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Intimate partner violence among HIV+ crack cocaine users: where and why to intervene

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Abstract Cover Page

Intimate partner violence among HIV+ crack cocaine users: where and why to intervene

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Abstract

Intimate partner violence among HIV+ crack cocaine users: where and why to intervene
By Ameeta Shivdas Kalokhe

Background: HIV+ crack cocaine users, collectively, are at high-risk for disease progression and transmitting HIV in that they encounter difficulty entering and remaining in HIV care, taking antiretroviral therapy (ART), and practicing safe sex. We hypothesized that intimate partner violence (IPV) occurs frequently in this cohort and contributes to these shortcomings.

Methods: From December 2006-April 2010 we recruited HIV+ crack cocaine users from inpatient services at Grady Memorial Hospital (Atlanta, GA) and Jackson Memorial Hospital (Miami, FL). Participants were screened for IPV using a 5-item validated survey, and IPV survivors were questioned regarding use and barriers to use of support services. Multivariate analysis was conducted to evaluate the association between IPV and unprotected intercourse or STI diagnosis in the prior 6 months, use of HIV care in the past year, and use of ART.

Results: 343 participants were enrolled. The majority were African American (89%), had not completed high school (52%), and earned <$10,000/year (91%). Fifty-six percent reported lifetime histories of IPV. After controlling for gender, frequency of crack use, and sexuality, IPV was associated with unprotected sex (PR 1.46, 95%CI=1.12-1.90). After controlling for gender, sexuality, and number of sexual partners, IPV was associated with report of an STI diagnosis in the prior 6 months (PR=2.43, 95%CI=1.11-5.36). While IPV was associated with reduced utilization of HIV care, this association was no longer statistically significant after controlling for frequency of crack use and homelessness. IPV survivors were less likely to report ART use (PR=0.57, 95%CI=0.41-0.80), however this negative association was driven by men. While IPV survivors most frequently used 911 services (31%) and the ED (27%), over one-third used no services. Barriers to resource utilization included unwillingness to deal with the situation, fears of partner notification and being judged, and perception of resources as unhelpful.

Conclusion: IPV occurs frequently in HIV+ crack cocaine users and is associated with high-risk sexual behaviors and less use of HIV care. IPV screening should become routine in this population, and resources directed toward emergency/911 services. Clinicians should focus on increasing awareness of IPV services and improving patient comfort and sense of confidentiality in discussing IPV.

Cover Page

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INTRODUCTION

While HIV incidence and mortality has continued to decline throughout the United States, the South remains home to over 17,000 new AIDS diagnoses and over 8,000 AIDS-related deaths per year according to the most recent estimates of the Centers for Disease Control and Prevention (CDC) (1). Crack cocaine may be a key factor fueling the Southeastern U.S. AIDS epidemic. In a recent study, more than one-third of 1,038 HIV-positive inpatients hospitalized in the public hospitals of two major Southeastern metropolises reported crack cocaine use (2). Crack cocaine was associated with reduced utilization of HIV care and HIV medications, as well as unprotected sexual intercourse in these individuals (2).

Among HIV-positive crack cocaine users, intimate partner violence (IPV) may be a critical barrier to practicing safe sex and utilizing HIV care. Clinical experience and emerging literature indicate that crack cocaine users are often subject to lifetime cycles of violence (3-4). The postulated explanatory mechanism is that these crack cocaine users, many of whom first experience abuse as children (5-6), may begin to use crack as a coping mechanism (7-8), and therefore have heightened vulnerability to further acts of violence, such as IPV (9). El-Bassel *et al* proposed that crack cocaine may increase vulnerability to IPV through impairing judgment and ability to detect of ongoing abuse, lowering the social status of the crack user and thus enabling the perpetrator to be violent toward him/her, and fostering a violent subculture (9). HIV-positive individuals also report high frequencies of IPV, likely in part due to the HIV diagnosis perpetuating self perceptions of inferiority and stigma (10). The HIV Costs and Service Utilization Study demonstrated that 45% of HIV-infected adults reporting IPV in their relationships described their HIV status as a cause of the partner violence (11). *The extent to which IPV may result in the inability of HIV-positive crack cocaine users to access HIV care, adhere to medications, and engage in safe sex practices is unknown.*

In this study, we aimed to estimate the prevalence of IPV among HIV-positive crack cocaine users and determine whether IPV is associated with behaviors and diseases that propagate

HIV disease progression and transmission (i.e. reduced utilization of HIV care, diminished use of antiretroviral therapy (ART), unprotected sexual intercourse, and sexually transmitted infections (STIs)). We also aimed to identify the community-based IPV services that HIV-infected crack cocaine users accessed and determine the barriers IPV survivors encountered in utilizing these services. The new knowledge learned thought this study will be essential to determine how to best allocate scarce resources in order to empower and support HIV-positive IPV survivors who use crack cocaine.

This study was designed as a cross-sectional, dual-centered, study nested within a larger randomized controlled trial. HIV-positive individuals reporting recent crack cocaine use were enrolled from the inpatient services of two urban hospitals (Grady Memorial Hospital, Atlanta, GA and Jackson Memorial Hospital, Miami, Fl). They underwent handheld device-assisted bedside interviews through which data regarding socio-demographics, safe sex practices, health care and medication use, and substance abuse histories was obtained. IPV histories were elicited using a 5-item questionnaire, adapted from a previously validated clinical screener for IPV. Finally, the participants reporting prior histories of IPV were questioned regarding use and barriers to use of various IPV community support services. Multivariate logistic regression was used to evaluate the association between IPV and an individual's use of HIV care, HIV medications, practice of safe sex, and carrying a diagnosis of a STI in the prior six months.

The study findings reported herein confirm our hypotheses that IPV occurs with high frequency in HIV-positive crack cocaine users and is associated with behaviors that propagate HIV disease progression and transmission. These results emphasize the need for behavioral HIV risk reduction and therapeutic HIV interventions catered toward HIV-positive crack cocaine users to incorporate a component which addresses IPV. Furthermore, these results suggest that HIV medication non-adherence, missed appointments, and new STI diagnoses may be surrogate markers for IPV. And when noted in clinical practice, these markers could potentially be used to initiate the IPV screening and referral process. The ultimate significance of this study is that in

addressing IPV among HIV-positive crack cocaine users, clinicians and other health care providers may begin to curb the Southern U.S. AIDS epidemic.

BACKGROUND

The current U.S. AIDS epidemic is concentrated in the Southeast

Throughout the United States AIDS incidence and mortality continues to decline (12). The rising prevalence of AIDS reflects the earlier detection of HIV infection, due to improved diagnostic modalities, and diminished AIDS-related mortality, due to the development and improved delivery of new HIV treatment. While the domestic progress in combating HIV has been marked in the past few decades, many individuals continue to be diagnosed with HIV and die of AIDS each year. In 2008, the Centers for Disease Control and Prevention (CDC) reported that 37,991 people were diagnosed with AIDS in the U.S. and 18,089 individuals died with AIDS in 2007 (12). In recent years the largest disease burden of new AIDS cases has been concentrated in the South (1). In 2008 Maryland, Florida, Louisiana, and Georgia were ranked in the top five states in per capita AIDS diagnoses (1, 13). *These statistics highlight the need for improved HIV and AIDS prevention and treatment in the Southeastern United States.*

In 2008, twenty-six new adult and adolescent AIDS diagnoses per 100,000 population were reported in Florida, compared to the national average of twelve (14). The bulk of these Florida AIDS diagnoses occurred in African Americans (49%) and secondly, Caucasians (34%). The largest HIV transmission categories were men who have sex with men (44%) and individuals engaging in heterosexual sex (31%), exceeding intravenous drug users, individuals receiving transfusions, individuals with occupational exposures, and perinatal exposures. Comparable to the Florida epidemic, twenty new adult and adolescent AIDS diagnoses per 100,000 population were reported in Georgia in 2008, with the bulk of the epidemic occurring in African Americans (67%) (14). The majority occurred in the transmission categories of men who have sex with men (51.1%) and individuals engaging in heterosexual sex (22.4%). *The disproportionate burden of AIDS cases in the Southeast among African Americans who acquired HIV through either heterosexual or same-sex sexual transmission suggests that current preventive, diagnostic, and treatment modalities may not sufficiently reach nor cater to this population. Furthermore, the*

present preventive and therapeutic strategies may not sufficiently address the concurrent social issues that contribute to the Southern AIDS epidemic.

Crack cocaine: a contributor to the Southeastern AIDS epidemic

Metsch *et al* aimed to identify the factors deterring HIV-infected individuals from accessing appropriate HIV care by studying 1,038 HIV-positive hospitalized patients from Atlanta, Georgia and Miami, Florida (71% of whom were African American) between 2006 and 2007 (2). Through multivariate analysis the use of crack cocaine was associated with never having an HIV provider, not being on current antiretroviral therapy (ART), and unprotected sexual intercourse with HIV-negative or HIV-unknown individuals in the prior six months. Over one-third of the study participants reported recent crack cocaine use. Since HIV-positive crack cocaine users engage in high-risk sexual activity and have difficulty accessing and remaining in HIV care and taking ART, they are at high risk for AIDS progression themselves and HIV transmission to others. *Thus, a better understanding of the factors that delay entry to or limit use of care for HIV, is essential if the epidemic is to be curbed.*

Intimate partner violence: a potential contributing factor to the Southeastern AIDS epidemic among HIV-positive crack cocaine users

Clinical experience and emerging literature suggests that IPV might be a significant contributing factor that is driving the AIDS epidemic among crack cocaine users. The CDC defines IPV as "physical, sexual, or psychological harm by a current or former partner or spouse, [which]…can occur among heterosexual or same-sex couples and does not require sexual intimacy(15)." Both the social-behavioral literature and clinical experience support that crack cocaine users, collectively, experience IPV at higher frequency than their drug-free counterparts (3, 16-17). Current literature also maintains that HIV-positive individuals are frequently survivors of IPV. IPV prevalence among HIV-positive cohorts has been reported to range from 39-93%,

with particularly high frequency among pregnant women (66%), transgendered individuals (93%), persons of low SES, and the homeless (64%-80%) (18-25). Furthermore, the frequency of IPV after HIV diagnosis may increase, with 20% of HIV-infected women in the U.S. reporting physical violence beginning after diagnosis and 10% reporting violence in the preceding three months (11, 26). Although it would follow that HIV-positive crack cocaine users experience IPV with high frequency, the prevalence of IPV in this cohort has not previously been reported. *The extent to which intimate partner violence contributes to the inability of HIV-positive crack cocaine users to remain in HIV care, adhere to ART, and practice safe sexual practices remains unknown.*

Prior to initiation of this study, little was known about the effects of intimate partner violence on the health of HIV-positive individuals. IPV in the general population (i.e. regardless of HIV status), had been associated with physical harm, chronic headaches and pelvic pain, irritable bowel syndrome, urinary tract infections, miscarriages, and sexually transmitted infections (27-33). Similarly, IPV was associated with poor mental health outcomes, including depression, suicidality, and post-traumatic stress disorder (33-36). It follows that IPV among HIV-positive crack cocaine users could also be associated with poor physical and mental health, and thus interfere with an individual's ability to negotiate safe sex and seek HIV care and ART. *Here, for the first time, we estimate the frequency with which IPV occurs among HIV-positive crack cocaine users and correlate it with behaviors known to propagate HIV disease progression and transmission.*

METHODS

Specific Aims and Hypotheses

We first estimated the prevalence of IPV among HIV-positive crack cocaine users. This frequency estimation was subsequently used to test the following aims and hypotheses:

Aim 1: to determine whether IPV among HIV-positive crack cocaine users is associated with less consistent condom use.

H_o: *HIV-positive crack cocaine users who experience IPV are more likely than their non-abused counterparts to report unsafe sex within the past six months.*

Aim 2: to determine whether IPV among HIV-positive crack cocaine users is associated with more frequent diagnoses with sexually transmitted infections (STIs).

H_o: *HIV-positive crack cocaine users who experience IPV are more likely than their non-abused counterparts to report a diagnosis of a STI within the prior six months.*

Aim 3: to determine whether IPV among HIV-positive crack cocaine users is associated with less frequent utilization of health care.

H_o: *HIV-positive crack cocaine users who experience IPV are less likely than their non-abused counterparts to have utilized HIV care within the prior twelve months.*

Aim 4: to determine whether IPV among HIV-positive crack cocaine users is associated with decreased use of antiretroviral therapy (ART).

H_o: *HIV-positive crack cocaine users who experience IPV are less likely than their non-abused counterparts to be currently taking ART.*

A final objective of the study was to determine which community-based services the survivors of IPV used most frequently and which barriers they encountered in using available resources. In the future, this knowledge could help target the use of scarce resources (i.e. financial, manpower, etc.) to services that IPV survivors frequently utilize. Similarly, an enhanced understanding of the barriers to resource utilization could aid in developing methods to better overcome them.

Study Design

This study was designed as a cross-sectional study nested within a larger study, Project HOPE (Hospital visit is an Opportunity for Prevention and Engagement). Project HOPE is a dual-centered randomized controlled trial that aims to evaluate the effectiveness of a behavioral, educational intervention in reducing high-risk HIV sexual practices and improving the use of outpatient HIV care and drug treatment by HIV-positive crack cocaine users. Our nested cross-sectional study of IPV enrolled patients prior to randomization into the Project HOPE intervention.

Between December 2006 and April 2010, individuals were enrolled from inpatient services at Jackson Memorial Hospital (Miami, Florida) and Grady Memorial Hospital (Atlanta, Georgia). In order to participate, individuals had to meet the following inclusion criteria: age 18 years or older, HIV-seropositivity, use of crack cocaine within the prior two years, sexual activity (i.e. vaginal or anal) within the prior six months, and capacity to communicate in English. Exclusion criteria were physician prediction of patient survival of less than 6 months or an active psychiatric disorder interfering with ability to participate in the study. Individuals fulfilling the above criteria were asked to provide written, informed consent and sign a HIPAA authorization form prior to enrollment. This study was approved by both the Emory University and University of Miami institutional review boards as well as the Grady Memorial Hospital Research Oversight Committee.

All participants underwent a two-hour, handheld device-assisted, one-on-one, bedside interview. Interviewers at both sites underwent a standardized training session and used the same question order and content. Information for all variables was collected by self-report only.

The primary predictor variable, intimate partner violence, was a categorical, binary (yes/no) variable defined as an affirmative response to at least one of five IPV screening questions (see Table 1). The 5-part IPV screener was adapted from the STaT questionnaire, which was previously validated in an urban clinical setting, the emergency department of Grady Memorial Hospital (37-38). Two questions were added to the STaT questionnaire to address sexual violence and partner control. Thus, our screener included assessment of physical, sexual, and emotional violence as well as threats of violence. A second predictor variable, *severe* intimate partner violence, was defined as an affirmative response to at least three of five IPV screening questions.

Other covariates that were assessed included sex (a categorical, binary variable, female versus male), income (a categorical, binary variable, ≤ $5000 versus >$5000), sexuality (a categorical, binary variable, heterosexual versus lesbian, gay, bisexual, or transgendered), crack frequency (a categorical, binary variable, at least daily versus less than daily), race (a categorical, binary variable, Black versus non-Black), education (a categorical, binary variable, high school diploma or higher versus less than high school diploma), number of sexual partners in the prior six months (a categorical, binary variable, at least 2 partners versus only 1 partner), age (a categorical, binary variable, > 45 years-old versus ≤45 years old), and transactional sex in the prior six months (a categorical, binary variable, traded sex for crack versus did not trade sex for crack). For the multivariate analysis, age and number of sexual partners were not dichotomized, but left in numerical form instead.

Outcome variables included unprotected sex in the prior six months (a categorical, binary variable, 100% compliance with condoms versus less than 100% compliance with condoms in the prior six months), STI diagnosis in the prior six months (a categorical, binary variable, diagnosis

of Chlamydia, Gonorrhea, Syphilis, Trichomonas, and/or other STI versus no diagnosis of STI), use of HIV care in the prior 12 months (a categorical, binary variable, use of HIV care versus no use of HIV care in prior 12 months), and current use of ART (a categorical, binary variable, current use of HIV medications versus not using current HIV medications).

Finally, only those individuals who screened positive for IPV were subsequently questioned regarding their utilization of various community support services, barriers to care, and individual comfort in discussing IPV with their HIV providers. For the service utilization question, participants were asked to choose from a list of resources, (adapted and expanded from a prior study (39)), including the emergency department, walk-in clinics, primary care doctors, 911 services, help lines, legal assistance, financial assistance, support groups, shelters, mental health services, spiritual leaders, and family/friends. Answer choices for barriers to resource utilization included putting it off, not wanting to deal with it, dislike of physicians and healthcare, fear of partner notification, fear of being judged or pitied, fear of their children being hurt or being separated from them, fear of the financial repercussions, fear of being treated rudely or unkindly, perception of IPV services as unpleasant or unhelpful, inconvenience of available services, lack of transportation, prolonged appointment wait times, lack of appointment availability, lack of phone access, costliness of support services, and lack of knowledge of available support services.

Sample Size Calculations

The initial sample size calculations were conducted for the Project HOPE study, the larger randomized controlled trial in which our study was nested. To achieve a power of 85% for the detection of a 10% reduction in unprotected sexual intercourse in the prior six months, using a one-sided α=.05, 180 participants needed to be enrolled in both the control and intervention arms.

In theory, had we calculated sample size for our nested cross-sectional IPV study under the assumption that IPV prevalence was 33% (as determined by a prior IPV study in the Grady Memorial Hospital Emergency Department (37)), to achieve a power of 80% and detect a 10%

difference in unprotected sexual intercourse in the prior six months between those who experienced IPV versus those who did not, a total of 381 individuals need to be enrolled. Sample size calculations were performed using PASS 2008 software.

Data Analysis

To better visualize potential causal pathways between the predictor and outcome variables, causal diagrams were drawn for each of the 4 regressions assessing the relationship between IPV and unprotected sexual intercourse in the prior 6 months, STI diagnosis in the prior 6 months, use of HIV care in the prior 12 months, and current use of ART (see Figure 1a-d). Given the cross-sectional nature of the study, we realize that the causal diagrams only provide a theoretical construct in which to assess the study question and that our study does not truly test causality, but rather tests the association between the variables.

Univariate analyses were performed to evaluate the distribution of the predictor variable, each of the covariates, and the outcome variables. Categorical variables with multilevel responses were consolidated into binary variables for ease of subsequent bivariate analysis. The PROC FREQ (for categorical variables) and PROC UNIVARIATE (for continuous variables) functions in SAS 9.2 were used for the univariate analysis. Prevalence was the measure of frequency obtained.

Next bivariate analysis was used to explore the associations between the exposure variable and covariates and also the outcome variable and covariates. The Chi-square test was used to test these associations and to assist in identifying potential confounders. A p-value of less than .05 was considered statistically significant. Prevalence ratios were the measure of association obtained.

To evaluate for potential interaction and confounding, stratum-specific prevalence ratios were calculated. The Breslow-Day test was used to test the homogeneity of the prevalence ratios (p-value<.05 was considered statistically significant). If interaction was noted, two different

stratum-specific prevalence ratios were reported. If interaction was not noted, adjusted prevalence ratios were compared to the crude prevalence ratios to identify potential confounding. If there was a sizeable difference (subjectively determined) between the adjusted and crude prevalence ratios, then the adjusted prevalence ratio was reported. (Prevalence ratios were adjusted for confounding using the Mantel-Haenszel approach).

Finally, a modeling approach was used to better visualize the association between the exposure variable and outcome in the setting of the covariates. First, a test model was generated including numerous covariates that were deemed important based on prior knowledge. Collinearity was tested using the Collin Macros by Dan Rosen, with collinearity defined as both a conditional index of $\geq$ 23 and variance decomposition proportion of $\geq$ 0.5 (40). Interaction, whether the association between the predictor variable and outcome variable changed based on levels of the third covariate, was evaluated using both a chunk test with likelihood ratio tests and the Wald test statistic (p-value<.05 was considered statistically significant). Finally, confounding, whether the association between the predictor and outcome variable changed when a covariate was included versus removed from a model, was evaluated by assessing whether there was a meaningful change (subjectively determined) in the prevalence ratios in the full versus reduced models. A final model was then constructed to include the predictor variable, outcome variable, identified confounders and interaction terms, and other clinically important covariates. Using the PROC GENMOD function with DIST=bin and LINK=log specifications, prevalence ratios and associated confidence intervals were calculated. This is a binary logarithm distribution providing prevalence risk ratios.

RESULTS

Between December 2006 and April 2010, 343 participants, 173 women and 170 men, were enrolled in the study. (See Table 1 for participant characteristics). The mean age of the cohort was 45 years and 89% were African American. While only 11% (19/173) of the women self-identified as being lesbian, bisexual, or transgendered (LBT), 30% (51/170) of the men self-identified as being gay, bisexual, or transgendered (GBT). Ninety-six percent (330/343) of the participants were currently unemployed and 76% (261/343) were homeless. Sixty-eight percent (117/173) of women and 57% (95/170) of men reported annual incomes of less than $5000. Furthermore, 61% (105/173) of the women and 44% (75/170) of the men had less than a high school (or GED equivalent) level of education. While all participants reportedly smoked crack cocaine within the prior two-year period, 46% (73/173) of women and 32% (51/170) of men smoked crack at least daily. Eighteen percent of all participants reported drinking alcohol at least daily. In the six months prior to the study, 24% (81/343) of the cohort engaged in transactional sex and 45% (155/343) engaged in unprotected sexual intercourse. The median CD4 count was 184 (25-75 IQR: 61-353).

The prevalence of intimate partner violence in our cohort was 56% (193/343), by the predetermined definition of an affirmative response to one of the five IPV screening questions. Sixty-eight percent (118/173) of the women reported IPV, whereas 44% (75/170) of the men reported IPV. (Table 2 demonstrates the frequency of IPV and severe IPV among the men and women). The prevalence of severe IPV was 36% (123/343), by the predetermined definition of an affirmative response to at least three of the five IPV screening questions. Fifty-one percent (88/173) of the women and 21% (35/170) of the men reported severe IPV. Table 3 displays the frequency of IPV and severe IPV by sexuality. Among the men, IPV occurred in 71% (36/51) of GBT individuals and 33% (38/117) of heterosexual individuals, while severe IPV occurred in 39% (20/51) of GBT individuals and 12% (14/117) of heterosexual individuals. Among the women, IPV occurred in 63% (12/19) of the LBT individuals and 69% (106/154) of the

heterosexual individuals, whereas severe IPV occurred in 42% (8/19) and 52% (80/173) individuals. Table 4 demonstrates the frequencies of the different forms of IPV. The most common types of IPV reported were having a partner throw, punch, or break things (47% or 160/343), being threatened by a partner with violence (43% or 149) and feeling controlled by a partner (42% or 143). While a significant proportion of men were reportedly survivors of IPV, physical abuse and sexual abuse were not frequently reported (12% or 20/170 and 6% or 10/170, respectively). Among the women, however, 43% (74/173) reported physical abuse and 29% (50/170) reported sexual abuse by an intimate partner.

The association between IPV and unprotected sexual intercourse

In bivariate analysis, the outcome variable, unprotected sex in the prior 6 months, was significantly and positively associated with intimate partner violence, severe IPV, the female gender, self-identifying as LGBT, smoking crack at least daily, drinking alcohol at least daily, possessing more than one sexual partner in the prior 6 months, and engaging in transactional sex in the prior 6 months (p-value<.05). See Table 5a and 5b for bivariate analysis. Similarly, in an attempt to identify potential confounders, the predictor variable, IPV, was analyzed with the various covariates (see Table 5c). IPV was significantly associated with the gender, sexuality, frequency of alcohol use, education level, and age. Through the stratified database approach (Table 6), no interaction was noted between IPV and the covariates (i.e. Breslow-Day p-value ≥.05). Similarly, confounding was not noted via the stratification approach (i.e. the prevalence ratio between IPV and unprotected condom use in the prior 6 months failed to change significantly in the presence and absence of the analyzed covariates). In the bivariate analysis, no confounding nor interaction was noted for the association between unprotected sexual intercourse and severe IPV variable (data not shown).

The initial full model evaluated the association between IPV and unprotected sexual intercourse in the prior 6 months controlling for gender, sexuality, frequency of crack cocaine

use, income, education, race, age, and number of sexual partners. No collinearity was noted between the variables (conditional indices <23 and VDP<.5). No interaction was noted between IPV and the covariates (Chunk test and Wald test p-value>.05). No confounding was noted by evaluating changes in the IPV prevalence ratio between the full and reduced models.

Thus, in the absence of confounding and interaction, we chose to include gender, sexuality, and crack frequency in our model that evaluated the association between IPV and unprotected intercourse in the prior 6 months. These covariates were included because of their noted importance based on the current literature and our own personal experiences. Thus, our final model is as follows:

*Log P(Y=unprotected intercourse/6 months)=-1.09+0.38*IPV-0.24*gender+0.26*sexuality + 0.38*frequency of crack use*

(coding: unprotected intercourse in the prior 6 months=1 if 'yes' and =0 if 'no,' gender=1 if male and gender=0 if female, sexuality=1 if LGBT, sexuality=0 if heterosexual, IPV=1 if present and IPV=0 if absent, and frequency of crack use=1 if ≥ daily and =0 if <daily).

By this model, HIV-positive crack cocaine users who experience IPV have 1.46 (95% confidence interval: 1.12, 1.90) times the prevalence of reporting unprotected sexual intercourse in the prior 6 months compared to their non-abused counterparts after controlling for sexuality, gender, and frequency of crack use.

The association between IPV and diagnosis of a sexually transmitted infection

The outcome variable, of STI diagnosis in the prior 6 months, was analyzed in two manners: 1) among participants who reported being tested for an STI in the prior 6 months (n=156), and 2) among all participants regardless of whether the participant sought STI testing

(n=343). In bivariate analysis, by both methods, a diagnosis of STI in the prior 6 months was positively associated with IPV, severe IPV, and the female gender (See Table 7a, 7b). In the stratification analysis to assess for confounding and interaction (Tables 7c, 7d), confounding of the IPV/STI relationship was noted by gender only if all participants were analyzed (as opposed to only those who were tested for an STI in the prior 6 months). No additional confounding of the IPV/STI association nor interaction was noted.

The initial test model evaluated the association between IPV and an STI diagnosis in the prior 6 months, controlling for gender, sexuality, race, age, number of sexual partners, and transactional sex in the prior 6 months. No collinearity was noted between the variables nor was interaction noted between IPV and the covariates. Confounding of the association between the exposure variable, IPV, and outcome variable, STI diagnosis in the prior 6 months, was noted by gender only when the STI responses of all participants were analyzed. Specifically, the prevalence ratio for the prevalence of STI diagnosis in the prior 6 months among those who experience IPV versus those who did not, changed from 4.69 to 3.76 when gender was included in the model. On this basis, gender was left in the final model. Although not identified as potential confounders, sexuality and number of sexual partners were also left in the reduced model because they have been identified as important covariates based on preexisting knowledge. Thus, the final models were:

1) model analyzed using only participants reporting STI testing in the prior 6 months:

$$Log\ P(Y=STI\ diagnosis/6\ months) = -1.67 - 0.91*gender + 0.25*sexuality + .00*sexualpartners + 0.89*IPV$$

2) model analyzed using all participants:

*Log P(Y=STI diagnosis/6 months)=-2.72-1.02*gender+0.20*sexuality+.00*sexual partners+1.36*IPV*

(where STI diagnosis in the prior 6 months=1 if 'yes' and =0 if 'no,' gender=1 if male and gender=0 if female, sexuality=1 if LGBT, sexuality=0 if heterosexual, IPV=1 if present and IPV=0 if absent, and sexual partners=continuous numerical variable).

By this model, among HIV-positive crack cocaine users tested for an STI in the prior 6 months, those who experienced IPV had 2.43 (95% CI 1.10-5.36) times the prevalence of STI diagnoses (in the prior 6 months) compared to their non-abused counterparts after controlling for sexuality, gender, and number of sexual partners. When all participants were analyzed regardless of testing history, HIV-positive crack cocaine users who reported IPV had 3.89 (95% CI 1.68-9.00) times greater prevalence of STI diagnosis compared to their non-abused counterparts.

The association between IPV and utilization of HIV care

In bivariate analysis, the outcome variable, utilization of HIV care in the prior 12 months, was negatively associated with intimate partner violence and frequent crack cocaine use and positively associated with having an annual income of >$5000 (p-value <.05). The association between utilization of HIV care in the prior 12 months and severe IPV also trended toward being significant (p=.051), but was likely limited by smaller sample size. (See Table 8a for the bivariate analysis). Similarly, in an attempt to identify potential confounders, the predictor variable, IPV, was analyzed with the various covariates (see Table 8b). IPV was significantly associated with gender, education, daily alcohol use, and age. Through the stratified database approach (Table 8c), no interaction was noted between IPV and the covariates (i.e. Breslow-Day p-value ≥.05). Similarly, confounding was not noted via the stratified approach (i.e. the prevalence ratio between

IPV and utilization of HIV care in the prior 12 months failed to change significantly in the presence and absence of the analyzed covariates).

The initial full model evaluated the association between IPV and utilization of HIV care in the prior 6 months controlling for age, gender, income, education, frequency of crack cocaine use, homelessness, frequency of alcohol use, and incarceration in the prior 6 months. No collinearity was noted between the variables (conditional indices <23 and VDP<.5). No interaction was noted between IPV and the covariates (Chunk test and Wald test p-value>.05). No confounding was noted by evaluating changes in the IPV prevalence ratio between the full and reduced models.

Thus, in the absence of confounding and interaction, we chose to include frequency of crack use and homelessness in the final model. These covariates were included because of their presumed significant contribution in determining whether an individual utilizes HIV care. Thus, our final model is as follows:

*Log P(Y=use of HIV care/12 months)= -0.15 - 0.09*IPV- 0.16*homelessness - 0.11*frequency of crack use*

(coding: use of HIV care/12 months=1 if 'yes' and =0 if 'no;' IPV=1 if present and IPV=0 if absent; homelessness=1 if currently homeless and =0 if not currently homeless; and frequency of crack use=1 if ≥ daily and =0 if <daily).

By this model, HIV-positive crack cocaine users who experience IPV have 0.91 (95% confidence interval: 0.77, 1.07) times the prevalence of reporting use of HIV care in the prior 12 months compared to their non-abused counterparts after controlling for current homelessness and frequency of crack use.

The association between IPV and use of current antiretroviral therapy

In bivariate analysis, the outcome variable, current use of ART, was negatively associated with IPV, severe IPV, homelessness, and daily alcohol use, and positively associated with an annual income of >$5000 (p-value <.05). See Table 9a for the bivariate analysis. Through the stratified database approach (Table 9b), interaction was noted between IPV and gender (i.e. Breslow-Day p-value .0007). This approach failed to identify potential confounding of the association between IPV and current use of ART.

The initial full model evaluated the association between IPV and current use of ART controlling for age, gender, income, education, frequency of crack use, homelessness, frequency of alcohol use, and incarceration in the prior 6 months. No collinearity was noted between the variables (conditional indices <23 and VDP<.5). Interaction between gender and IPV was again noted (likelihood ratio chunk test p-value=.0007 and Wald chunk test p-value=.0018), but not between IPV and the other covariates. No confounding was noted by evaluating changes in the IPV prevalence ratio between the full and reduced models.

In lieu of the interaction between IPV and gender, both terms and the interaction terms were left in the final model. Thus, our final chosen model:

*Log P(Y=use of current ART)= -1.42 + 0.68*gender +0.12*IPV -1.29*IPV*gender*

(coding: current use of ART=1 if 'yes' and =0 if 'no;' IPV=1 if present and IPV=0 if absent; gender=1 if male and 0 if female)

By this model, male HIV-positive crack cocaine users who experience IPV have 0.61 times the prevalence of reporting use of current ART compared to their non-abused counterparts after controlling for current homelessness and frequency of crack use. Female HIV-positive crack cocaine users who experience IPV have 1.13 times the prevalence of reporting use of current

ART compared to their non-abused counterparts after controlling for current homelessness and frequency of crack use.

Use and Barriers to Use of IPV Support Services

Finally, all 193 individuals who experienced IPV were questioned about their utilization of various community and medical support services after they experienced violence. Thirty-eight percent (73/193) reported not seeking any assistance after they were abused by their partners. The most commonly used IPV support resources used by this cohort after abuse included 911 emergency services (31%), the emergency department (27%), family and friends (20%), and mental health (13%). Shelters, support groups, walk-in-clinics, spiritual leaders, domestic violence help lines, primary care providers, legal aid, and financial aid were used by less than 10% of these individuals (see Figure 2a).

The most commonly cited barriers to use of IPV support services included unwillingness to deal with the violence, fear of partner finding out, perception of the services as unhelpful, fear of being judged, and lack of knowledge that the services existed (see Figure 2b). However, when these individuals were specifically asked about how comfortable they felt in discussing IPV with their HIV provider, approximately two-thirds reported high levels of comfort (see Figure 2c).

DISCUSSION

To our knowledge, this study is the first to characterize the IPV experiences of HIV-positive crack cocaine users and highlights the association between IPV and behaviors that propagate HIV transmission and disease progression. As HIV clinicians in the Southeast, we continue to encounter difficulty engaging crack cocaine users in HIV care. Our study findings support the theory that among crack cocaine users, IPV likely fuels HIV progression to AIDS through partner-controlled limited access to HIV care and ART, and likely fuels HIV transmission by reducing condom use and increasing the frequency of STI acquisition.

This study confirms our clinical suspicion of the high prevalence of IPV among HIV-positive crack cocaine users, with 56% (193/343) reporting lifetime histories of IPV and 36% (123/343) reporting lifetime histories of severe IPV. These IPV frequency statistics were within the range reported by prior studies evaluating the frequency of IPV in low-income HIV-positive cohorts (19, 22). While affirmative responses to each of the individual IPV screening questions were more common among the women than men, a sizeable proportion (44% or 75/170) of the men also reported experiencing lifetime IPV. While verbal and psychological abuse and threats of abuse occurred frequently among both genders, physical and sexual abuse occurred with high frequency (43% and 29%, respectively) only in the female cohort. Narrowing of the IPV definition to assess the frequency of more 'severe' abuse resulted in the frequency of IPV falling by over one-half among the men, but approximately only one-third among the women. Interestingly and also in accordance with the present literature, IPV occurred with high frequency among both women (63% or 12/19) and men (71% or 36/51) in same-sex relationships. Collectively, our data suggests that IPV among HIV-positive crack cocaine users occurs frequently among men and women and traverses both heterosexual and same-sex relationships.

We further demonstrated that IPV is associated with various high-risk behaviors that promote HIV transmission to others and fuel progression of HIV disease to AIDS. IPV was positively associated with the reporting of unsafe sex and diagnosis of an STI in the prior six months, as

well as negatively associated with currently being on ART and seeking HIV care in the prior year. After controlling for frequency of crack use, gender, and sexuality, participants reporting IPV were one-and-a-half times as likely to report unsafe sex in the prior 6 months. This supports prior studies which suggest that IPV diminishes the capacity and control in negotiating condom use and safe sex(26, 41-43). Similarly, after controlling for gender, sexuality, and multitude of sex partners, participants reporting IPV were 2.4-3.9 times as likely to report being diagnosed with an STI in the prior 6 months (depending on the cohort analyzed: those reporting STI testing versus the entire cohort, respectively). While IPV was associated with less utilization of HIV care in the prior 12 months, the association was no longer statistically significant after controlling for frequency of crack use and homelessness. Finally, participants who reported IPV were 0.57 times less likely to report being on ART. This negative association appeared to be driven largely by males (PR=0.61) as opposed to the women (PR=1.13).

The association between IPV and inconsistent condom use and STIs supports the need for developing interventions aimed at curbing unsafe sex which incorporate a component that addresses IPV. Furthermore, safe sex methods that empower the IPV survivor to protect him/herself and require minimal consent from the abuse-perpetrating partner (i.e. female condoms for vaginal or anal intercourse and microbicides) should be tested for acceptability and efficacy within abusive relationships.

The association between IPV and diminished utilization of ART and HIV care has many possible explanations. Concern for personal safety and the safety of one's children, perceptions of financial and structural self-insufficiency, as well as poor mental and physical health resulting from the abuse may prevent IPV survivors from seeking and engaging in appropriate HIV medical care. Therefore, HIV clinics should strive to provide comprehensive support (i.e. mental health and shelter referrals, linkage to caseworkers for financial assistance, legal services, housing, and childcare, etc.) to empower IPV survivors and minimize the barriers they may encounter in using HIV medications and care. Finally, a new STI diagnosis, non-adherence to

ART, and missed clinic appointments may be surrogate markers for IPV in this population. When noted in the clinical setting, they could potentially be used by clinicians to initiate the IPV screening and referral process.

Only 62% of the study participants used IPV support services after experiencing abuse. Emergency services such as 911 phone lines and emergency departments were the most frequently used, well ahead of primary care and other services which build a longer-lasting support infrastructure over an extended time period (i.e. mental health, financial and legal counseling, shelters and support groups). Thus, future efforts may need to be focused on using the emergency venues to refer these IPV survivors to longer-lasting support services after initial stabilization and care. The most commonly cited barrier in using IPV resources was not wanting to deal with the problem. Empowering the survivors by providing them with the tools to develop a durable support system may improve their ability to recognize, acknowledge, and begin to deal with the violence. Fear of partner notification, being judged, and lack of knowledge of IPV services are issues that should be addressed by HIV clinicians and clinic staff by providing a safe, secure, and non-judgmental environment and displaying available IPV resources throughout the clinic. Interestingly, two-thirds of IPV survivors did report feeling comfortable discussing IPV with their HIV care provider, thus suggesting that HIV clinicians can use the clinic visit as an opportune venue to address relationship violence and safety.

While being the first to characterize the IPV experiences of HIV-positive crack cocaine users and their association with poor health outcomes and behaviors, this study also possesses limitations. The first limitation is its cross-sectional nature which limits causal conclusions. We believe that IPV results in inconsistent safe sex practices, more STIs, as well as less utilization of HIV care and medications. However, the possibility exists that a new STI diagnosis may trigger abuse by engendering the perpetrator's feelings of betrayal. Similarly, use of HIV care and medications and condom negotiation by the survivor may challenge the perpetrator's control in the relationship and subsequently result in heightened violence (29, 44). A selection bias may also

bias the results in that hospitalized patients may be more or less likely than their non-hospitalized counterparts to have experienced IPV and also more or less likely to report unprotected intercourse, STIs, and diminished use of HIV care.

An information bias may also be present in that all outcome and predictor variables were not measured but based on personal recall. The IPV literature describes large underreporting of IPV by survivors, thus our data may underestimate the true prevalence of IPV in this cohort. To minimize this bias, we adapted our screener from a previously validated questionnaire and used two IPV definitions. The first IPV definition was kept broad with the goal of identifying the greatest number of IPV survivors. The diminished specificity likely resulted in some false positives, however in the multivariate analyses the bias would have been toward the null. The second definition of IPV, severe IPV, was used to improve the specificity of our screener. Ideally, all questions within our five-part screener would have been validated against frequently used research IPV tools such as the Index of Spouse Abuse or Conflict Tactics Scale-2.

Further limitations included that the study was not designed to determine which participants required ART. The U.S. Department of Health and Human Services guidelines for initiation of ART based on CD4 counts changed during the period of the study, thus possibly impacting which study participants merited treatment. The overall balance in CD4 counts between those who experienced IPV and those who did not suggests that this bias may be minimal. Finally, we may have in fact weakened the association between IPV and unsafe sex, STIs, and ART use by controlling for crack use.

Nonetheless, this study has been the first to capture and characterize the IPV experiences of a very difficult-to-reach population, crack cocaine users, who comprise a large proportion of the HIV-positive epidemic in the Southeast. Future studies should aim to better assess causality between IPV and the aforementioned high-risk HIV behaviors. For example, retrospective case-control studies could be conducted in which HIV-positive individuals with new STI diagnoses and those without STI diagnosis are both questioned about their preceding IPV histories. Cohort

studies should be developed that prospectively follow HIV-positive individuals who report abuse and those who do not for the development of STIs and AIDS-defining illnesses, and use of ART and HIV appointments. More importantly, interventions aimed at enhancing utilization of HIV care and medications and improving safe sex practices by HIV-positive crack cocaine users who experience abuse (i.e. through educational/financial empowerment, drug rehabilitation, HIV education and establishment of care, safe-sex negotiation within abusive relationships) need to be developed and tested in randomized controlled trials. By improving our diagnosis and management of IPV in the context of HIV we can better combat the Southeastern HIV epidemic and improve the quality of life of those afflicted by the HIV and IPV syndemic.

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TABLES

Table 1: Characteristics of 343 study participants by gender

	Female (n=173)	Male (n=170)	Total (n=343)
Mean Age (years)	44	45	45
Sexuality: Heterosexual **Sexuality: LGBT**	154 (89%) 19 (11%)	117 (69%) 51 (30%)	271 (79%) 70 (20%)
Race: Black/AA **Race: White/Caucasian**	154 (90%) 14 (8%)	150 (89%) 11 (7%)	304 (89%) 25 (7%)
Annual income ≤ $5000	117 (68%)	95 (57%)	212 (62%)
Education < H.S. diploma	105 (61%)	75 (44%)	180 (52%)
Currently employed	2 (1%)	11 (7%)	13 (4%)
History of homelessness	129 (75%)	132 (78%)	261 (76%)
Drink alcohol ≥ daily	29 (17%)	34 (20%)	63 (18%)
Smoke crack ≥ daily	73 (46%)	51 (32%)	124 (36%)
Transactional sex/6 months	63 (36%)	18 (11%)	81 (24%)
Unprotected sex / 6 months	88 (52%)	67 (40%)	155 (45%)

Table 2: Intimate partner violence spectrum of severity

Number of affirmative responses to IPV questions	Male (n=170)	Female (n=173)	Total (n=343)
increasing severity ↓ **At least 1 questions**	75 (44%)	118 (68%)	193 (56%)
At least 2 questions	59 (35%)	105 (61%)	164 (48%)
At least 3 questions	35 (21%)	88 (51%)	123 (36%)
At least 4 questions	14 (8%)	67 (39%)	81 (24%)
All 5 questions	5 (3%)	39 (23%)	44 (13%)

Table 3: Intimate partner violence by sexuality

	Men (n=168)		Women (n=173)	
Sexuality (self-identification)	Heterosexual (n=117)	GBT (n=51)	Heterosexual (n=154)	LBT (n=19)
IPV	38 (33%)	36 (71%)	106 (69%)	12 (63%)
Severe IPV	14 (12%)	20 (39%)	80 (52%)	8 (42%)

Table 4: Frequency of intimate partner violence by gender

Reported being in a relationship in which:	Male (n=170)	Female (n=173)	Total (n=343)
a sexual partner was physically abusive	20 (12%)	74 (43%)	94 (27%)
a sexual partner was sexually abusive	10 (6%)	50 (29%)	60 (17%)
a sexual partner threw, punched, or broke things	64 (38%)	96 (56%)	160 (47%)
a sexual partner threatened the participant with violence	49 (30%)	100 (58%)	149 (43%)
felt controlled by a sexual partner	45 (27%)	97 (56%)	143 (42%)

Table 5a: Frequency of exposure variables among those who did and did not report unprotected sexual intercourse in the prior 6 months

	Unprotected sex/6 mos (155)		100% protected sex/6 mos (180)		Chi-sq test	p – value	Prevalence ratio (95% CI)
Intimate partner violence	**104**	**68%**	**85**	**47%**	**13.55**	**<.001***	**1.58 (1.22, 2.05)**
Gender (female)	88	57%	80	44%	5.06	.024*	1.31 (1.03, 1.65)
Income >$5000	55	44%	98	47%	.24	.626	0.94 (.78, 1.16)
LGBT	40	26%	27	15%	6.11	.014*	1.39 (1.10, 1.77)
Alcohol>daily	37	24%	25	14%	5.50	.019*	1.38 (1.08, 1.77)
Crack >daily	70	48%	47	29%	12.00	<.001*	1.51 (1.20, 1.90)
Race, Black	135	87%	165	92%	1.86	.173	0.79 (.58, 1.08)
≥H.S. diploma	70	45%	90	50%	.87	.350	.90 (.71, 1.13)
>1 Sexual partner/6 mos	85	55%	71	39%	7.93	.005*	1.39 (1.10, 1.76)
Transactional sex/6mos	53	34%	22	12%	23.14	<.001*	1.80 (1.46, 2.22)
Age>45 yo	68	44%	94	52%	2.33	.127	0.83 (.66, 1.05)

Table 5b: Frequency of varying degrees of IPV severity among those who did and did not report unprotected sexual intercourse in the prior 6 months

	Unprotected sex/6 mos (155)		100% protected sex/6 mos (180)		Chi-sq test	p – value	Prevalence ratio (95% CI)
Intimate partner violence	104	68%	85	47%	13.55	<.001*	1.58 (1.22, 2.05)
Less severe IPV	37	24%	33	18%	1.55	.213	1.19 (0.92, 1.54)
More severe IPV	67	43%	52	29%	7.47	.006	1.38 (1.10, 1.73)

Table 5c: Assessing potential confounding: association between the exposure variable (IPV) and the other covariates

	IPV (n=193)		No IPV (n=150)		Chi-sq test	p –value
Gender (female)	118	61%	54	36%	19.88	<.001*
Income >$5000	118	61%	94	64%	.30	.58
LGBT	144	75%	124	85%	4.98	.03*
Crack >daily	112	63%	79	58%	1.02	.31
Alcohol>daily	43	22%	20	14%	4.16	0.04*
Race, Black	168	87%	135	92%	1.97	.16
≥H.S. diploma	101	52%	60	41%	4.44	.04*
>1 Sexual partner/ 6 months	97	50%	61	42%	2.58	.11
Transactional sex/6 months	53	27%	28	19%	3.25	.07
Age>45 yo	81	44%	85	55%	4.09	.04*

Table 6: Assessing interaction and confounding by stratification: the association between IPV and unprotected sexual intercourse/6 months

Stratification Variable	Crude PR	Stratum-specific prevalence ratios PR1	PR2	Breslow-Day p –value	Adjusted prevalence ratio (95% CI)
Sex (Female v. male)	1.58	1.51	1.53	.85	1.52 (1.17, 1.98)
Income (>$5000 v. ≤ $5000)	1.58	1.78	1.52	.67	1.61 (1.24, 2.09)
Sexuality (LGBT v. heterosexual)	1.58	1.20	1.70	.43	1.56 (1.21, 2.02)
Alcohol (≥daily v. <daily)	1.58	1.19	1.64	.47	1.54 (1.19, 1.99)
Crack (≥daily v. <daily)	1.58	1.59	1.63	.48	1.61 (1.24, 2.08)
Race (Black v. Other)	1.58	1.64	1.12	.43	1.56 (1.21, 2.02)
Education (≥HS diploma v. <HS diploma)	1.58	2.03	1.39	.25	1.62 (1.24, 2.11)
Age (>45 v. ≤45)	1.58	1.45	1.68	.44	1.56 (1.20, 2.03)
Transactional sex/6 months	1.58	1.34	1.59	.76	1.51 (1.17, 1.94)
Sex partners/6mos (>1 v. ≤1)	1.58	1.51	1.59	.82	1.54 (1.19, 1.99)

Table 7a: Exposure variable frequency among participants tested for an STI in the prior 6 months who did and did not report being diagnosed with a STI/6 months

	STI diagnosis/6 mos (47)		No STI diagnosis/6 mos (109)		Chi-sq test	p – value	Prevalence ratio (95% CI)
Intimate partner violence	39	85%	66	61%	8.33	.004	2.60 (1.25, 5.39)
IPV severe	28	49%	40	29%	7.39	.007	1.82 (1.18, 2.79)
Sex (female)	35	74%	52	48%	9.53	.002	2.31 (1.30, 4.11)
LGBT	9	20%	27	25%	0.53	0.466	.80 (.43, 1.50)
Race, Black	40	85%	96	88%	.26	.611	0.84 (0.44, 1.61)
>1 Sexual partner/6 mos	27	57%	46	42%	3.07	.080	1.53 (.94, 2.49)
Traded sex/6 mos	15	32%	20	18%	3.47	.06	1.62 (1.00, 2.63)
Age>45 yo	16	34%	50	46%	1.88	.17	0.70 (0.42, 1.18)

Table 7b: Exposure variable frequency among participants with and without an STI diagnosis/6 months

	STI diagnosis/6 mos (47)		No STI diagnosis/ 6 mos (296)		Chi-sq test	p –value	Prevalence ratio (95% CI)
Intimate partner violence	39	85%	154	52%	17.02	<.0001	4.24 (1.95, 9.21)
IPV severe	28	49%	95	27%	11.83	0.0006	2.28 (1.42, 3.66)
Sex (female)	35	74%	138	47%	12.58	0.0004	2.87 (1.54, 5.33)
LGBT	9	20%	61	21%	0.03	0.862	0.94 (0.48, 1.86)
Race, Black	40	85%	264	89%	0.67	0.413	0.73 (0.35, 1.52)
>1 Sexual partner/6 mos	27	57%	133	45%	2.55	0.110	1.54 (0.90, 2.64)
Traded sex/6 mos	15	32%	66	22%	2.08	0.149	1.52 (0.87, 2.66)
Age>45 yo	16	34%	150	51%	4.49	0.034	0.55 (0.31, 0.97)

Table 7c: Assessing interaction and confounding: the association between IPV and STI/6 months (among those tested)

Stratification Variable	Crude PR	Stratum-specific prevalence ratios PR1	PR2	Breslow-Day p –value	Adjusted prevalence ratio (95% CI)
Sex (Female v. male)	2.60	2.63	1.56	.36	2.13 (0.98, 4.60)
Sexuality (LGBT v. heterosexual)	2.60	4.00	2.79	.79	2.99 (1.36, 6.56)
Transactional sex/6 mos (yes v. no)	2.60	4.15	2.19	.41	2.51 (1.19, 5.28)
Race (Black v. Other)	2.60	2.44	*	.52	2.60 (1.23, 5.49)
Age (>45 v. ≤45)	2.60	2.32	2.73	.73	2.56 (1.23, 5.31)
Sex partners/6mos (>1 v. ≤1)	2.60	1.84	4.42	.35	2.56 (1.25, 5.27)

Table 7d: Assessing interaction and confounding: the association between IPV and STI/6 months (all participants)

Stratification Variable	Crude PR	Stratum-specific prevalence ratios PR1	PR2	Breslow-Day p –value	Adjusted prevalence ratio (95% CI)
Sex (Female v. male)	4.24	4.88	2.17	.25	3.62 (1.58, 8.28)
Sexuality (LGBT v. heterosexual)	4.24	3.67	5.34	.71	5.00 (2.18, 11.46)
Transactional sex/6 mos (yes v. no)	4.24	7.40	3.54	.45	4.19 (1.90, 9.23)
Race (Black v. Other)	4.24	3.67	*	.31	4.26 (1.93, 9.39)
Age (>45 v. ≤45)	4.24	4.13	3.97	.96	4.03 (1.85, 8.77)
Sex partners/6mos (>1 v. ≤1)	4.24	2.64	8.06	.21	4.03 (1.88, 8.61)

Table 8a: Exposure variable frequency among who did/did not report HIV care in the prior 12 months

	HIV care/12 months (202)		No HIV care/12 months (68)		Chi-sq test	p – value	Prevalence ratio (95% CI)
IPV	108	53%	45	67%	3.85	0.050*	0.87 (0.76, 1.00)
Severe IPV	65	27%	31	38%	3.68	0.051	0.87 (0.75, 1.02)
Sex (female)	93	46%	32	47%	0.02	0.884	0.99 (0.86, 1.14)
Homeless	68	46%	32	55%	1.52	0.218	0.90 (0.76, 1.07)
Race, Black	183	91%	60	88%	0.31	0.575	1.07 (0.83, 1.38)
Edu≥ HS diploma	95	47%	35	52%	0.55	0.460	0.95 (0.83, 1.09)
Incarcerated/6mo	60	30%	15	22%	1.48	0.224	1.10 (0.95, 1.27)
Income >$5000	95	47%	20	30%	5.83	.016	1.18 (1.04, 1.35)
Daily alcohol use	29	14%	13	19%	0.88	0.34	0.91 (0.73, 1.13)
Crack >daily	57	31%	27	45%	4.05	.044	0.85 (0.72, 1.01)
Age>45 yo	101	50%	34	50%	0.00	1.00	1.00 (0.87, 1.15)

Table 8b: Exposure variable frequency among who did/did not report IPV: potential confounders

	IPV yes (193)		IPV no (147)		Chi-sq test	p –value
Sex (female)	118	61%	45	36%	19.89	<.001
Homeless	86	54%	49	49%	0.77	0.381
Race, Black	168	87%	135	91%	1.97	0.160
Edu≥ HS diploma	101	52%	60	41%	4.44	0.035
Incarcerated/6mo	57	30%	44	30%	0.01	0.937
Income >$5000	74	39%	52	36%	0.30	0.582
Daily alcohol use	43	22%	20	14%	4.16	0.041
Crack >daily	65	37%	58	42%	1.02	0.31
Age>45 yo	85	44%	81	55%	4.09	0.04

Table 8c: Assessing interaction and confounding: the association between IPV and use of HIV care/12 months

Stratification Variable	Crude PR	PR (var=1)	PR (var=2)	p –value (Breslow-Day)	PRmh, 95% CI
Sex, female	.87	.86	.87	.91	.86
Currently homeless	.87	.89	.90	.92	.89
Race, Black	.87	.86	.91	.83	.87
Edu ≥HS diploma	.87	.94	.82	.28	.87
Incarcerated/6 months	.87	.98	.82	.31	.87
Income >$5000	.87	.96	.80	.42	.87
Alcohol use≥daily	.87	.98	.87	.51	.88
Crack freq≥daily	.87	.84	.89	.96	.88
Age>45	.87	.86	.88	.88	.87

Table 9a: Exposure variable frequency among who are/are not currently on antiretroviral therapy

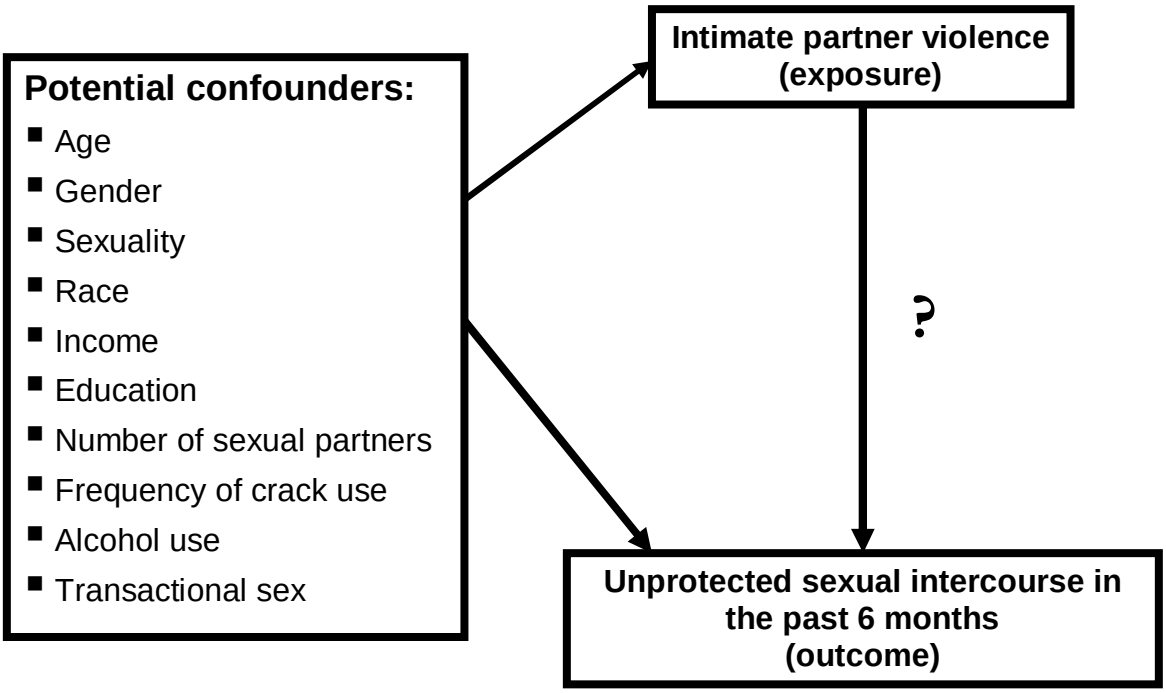
	Currently on ART (100)		Not currently on ART (243)		Chi-sq test	p – value	Prevalence ratio (95% CI)
IPV	43	43%	150	63%	10.94	0.001*	0.57 (0.41, 0.80)
Severe IPV	26	26%	97	40%	5.97	.0146*	0.63 (0.43, 0.93)
Sex (female)	45	45%	128	53%	1.67	0.196	0.80 (0.58, 1.12)
Homeless	26	38%	109	56%	6.70	0.010*	0.58 (0.38, 0.88)
Race, Black	91	91%	213	88%	0.787	0.375	1.30 (0.71, 2.36)
Edu≥ HS diploma	45	45%	116	48%	0.278	0.598	0.91 (0.66, 1.27)
Incarcerated/6mo	27	27%	75	31%	0.506	0.477	0.87 (0.60, 1.27)
Income >$5000	46	46%	81	34%	4.84	0.028	1.45 (1.04, 2.01)
Daily alcohol use	11	11%	52	21%	5.11	0.024	0.55 (0.31, 0.97)
Crack >daily	33	38%	91	40%	0.16	0.694	0.93 (0.64, 1.34)
Age>45 yo	52	52%	114	47%	0.73	0.392	1.15 (0.83, 1.61)

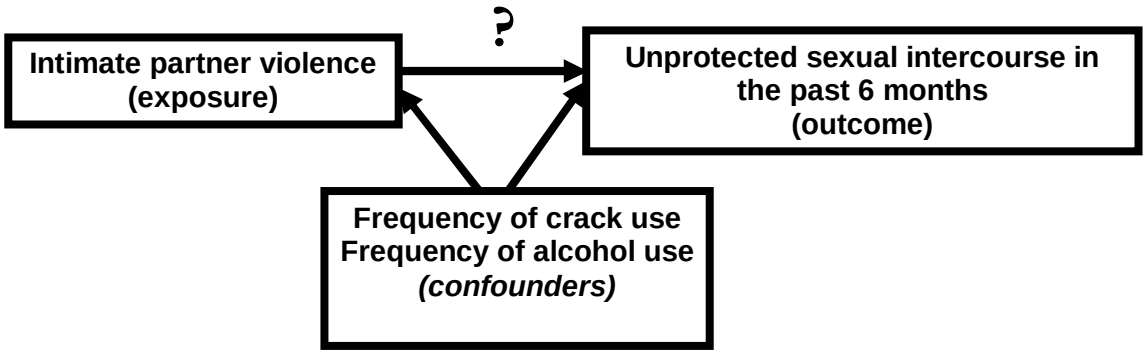
Table 9b: Assessing interaction and confounding: the association between IPV and use of ART

Stratification Variable	Crude PR	PR (var=1)	PR (var=2)	p –value (Breslow-Day)	PRmh, 95% CI
Sex, female	0.57	1.12	0.31	.0007	0.56 (0.39, 0.83)
Currently homeless	0.57	0.42	0.59	0.63	0.52 (0.35, 0.77)
Race, Black	0.57	0.58	0.60	0.90	0.58 (0.41, 0.81)
Edu ≥HS diploma	0.57	0.52	0.63	0.58	0.58 (0.41, 0.81)
Incarcerated/6 months	0.57	0.83	0.50	0.16	0.57 (0.41, 0.80)
Income >$5000	0.57	0.59	0.57	0.86	0.58 (0.41, 0.80)
Alcohol use≥daily	0.57	0.81	0.58	0.44	0.60 (0.43, 0.84)
Crack freq≥daily	0.57	0.51	0.55	0.91	0.53 (0.37, 0.77)
Age>45	0.57	0.70	0.48	0.27	0.58 (0.42, 0.81)

FIGURES

Figure 1a: Causal diagrams depicting the potential association between IPV and unprotected sexual intercourse in the prior 6 months





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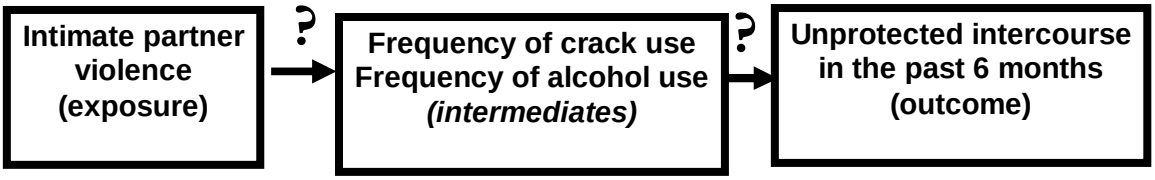


Figure 1b: Causal diagrams depicting the potential association between IPV and STI diagnosis in the prior 6 months

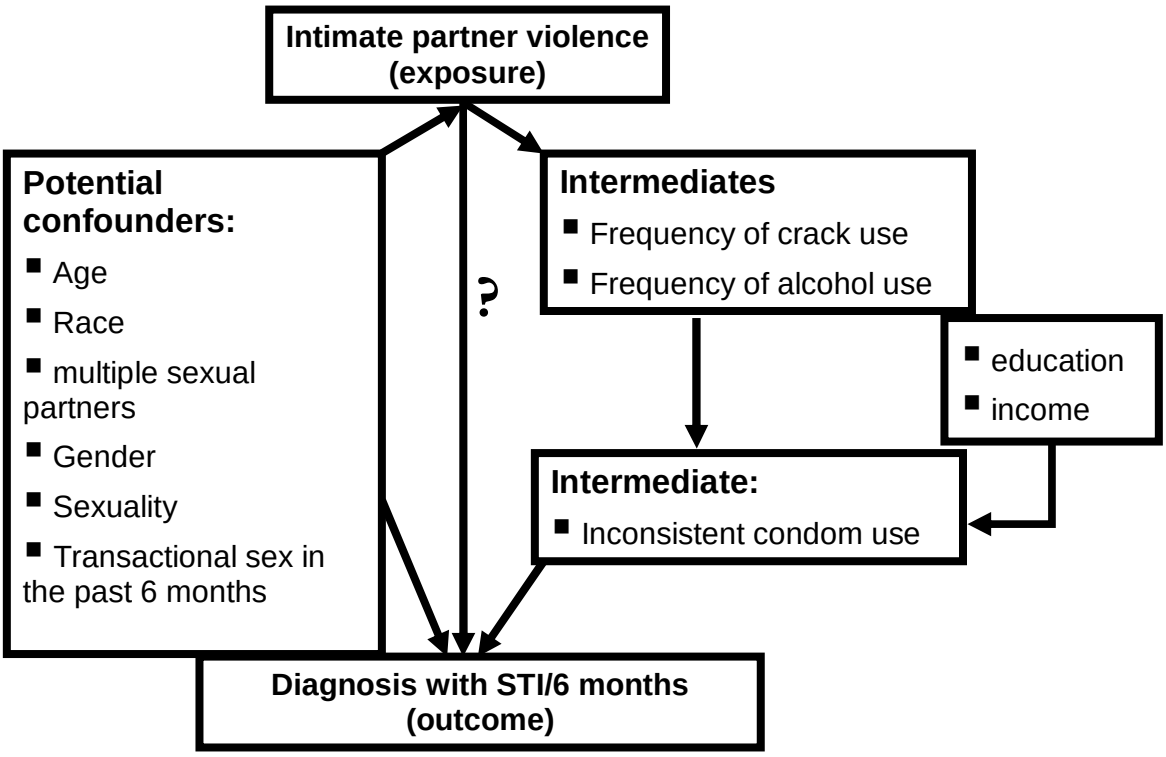


Figure 1c: Causal diagrams depicting the potential association between IPV and HIV care in the past 12 months

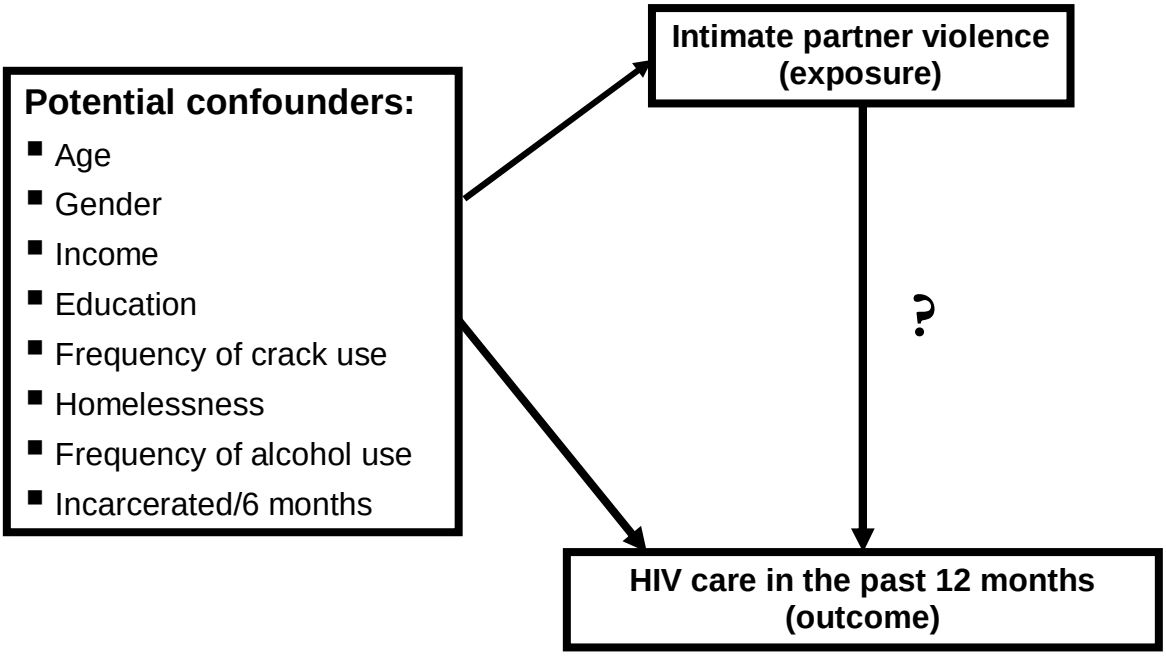
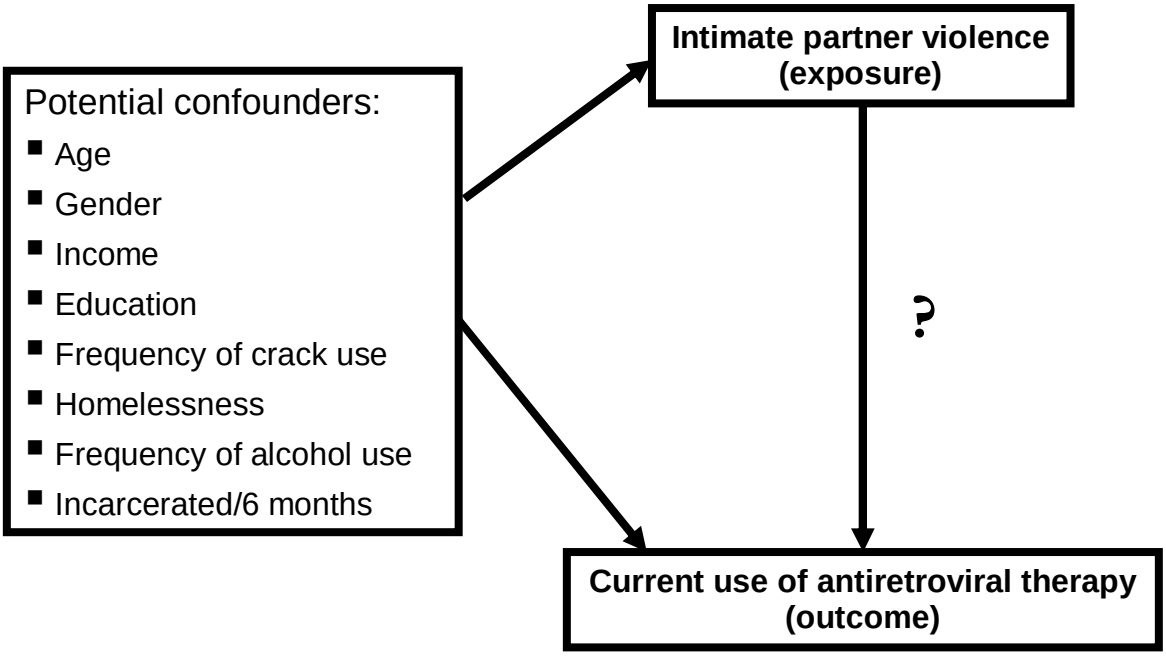


Figure 1d: Causal diagrams depicting the potential association between IPV and current use of ART



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Approval Sheet

Intimate partner violence among HIV+ crack cocaine users: where and why to intervene

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Abstract Cover Page

Intimate partner violence among HIV+ crack cocaine users: where and why to intervene

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An abstract of
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in Clinical Research
2011

Abstract

Intimate partner violence among HIV+ crack cocaine users: where and why to intervene
By Ameeta Shivdas Kalokhe

Background: HIV+ crack cocaine users, collectively, are at high-risk for disease progression and transmitting HIV in that they encounter difficulty entering and remaining in HIV care, taking antiretroviral therapy (ART), and practicing safe sex. We hypothesized that intimate partner violence (IPV) occurs frequently in this cohort and contributes to these shortcomings.

Methods: From December 2006-April 2010 we recruited HIV+ crack cocaine users from inpatient services at Grady Memorial Hospital (Atlanta, GA) and Jackson Memorial Hospital (Miami, FL). Participants were screened for IPV using a 5-item validated survey, and IPV survivors were questioned regarding use and barriers to use of support services. Multivariate analysis was conducted to evaluate the association between IPV and unprotected intercourse or STI diagnosis in the prior 6 months, use of HIV care in the past year, and use of ART.

Results: 343 participants were enrolled. The majority were African American (89%), had not completed high school (52%), and earned <$10,000/year (91%). Fifty-six percent reported lifetime histories of IPV. After controlling for gender, frequency of crack use, and sexuality, IPV was associated with unprotected sex (PR 1.46, 95%CI=1.12-1.90). After controlling for gender, sexuality, and number of sexual partners, IPV was associated with report of an STI diagnosis in the prior 6 months (PR=2.43, 95%CI=1.11-5.36). While IPV was associated with reduced utilization of HIV care, this association was no longer statistically significant after controlling for frequency of crack use and homelessness. IPV survivors were less likely to report ART use (PR=0.57, 95%CI=0.41-0.80), however this negative association was driven by men. While IPV survivors most frequently used 911 services (31%) and the ED (27%), over one-third used no services. Barriers to resource utilization included unwillingness to deal with the situation, fears of partner notification and being judged, and perception of resources as unhelpful.

Conclusion: IPV occurs frequently in HIV+ crack cocaine users and is associated with high-risk sexual behaviors and less use of HIV care. IPV screening should become routine in this population, and resources directed toward emergency/911 services. Clinicians should focus on increasing awareness of IPV services and improving patient comfort and sense of confidentiality in discussing IPV.

Cover Page

Intimate partner violence among HIV+ crack cocaine users: where and why to intervene

By
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A thesis submitted to the Faculty of the
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INTRODUCTION

While HIV incidence and mortality has continued to decline throughout the United States, the South remains home to over 17,000 new AIDS diagnoses and over 8,000 AIDS-related deaths per year according to the most recent estimates of the Centers for Disease Control and Prevention (CDC) (1). Crack cocaine may be a key factor fueling the Southeastern U.S. AIDS epidemic. In a recent study, more than one-third of 1,038 HIV-positive inpatients hospitalized in the public hospitals of two major Southeastern metropolises reported crack cocaine use (2). Crack cocaine was associated with reduced utilization of HIV care and HIV medications, as well as unprotected sexual intercourse in these individuals (2).

Among HIV-positive crack cocaine users, intimate partner violence (IPV) may be a critical barrier to practicing safe sex and utilizing HIV care. Clinical experience and emerging literature indicate that crack cocaine users are often subject to lifetime cycles of violence (3-4). The postulated explanatory mechanism is that these crack cocaine users, many of whom first experience abuse as children (5-6), may begin to use crack as a coping mechanism (7-8), and therefore have heightened vulnerability to further acts of violence, such as IPV (9). El-Bassel *et al* proposed that crack cocaine may increase vulnerability to IPV through impairing judgment and ability to detect of ongoing abuse, lowering the social status of the crack user and thus enabling the perpetrator to be violent toward him/her, and fostering a violent subculture (9). HIV-positive individuals also report high frequencies of IPV, likely in part due to the HIV diagnosis perpetuating self perceptions of inferiority and stigma (10). The HIV Costs and Service Utilization Study demonstrated that 45% of HIV-infected adults reporting IPV in their relationships described their HIV status as a cause of the partner violence (11). *The extent to which IPV may result in the inability of HIV-positive crack cocaine users to access HIV care, adhere to medications, and engage in safe sex practices is unknown.*

In this study, we aimed to estimate the prevalence of IPV among HIV-positive crack cocaine users and determine whether IPV is associated with behaviors and diseases that propagate

HIV disease progression and transmission (i.e. reduced utilization of HIV care, diminished use of antiretroviral therapy (ART), unprotected sexual intercourse, and sexually transmitted infections (STIs)). We also aimed to identify the community-based IPV services that HIV-infected crack cocaine users accessed and determine the barriers IPV survivors encountered in utilizing these services. The new knowledge learned thought this study will be essential to determine how to best allocate scarce resources in order to empower and support HIV-positive IPV survivors who use crack cocaine.

This study was designed as a cross-sectional, dual-centered, study nested within a larger randomized controlled trial. HIV-positive individuals reporting recent crack cocaine use were enrolled from the inpatient services of two urban hospitals (Grady Memorial Hospital, Atlanta, GA and Jackson Memorial Hospital, Miami, Fl). They underwent handheld device-assisted bedside interviews through which data regarding socio-demographics, safe sex practices, health care and medication use, and substance abuse histories was obtained. IPV histories were elicited using a 5-item questionnaire, adapted from a previously validated clinical screener for IPV. Finally, the participants reporting prior histories of IPV were questioned regarding use and barriers to use of various IPV community support services. Multivariate logistic regression was used to evaluate the association between IPV and an individual's use of HIV care, HIV medications, practice of safe sex, and carrying a diagnosis of a STI in the prior six months.

The study findings reported herein confirm our hypotheses that IPV occurs with high frequency in HIV-positive crack cocaine users and is associated with behaviors that propagate HIV disease progression and transmission. These results emphasize the need for behavioral HIV risk reduction and therapeutic HIV interventions catered toward HIV-positive crack cocaine users to incorporate a component which addresses IPV. Furthermore, these results suggest that HIV medication non-adherence, missed appointments, and new STI diagnoses may be surrogate markers for IPV. And when noted in clinical practice, these markers could potentially be used to initiate the IPV screening and referral process. The ultimate significance of this study is that in

addressing IPV among HIV-positive crack cocaine users, clinicians and other health care providers may begin to curb the Southern U.S. AIDS epidemic.

BACKGROUND

The current U.S. AIDS epidemic is concentrated in the Southeast

Throughout the United States AIDS incidence and mortality continues to decline (12). The rising prevalence of AIDS reflects the earlier detection of HIV infection, due to improved diagnostic modalities, and diminished AIDS-related mortality, due to the development and improved delivery of new HIV treatment. While the domestic progress in combating HIV has been marked in the past few decades, many individuals continue to be diagnosed with HIV and die of AIDS each year. In 2008, the Centers for Disease Control and Prevention (CDC) reported that 37,991 people were diagnosed with AIDS in the U.S. and 18,089 individuals died with AIDS in 2007 (12). In recent years the largest disease burden of new AIDS cases has been concentrated in the South (1). In 2008 Maryland, Florida, Louisiana, and Georgia were ranked in the top five states in per capita AIDS diagnoses (1, 13). *These statistics highlight the need for improved HIV and AIDS prevention and treatment in the Southeastern United States.*

In 2008, twenty-six new adult and adolescent AIDS diagnoses per 100,000 population were reported in Florida, compared to the national average of twelve (14). The bulk of these Florida AIDS diagnoses occurred in African Americans (49%) and secondly, Caucasians (34%). The largest HIV transmission categories were men who have sex with men (44%) and individuals engaging in heterosexual sex (31%), exceeding intravenous drug users, individuals receiving transfusions, individuals with occupational exposures, and perinatal exposures. Comparable to the Florida epidemic, twenty new adult and adolescent AIDS diagnoses per 100,000 population were reported in Georgia in 2008, with the bulk of the epidemic occurring in African Americans (67%) (14). The majority occurred in the transmission categories of men who have sex with men (51.1%) and individuals engaging in heterosexual sex (22.4%). *The disproportionate burden of AIDS cases in the Southeast among African Americans who acquired HIV through either heterosexual or same-sex sexual transmission suggests that current preventive, diagnostic, and treatment modalities may not sufficiently reach nor cater to this population. Furthermore, the*

present preventive and therapeutic strategies may not sufficiently address the concurrent social issues that contribute to the Southern AIDS epidemic.

Crack cocaine: a contributor to the Southeastern AIDS epidemic

Metsch *et al* aimed to identify the factors deterring HIV-infected individuals from accessing appropriate HIV care by studying 1,038 HIV-positive hospitalized patients from Atlanta, Georgia and Miami, Florida (71% of whom were African American) between 2006 and 2007 (2). Through multivariate analysis the use of crack cocaine was associated with never having an HIV provider, not being on current antiretroviral therapy (ART), and unprotected sexual intercourse with HIV-negative or HIV-unknown individuals in the prior six months. Over one-third of the study participants reported recent crack cocaine use. Since HIV-positive crack cocaine users engage in high-risk sexual activity and have difficulty accessing and remaining in HIV care and taking ART, they are at high risk for AIDS progression themselves and HIV transmission to others. *Thus, a better understanding of the factors that delay entry to or limit use of care for HIV, is essential if the epidemic is to be curbed.*

Intimate partner violence: a potential contributing factor to the Southeastern AIDS epidemic among HIV-positive crack cocaine users

Clinical experience and emerging literature suggests that IPV might be a significant contributing factor that is driving the AIDS epidemic among crack cocaine users. The CDC defines IPV as "physical, sexual, or psychological harm by a current or former partner or spouse, [which]…can occur among heterosexual or same-sex couples and does not require sexual intimacy(15)." Both the social-behavioral literature and clinical experience support that crack cocaine users, collectively, experience IPV at higher frequency than their drug-free counterparts (3, 16-17). Current literature also maintains that HIV-positive individuals are frequently survivors of IPV. IPV prevalence among HIV-positive cohorts has been reported to range from 39-93%,

with particularly high frequency among pregnant women (66%), transgendered individuals (93%), persons of low SES, and the homeless (64%-80%) (18-25). Furthermore, the frequency of IPV after HIV diagnosis may increase, with 20% of HIV-infected women in the U.S. reporting physical violence beginning after diagnosis and 10% reporting violence in the preceding three months (11, 26). Although it would follow that HIV-positive crack cocaine users experience IPV with high frequency, the prevalence of IPV in this cohort has not previously been reported. *The extent to which intimate partner violence contributes to the inability of HIV-positive crack cocaine users to remain in HIV care, adhere to ART, and practice safe sexual practices remains unknown.*

Prior to initiation of this study, little was known about the effects of intimate partner violence on the health of HIV-positive individuals. IPV in the general population (i.e. regardless of HIV status), had been associated with physical harm, chronic headaches and pelvic pain, irritable bowel syndrome, urinary tract infections, miscarriages, and sexually transmitted infections (27-33). Similarly, IPV was associated with poor mental health outcomes, including depression, suicidality, and post-traumatic stress disorder (33-36). It follows that IPV among HIV-positive crack cocaine users could also be associated with poor physical and mental health, and thus interfere with an individual's ability to negotiate safe sex and seek HIV care and ART. *Here, for the first time, we estimate the frequency with which IPV occurs among HIV-positive crack cocaine users and correlate it with behaviors known to propagate HIV disease progression and transmission.*

METHODS

Specific Aims and Hypotheses

We first estimated the prevalence of IPV among HIV-positive crack cocaine users. This frequency estimation was subsequently used to test the following aims and hypotheses:

Aim 1: to determine whether IPV among HIV-positive crack cocaine users is associated with less consistent condom use.

H_o: *HIV-positive crack cocaine users who experience IPV are more likely than their non-abused counterparts to report unsafe sex within the past six months.*

Aim 2: to determine whether IPV among HIV-positive crack cocaine users is associated with more frequent diagnoses with sexually transmitted infections (STIs).

H_o: *HIV-positive crack cocaine users who experience IPV are more likely than their non-abused counterparts to report a diagnosis of a STI within the prior six months.*

Aim 3: to determine whether IPV among HIV-positive crack cocaine users is associated with less frequent utilization of health care.

H_o: *HIV-positive crack cocaine users who experience IPV are less likely than their non-abused counterparts to have utilized HIV care within the prior twelve months.*

Aim 4: to determine whether IPV among HIV-positive crack cocaine users is associated with decreased use of antiretroviral therapy (ART).

H_o: *HIV-positive crack cocaine users who experience IPV are less likely than their non-abused counterparts to be currently taking ART.*

A final objective of the study was to determine which community-based services the survivors of IPV used most frequently and which barriers they encountered in using available resources. In the future, this knowledge could help target the use of scarce resources (i.e. financial, manpower, etc.) to services that IPV survivors frequently utilize. Similarly, an enhanced understanding of the barriers to resource utilization could aid in developing methods to better overcome them.

Study Design

This study was designed as a cross-sectional study nested within a larger study, Project HOPE (Hospital visit is an Opportunity for Prevention and Engagement). Project HOPE is a dual-centered randomized controlled trial that aims to evaluate the effectiveness of a behavioral, educational intervention in reducing high-risk HIV sexual practices and improving the use of outpatient HIV care and drug treatment by HIV-positive crack cocaine users. Our nested cross-sectional study of IPV enrolled patients prior to randomization into the Project HOPE intervention.

Between December 2006 and April 2010, individuals were enrolled from inpatient services at Jackson Memorial Hospital (Miami, Florida) and Grady Memorial Hospital (Atlanta, Georgia). In order to participate, individuals had to meet the following inclusion criteria: age 18 years or older, HIV-seropositivity, use of crack cocaine within the prior two years, sexual activity (i.e. vaginal or anal) within the prior six months, and capacity to communicate in English. Exclusion criteria were physician prediction of patient survival of less than 6 months or an active psychiatric disorder interfering with ability to participate in the study. Individuals fulfilling the above criteria were asked to provide written, informed consent and sign a HIPAA authorization form prior to enrollment. This study was approved by both the Emory University and University of Miami institutional review boards as well as the Grady Memorial Hospital Research Oversight Committee.

All participants underwent a two-hour, handheld device-assisted, one-on-one, bedside interview. Interviewers at both sites underwent a standardized training session and used the same question order and content. Information for all variables was collected by self-report only.

The primary predictor variable, intimate partner violence, was a categorical, binary (yes/no) variable defined as an affirmative response to at least one of five IPV screening questions (see Table 1). The 5-part IPV screener was adapted from the STaT questionnaire, which was previously validated in an urban clinical setting, the emergency department of Grady Memorial Hospital (37-38). Two questions were added to the STaT questionnaire to address sexual violence and partner control. Thus, our screener included assessment of physical, sexual, and emotional violence as well as threats of violence. A second predictor variable, *severe* intimate partner violence, was defined as an affirmative response to at least three of five IPV screening questions.

Other covariates that were assessed included sex (a categorical, binary variable, female versus male), income (a categorical, binary variable, ≤ $5000 versus >$5000), sexuality (a categorical, binary variable, heterosexual versus lesbian, gay, bisexual, or transgendered), crack frequency (a categorical, binary variable, at least daily versus less than daily), race (a categorical, binary variable, Black versus non-Black), education (a categorical, binary variable, high school diploma or higher versus less than high school diploma), number of sexual partners in the prior six months (a categorical, binary variable, at least 2 partners versus only 1 partner), age (a categorical, binary variable, > 45 years-old versus ≤45 years old), and transactional sex in the prior six months (a categorical, binary variable, traded sex for crack versus did not trade sex for crack). For the multivariate analysis, age and number of sexual partners were not dichotomized, but left in numerical form instead.

Outcome variables included unprotected sex in the prior six months (a categorical, binary variable, 100% compliance with condoms versus less than 100% compliance with condoms in the prior six months), STI diagnosis in the prior six months (a categorical, binary variable, diagnosis

of Chlamydia, Gonorrhea, Syphilis, Trichomonas, and/or other STI versus no diagnosis of STI), use of HIV care in the prior 12 months (a categorical, binary variable, use of HIV care versus no use of HIV care in prior 12 months), and current use of ART (a categorical, binary variable, current use of HIV medications versus not using current HIV medications).

Finally, only those individuals who screened positive for IPV were subsequently questioned regarding their utilization of various community support services, barriers to care, and individual comfort in discussing IPV with their HIV providers. For the service utilization question, participants were asked to choose from a list of resources, (adapted and expanded from a prior study (39)), including the emergency department, walk-in clinics, primary care doctors, 911 services, help lines, legal assistance, financial assistance, support groups, shelters, mental health services, spiritual leaders, and family/friends. Answer choices for barriers to resource utilization included putting it off, not wanting to deal with it, dislike of physicians and healthcare, fear of partner notification, fear of being judged or pitied, fear of their children being hurt or being separated from them, fear of the financial repercussions, fear of being treated rudely or unkindly, perception of IPV services as unpleasant or unhelpful, inconvenience of available services, lack of transportation, prolonged appointment wait times, lack of appointment availability, lack of phone access, costliness of support services, and lack of knowledge of available support services.

Sample Size Calculations

The initial sample size calculations were conducted for the Project HOPE study, the larger randomized controlled trial in which our study was nested. To achieve a power of 85% for the detection of a 10% reduction in unprotected sexual intercourse in the prior six months, using a one-sided α=.05, 180 participants needed to be enrolled in both the control and intervention arms.

In theory, had we calculated sample size for our nested cross-sectional IPV study under the assumption that IPV prevalence was 33% (as determined by a prior IPV study in the Grady Memorial Hospital Emergency Department (37)), to achieve a power of 80% and detect a 10%

difference in unprotected sexual intercourse in the prior six months between those who experienced IPV versus those who did not, a total of 381 individuals need to be enrolled. Sample size calculations were performed using PASS 2008 software.

Data Analysis

To better visualize potential causal pathways between the predictor and outcome variables, causal diagrams were drawn for each of the 4 regressions assessing the relationship between IPV and unprotected sexual intercourse in the prior 6 months, STI diagnosis in the prior 6 months, use of HIV care in the prior 12 months, and current use of ART (see Figure 1a-d). Given the cross-sectional nature of the study, we realize that the causal diagrams only provide a theoretical construct in which to assess the study question and that our study does not truly test causality, but rather tests the association between the variables.

Univariate analyses were performed to evaluate the distribution of the predictor variable, each of the covariates, and the outcome variables. Categorical variables with multilevel responses were consolidated into binary variables for ease of subsequent bivariate analysis. The PROC FREQ (for categorical variables) and PROC UNIVARIATE (for continuous variables) functions in SAS 9.2 were used for the univariate analysis. Prevalence was the measure of frequency obtained.

Next bivariate analysis was used to explore the associations between the exposure variable and covariates and also the outcome variable and covariates. The Chi-square test was used to test these associations and to assist in identifying potential confounders. A p-value of less than .05 was considered statistically significant. Prevalence ratios were the measure of association obtained.

To evaluate for potential interaction and confounding, stratum-specific prevalence ratios were calculated. The Breslow-Day test was used to test the homogeneity of the prevalence ratios (p-value<.05 was considered statistically significant). If interaction was noted, two different

stratum-specific prevalence ratios were reported. If interaction was not noted, adjusted prevalence ratios were compared to the crude prevalence ratios to identify potential confounding. If there was a sizeable difference (subjectively determined) between the adjusted and crude prevalence ratios, then the adjusted prevalence ratio was reported. (Prevalence ratios were adjusted for confounding using the Mantel-Haenszel approach).

Finally, a modeling approach was used to better visualize the association between the exposure variable and outcome in the setting of the covariates. First, a test model was generated including numerous covariates that were deemed important based on prior knowledge. Collinearity was tested using the Collin Macros by Dan Rosen, with collinearity defined as both a conditional index of $\geq$ 23 and variance decomposition proportion of $\geq$ 0.5 (40). Interaction, whether the association between the predictor variable and outcome variable changed based on levels of the third covariate, was evaluated using both a chunk test with likelihood ratio tests and the Wald test statistic (p-value<.05 was considered statistically significant). Finally, confounding, whether the association between the predictor and outcome variable changed when a covariate was included versus removed from a model, was evaluated by assessing whether there was a meaningful change (subjectively determined) in the prevalence ratios in the full versus reduced models. A final model was then constructed to include the predictor variable, outcome variable, identified confounders and interaction terms, and other clinically important covariates. Using the PROC GENMOD function with DIST=bin and LINK=log specifications, prevalence ratios and associated confidence intervals were calculated. This is a binary logarithm distribution providing prevalence risk ratios.

RESULTS

Between December 2006 and April 2010, 343 participants, 173 women and 170 men, were enrolled in the study. (See Table 1 for participant characteristics). The mean age of the cohort was 45 years and 89% were African American. While only 11% (19/173) of the women self-identified as being lesbian, bisexual, or transgendered (LBT), 30% (51/170) of the men self-identified as being gay, bisexual, or transgendered (GBT). Ninety-six percent (330/343) of the participants were currently unemployed and 76% (261/343) were homeless. Sixty-eight percent (117/173) of women and 57% (95/170) of men reported annual incomes of less than $5000. Furthermore, 61% (105/173) of the women and 44% (75/170) of the men had less than a high school (or GED equivalent) level of education. While all participants reportedly smoked crack cocaine within the prior two-year period, 46% (73/173) of women and 32% (51/170) of men smoked crack at least daily. Eighteen percent of all participants reported drinking alcohol at least daily. In the six months prior to the study, 24% (81/343) of the cohort engaged in transactional sex and 45% (155/343) engaged in unprotected sexual intercourse. The median CD4 count was 184 (25-75 IQR: 61-353).

The prevalence of intimate partner violence in our cohort was 56% (193/343), by the predetermined definition of an affirmative response to one of the five IPV screening questions. Sixty-eight percent (118/173) of the women reported IPV, whereas 44% (75/170) of the men reported IPV. (Table 2 demonstrates the frequency of IPV and severe IPV among the men and women). The prevalence of severe IPV was 36% (123/343), by the predetermined definition of an affirmative response to at least three of the five IPV screening questions. Fifty-one percent (88/173) of the women and 21% (35/170) of the men reported severe IPV. Table 3 displays the frequency of IPV and severe IPV by sexuality. Among the men, IPV occurred in 71% (36/51) of GBT individuals and 33% (38/117) of heterosexual individuals, while severe IPV occurred in 39% (20/51) of GBT individuals and 12% (14/117) of heterosexual individuals. Among the women, IPV occurred in 63% (12/19) of the LBT individuals and 69% (106/154) of the

heterosexual individuals, whereas severe IPV occurred in 42% (8/19) and 52% (80/173) individuals. Table 4 demonstrates the frequencies of the different forms of IPV. The most common types of IPV reported were having a partner throw, punch, or break things (47% or 160/343), being threatened by a partner with violence (43% or 149) and feeling controlled by a partner (42% or 143). While a significant proportion of men were reportedly survivors of IPV, physical abuse and sexual abuse were not frequently reported (12% or 20/170 and 6% or 10/170, respectively). Among the women, however, 43% (74/173) reported physical abuse and 29% (50/170) reported sexual abuse by an intimate partner.

The association between IPV and unprotected sexual intercourse

In bivariate analysis, the outcome variable, unprotected sex in the prior 6 months, was significantly and positively associated with intimate partner violence, severe IPV, the female gender, self-identifying as LGBT, smoking crack at least daily, drinking alcohol at least daily, possessing more than one sexual partner in the prior 6 months, and engaging in transactional sex in the prior 6 months (p-value<.05). See Table 5a and 5b for bivariate analysis. Similarly, in an attempt to identify potential confounders, the predictor variable, IPV, was analyzed with the various covariates (see Table 5c). IPV was significantly associated with the gender, sexuality, frequency of alcohol use, education level, and age. Through the stratified database approach (Table 6), no interaction was noted between IPV and the covariates (i.e. Breslow-Day p-value ≥.05). Similarly, confounding was not noted via the stratification approach (i.e. the prevalence ratio between IPV and unprotected condom use in the prior 6 months failed to change significantly in the presence and absence of the analyzed covariates). In the bivariate analysis, no confounding nor interaction was noted for the association between unprotected sexual intercourse and severe IPV variable (data not shown).

The initial full model evaluated the association between IPV and unprotected sexual intercourse in the prior 6 months controlling for gender, sexuality, frequency of crack cocaine

use, income, education, race, age, and number of sexual partners. No collinearity was noted between the variables (conditional indices <23 and VDP<.5). No interaction was noted between IPV and the covariates (Chunk test and Wald test p-value>.05). No confounding was noted by evaluating changes in the IPV prevalence ratio between the full and reduced models.

Thus, in the absence of confounding and interaction, we chose to include gender, sexuality, and crack frequency in our model that evaluated the association between IPV and unprotected intercourse in the prior 6 months. These covariates were included because of their noted importance based on the current literature and our own personal experiences. Thus, our final model is as follows:

*Log P(Y=unprotected intercourse/6 months)=-1.09+0.38*IPV-0.24*gender+0.26*sexuality + 0.38*frequency of crack use*

(coding: unprotected intercourse in the prior 6 months=1 if 'yes' and =0 if 'no,' gender=1 if male and gender=0 if female, sexuality=1 if LGBT, sexuality=0 if heterosexual, IPV=1 if present and IPV=0 if absent, and frequency of crack use=1 if ≥ daily and =0 if <daily).

By this model, HIV-positive crack cocaine users who experience IPV have 1.46 (95% confidence interval: 1.12, 1.90) times the prevalence of reporting unprotected sexual intercourse in the prior 6 months compared to their non-abused counterparts after controlling for sexuality, gender, and frequency of crack use.

The association between IPV and diagnosis of a sexually transmitted infection

The outcome variable, of STI diagnosis in the prior 6 months, was analyzed in two manners: 1) among participants who reported being tested for an STI in the prior 6 months (n=156), and 2) among all participants regardless of whether the participant sought STI testing

(n=343). In bivariate analysis, by both methods, a diagnosis of STI in the prior 6 months was positively associated with IPV, severe IPV, and the female gender (See Table 7a, 7b). In the stratification analysis to assess for confounding and interaction (Tables 7c, 7d), confounding of the IPV/STI relationship was noted by gender only if all participants were analyzed (as opposed to only those who were tested for an STI in the prior 6 months). No additional confounding of the IPV/STI association nor interaction was noted.

The initial test model evaluated the association between IPV and an STI diagnosis in the prior 6 months, controlling for gender, sexuality, race, age, number of sexual partners, and transactional sex in the prior 6 months. No collinearity was noted between the variables nor was interaction noted between IPV and the covariates. Confounding of the association between the exposure variable, IPV, and outcome variable, STI diagnosis in the prior 6 months, was noted by gender only when the STI responses of all participants were analyzed. Specifically, the prevalence ratio for the prevalence of STI diagnosis in the prior 6 months among those who experience IPV versus those who did not, changed from 4.69 to 3.76 when gender was included in the model. On this basis, gender was left in the final model. Although not identified as potential confounders, sexuality and number of sexual partners were also left in the reduced model because they have been identified as important covariates based on preexisting knowledge. Thus, the final models were:

1) model analyzed using only participants reporting STI testing in the prior 6 months:

$$Log\ P(Y=STI\ diagnosis/6\ months) = -1.67 - 0.91*gender + 0.25*sexuality + .00*sexualpartners + 0.89*IPV$$

2) model analyzed using all participants:

*Log P(Y=STI diagnosis/6 months)=-2.72-1.02*gender+0.20*sexuality+.00*sexual partners+1.36*IPV*

(where STI diagnosis in the prior 6 months=1 if 'yes' and =0 if 'no,' gender=1 if male and gender=0 if female, sexuality=1 if LGBT, sexuality=0 if heterosexual, IPV=1 if present and IPV=0 if absent, and sexual partners=continuous numerical variable).

By this model, among HIV-positive crack cocaine users tested for an STI in the prior 6 months, those who experienced IPV had 2.43 (95% CI 1.10-5.36) times the prevalence of STI diagnoses (in the prior 6 months) compared to their non-abused counterparts after controlling for sexuality, gender, and number of sexual partners. When all participants were analyzed regardless of testing history, HIV-positive crack cocaine users who reported IPV had 3.89 (95% CI 1.68-9.00) times greater prevalence of STI diagnosis compared to their non-abused counterparts.

The association between IPV and utilization of HIV care

In bivariate analysis, the outcome variable, utilization of HIV care in the prior 12 months, was negatively associated with intimate partner violence and frequent crack cocaine use and positively associated with having an annual income of >$5000 (p-value <.05). The association between utilization of HIV care in the prior 12 months and severe IPV also trended toward being significant (p=.051), but was likely limited by smaller sample size. (See Table 8a for the bivariate analysis). Similarly, in an attempt to identify potential confounders, the predictor variable, IPV, was analyzed with the various covariates (see Table 8b). IPV was significantly associated with gender, education, daily alcohol use, and age. Through the stratified database approach (Table 8c), no interaction was noted between IPV and the covariates (i.e. Breslow-Day p-value ≥.05). Similarly, confounding was not noted via the stratified approach (i.e. the prevalence ratio between

IPV and utilization of HIV care in the prior 12 months failed to change significantly in the presence and absence of the analyzed covariates).

The initial full model evaluated the association between IPV and utilization of HIV care in the prior 6 months controlling for age, gender, income, education, frequency of crack cocaine use, homelessness, frequency of alcohol use, and incarceration in the prior 6 months. No collinearity was noted between the variables (conditional indices <23 and VDP<.5). No interaction was noted between IPV and the covariates (Chunk test and Wald test p-value>.05). No confounding was noted by evaluating changes in the IPV prevalence ratio between the full and reduced models.

Thus, in the absence of confounding and interaction, we chose to include frequency of crack use and homelessness in the final model. These covariates were included because of their presumed significant contribution in determining whether an individual utilizes HIV care. Thus, our final model is as follows:

*Log P(Y=use of HIV care/12 months)= -0.15 - 0.09*IPV- 0.16*homelessness - 0.11*frequency of crack use*

(coding: use of HIV care/12 months=1 if 'yes' and =0 if 'no;' IPV=1 if present and IPV=0 if absent; homelessness=1 if currently homeless and =0 if not currently homeless; and frequency of crack use=1 if ≥ daily and =0 if <daily).

By this model, HIV-positive crack cocaine users who experience IPV have 0.91 (95% confidence interval: 0.77, 1.07) times the prevalence of reporting use of HIV care in the prior 12 months compared to their non-abused counterparts after controlling for current homelessness and frequency of crack use.

The association between IPV and use of current antiretroviral therapy

In bivariate analysis, the outcome variable, current use of ART, was negatively associated with IPV, severe IPV, homelessness, and daily alcohol use, and positively associated with an annual income of >$5000 (p-value <.05). See Table 9a for the bivariate analysis. Through the stratified database approach (Table 9b), interaction was noted between IPV and gender (i.e. Breslow-Day p-value .0007). This approach failed to identify potential confounding of the association between IPV and current use of ART.

The initial full model evaluated the association between IPV and current use of ART controlling for age, gender, income, education, frequency of crack use, homelessness, frequency of alcohol use, and incarceration in the prior 6 months. No collinearity was noted between the variables (conditional indices <23 and VDP<.5). Interaction between gender and IPV was again noted (likelihood ratio chunk test p-value=.0007 and Wald chunk test p-value=.0018), but not between IPV and the other covariates. No confounding was noted by evaluating changes in the IPV prevalence ratio between the full and reduced models.

In lieu of the interaction between IPV and gender, both terms and the interaction terms were left in the final model. Thus, our final chosen model:

*Log P(Y=use of current ART)= -1.42 + 0.68*gender +0.12*IPV -1.29*IPV*gender*

(coding: current use of ART=1 if 'yes' and =0 if 'no;' IPV=1 if present and IPV=0 if absent; gender=1 if male and 0 if female)

By this model, male HIV-positive crack cocaine users who experience IPV have 0.61 times the prevalence of reporting use of current ART compared to their non-abused counterparts after controlling for current homelessness and frequency of crack use. Female HIV-positive crack cocaine users who experience IPV have 1.13 times the prevalence of reporting use of current

ART compared to their non-abused counterparts after controlling for current homelessness and frequency of crack use.

Use and Barriers to Use of IPV Support Services

Finally, all 193 individuals who experienced IPV were questioned about their utilization of various community and medical support services after they experienced violence. Thirty-eight percent (73/193) reported not seeking any assistance after they were abused by their partners. The most commonly used IPV support resources used by this cohort after abuse included 911 emergency services (31%), the emergency department (27%), family and friends (20%), and mental health (13%). Shelters, support groups, walk-in-clinics, spiritual leaders, domestic violence help lines, primary care providers, legal aid, and financial aid were used by less than 10% of these individuals (see Figure 2a).

The most commonly cited barriers to use of IPV support services included unwillingness to deal with the violence, fear of partner finding out, perception of the services as unhelpful, fear of being judged, and lack of knowledge that the services existed (see Figure 2b). However, when these individuals were specifically asked about how comfortable they felt in discussing IPV with their HIV provider, approximately two-thirds reported high levels of comfort (see Figure 2c).

DISCUSSION

To our knowledge, this study is the first to characterize the IPV experiences of HIV-positive crack cocaine users and highlights the association between IPV and behaviors that propagate HIV transmission and disease progression. As HIV clinicians in the Southeast, we continue to encounter difficulty engaging crack cocaine users in HIV care. Our study findings support the theory that among crack cocaine users, IPV likely fuels HIV progression to AIDS through partner-controlled limited access to HIV care and ART, and likely fuels HIV transmission by reducing condom use and increasing the frequency of STI acquisition.

This study confirms our clinical suspicion of the high prevalence of IPV among HIV-positive crack cocaine users, with 56% (193/343) reporting lifetime histories of IPV and 36% (123/343) reporting lifetime histories of severe IPV. These IPV frequency statistics were within the range reported by prior studies evaluating the frequency of IPV in low-income HIV-positive cohorts (19, 22). While affirmative responses to each of the individual IPV screening questions were more common among the women than men, a sizeable proportion (44% or 75/170) of the men also reported experiencing lifetime IPV. While verbal and psychological abuse and threats of abuse occurred frequently among both genders, physical and sexual abuse occurred with high frequency (43% and 29%, respectively) only in the female cohort. Narrowing of the IPV definition to assess the frequency of more 'severe' abuse resulted in the frequency of IPV falling by over one-half among the men, but approximately only one-third among the women. Interestingly and also in accordance with the present literature, IPV occurred with high frequency among both women (63% or 12/19) and men (71% or 36/51) in same-sex relationships. Collectively, our data suggests that IPV among HIV-positive crack cocaine users occurs frequently among men and women and traverses both heterosexual and same-sex relationships.

We further demonstrated that IPV is associated with various high-risk behaviors that promote HIV transmission to others and fuel progression of HIV disease to AIDS. IPV was positively associated with the reporting of unsafe sex and diagnosis of an STI in the prior six months, as

well as negatively associated with currently being on ART and seeking HIV care in the prior year. After controlling for frequency of crack use, gender, and sexuality, participants reporting IPV were one-and-a-half times as likely to report unsafe sex in the prior 6 months. This supports prior studies which suggest that IPV diminishes the capacity and control in negotiating condom use and safe sex(26, 41-43). Similarly, after controlling for gender, sexuality, and multitude of sex partners, participants reporting IPV were 2.4-3.9 times as likely to report being diagnosed with an STI in the prior 6 months (depending on the cohort analyzed: those reporting STI testing versus the entire cohort, respectively). While IPV was associated with less utilization of HIV care in the prior 12 months, the association was no longer statistically significant after controlling for frequency of crack use and homelessness. Finally, participants who reported IPV were 0.57 times less likely to report being on ART. This negative association appeared to be driven largely by males (PR=0.61) as opposed to the women (PR=1.13).

The association between IPV and inconsistent condom use and STIs supports the need for developing interventions aimed at curbing unsafe sex which incorporate a component that addresses IPV. Furthermore, safe sex methods that empower the IPV survivor to protect him/herself and require minimal consent from the abuse-perpetrating partner (i.e. female condoms for vaginal or anal intercourse and microbicides) should be tested for acceptability and efficacy within abusive relationships.

The association between IPV and diminished utilization of ART and HIV care has many possible explanations. Concern for personal safety and the safety of one's children, perceptions of financial and structural self-insufficiency, as well as poor mental and physical health resulting from the abuse may prevent IPV survivors from seeking and engaging in appropriate HIV medical care. Therefore, HIV clinics should strive to provide comprehensive support (i.e. mental health and shelter referrals, linkage to caseworkers for financial assistance, legal services, housing, and childcare, etc.) to empower IPV survivors and minimize the barriers they may encounter in using HIV medications and care. Finally, a new STI diagnosis, non-adherence to

ART, and missed clinic appointments may be surrogate markers for IPV in this population. When noted in the clinical setting, they could potentially be used by clinicians to initiate the IPV screening and referral process.

Only 62% of the study participants used IPV support services after experiencing abuse. Emergency services such as 911 phone lines and emergency departments were the most frequently used, well ahead of primary care and other services which build a longer-lasting support infrastructure over an extended time period (i.e. mental health, financial and legal counseling, shelters and support groups). Thus, future efforts may need to be focused on using the emergency venues to refer these IPV survivors to longer-lasting support services after initial stabilization and care. The most commonly cited barrier in using IPV resources was not wanting to deal with the problem. Empowering the survivors by providing them with the tools to develop a durable support system may improve their ability to recognize, acknowledge, and begin to deal with the violence. Fear of partner notification, being judged, and lack of knowledge of IPV services are issues that should be addressed by HIV clinicians and clinic staff by providing a safe, secure, and non-judgmental environment and displaying available IPV resources throughout the clinic. Interestingly, two-thirds of IPV survivors did report feeling comfortable discussing IPV with their HIV care provider, thus suggesting that HIV clinicians can use the clinic visit as an opportune venue to address relationship violence and safety.

While being the first to characterize the IPV experiences of HIV-positive crack cocaine users and their association with poor health outcomes and behaviors, this study also possesses limitations. The first limitation is its cross-sectional nature which limits causal conclusions. We believe that IPV results in inconsistent safe sex practices, more STIs, as well as less utilization of HIV care and medications. However, the possibility exists that a new STI diagnosis may trigger abuse by engendering the perpetrator's feelings of betrayal. Similarly, use of HIV care and medications and condom negotiation by the survivor may challenge the perpetrator's control in the relationship and subsequently result in heightened violence (29, 44). A selection bias may also

bias the results in that hospitalized patients may be more or less likely than their non-hospitalized counterparts to have experienced IPV and also more or less likely to report unprotected intercourse, STIs, and diminished use of HIV care.

An information bias may also be present in that all outcome and predictor variables were not measured but based on personal recall. The IPV literature describes large underreporting of IPV by survivors, thus our data may underestimate the true prevalence of IPV in this cohort. To minimize this bias, we adapted our screener from a previously validated questionnaire and used two IPV definitions. The first IPV definition was kept broad with the goal of identifying the greatest number of IPV survivors. The diminished specificity likely resulted in some false positives, however in the multivariate analyses the bias would have been toward the null. The second definition of IPV, severe IPV, was used to improve the specificity of our screener. Ideally, all questions within our five-part screener would have been validated against frequently used research IPV tools such as the Index of Spouse Abuse or Conflict Tactics Scale-2.

Further limitations included that the study was not designed to determine which participants required ART. The U.S. Department of Health and Human Services guidelines for initiation of ART based on CD4 counts changed during the period of the study, thus possibly impacting which study participants merited treatment. The overall balance in CD4 counts between those who experienced IPV and those who did not suggests that this bias may be minimal. Finally, we may have in fact weakened the association between IPV and unsafe sex, STIs, and ART use by controlling for crack use.

Nonetheless, this study has been the first to capture and characterize the IPV experiences of a very difficult-to-reach population, crack cocaine users, who comprise a large proportion of the HIV-positive epidemic in the Southeast. Future studies should aim to better assess causality between IPV and the aforementioned high-risk HIV behaviors. For example, retrospective case-control studies could be conducted in which HIV-positive individuals with new STI diagnoses and those without STI diagnosis are both questioned about their preceding IPV histories. Cohort

studies should be developed that prospectively follow HIV-positive individuals who report abuse and those who do not for the development of STIs and AIDS-defining illnesses, and use of ART and HIV appointments. More importantly, interventions aimed at enhancing utilization of HIV care and medications and improving safe sex practices by HIV-positive crack cocaine users who experience abuse (i.e. through educational/financial empowerment, drug rehabilitation, HIV education and establishment of care, safe-sex negotiation within abusive relationships) need to be developed and tested in randomized controlled trials. By improving our diagnosis and management of IPV in the context of HIV we can better combat the Southeastern HIV epidemic and improve the quality of life of those afflicted by the HIV and IPV syndemic.

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TABLES

Table 1: Characteristics of 343 study participants by gender

	Female (n=173)	Male (n=170)	Total (n=343)
Mean Age (years)	44	45	45
Sexuality: Heterosexual **Sexuality: LGBT**	154 (89%) 19 (11%)	117 (69%) 51 (30%)	271 (79%) 70 (20%)
Race: Black/AA **Race: White/Caucasian**	154 (90%) 14 (8%)	150 (89%) 11 (7%)	304 (89%) 25 (7%)
Annual income ≤ $5000	117 (68%)	95 (57%)	212 (62%)
Education < H.S. diploma	105 (61%)	75 (44%)	180 (52%)
Currently employed	2 (1%)	11 (7%)	13 (4%)
History of homelessness	129 (75%)	132 (78%)	261 (76%)
Drink alcohol ≥ daily	29 (17%)	34 (20%)	63 (18%)
Smoke crack ≥ daily	73 (46%)	51 (32%)	124 (36%)
Transactional sex/6 months	63 (36%)	18 (11%)	81 (24%)
Unprotected sex / 6 months	88 (52%)	67 (40%)	155 (45%)

Table 2: Intimate partner violence spectrum of severity

Number of affirmative responses to IPV questions	Male (n=170)	Female (n=173)	Total (n=343)
increasing severity ↓ **At least 1 questions**	75 (44%)	118 (68%)	193 (56%)
At least 2 questions	59 (35%)	105 (61%)	164 (48%)
At least 3 questions	35 (21%)	88 (51%)	123 (36%)
At least 4 questions	14 (8%)	67 (39%)	81 (24%)
All 5 questions	5 (3%)	39 (23%)	44 (13%)

Table 3: Intimate partner violence by sexuality

	Men (n=168)		Women (n=173)	
Sexuality (self-identification)	Heterosexual (n=117)	GBT (n=51)	Heterosexual (n=154)	LBT (n=19)
IPV	38 (33%)	36 (71%)	106 (69%)	12 (63%)
Severe IPV	14 (12%)	20 (39%)	80 (52%)	8 (42%)

Table 4: Frequency of intimate partner violence by gender

Reported being in a relationship in which:	Male (n=170)	Female (n=173)	Total (n=343)
a sexual partner was physically abusive	20 (12%)	74 (43%)	94 (27%)
a sexual partner was sexually abusive	10 (6%)	50 (29%)	60 (17%)
a sexual partner threw, punched, or broke things	64 (38%)	96 (56%)	160 (47%)
a sexual partner threatened the participant with violence	49 (30%)	100 (58%)	149 (43%)
felt controlled by a sexual partner	45 (27%)	97 (56%)	143 (42%)

Table 5a: Frequency of exposure variables among those who did and did not report unprotected sexual intercourse in the prior 6 months

	Unprotected sex/6 mos (155)		100% protected sex/6 mos (180)		Chi-sq test	p – value	Prevalence ratio (95% CI)
Intimate partner violence	**104**	**68%**	**85**	**47%**	**13.55**	**<.001***	**1.58 (1.22, 2.05)**
Gender (female)	88	57%	80	44%	5.06	.024*	1.31 (1.03, 1.65)
Income >$5000	55	44%	98	47%	.24	.626	0.94 (.78, 1.16)
LGBT	40	26%	27	15%	6.11	.014*	1.39 (1.10, 1.77)
Alcohol>daily	37	24%	25	14%	5.50	.019*	1.38 (1.08, 1.77)
Crack >daily	70	48%	47	29%	12.00	<.001*	1.51 (1.20, 1.90)
Race, Black	135	87%	165	92%	1.86	.173	0.79 (.58, 1.08)
≥H.S. diploma	70	45%	90	50%	.87	.350	.90 (.71, 1.13)
>1 Sexual partner/6 mos	85	55%	71	39%	7.93	.005*	1.39 (1.10, 1.76)
Transactional sex/6mos	53	34%	22	12%	23.14	<.001*	1.80 (1.46, 2.22)
Age>45 yo	68	44%	94	52%	2.33	.127	0.83 (.66, 1.05)

Table 5b: Frequency of varying degrees of IPV severity among those who did and did not report unprotected sexual intercourse in the prior 6 months

	Unprotected sex/6 mos (155)		100% protected sex/6 mos (180)		Chi-sq test	p – value	Prevalence ratio (95% CI)
Intimate partner violence	104	68%	85	47%	13.55	<.001*	1.58 (1.22, 2.05)
Less severe IPV	37	24%	33	18%	1.55	.213	1.19 (0.92, 1.54)
More severe IPV	67	43%	52	29%	7.47	.006	1.38 (1.10, 1.73)

Table 5c: Assessing potential confounding: association between the exposure variable (IPV) and the other covariates

	IPV (n=193)		No IPV (n=150)		Chi-sq test	p –value
Gender (female)	118	61%	54	36%	19.88	<.001*
Income >$5000	118	61%	94	64%	.30	.58
LGBT	144	75%	124	85%	4.98	.03*
Crack >daily	112	63%	79	58%	1.02	.31
Alcohol>daily	43	22%	20	14%	4.16	0.04*
Race, Black	168	87%	135	92%	1.97	.16
≥H.S. diploma	101	52%	60	41%	4.44	.04*
>1 Sexual partner/ 6 months	97	50%	61	42%	2.58	.11
Transactional sex/6 months	53	27%	28	19%	3.25	.07
Age>45 yo	81	44%	85	55%	4.09	.04*

Table 6: Assessing interaction and confounding by stratification: the association between IPV and unprotected sexual intercourse/6 months

Stratification Variable	Crude PR	Stratum-specific prevalence ratios PR1	PR2	Breslow-Day p –value	Adjusted prevalence ratio (95% CI)
Sex (Female v. male)	1.58	1.51	1.53	.85	1.52 (1.17, 1.98)
Income (>$5000 v. ≤ $5000)	1.58	1.78	1.52	.67	1.61 (1.24, 2.09)
Sexuality (LGBT v. heterosexual)	1.58	1.20	1.70	.43	1.56 (1.21, 2.02)
Alcohol (≥daily v. <daily)	1.58	1.19	1.64	.47	1.54 (1.19, 1.99)
Crack (≥daily v. <daily)	1.58	1.59	1.63	.48	1.61 (1.24, 2.08)
Race (Black v. Other)	1.58	1.64	1.12	.43	1.56 (1.21, 2.02)
Education (≥HS diploma v. <HS diploma)	1.58	2.03	1.39	.25	1.62 (1.24, 2.11)
Age (>45 v. ≤45)	1.58	1.45	1.68	.44	1.56 (1.20, 2.03)
Transactional sex/6 months	1.58	1.34	1.59	.76	1.51 (1.17, 1.94)
Sex partners/6mos (>1 v. ≤1)	1.58	1.51	1.59	.82	1.54 (1.19, 1.99)

Table 7a: Exposure variable frequency among participants tested for an STI in the prior 6 months who did and did not report being diagnosed with a STI/6 months

	STI diagnosis/6 mos (47)		No STI diagnosis/6 mos (109)		Chi-sq test	p – value	Prevalence ratio (95% CI)
Intimate partner violence	39	85%	66	61%	8.33	.004	2.60 (1.25, 5.39)
IPV severe	28	49%	40	29%	7.39	.007	1.82 (1.18, 2.79)
Sex (female)	35	74%	52	48%	9.53	.002	2.31 (1.30, 4.11)
LGBT	9	20%	27	25%	0.53	0.466	.80 (.43, 1.50)
Race, Black	40	85%	96	88%	.26	.611	0.84 (0.44, 1.61)
>1 Sexual partner/6 mos	27	57%	46	42%	3.07	.080	1.53 (.94, 2.49)
Traded sex/6 mos	15	32%	20	18%	3.47	.06	1.62 (1.00, 2.63)
Age>45 yo	16	34%	50	46%	1.88	.17	0.70 (0.42, 1.18)

Table 7b: Exposure variable frequency among participants with and without an STI diagnosis/6 months

	STI diagnosis/6 mos (47)		No STI diagnosis/ 6 mos (296)		Chi-sq test	p –value	Prevalence ratio (95% CI)
Intimate partner violence	39	85%	154	52%	17.02	<.0001	4.24 (1.95, 9.21)
IPV severe	28	49%	95	27%	11.83	0.0006	2.28 (1.42, 3.66)
Sex (female)	35	74%	138	47%	12.58	0.0004	2.87 (1.54, 5.33)
LGBT	9	20%	61	21%	0.03	0.862	0.94 (0.48, 1.86)
Race, Black	40	85%	264	89%	0.67	0.413	0.73 (0.35, 1.52)
>1 Sexual partner/6 mos	27	57%	133	45%	2.55	0.110	1.54 (0.90, 2.64)
Traded sex/6 mos	15	32%	66	22%	2.08	0.149	1.52 (0.87, 2.66)
Age>45 yo	16	34%	150	51%	4.49	0.034	0.55 (0.31, 0.97)

Table 7c: Assessing interaction and confounding: the association between IPV and STI/6 months (among those tested)

Stratification Variable	Crude PR	Stratum-specific prevalence ratios PR1	PR2	Breslow-Day p –value	Adjusted prevalence ratio (95% CI)
Sex (Female v. male)	2.60	2.63	1.56	.36	2.13 (0.98, 4.60)
Sexuality (LGBT v. heterosexual)	2.60	4.00	2.79	.79	2.99 (1.36, 6.56)
Transactional sex/6 mos (yes v. no)	2.60	4.15	2.19	.41	2.51 (1.19, 5.28)
Race (Black v. Other)	2.60	2.44	*	.52	2.60 (1.23, 5.49)
Age (>45 v. ≤45)	2.60	2.32	2.73	.73	2.56 (1.23, 5.31)
Sex partners/6mos (>1 v. ≤1)	2.60	1.84	4.42	.35	2.56 (1.25, 5.27)

Table 7d: Assessing interaction and confounding: the association between IPV and STI/6 months (all participants)

Stratification Variable	Crude PR	Stratum-specific prevalence ratios PR1	PR2	Breslow-Day p –value	Adjusted prevalence ratio (95% CI)
Sex (Female v. male)	4.24	4.88	2.17	.25	3.62 (1.58, 8.28)
Sexuality (LGBT v. heterosexual)	4.24	3.67	5.34	.71	5.00 (2.18, 11.46)
Transactional sex/6 mos (yes v. no)	4.24	7.40	3.54	.45	4.19 (1.90, 9.23)
Race (Black v. Other)	4.24	3.67	*	.31	4.26 (1.93, 9.39)
Age (>45 v. ≤45)	4.24	4.13	3.97	.96	4.03 (1.85, 8.77)
Sex partners/6mos (>1 v. ≤1)	4.24	2.64	8.06	.21	4.03 (1.88, 8.61)

Table 8a: Exposure variable frequency among who did/did not report HIV care in the prior 12 months

	HIV care/12 months (202)		No HIV care/12 months (68)		Chi-sq test	p – value	Prevalence ratio (95% CI)
IPV	108	53%	45	67%	3.85	0.050*	0.87 (0.76, 1.00)
Severe IPV	65	27%	31	38%	3.68	0.051	0.87 (0.75, 1.02)
Sex (female)	93	46%	32	47%	0.02	0.884	0.99 (0.86, 1.14)
Homeless	68	46%	32	55%	1.52	0.218	0.90 (0.76, 1.07)
Race, Black	183	91%	60	88%	0.31	0.575	1.07 (0.83, 1.38)
Edu≥ HS diploma	95	47%	35	52%	0.55	0.460	0.95 (0.83, 1.09)
Incarcerated/6mo	60	30%	15	22%	1.48	0.224	1.10 (0.95, 1.27)
Income >$5000	95	47%	20	30%	5.83	.016	1.18 (1.04, 1.35)
Daily alcohol use	29	14%	13	19%	0.88	0.34	0.91 (0.73, 1.13)
Crack >daily	57	31%	27	45%	4.05	.044	0.85 (0.72, 1.01)
Age>45 yo	101	50%	34	50%	0.00	1.00	1.00 (0.87, 1.15)

Table 8b: Exposure variable frequency among who did/did not report IPV: potential confounders

	IPV yes (193)		IPV no (147)		Chi-sq test	p –value
Sex (female)	118	61%	45	36%	19.89	<.001
Homeless	86	54%	49	49%	0.77	0.381
Race, Black	168	87%	135	91%	1.97	0.160
Edu≥ HS diploma	101	52%	60	41%	4.44	0.035
Incarcerated/6mo	57	30%	44	30%	0.01	0.937
Income >$5000	74	39%	52	36%	0.30	0.582
Daily alcohol use	43	22%	20	14%	4.16	0.041
Crack >daily	65	37%	58	42%	1.02	0.31
Age>45 yo	85	44%	81	55%	4.09	0.04

Table 8c: Assessing interaction and confounding: the association between IPV and use of HIV care/12 months

Stratification Variable	Crude PR	PR (var=1)	PR (var=2)	p –value (Breslow-Day)	PRmh, 95% CI
Sex, female	.87	.86	.87	.91	.86
Currently homeless	.87	.89	.90	.92	.89
Race, Black	.87	.86	.91	.83	.87
Edu ≥HS diploma	.87	.94	.82	.28	.87
Incarcerated/6 months	.87	.98	.82	.31	.87
Income >$5000	.87	.96	.80	.42	.87
Alcohol use≥daily	.87	.98	.87	.51	.88
Crack freq≥daily	.87	.84	.89	.96	.88
Age>45	.87	.86	.88	.88	.87

Table 9a: Exposure variable frequency among who are/are not currently on antiretroviral therapy

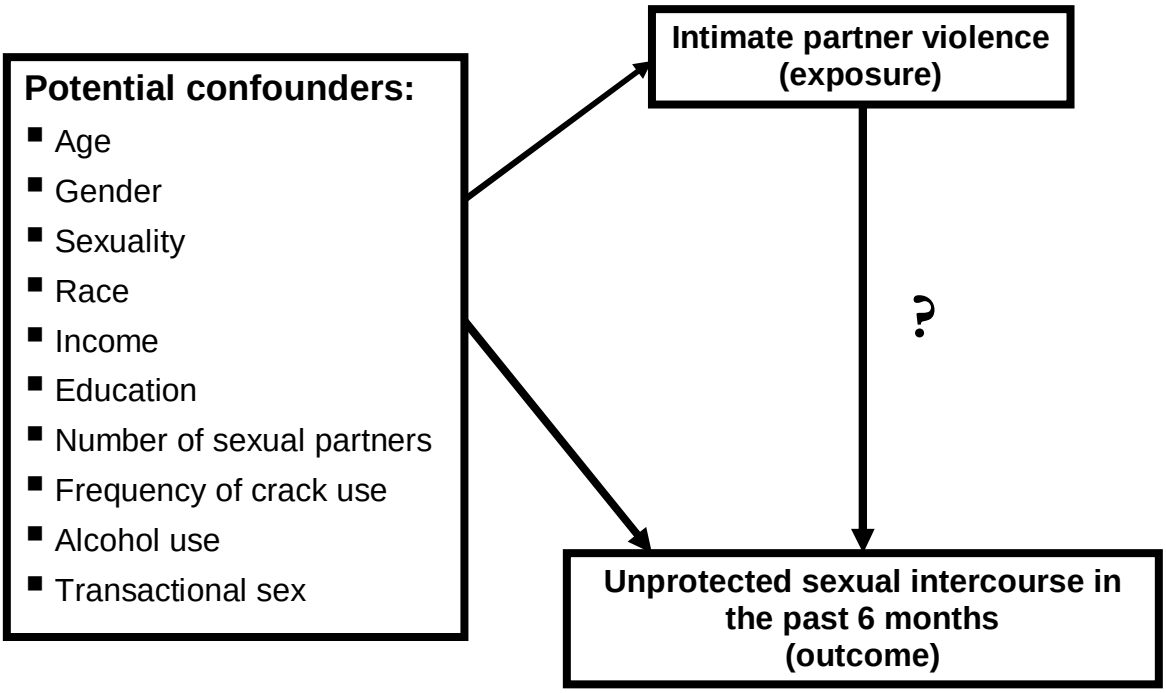
	Currently on ART (100)		Not currently on ART (243)		Chi-sq test	p – value	Prevalence ratio (95% CI)
IPV	43	43%	150	63%	10.94	0.001*	0.57 (0.41, 0.80)
Severe IPV	26	26%	97	40%	5.97	.0146*	0.63 (0.43, 0.93)
Sex (female)	45	45%	128	53%	1.67	0.196	0.80 (0.58, 1.12)
Homeless	26	38%	109	56%	6.70	0.010*	0.58 (0.38, 0.88)
Race, Black	91	91%	213	88%	0.787	0.375	1.30 (0.71, 2.36)
Edu≥ HS diploma	45	45%	116	48%	0.278	0.598	0.91 (0.66, 1.27)
Incarcerated/6mo	27	27%	75	31%	0.506	0.477	0.87 (0.60, 1.27)
Income >$5000	46	46%	81	34%	4.84	0.028	1.45 (1.04, 2.01)
Daily alcohol use	11	11%	52	21%	5.11	0.024	0.55 (0.31, 0.97)
Crack >daily	33	38%	91	40%	0.16	0.694	0.93 (0.64, 1.34)
Age>45 yo	52	52%	114	47%	0.73	0.392	1.15 (0.83, 1.61)

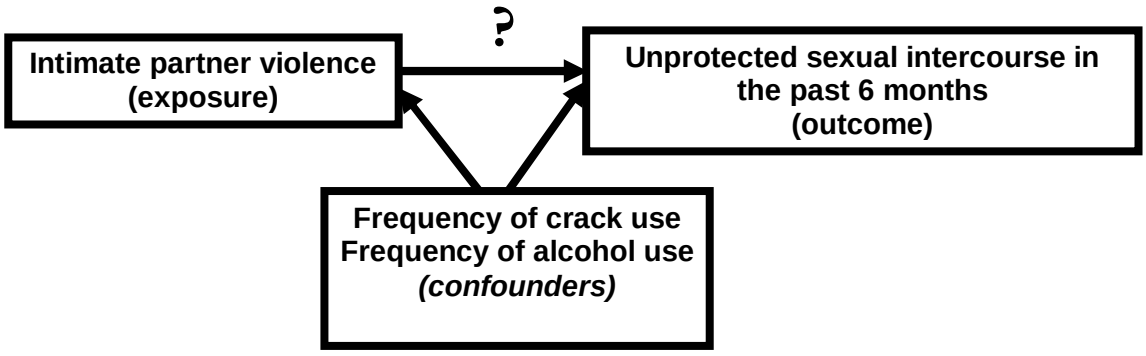
Table 9b: Assessing interaction and confounding: the association between IPV and use of ART

Stratification Variable	Crude PR	PR (var=1)	PR (var=2)	p –value (Breslow-Day)	PRmh, 95% CI
Sex, female	0.57	1.12	0.31	.0007	0.56 (0.39, 0.83)
Currently homeless	0.57	0.42	0.59	0.63	0.52 (0.35, 0.77)
Race, Black	0.57	0.58	0.60	0.90	0.58 (0.41, 0.81)
Edu ≥HS diploma	0.57	0.52	0.63	0.58	0.58 (0.41, 0.81)
Incarcerated/6 months	0.57	0.83	0.50	0.16	0.57 (0.41, 0.80)
Income >$5000	0.57	0.59	0.57	0.86	0.58 (0.41, 0.80)
Alcohol use≥daily	0.57	0.81	0.58	0.44	0.60 (0.43, 0.84)
Crack freq≥daily	0.57	0.51	0.55	0.91	0.53 (0.37, 0.77)
Age>45	0.57	0.70	0.48	0.27	0.58 (0.42, 0.81)

FIGURES

Figure 1a: Causal diagrams depicting the potential association between IPV and unprotected sexual intercourse in the prior 6 months





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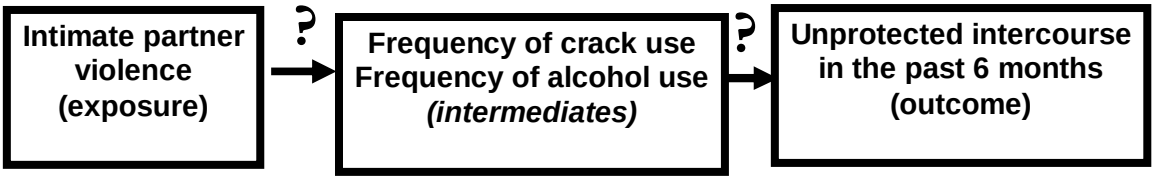

Figure 1b: Causal diagrams depicting the potential association between IPV and STI diagnosis in the prior 6 months

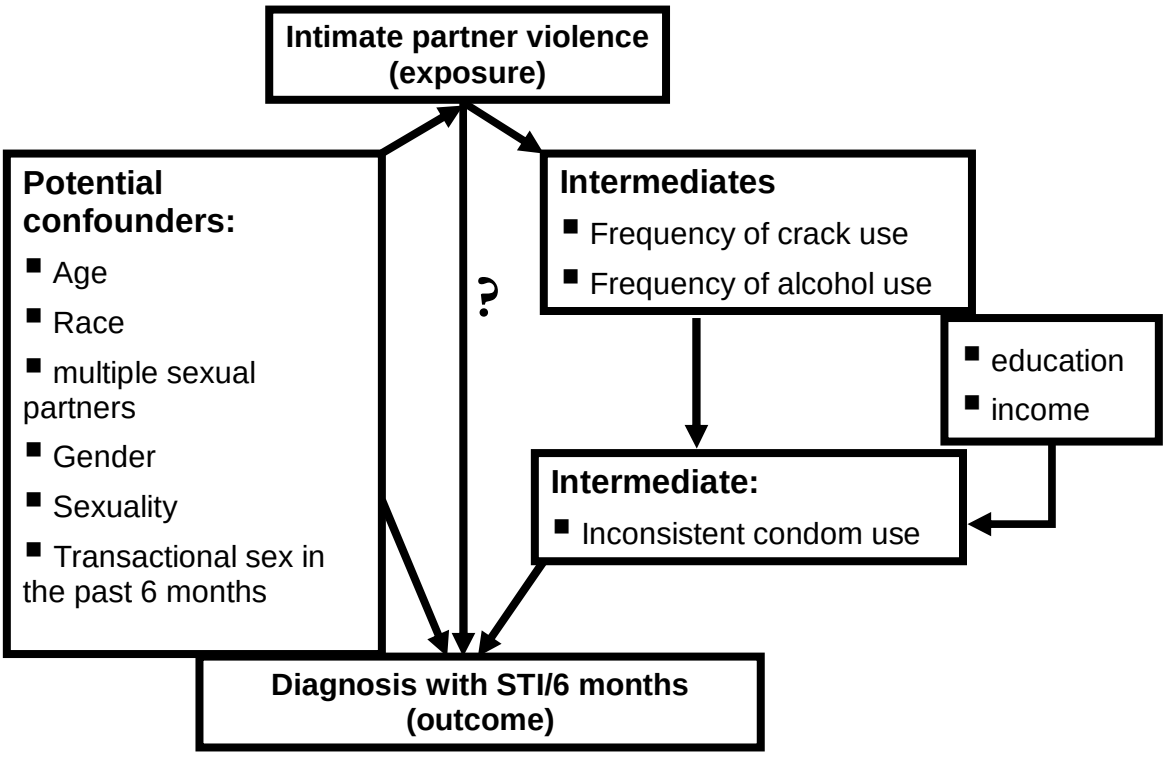

Figure 1c: Causal diagrams depicting the potential association between IPV and HIV care in the past 12 months

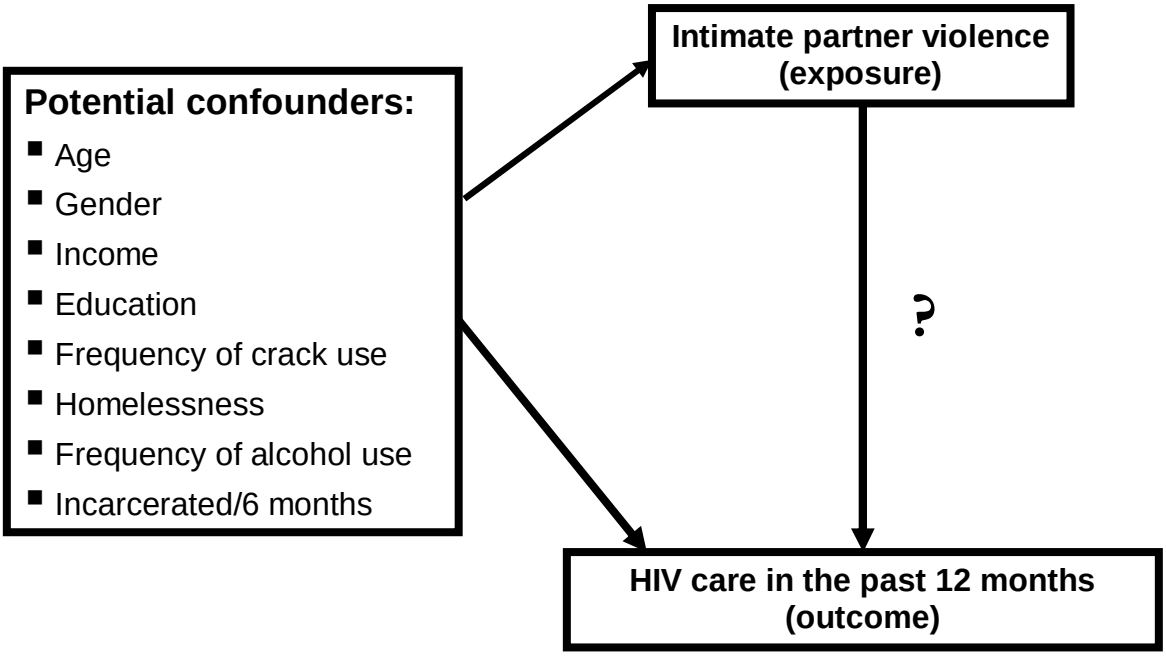

Figure 1d: Causal diagrams depicting the potential association between IPV and current use of ART