other institutional setting at the time of recruitment, (2) were intoxicated at the time of consent or interview, or (3) displayed signs of cognitive impairment at the time of consent or interview.

After acquiring informed consent, trained interviewers invited study participants to a local research site, where they completed computer assisted surveys that included questions from various domains, including socio-demographic characteristics, psychological/psychosocial functioning, childhood maltreatment, reproductive health, sexual history and recent sexual activity, and substance use. Participants were compensated \$30 for their time (typically one to two hours) and then were offered referrals to local health and/or social service agencies as appropriate/necessary. The Emory Institutional Review Board approved the study protocol.

MEASURES

Socio-demographic Characteristics—These include age (continuous), gender (male versus female), educational attainment (high school or less versus all other categories), sexual orientation (heterosexual versus gay, lesbian, or bisexual), relationship status (“involved” with someone versus not “involved”), and living situation (own or rent a private residence, living in someone else’s residence), and employment status (unemployed, employed part time, employed full time). Yearly income was measured through a series of questions about the amount of income received in the past 30 days from a variety of sources including legal employment, “under the table” income, public assistance, retirement benefits, unemployment benefits, family sources, illegal income, and other sources. A total was calculated and the participant was asked to confirm the amount. For the purposes of this study, we present income as a categorical variable for descriptive reasons, but the square root of income was computed to make the variable conform to a normal distribution.

Dependent Variables—A measure of condom use during vaginal and/or anal sex with steady partners and casual partners was derived from four questions. Initially, participants

were asked to indicate the number of times that they engaged in vaginal sex with a steady partner during the 90 days prior to the interview. Then, they were asked to indicate how many of those times they or their partner(s) used a male condom. Comparable questions were asked for vaginal sex with casual partners, anal sex with steady partners, and anal sex with casual partners. For analytical purposes in the present paper, the responses to these questions were dichotomized to indicate condomless sex (i.e., less than 100% condom use, coded as (1) or consistent condom use (i.e., condoms used 100% of the time, coded as (0).

Secondary HIV sexual risk behavior measures included: (1) multiple sex partners in the past 90 days, (2) any sex while the respondent was high, (3) and any sex with a high partner. To assess multiple sex partners in the past 90 days participants were asked the number of men and the number of women they had sex with in the past 90 days. Responses were combined for male and female partners and then dichotomized into a single measure indicating had versus had not had multiple sex partners. Participants were also asked to report the frequency of which they had sex while high and had sex with a high partner in the past 30 days. Responses to these items used a five-point ordinal range, including “never,” “about once per month,” “a few times per month,” “about once per month,” “several times per week” or “daily.” Responses were dichotomized and then used to create two measures indicating and/no sex while high during the previous 30 days and any/no sex with a high partner during the previous 30 days.

Predictors

Childhood Trauma: Items from the brief screening version of the Childhood Trauma Questionnaire (71) were used to examine *childhood maltreatment experiences*, which asked participants to report on the experiences before the age of 18. Five items were used to assess the level of childhood sexual abuse experienced (Cronbach’s $\alpha = .94$); five items were used to measure physical abuse (Cronbach’s $\alpha = .76$); and five items were used to assess emotional abuse (Cronbach’s $\alpha = .81$). Responses to these items used a five-point ordinal range, including “never,” “rarely,” “sometimes,” “often,” or “very often.” Responses were dichotomized to represent any versus no abuse for each form of childhood maltreatment.

Psychological characteristics

Depressive Symptoms: The Center for Epidemiologic Studies Depression Scale (CESD-20) was used to screen for depressive symptoms.(72) The CES-D consists of 20 self-reported items related to the number of days during the past week during which the participant experienced emotional or behavioral difficulty. As with other research into the validity of the CES-D using different cut-points, those with scores higher than 22 were considered to indicate depressive symptoms.(56, 73, 74) The CESD-20’s reliability among this sample was found to be acceptable (Cronbach’s $\alpha = .87$; mean = 14.5, $SD = 10.7$).

Self-esteem was assessed using the 10-item Rosenberg Self Esteem scale.(75) Response options ranged from “strongly disagree” (coded 1) to “strongly agree” (coded 5). Scores ranged from 20 to 50, with higher scores representing higher levels of reported self-esteem (Cronbach’s $\alpha = .82$; mean = 39.5; $SD = 5.5$).

Condom use self-efficacy was assessed using selected items from Brafford and Beck's (1991) Condom Use Self Efficacy Scale.(76) In this study, we used 13 items to create an overall scale measuring condom use self-efficacy, with individual items scored using a 5-point Likert scale with responses ranging from "strongly disagree" (coded 1) to "strongly agree" (coded 5). The items included measurements of confidence in purchasing condoms, remembering to use condoms in different circumstances, suggesting condom use with partners, persistence in one's efforts to use condoms, and so forth. Scores ranged from 13 to 52, with higher scores representing higher levels of reported condom use self-efficacy (Cronbach's alpha = .81; mean = 39.7; *SD* = 6.2).

Substance use

Illicit drug use: Use of five specific types of illicit drugs in the past 90 days were assessed: crack, cocaine, heroin, ecstasy, and marijuana. For each illicit drug, participants were asked to indicate yes/no to the question: "Have you used ___ in the past 90 days?" Responses were recoded into a single dichotomous variable across drug types to indicate any/no illicit drug use in the past 90 days. *Binge Drinking.* Participants reported the number of days in the past 90 "How many days did you drink alcohol in the past 90 days?" and the average number of drinks per session "On an average day when you drink, how many drinks do you have?" Using cutoffs of 4 drinks for women per setting and 5 for men,(77) participants were classified as having at least one binge drinking session in the past 90 days versus no binge drinking days.

Statistical Analysis

The objective of this study was to examine the associations between HIV sexual risk behaviors and binge drinking, depressive symptoms, socio-demographics, childhood maltreatment, and psychological functioning factors, their co-occurrence, and how a combination of these may correspond with an increase in HIV sexual risk behaviors. Analyses to address these research aims were undertaken in steps that mirror the approach taken by Parson, Grov, & Golub (2012) and others.(51, 56, 58) First, descriptive statistics were used to characterize personal socio-demographics, reports of condomless sex, multiple sex partners, sex while the respondent was high, and sex with a high partner, and illicit drug use, binge drinking, and depressive symptoms. Second, Pearson's *r* correlations were calculated across pairings of behaviors to determine any possible intersections among these behaviors and establish the associations between pairs of HIV sexual risk behaviors. Third, multivariate logistic regression models were used to determine the associations between the predictors and HIV sexual risk behaviors. Predictors were selected for this model to represent the each of the hypothesized domains as tested in the literature.(49, 51, 56–59) Inter-predictor correlations and variance inflation factor (VIF) values were produced to check the assumption of multicollinearity among these predictors. Models were also computed predicting reporting of multiple sex partners, sex while the respondent was high, and sex with a high partner for comparison to results for condomless sex. Finally, reports of self-reported condomless sex were also calculated for the number of positive responses to HIV risk behaviors including: any illicit drug use, any binge drinking, depressive symptoms, multiple sex partners, any sex while high, and any sex while partner high categorized into 0, 1, 2, and 3 or more. A logistic regression model including the count of HIV risk behaviors as

a predictor was used to test the strength and direction of the association. Logistic regressions with pairwise interactions of the variables were computed using grand mean centered variables to determine if these interactions predicted greater condomless sex.

RESULTS

Sample Description

As shown in Table I, among the 1,535 participants, the average age was 37.5 ($SD = 13.2$), 57.3% were male, 58.9% had an income of less than \$8,500 per year, 77.1% had a high school education or less, 92.7% were heterosexual, 56.3% reported being partnered in a relationship, only 8.4% owned their own home, and 74.4% were unemployed. Also, 57.9% of participants reported childhood emotional abuse, 26.8% reported childhood sexual abuse, and 72.4% reported childhood physical abuse. A total of 67.8% reported condomless sex with sexual partners in the past 90 days, 39.9% reported multiple sexual partners, 55.0% reported having sex while high, and 36.3% reported sex with a high partner in the past month. A high prevalence other HIV risk behaviors and conditions were also reported by the participants; 36.3% reported illicit drug use and 28.2% reported binge drinking in the past 90 days, and 19.7% reported depressive symptoms.

Bivariate Associations and Odds Ratios among HIV Risk Behaviors

Table II presents Pearson's r correlations among for the HIV risk behaviors. As shown in Table II, thirteen of the fifteen correlations that were computed among the other HIV risk behaviors were statistically significant and all except one of these associations were positive. For example, condomless sex was associated with a greater likelihood of binge drinking ($r = .08, p < .01$), a greater likelihood of experiencing depressive symptoms ($r = .06, p < .05$), a greater chance of having sex while the respondent was high ($r = .11, p < .001$), a greater chance of having sex with a partner who was high ($r = .09, p < .001$), and a diminished likelihood of recently having had more than one sex partner ($r = -.06, p < .05$). In general, the size of these relationships were found to be what could be described as small effect sizes. (78) Additionally, the results suggest that relationships between those who participated in illicit drug and binge drinking was .15 ($p < .001$), depressive symptoms was .08 ($p < .01$), having multiple sexual partners was .26 ($p < .001$), sex while the respondent was high in the past month was .42 ($p < .001$), and sex with a high partner in the past month was .30 ($p < .001$); suggesting that as illicit drug use increases, the other HIV risk behaviors also increase. The size of these relationships were found to be what could be described as small to medium effect sizes. (78) Overall, there were consistent statistically significant and positive prediction of increasing levels of HIV risk behaviors associated with participation in other behaviors.

Multivariate Logistic Regression Analyses of HIV Sexual Risk Behaviors

This paper also examined the co-occurrence of risk factors and how a combination of these may correspond with an increase in HIV sexual risk behaviors among disadvantaged African American adults. The multivariate model predicting condomless sex with all predictors entered was statistically significant overall $\chi^2 (14) = 201.57, p < .001$, Nagelkerke $R^2 = 0.19$.

Correlations (e.g. no values above .60) and VIF values (e.g. no values approached 10) indicated no problems with multicollinearity among predictors.

As can be seen in Table III, women (adjusted odds ratio ($p < .05$), those who reported being in a steady relationship ($p < .001$), heterosexuals ($p < .05$), with higher levels of self-esteem ($p < .01$), those reporting sex while high ($p < .01$), and sex with a high partner ($p < .01$) were more likely to report condomless sex. Those with higher condom use self-efficacy were less likely to engage in condomless sex ($p < .001$).

In order to further elucidate the findings for condomless sex an additional three models were also computed to predict multiple sex partners, sex while the respondent was high, and sex with a high partner. The intent of these models was to examine the relative stability of predictors across each of these HIV sexual risk behaviors and if they are consistent with our results for condomless sex. Overall models for multiple partners $\chi^2(14) = 399.42, p < .001$, Nagelkerke $R^2 = 0.34$, sex while the respondent was high $\chi^2(14) = 552.42, p < .001$, Nagelkerke $R^2 = 0.45$, and sex with a high partner $\chi^2(14) = 437.99, p < .001$, Nagelkerke $R^2 = 0.38$ were statistically significant. Table III reveals that women reported less instances of having multiple partners (AOR = 0.47, $p < .001$), less sex while the respondent was high (AOR = 0.58, $p < .001$), but a higher likelihood of a sex partner that was high (AOR = 1.69, $p < .001$). Those who reported being heterosexual were less likely to report multiple sex partners (AOR = 0.20, $p < .001$) and having a sex partner who was high (AOR = 0.49, $p < .01$). Those who reported having a relationship partner were less likely to report multiple partners (AOR = 0.32, $p < .001$), and having a high sex partner (AOR = 0.73, $p < .05$). Illicit drug users were more likely to report multiple sex partners (AOR = 1.88, $p < .001$), sex while the respondent was high (AOR = 4.60, $p < .001$), and a high sex partner (AOR = 1.74, $p < .001$). Last, with the exception of multiple sex partners and condomless sex in their respective models, the HIV sexual risk behaviors were largely statistically significant predictors of each other.

Among the sample 14.1% ($n = 217$) reported zero, 19.7% ($n = 303$) one, 19.5% ($n = 300$) two, and 46.6% ($n = 715$) three or more HIV risk behaviors. A multivariate logistic regression model was computed to explore the association of an increasing number of HIV risk behaviors on condomless sex. Predictors used in earlier models were also included in these models. The multivariate model predicting condomless sex with all predictors entered was statistically significant overall $\chi^2(14) = 181.59, p < .001$, Nagelkerke $R^2 = 0.17$. Those having three or more HIV risk behaviors AOR 1.72 (1.17, 2.53, $p < .01$) were more likely to report condomless sex than those who did not report any of the HIV risk behaviors. Additionally, women AOR 1.47 (1.08, 1.83, $p < .05$), those reporting having a steady partner AOR 3.11 (2.42, 4.01, $p < .001$), and those who were heterosexual AOR 1.65 (1.03, 2.64, $p < .05$), had higher levels of self-esteem AOR 1.04 (1.01, 1.06, $p < .01$), and those with higher condom use self-efficacy were less likely to report condomless sex AOR 0.90 (0.88, 0.93, $p < .001$). Finally, models were computed that tested interactions between HIV risk behaviors and condomless sex. None of the pairwise interactions between HIV risk behaviors were statistically significant predictors of condomless sex.

DISCUSSION

In this study we examine the associations between HIV sexual risk behaviors and binge drinking, depressive symptoms, socio-demographics, childhood maltreatment, and psychological functioning factors, their co-occurrence, and how a combination of these may correspond with an increase in HIV sexual risk behaviors. High rates of the use of alcohol and other drugs as well as health problems (specifically depressive symptoms) have been identified among residents in disadvantaged urban neighborhoods, many of who tend to be members of racial/ethnic minority population, live below the poverty level, and experience social and health challenges. It appears that the conditions of the participant's life create an underlying foundation for the co-occurring conditions that form a syndemic. From a public health perspective such a co-occurrence reveals a syndemic.(45) For example, existing research findings show that African American adults who are disadvantaged at the individual as well as the neighborhood level are more likely than those in more advantaged situations to report depressive symptoms,(79) high levels of alcohol use, (80, 81) illicit drug use,(82–84) and engagement in unsafe sex that places them at risk for HIV infection.(16, 24–26, 62) In this paper we found that greater numbers of co-occurring socio-demographic, socio-psychological, and sexual behaviors intensify reports of condomless sex.

Limitations of the present study include its cross-sectional nature, thereby not allowing for making any causal inference. Second, study participants self-reported information on sensitive topics such as childhood maltreatment and sexual behaviors. This may have resulted in bias due to recall and social desirability. Third, is the limitation that the results of the present study have uncertain generalizability to other disadvantaged African American adults. The purposive convenience methods of recruitment also preclude an assessment of the representativeness of the sample. Last, we recognize that the complexity of the HIV epidemic cannot be limited to individual HIV risk behaviors. Future analyses should include structural and socio-contextual factors such as racism and access to healthcare, which likely put urban at-risk African Americans at greater HIV risk.

Consistent with past research, a large majority of participants (67%) reported condomless sex.(26, 85) The men and women in this study indicated a similar frequency of substance use, including illicit drugs and binge drinking, that has been reported in studies of African Americans living in disadvantaged areas of Atlanta.(19, 86) In addition, approximately 20% of the respondents reported depressive symptoms and over 70% reported at least one type of negative childhood maltreatment. Based upon our findings, this study provided some evidence supporting the application of a syndemic burden that is linked to elevated levels of HIV sexual behaviors among disadvantaged African American adults. Socio-demographics and an increasing number of socio-psychological challenges increased the likelihood of condomless sex. Hence it important to encourage at-risk African American adults to seek HIV testing so that they may become aware of their HIV status and be connected to available social and health services, including the continuum of care available to HIV infected individuals.

The results illustrate that there is inter-relatedness among HIV risk behaviors for urban African American adults. For instance, although our results did not indicate that illicit drug

use was directly associated with condomless sex, our preliminary analyses found bivariate relationships between illicit drug use and each of the other detrimental health behaviors. Additionally, we did find that reporting sex while the respondent was high and sex with a high partner to be strongly related to condomless sex. The prevalence of illicit drug use among African Americans is 11% and this rate has increased significantly since 2002, when it was reported to be 9.7%.(87) Furthermore, the use of crack cocaine has also been shown to be related to HIV risk (88–93) and may be a key risk factor for various infectious diseases,(52) and cocaine, marijuana, and heroin are the dominant drugs of abuse in the Atlanta area.(3) Crack use is often associated with greater involvement in risk behaviors and with HIV/AIDS, especially in disadvantaged neighborhoods.(63, 94–98) Although we used condomless sex as our primary outcome variable, our research corroborates studies using binge drinking, illicit drug use, and the other predictors we explored in our models.

The syndemic conceptual framework used for the main analyses in this study posited intersecting influences hypothesized to affect the extent to which disadvantaged African American adults engage in risk behaviors: socio-demographic characteristics, childhood maltreatment experiences, psychosocial functioning, and substance use. Among the distinct contributions of this study are the nature of the study sample, which represented disadvantaged African American adults who live in disadvantaged neighborhoods. The relationship between social disadvantage and unhealthy behaviors as well as poor health is structural in nature. Krieger (1999) introduced the concept of ecosocial factors.(99) Few studies have used a sampling frame that has considered unhealthy behaviors, in this case condomless sex and other HIV sexual risk behaviors, from an ecosocial (100) or risk environment perspective.(101). Moreover, studies reporting on a community-based, heterosexual sample are limited.(8, 45) The inclusion of childhood maltreatment as a more distal risk factor compared to more recent ones also has not received much investigation. (49, 55)

The findings from the current study reveal the presence of a syndemic or synergistic relationships between distal and current social and social-psychological characteristics and HIV sexual risk behaviors, specifically condomless sex. Moreover, the findings suggest the need for comprehensive and innovative prevention and intervention efforts, those that move beyond isolating HIV sexual risk taking. Condomless sex is triggered by individual perceptions (e.g., the safety of condoms or the sexual experience with a condom), sex partner dynamics (e.g., gender role expectations and the inherent message that proposing condom use may give), and community norms (e.g., regarding condomless sex). It is essential that such interventions consider the realities and underlying causes of social and health disparities, including those at the individual, dyad, network, community-level, and society at large. In addition, it is important to expand these programs not only to cover multiple health conditions, but also consider multi-level population-based approaches to research and care based upon the complex individual, dyadic, familial, and social determinants that put African Americans at higher risk of HIV infection. Furthermore, an enhanced understanding of how disparities are supported and sustained within the cultural and political societal structures and climate is needed. This includes consideration of perceived discrimination and its link to health disparities.(102) Doing so will ensure that prevention and intervention efforts are prepared to address features of a syndemic and move

beyond behavioral change into elimination of factors that contribute to social and health disparities. Such structural interventions must address poverty, discrimination, living conditions, employment opportunities, and access to health care as well as changes in policies and legal approaches that result in loss of employment, dismantling families and support networks, among other major disruptions that further push the disadvantages away from mainstream society and its privileges.

References

- Centers for Disease Control & Prevention. HIV surveillance report, 2011. 2013;1–84.
- Hixson BA, Omer SB, del Rio C, Frew PM. Spatial clustering of HIV prevalence in Atlanta, Georgia and population characteristics associated with case concentrations. *J Urban Health*. 2011; 88(1):129–41. [PubMed: 21249526]
- Dew, BJ.; Golubovic, N. Patterns and Trends of Drug Use in Atlanta: 2013. Proceedings of the Community Epidemiology Work Group; June 2014; 2014. p. 1-13.
- Centers for Disease Control & Prevention. Estimated HIV incidence in the United States, 2007–2010. HIV surveillance supplemental report. 2012; 17(4)
- Shoptaw S, Reback CJ. Methamphetamine use and infectious disease-related behaviors in men who have sex with men: implications for interventions. *Addiction*. 2007; 102(s1):130–5. [PubMed: 17493062]
- Drumright LN, Patterson TL, Strathdee SA. Club drugs as causal risk factors for HIV acquisition among men who have sex with men: a review. *Subst Use Misuse*. 2006; 41(10–12):1551–601. [PubMed: 17002993]
- Millett, GA.; Malebranche, DJ.; Peterson, JL. The Health of Sexual Minorities. Springer; 2007. HIV/AIDS prevention research among Black men who have sex with men: Current progress and future directions; p. 539-65.
- Ostrow DG. The role of drugs in the sexual lives of men who have sex with men: Continuing barriers to researching this question. *AIDS Behav*. 2000; 4(2):205–19.
- Dew BJ, Elifson KW, Sterk CE. Differences in HIV sexual risk behaviors between heterosexual and nonheterosexual male users of methamphetamine. *J Drug Issues*. 2007; 37(2):281–98.
- Koblin BA, Murrill C, Camacho M, Xu G, Liu K, Raj-Singh S, et al. Amphetamine use and sexual risk among men who have sex with men: results from the National HIV Behavioral Surveillance study-New York City. *Subst Use Misuse*. 2007; 42(10):1613–28. [PubMed: 17918031]
- Morgenstern J, Irwin TW, Wainberg ML, Parsons JT, Muench F, Bux DA Jr, et al. A randomized controlled trial of goal choice interventions for alcohol use disorders among men who have sex with men. *J Consult Clin Psychol*. 2007; 75(1):72. [PubMed: 17295566]
- Vaudrey J, Raymond HF, Chen S, Hecht J, Ahrens K, McFarland W. Indicators of use of methamphetamine and other substances among men who have sex with men, San Francisco, 2003–2006. *Drug Alcohol Depend*. 2007; 90(1):97–100. [PubMed: 17428622]
- St Lawrence JS, Wilson TE, Eldridge GD, Brasfield TL, O'Bannon RE III. Community-based interventions to reduce low income, African American women's risk of sexually transmitted diseases: A randomized controlled trial of three theoretical models. *Am J Community Psychol*. 2001; 29(6):937–64. [PubMed: 11800513]
- Lightfoot M, Song J, Rotheram-Borus MJ, Newman P. The influence of partner type and risk status on the sexual behavior of young men who have sex with men living with HIV/AIDS. *J Acquir Immune Defic Syndr*. 2005; 38(1):61–8. [PubMed: 15608527]
- Whittier DK, St Lawrence JS, Seeley S. Sexual risk behavior of men who have sex with men: Comparison of behavior at home and at a gay resort. *Arch Sex Behav*. 2005; 34(1):95–102. [PubMed: 15772772]
- Macaluso M, Demand MJ, Artz LM, Hook EW III. Partner type and condom use. *AIDS*. 2000; 14(5):537–46. [PubMed: 10780716]

17. Lichtenstein B, Desmond RA, Schwebke JR. Partnership Concurrency Status and Condom Use Among Women Diagnosed with *Trichomonas vaginalis*. *Women's Health Issues*. 2008; 18(5):369–74. [PubMed: 18657997]
18. Scott-Sheldon LAJ, Carey MP, Vanable PA, Senn TE, Coury-Doniger P, Urban MA. Alcohol consumption, drug use, and condom use among STD clinic patients. *J Stud Alcohol Drugs*. 2009; 70(5):762. [PubMed: 19737501]
19. DePadilla L, Elifson KW, Sterk CE. Beyond sexual partnerships: The lack of condom use during vaginal sex with steady partners. *Int Public Health J*. 2012; 4(4):435. [PubMed: 24634708]
20. Sterk, C. *Tricking and tripping: Prostitution during the AIDS era*. Social Change Press; Putnam Valley, NY: 2000.
21. Theall KP, Sterk CE, Elifson KW. Male condom use by type of relationship following an HIV intervention among women who use illegal drugs. *J Drug Issues*. 2003; 33(1):1–27.
22. Holtgrave DR, Crosby RA, Shouse RL. Correlates of unprotected anal sex with casual partners: a study of gay men living in the southern United States. *AIDS Behav*. 2006; 10(5):575–8. [PubMed: 16715345]
23. 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.
24. Adimora AA, Schoenbach VJ, Doherty IA. Concurrent sexual partnerships among men in the United States. *Am J Public Health*. 2007; 97(12):2230–7. [PubMed: 17971556]
25. Ivy W III, Miles I, Le B, Paz-Bailey G. Correlates of HIV Infection Among African American Women from 20 Cities in the United States. *AIDS Behav*. 2013:1–10. [PubMed: 23054037]
26. Crosby RA, DiClemente RJ, Salazar LF, Wingood GM, McDermott-Sales J, Young AM, et al. Predictors of consistent condom use among young African American women. *AIDS Behav*. 2013; 17(3):865–71. [PubMed: 21796442]
27. Baeten JM, Donnell D, Ndase P, Mugo NR, Campbell JD, Wangisi J, et al. Antiretroviral prophylaxis for HIV prevention in heterosexual men and women. *N Engl J Med*. 2012; 367(5):399–410. [PubMed: 22784037]
28. Grant RM, Lama JR, Anderson PL, McMahan V, Liu AY, Vargas L, et al. Preexposure chemoprophylaxis for HIV prevention in men who have sex with men. *N Engl J Med*. 2010; 363(27):2587–99. [PubMed: 21091279]
29. Karim QA, Karim SSA, Frohlich JA, Grobler AC, Baxter C, Mansoor LE, et al. Effectiveness and safety of tenofovir gel, an antiretroviral microbicide, for the prevention of HIV infection in women. *Science*. 2010; 329(5996):1168–74. [PubMed: 20643915]
30. Crosby RA. State of condom use in HIV prevention science and practice. *Curr HIV/AIDS Rep*. 2013; 10(1):59–64. [PubMed: 23224425]
31. Crosby RA, Cates W. Condom use: still a sexual health staple. *Sex Health*. 2012; 9(1):1–3. [PubMed: 22348626]
32. Crepaz N, Marshall KJ, Aupont LW, Jacobs ED, Mizuno Y, Kay LS, et al. The efficacy of HIV/STI behavioral interventions for African American females in the United States: a meta-analysis. *Am J Public Health*. 2009; 99(11):2069. [PubMed: 19762676]
33. Henny KD, Crepaz N, Lyles CM, Marshall KJ, Aupont LW, Jacobs ED, et al. Efficacy of HIV/STI behavioral interventions for heterosexual African American men in the United States: A meta-analysis. *AIDS Behav*. 2012; 16(5):1092–114. [PubMed: 22234436]
34. Wingood G, DiClemente RJ. Partner influences and gender-related factors associated with noncondom use among young adult African American women. *Am J Community Psychol*. 1998; 26(1):29–51. [PubMed: 9574497]
35. Wingood G, DiClemente R. The effects of an abusive primary partner on the condom use and sexual negotiation practices of African-American women. *Am J Public Health*. 1997; 87(6):1016–8. [PubMed: 9224187]
36. Sterk C, Klein H, Elifson K. Perceived condom use self-efficacy among at-risk women. *AIDS Behav*. 2003; 7(2):175–82. [PubMed: 14586202]
37. Crosby R, DiClemente R, Wingood G, Salazar L, Head S, Rose E, et al. Sexual agency versus relational factors: a study of condom use antecedents among high-risk young African American women. *Sex Health*. 2008; 5(1):41–7. [PubMed: 18361853]

38. Crosby R, DiClemente R, Salazar L, Wingood G, McDermott-Sales J, Young A, et al. Predictors of consistent condom use among young African American women. *AIDS Behav.* 2013; 17(3):865–71. [PubMed: 21796442]
39. Sobo EJ. Inner-city women and AIDS: the psycho-social benefits of unsafe sex. *Culture, medicine and psychiatry.* 1993; 17(4):455–85.
40. Dancy B, Berbaum M. Condom use predictors for low-income African American women. *West J Nurs Res.* 2005; 27(1):28–44. [PubMed: 15659584]
41. El-Bassel N, Caldeira N, Ruglass L, Gilbert L. Addressing the unique needs of African American women in HIV prevention. *Am J Public Health.* 2009; 99(6):996. [PubMed: 19372518]
42. Raiford J, Wingood G, DiClemente R. Correlates of consistent condom use among HIV-positive African American women. *Women Health.* 2007; 46(2–3):41–58. [PubMed: 18160369]
43. Singer M. A dose of drugs, a touch of violence, a case of AIDS, part 2: Further conceptualizing the SAVA syndemic. *Free Inquiry in Creative Sociology.* 2006; 34(1):39–54.
44. Singer, M. *Introduction to syndemics: A critical systems approach to public and community health.* San Francisco, CA: John Wiley & Sons; 2009.
45. Singer MC, Erickson PI, Badiane L, Diaz R, Ortiz D, Abraham T, et al. Syndemics, sex and the city: understanding sexually transmitted diseases in social and cultural context. *Soc Sci Med.* 2006; 63(8):2010–21. [PubMed: 16782250]
46. Singer M, Clair S. Syndemics and public health: Reconceptualizing disease in bio-social context. *Med Anthropol Q.* 2003; 17(4):423–41. [PubMed: 14716917]
47. Senn TE, Carey MP, Venable PA. The intersection of violence, substance use, depression, and STDs: testing of a syndemic pattern among patients attending an urban STD clinic. *J Natl Med Assoc.* 2010; 102(7):614–20. [PubMed: 20690325]
48. Walkup J, Blank MB, Gonzalez JS, Safren S, Schwartz R, Brown L, et al. The impact of mental health and substance abuse factors on HIV prevention and treatment. *J Acquir Immune Defic Syndr.* 2008; 47:S15–S9. [PubMed: 18301129]
49. Klein H. Using a syndemics theory approach to study HIV risk taking in a population of men who use the Internet to find partners for unprotected sex. *Am J Mens Health.* 2011; 5(6):466–76. [PubMed: 21406487]
50. Singer M. A dose of drugs, a touch of violence, a case of AIDS: conceptualizing the SAVA syndemic. *Free Inquiry in Creative Sociology.* 1996; 24(2):99–110.
51. Stall R, Mills TC, Williamson J, Hart T, Greenwood G, Paul J, et al. Association of co-occurring psychosocial health problems and increased vulnerability to HIV/AIDS among urban men who have sex with men. *Am J Public Health.* 2003; 93(6):939–42. [PubMed: 12773359]
52. Singer M. The infectious disease syndemics of crack cocaine. *J Equity Health.* 2014; 3(1):32–44.
53. Singer M, Clair S. Syndemics and public health: Reconceptualizing disease in bio-social context. *Medical Anthropology Quarterly.* 2003; 17(4):423–41. [PubMed: 14716917]
54. Gonzalez-Guarda RM, Vasquez EP, Urrutia MT, Villarruel AM, Peragallo N. Hispanic women's experiences with substance abuse, intimate partner violence, and risk for HIV. *J Transcult Nurs.* 2011; 22(1):46–54. [PubMed: 21191036]
55. Klein H, Tilley D. Childhood maltreatment and HIV risk taking among men using the Internet specifically to find partners for unprotected sex. *Int J Public Health.* 2012; 4:33–42.
56. Parsons JT, Grov C, Golub SA. Sexual compulsivity, co-occurring psychosocial health problems, and HIV risk among gay and bisexual men: further evidence of a syndemic. *Am J Public Health.* 2012; 102(1):156–62. [PubMed: 22095358]
57. Halkitis PN, Kupprat SA, Hampton MB, Perez-Figueroa R, Kingdon M, Eddy JA, et al. Evidence for a syndemic in aging HIV-positive gay, bisexual, and other MSM: Implications for a holistic approach to prevention and health care. *Ann Anthropol Pract.* 2012; 36(2):365–86.
58. Mustanski B, Garofalo R, Herrick A, Donenberg G. Psychosocial health problems increase risk for HIV among urban young men who have sex with men: preliminary evidence of a syndemic in need of attention. *Ann Behav Med.* 2007; 34(1):37–45. [PubMed: 17688395]
59. Wolitski, RJ.; Stall, R.; Valdiserri, RO. *Unequal opportunity: health disparities affecting gay and bisexual men in the United States.* Oxford University Press; 2008.

60. O'Leary A, Jemmott JB III, Stevens R, Rutledge SE, Icard LD. Optimism and Education Buffer the Effects of Syndemic Conditions on HIV Status Among African American Men Who Have Sex with Men. *AIDS Behav.* 2014;1–9. [PubMed: 23321946]
61. Ostrach B, Singer M. At special risk: Biopolitical vulnerability and HIV/STI syndemics among women. *Health Soc Review.* 2012; 21(3):258–71.
62. McCarty F, DePadilla L, Elifson K, Sterk C. Excessive drinking among African American men: individual and contextual correlates. *J Ethn Subst Abuse.* 2012; 11(2):113–29. [PubMed: 22679893]
63. Sterk CE, Elifson KW, DePadilla L. Neighbourhood structural characteristics and crack cocaine use: Exploring the impact of perceived neighbourhood disorder on use among African Americans. *Int J Drug Policy.* 2013
64. DePadilla, L.; Wolfe, M. Drug abuse patterns and trends in Atlanta - Update. Bethesda, MD: U.S Department of Health and Human Service, National Institutes of Health; Jan. 2012
65. Sterk CE, Elifson KW, Theall KP. Individual action and community context: the Health Intervention Project. *Am J Prev Med.* 2007; 32(6):S177–S81. [PubMed: 17543709]
66. Cutrona CE, Russell DW, Brown PA, Clark LA, Hessling RM, Gardner KA. Neighborhood context, personality, and stressful life events as predictors of depression among African American women. *J Abnorm Psychol.* 2005; 114(1):3. [PubMed: 15709807]
67. Sampson RJ, Raudenbush SW, Earls F. Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science.* 1997; 277(5328):918–24. [PubMed: 9252316]
68. Satre DD, Mertens JR, Areal PA, Weisner C. Five-year alcohol and drug treatment outcomes of older adults versus middle-aged and younger adults in a managed care program. *Addiction.* 2004; 99(10):1286–97. [PubMed: 15369567]
69. Inciardi JA, Martin SS, Butzin CA. Five-year outcomes of therapeutic community treatment of drug-involved offenders after release from prison. *Crime & Delinquency.* 2004; 50(1):88–107.
70. Hubbard RL, Craddock SG, Anderson J. Overview of 5-year followup outcomes in the drug abuse treatment outcome studies (DATOS). *Journal of substance abuse treatment.* 2003; 25(3):125–34. [PubMed: 14670518]
71. Bernstein DP, Fink L, Handelsman L, Foote J, Lovejoy M, Wenzel K, et al. Initial reliability and validity of a new retrospective measure of child abuse and neglect. *Am J Psychiatry.* 1994
72. Radloff LS. The CES-D scale a self-report depression scale for research in the general population. *Appl Psychol Meas.* 1977; 1(3):385–401.
73. Haringsma R, Engels G, Beekman A, Spinhoven P. The criterion validity of the Center for Epidemiological Studies Depression Scale (CES-D) in a sample of self-referred elders with depressive symptomatology. *Int J Geriatr Psychiatry.* 2004; 19(6):558–63. [PubMed: 15211536]
74. Givens JL, Houston TK, Van Voorhees BW, Ford DE, Cooper LA. Ethnicity and preferences for depression treatment. *Gen Hosp Psychiatry.* 2007; 29(3):182–91. [PubMed: 17484934]
75. Rosenberg, M. Society and the adolescent self-image. Princeton, NJ: Princeton University Press; 1965.
76. Brafford LJ, Beck KH. Development and validation of a condom self-efficacy scale for college students. *J Am Coll Health.* 1991; 39(5):219–25. [PubMed: 1783705]
77. National Institute on Alcohol Abuse and Alcoholism. NIAAA Council approves definition of binge drinking. *NIAAA newsletter.* 2004; 3:3.
78. Cohen J. A power primer. *Psychological bulletin.* 1992; 112(1):155. [PubMed: 19565683]
79. Williams DR, Gonzalez HM, Neighbors H, Nesse R, Abelson JM, Sweetman J, et al. Prevalence and distribution of major depressive disorder in African Americans, Caribbean blacks, and non-Hispanic whites: results from the National Survey of American Life. *Archives of General Psychiatry.* 2007; 64(3):305–15. [PubMed: 17339519]
80. Bryant KJ. Expanding Research on the Role of Alcohol Consumption and Related Risks in the Prevention and Treatment of HIV/AIDS. *Substance use & misuse.* 2006; 41(10–12):1465–507. [PubMed: 17002990]
81. Kalichman SC, Simbayi LC, Kaufman M, Cain D, Jooste S. Alcohol use and sexual risks for HIV/AIDS in sub-Saharan Africa: systematic review of empirical findings. *Prevention Science.* 2007; 8(2):141–51. [PubMed: 17265194]

82. Freeman RC. Sociodemographic, HIV Risk Behavior and Attitudinal Characteristics that Discriminate Urban, Crack-Using African-American Men Reporting Involvement in Concurrent Sexual Partnerships. *Journal of Therapy & Management in HIV Infection*. 2013; 1(1):7–18.
83. Strathdee SA, Stockman JK. Epidemiology of HIV among injecting and non-injecting drug users: current trends and implications for interventions. *Current HIV/AIDS Reports*. 2010; 7(2):99–106. [PubMed: 20425564]
84. Khan MR, Berger A, Hemberg J, O'Neill A, Dyer TP, Smyrk K. Non-injection and injection drug use and STI/HIV risk in the United States: The degree to which sexual risk behaviors versus sex with an STI-infected partner account for infection transmission among drug users. *AIDS and Behavior*. 2013; 17(3):1185–94. [PubMed: 22890684]
85. DePadilla L, Elifson KW, Sterk CE. Beyond Sexual Partnerships: The Lack of Condom Use during Vaginal Sex with Steady Partners. *International Public Health Journal*. 2012; 4(4):435. [PubMed: 24634708]
86. Cooper HL, Bonney LE, Ross Z, Karnes C, Hunter-Jones J, Kelley ME, et al. The aftermath of public housing relocation: Relationship to substance misuse. Drug and alcohol dependence. 2013; 133(1):37–44. [PubMed: 23850372]
87. SAMSHA. Administration SAAHHS. Results from the 2011 National Survey on Drug Use and Health: Summary of National Findings, NSDUH Series H–44. Rockville, MD: 2012.
88. Ivy W III, Miles I, Le B, Paz-Bailey G. Correlates of HIV Infection Among African American Women from 20 Cities in the United States. *AIDS and Behavior*. 2013:1–10. [PubMed: 23054037]
89. Sterk CE, Theall KP, Elifson KW. Effectiveness of a risk reduction intervention among African American women who use crack cocaine. *AIDS Educ Prev*. 2003; 15(1):15–32. [PubMed: 12627741]
90. Sterk CE, Elifson KW, German D. Female crack users and their sexual relationships: The role of sex-for-crack exchanges. *J Sex Res*. 2000; 37(4):354–60.
91. Timpson SC, Williams ML, Bowen AM, Atkinson JS, Ross MW. Sexual activity in HIV-positive African American crack cocaine smokers. *Arch Sex Behav*. 2010; 39(6):1353–8. [PubMed: 20628803]
92. Atkinson JS, Williams ML, Timpson SC, Schönnesson LN. Multiple sexual partnerships in a sample of African-American crack smokers. *AIDS Behav*. 2010; 14(1):48–58. [PubMed: 18161020]
93. Freeman RC. Sociodemographic, HIV risk behavior and attitudinal characteristics that discriminate urban, crack-using African-American men reporting involvement in concurrent sexual partnerships. *J Therapy & Management in HIV Inf*. 2013; 1(1):7–18.
94. DeBeck K, Kerr T, Li K, Fischer B, Buxton J, Montaner J, et al. Smoking of crack cocaine as a risk factor for HIV infection among people who use injection drugs. *CMAJ*. 2009; 181(9):585–9. [PubMed: 19841052]
95. Harzke AJ, Williams ML, Bowen AM. Binge use of crack cocaine and sexual risk behaviors among African-American, HIV-positive users. *AIDS Behav*. 2009; 13(6):1106–18. [PubMed: 18758935]
96. Latkin CA, Curry AD, Hua W, Davey MA. Direct and indirect associations of neighborhood disorder with drug use and high-risk sexual partners. *Am J Prev Med*. 2007; 32(6):S234–S41. [PubMed: 17543716]
97. Logan T, Cole J, Leukefeld C. Gender differences in the context of sex exchange among individuals with a history of crack use. *AIDS Educ Prev*. 2003; 15(5):448–64. [PubMed: 14626466]
98. Latkin CA, German D, Vlahov D, Galea S. Neighborhoods and HIV: A social ecological approach to prevention and care. *Am Psychol*. 2013; 68(4):210. [PubMed: 23688089]
99. Krieger N. Questioning epidemiology: objectivity, advocacy, and socially responsible science. *Am J Public Health*. 1999; 89(8):1151–3. [PubMed: 10432896]
100. Krieger N. Theories for social epidemiology in the 21st century: an ecosocial perspective. *Int J Epidemiology*. 2001; 30(4):668–77.
101. Rhodes T, Singer M, Bourgois P, Friedman SR, Strathdee SA. The social structural production of HIV risk among injecting drug users. *Soc Sci Med*. 2005; 61(5):1026–44. [PubMed: 15955404]

102. Smedley BD. The lived experience of race and its health consequences. *Am J Public Health*. 2012; 102(5):933–5. [PubMed: 22420805]

Table I

Study demographic variable descriptive statistics (n=1,535).

	Overall
	Mean (SD)
Age	37.5 (13.2)
	n (%)
Yearly Income	
Up to \$2,500	321 (20.9)
\$2,501 – \$5,500	301 (19.6)
\$5,501 – \$8,500	282 (18.4)
\$8,501 – \$14,500	342 (22.3)
More than \$14,500	287 (18.7)
Gender	
Male	879 (57.3)
Female	656 (42.7)
Educational Attainment	
Less than high school	585 (38.1)
High school graduate/GED	599 (39.0)
At least some college	351 (22.9)
Sexual orientation	
Heterosexual	1410 (92.7)
Gay, lesbian, or bisexual	111 (7.3)
Relationship Status	
Not partnered	670 (43.7)
Partnered	864 (56.3)
Employment Status	
Unemployed	1063 (74.4)
Employed, part-time	233 (16.3)
Employed, full-time	133 (9.3)
Any Childhood Trauma	
Emotional abuse	887 (57.9)
Sexual abuse	410 (26.8)
Physical abuse	1108 (72.4)

Table II
Correlations Among Psychosocial HIV Risk Behaviors and HIV Sexual Risk Behaviors

	Any Illicit Drug Use	Any Binge Drinking	Depressive Symptoms	Multiple Sex Partners	Any Sex while High	Any Sex with High Partner	Condomless Sex
Any Illicit Drug Use		.15***	.08**	.26***	.42***	.30***	0.03
Any Binge Drinking			.11***	.11***	.26***	.15***	.08**
Depressive Symptoms				.06*	.05	.08**	.06*
Multiple Sex Partners					.28***	.35***	-.06*
Any Sex while High						.46***	.11***
Any Sex with High Partner							.09***

Note:

* = $p < .05$,

** = $p < .01$,

*** = $p < .001$

Table III

Multivariate Logistic Regressions Among Intersecting HIV Sexual Risk Behaviors

Independent Variables	Dependent Variables			
	Multiple Sex Partners AOR (95% CI)	Any Sex while High AOR (95% CI)	Any High Sex Partner AOR (95% CI)	Condomless Sex AOR (95% CI)
Gender (1=female)	0.47 (0.35, 0.62) ***	0.58 (0.43, 0.77) ***	1.69 (1.26, 2.27) ***	1.32 (1.01, 1.73) *
Sexual orientation (1=heterosexual)	0.20 (0.12, 0.35) ***	1.43 (0.80, 2.55)	0.49 (0.29, 0.84) **	1.65 (1.02, 2.67) *
Relationship status (1=partnered)	0.32 (0.24, 0.41) ***	1.23 (0.92, 1.65)	0.73 (0.55, 0.98) *	2.97 (2.29, 3.85) ***
Childhood Sexual Abuse	1.22 (0.89, 1.67)	0.96 (0.69, 1.35)	1.39 (1.01, 1.91) *	1.32 (0.97, 1.81)
Childhood Physical abuse	1.10 (0.81, 1.49)	1.27 (0.93, 1.75)	1.18 (0.86, 1.62)	1.30 (0.97, 1.73)
Childhood Emotional Abuse	0.95 (0.72, 1.26)	1.05 (0.78, 1.41)	0.99 (0.74, 1.31)	0.96 (0.73, 1.25)
Self Esteem	0.97 (0.94, 1.00) *	1.01 (0.98, 1.04)	1.00 (0.97, 1.03)	1.04 (1.01, 1.07) **
Condom Use Self-Efficacy	0.99 (0.97, 1.01)	1.00 (0.98, 1.03)	1.00 (0.98, 1.03)	0.90 (0.88, 0.93) ***
Any Illicit drug use	1.88 (1.39, 2.54) ***	4.60 (3.47, 6.11) ***	1.74 (1.26, 2.40) **	0.91 (0.68, 1.21)
Any Binge drinking	0.99 (0.74, 1.32)	3.23 (2.35, 4.45) ***	0.93 (0.69, 1.24)	1.30 (0.97, 1.75)
Depressive Symptoms	0.95 (0.66, 1.36)	1.07 (0.73, 1.58)	1.07 (0.74, 1.55)	1.35 (0.93, 1.95)
Multiple Sex Partners	----	1.80 (1.33, 2.45) ***	2.90 (2.16, 3.88) ***	0.78 (0.58, 1.04)
Any Sex while High	1.72 (1.27, 2.34) **	----	6.54 (4.73, 9.03) ***	1.51 (1.12, 2.05) **
Any Sex while Partner High	2.87 (2.15, 3.84) ***	6.69 (4.84, 9.23) ***	----	1.59 (1.17, 2.17) **
Condomless Sex	0.81 (0.60, 1.08)	1.49 (1.10, 2.02) **	1.61 (1.19, 2.19) **	----
Model r^2 (Nagelkerke)	0.34	0.45	0.38	0.19

Note:

*
= p < .05,**
= p < .01,***
= p < .001