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Binge Use of Crack Cocaine and Sexual Risk Behaviors Among African-American, HIV-Positive Users

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Abstract

This study describes binge use of crack cocaine, binge users, and their sexual risk behaviors in a sample of 303 African-American, HIV-positive users. Recent binge use was defined as, “using as much crack cocaine as you can, until you run out of crack or are unable to use any more” in the last 30 days. Fifty-one percent reported a recent crack binge. The typical crack binge lasted 3.7 days and involved smoking 40 rocks on average. Nearly two-thirds reported their last binge was in their own or another's home. Seventy-two percent had sex during the last binge, with an average of 3.1 partners. In multivariable logistic regression analyses, recent bingers were more likely than non-bingers to consider themselves homeless, to have any income source, to have used crack longer, and to score higher on risk-taking and need for help with their drug problem. In multivariable ordinal and logistic regression analyses, recent bingers had more sex partners in the last six months and 30 days and were more likely to have never used a condom in the last 30 days. Among male users, recent bingers were more likely to report lifetime and recent exchange of money for sex and drugs for sex. Among both male and female users, recent bingers were more likely to report lifetime trading of sex for drugs. African-American, HIV-positive binge users of crack cocaine appear to be at increased risk for HIV transmission. Further investigations of binge crack use and sexual risk behaviors and interventions targeting and tailored to this group should be considered.

Keywords

Crack cocaine; Binge; HIV; High risk sex; Risk taking

Introduction

Although a majority of people living with HIV/AIDS report reductions in sexual risk behaviors after diagnosis (Weinhardt et al. 1999; Campsmith et al. 2000), a substantial minority of HIV-positive persons continue to engage in risky sexual behaviors (Kalichman 2000; Schiltz and Sandfort 2000). From a U.S. sample representing a diversity of settings, subpopulations, and geographic regions, Kalichman (2000) estimated that approximately 33% of HIV-positive persons continued to engage in unprotected sexual intercourse. This

minority of HIV-positive persons may not only place their sex partners at risk of HIV or other sexually transmitted infections, but may also place themselves at risk for re-infection with medication-resistant HIV strains (Booth and Gerretti 2007).

Studies indicate that HIV-positive persons who use crack cocaine engage in sexual risk behaviors at relatively high rates and may be at especially high risk for HIV transmission or re-infection. In a study of 10,415 HIV-positive heterosexual men, heterosexual women, and men who have sex with men, Campsmith et al. (2000) found that those who continued to use crack after HIV-diagnosis ($n = 2,361$) reported the highest prevalence of unprotected sex, multiple partners, and exchanging sex for drugs or money across strata of sexual orientation and gender. Moore et al. (2001) found that, among 386 HIV-infected women, those who reported smoking crack during the study period were at least twice as likely as their non-crack smoking counterparts to report inconsistent condom use with HIV-negative partners. In a study of 137 crack-smoking, African-American, HIV-positive men and women (Timpson et al. 2003), nearly 40% reported multiple sex partners in the previous three months, more than two-thirds reported inconsistent condom use, about half reported trading sex for drugs or money, and more than half reported being high on crack during sex.

Risk of HIV transmission or re-infection may be increased among HIV-positive crack for other reasons as well. High rates of sexually transmitted infections among crack users may serve to enhance transmission efficiency (Fleming and Wasserheit 1999). Because HIV-positive crack users are more likely to delay or reduce healthcare utilization (Cunningham et al. 2006; Kang et al. 2006) and to be non-adherent to antiretroviral medications (Moss et al. 2004; Hinkin et al. 2007), they may experience increased viral load and greater risk of transmission. Moreover, the presence of cocaine in the bloodstream may enhance the HIV replication process (Bagasra and Pomerantz 1993; Roth et al. 2002), thereby increasing viral load and the risk of transmission.

Despite the potentially serious consequences of sexual risk behaviors among HIV-positive crack users, the relationship between crack use and sexual risk behaviors is not well-understood. The literature suggests that the relationship between crack smoking and risky sexual behaviors may be explained, in part, by the nature of the high produced by crack use and the subsequent low resulting from crack's withdrawal (Williams 1992; Inciardi et al. 1993). Smoking crack produces a strong sense of euphoria, heightened feelings of mental or physical agility, or other feelings of mood elevation (McCoy and Inciardi 1995), increasing expectations of heightened sexual pleasure and reducing expectations of deleterious consequences of behavior (Seage et al. 1998; Ostrow 2000; McKirnan et al. 2001). Conversely, deprivation of crack may cause anxiety or depression and extreme cravings for the drug, and users experiencing extreme cravings may exchange sex for crack or for money to purchase more crack (Williams 1992; Inciardi et al. 1993).

Extending this view about the pharmacologic effects of crack smoking on sexual risk behaviors, the literature also suggests that patterns of crack use influence the frequency and types of sexual risk behaviors. A wealth of early qualitative studies suggested that most crack smokers use in binge cycles; that is, users rarely stop with one hit, but use as much crack as resources allow, then "crash" into a state of physical and psychological withdrawal (Williams 1992; Inciardi et al. 1993). The relationship between crack smoking and risky sexual behaviors was understood in terms of the high and low phases of a binge cycle, and it was assumed that sexual risk behaviors were influenced largely by the intensity and frequency of binge behavior (Williams 1992; Inciardi et al. 1993).

More recent studies have contradicted the view of binge use of crack as the predominant pattern (Daniulaityte et al. 2007; German and Sterk 2002), but have generally supported the

notion that heavier crack use correlates with increased sexual risk behaviors (Hoffman et al. 2000). Hoffman et al. (2000) categorized female crack smokers ($n = 1,723$) into four distinct groups by frequency and intensity of use (number of days used in the last 30 days and number of times crack was smoked per day, respectively) and found that the high frequency/high intensity group ($n = 547$) reported the highest frequency of sex partners, sex while high, and sex trades, and greatest proportion of unprotected sex acts. It is unclear whether these frequency/intensity classifications of crack use capture what crack smokers consider binge smoking of the drug, but the findings of Hoffman et al. (2000) support the general notion that more crack use translates into more sexual risk behavior.

In this study, baseline data from a sexual risk reduction intervention among heterosexually active, African-American, HIV-positive crack smokers were used to describe binge crack use and to explore differences between binge users and non-binger users, particularly with respect to sexual risk behaviors. Binge use of crack was conceptualized as, “using as much crack as you can, until you run out of crack or are unable to use any more,” which is consistent with early qualitative data in the literature and the authors’ many years of experience working with crack users. The main study questions were: What does binge use of crack look like in this sample? Are those who report recent binge use of crack (i.e., in the last 30 days) different from non-bingers in ways that are relevant to the transmission and prevention of HIV infection? Specifically, do recent binge users of crack report more frequent sexual risk behaviors compared to those who do not report binge crack use? To answer these questions, participants’ responses about the recency, location, and duration of a typical crack binge were described as well as the amount of crack used, reasons for stopping, and sexual risk behaviors during a typical binge. Recent binge users were then compared to their non-bingeing counterparts in terms of sociodemographic and HIV-related characteristics, lifetime and recent use of crack and other drugs, psychosocial functioning, and sexual risk behaviors. Understanding how HIV-positive crack users differ across patterns of crack use, particularly how binge crack use relates to sexual risk behaviors, may ultimately inform HIV risk-reduction intervention strategies. Effective interventions are particularly needed in poorer African-American communities, as these communities experience high rates of crack cocaine use and an increasingly disproportionate burden of HIV prevalence and HIV-related mortality (Centers for Disease Control and Prevention Research 2007a, b).

Methods

Procedures

Data were collected between April 2004 and December 2006 in Houston, TX, as part of an intervention study targeting condom use in African-American, HIV-positive drug users. Eligibility criteria required that all participants were African-American, HIV-positive, ≥ 18 years of age, had used crack cocaine in the last 48 h, and had engaged in vaginal sex in the last seven days before eligibility screening. Participants were recruited by posting general notices at health and social service agencies providing services to HIV-positive persons. Interested persons were asked to phone the neighborhood data collection center to be screened for eligibility. If initially eligible and interested, the caller was provided with a full description of the study and asked to come to the data collection center to complete the screening process. The screening process involved completion of a questionnaire and a written consent form and provision of a urine sample to confirm cocaine use in the last 48 h, provision of a dated anti-HIV medication bottles or HIV test results to confirm HIV-positive status. Data were collected by trained personnel using computer-assisted (CAPI) and computer assisted audio (Audio-CASI) formats. Quota sampling was used to obtain a sample with equal numbers of males and females. Participants received an incentive of 25

U.S. dollars for the baseline interview and for each subsequent interview. Procedures were approved by a university institutional review board.

Instrumentation

Binge Use Items—Questions regarding binge use of crack were developed for the parent intervention study. Binge crack use was defined as, “using as much crack as you can, until you run out of crack or are unable to use any more.” Lifetime binge use was assessed by asking, “Have you ever binge used crack cocaine?” The respondent was then queried about how much crack they smoked on a typical binge, how many days a typical binge lasted, typical reasons for ending a binge, how many days since their last binge, and number of sex partners during their last binge. “Recent” binge use was operationalized as binge use in the last 30 days. Possible responses for ending a binge included: “run out of money,” “run out of drug,” “get too tired to keep using,” and “get too sick to keep using.” In the parent intervention study and in a subsequent study of crack smokers (Harzke, unpublished data), binge use has been shown to be conceptually distinct from frequency of recent use and from heaviest lifetime use (divergent validity).

The HIV Risk Reduction Self-Efficacy Questionnaire (SEQ)—The SEQ was adapted from the Texas Christian University (TCU) Short Assessment Form (Knight et al. 1994). SEQ items used for this study include sociodemographic characteristics, HIV history and current medical treatment, lifetime and recent non-injecting and injecting drug use behaviors, and sexual behaviors, including condom use. These items have shown adequate reliability and have been used in a number of HIV-related research projects (Williams et al. 2000; Simpson et al. 1993; Rotheram-Borus et al. 1998).

Sociodemographic characteristics assessed were age, gender, education, income, marital status, and housing. Participants were asked when they were first diagnosed HIV-positive, received HIV-related care, and began taking anti-HIV medications. Participants were also asked whether they were currently under a doctor's care for HIV and/or taking anti-HIV medications.

Participants' use of crack, powder cocaine, heroin, methamphetamine, speedball, marijuana, and alcohol was assessed in a number of ways. Lifetime use was assessed by asking, “Have you ever used [specific drug]?” The period of heaviest use was assessed with a 5-category item from “less than monthly” to “more than once per day.” Recent drug use included the number of times the drug was used in the previous 30 days and in the previous seven days (as a validity check on the 30-day item). Thirty-day recall of recent drug use is reliable and has high validity in other studies using the same or similar measures (Weatherby et al. 1994; Needle et al. 1995).

Sexual behaviors assessed were the number of male and female partners, number of times had vaginal sex, and how often condoms were used for the past 6 months, past 30 days, and past seven days (as a validity check). Number of sex partners was also measured for primary partners (“like a husband, wife, or lover, for whom you have strong feelings”) and for casual partners (“people that you have sex with, but with whom you are not in love”). Condom use was defined as use of male condoms for sexual encounters and was measured using a 5-point response scale, ranging from “never” to “always.”

Four sex trade behaviors were assessed: sex for money, money for sex, sex for drugs, and drugs for sex. Participants were asked, “Have you ever traded (*blank*) for (*blank*)?” for each trade behavior. Respondents reporting a history of trading behavior were then asked about when they last traded, the number of trade behaviors, and the number of trade partners in the last 30 days and the last seven days. Participants were asked about whether they used a

condom (yes/no) with the last trade partner and, more generally, about how often they used a condom with a trade partner (5-categories, from “never” to “always”).

The Self-Rated Psychosocial Form (SRF)—Psychosocial data were collected using the SRF. Investigators from TCU developed the SRF for use with drug using populations and assessed the instrument's psychometric properties (Knight et al. 1994) using two in-treatment samples in Texas. SRF scales have been shown to have good internal reliability and validity (Knight et al. 1994) and have been subsequently used in crack-using samples (Simpson et al. 1994; Timpson et al. 2003; Harzke et al. 2004). Cronbach's alpha scores were calculated for psychosocial measures to check their comparability with those obtained in validation studies. The SRF measures used for this study included: anxiety ($\alpha = 0.77$), depression ($\alpha = 0.74$), hostility ($\alpha = 0.82$), self-esteem ($\alpha = 0.72$), risk-taking ($\alpha = 0.75$), decision-making confidence ($\alpha = 0.69$), social conformity ($\alpha = 0.66$), drug problem recognition ($\alpha = 0.83$), and need for help with drug problem ($\alpha = 0.73$). Items were scored on a 5-point ordinal scale ranging from “never” to “almost always,” such that a higher score on a summary scale indicated a greater degree of the measured factor.

Analyses

All calculations and analyses were conducted using SPSS 16.0. Means and standard deviations were calculated for continuous variables, and frequencies and proportions were calculated for categorical variables. In order to provide comparisons of clearly distinct groups, analyses excluded those who reported a history of binge crack use but no recent binge crack use, and descriptive statistics were stratified by recent crack binge use vs. no such history (hereafter, “bingers” and “non-bingers”). Differences between bingers and non-bingers were explored for all variables, conducting *t*-tests for continuous variables and for normally distributed ordinal variables, Mann–Whitney *U* tests for ordinal variables with non-normal distributions, and chi-square tests of independence for nominal variables. For chi-square tests, when expected values were less than five for more than 20% of cells, categories were collapsed along conceptually meaningful lines. In such cases, if there was no significant difference between bingers and non-bingers on the re-categorized variable, the frequencies and proportions for the original categories were reported (without a chi-square value) to maximize the descriptive information. Reported *P*-values for statistical comparisons were based on two-tailed tests, and for *t*-tests, reported *P*-values assume unequal variances if Levene's test was significant at the 0.01 level.

Multivariable logistic regression modeling was used to determine the set of variables that best distinguished bingers from non-bingers while controlling for confounding. Sociodemographic, psychosocial, and drug history variables that demonstrated significant differences across binge status ($P < .05$) were entered as independent variables into a logistic regression model using a forward stepwise entry method, based on the likelihood ratio, with binge status as the dependent variable. Sexual risk behaviors were viewed as attendant to or co-occurring with binge behavior, rather than explanatory or predictive of binge behavior, and were analyzed separately as described below. Age, years using crack, and psychosocial variables were treated as continuous variables. Amount of income and heaviest use of crack, marijuana, alcohol, and powder cocaine were treated as continuous variables to conserve degrees of freedom. History of drug treatment and history of powder cocaine, codeine syrup, and injection drug use were dichotomous variables, and no history was the referent category for each of these. Income source, perceived homelessness, and gender were dichotomous variables, and no income source, not homeless, and female gender were the referent categories.

Multivariable analyses were conducted to examine whether apparent differences in sexual risk behaviors between bingers and non-bingers resulted from confounding by other measured factors. By definition, confounding results when the association of one variable (e.g. binge) with another variable (e.g. sexual risk behavior) results from the association of a third variable with both of the first two variables. So, to rule out confounding here, recent binge (vs. no binge history) and predictors of recent binge crack use (identified in logistic regression analyses described above) were entered as independent variables into multivariable regression models with sexual risk behaviors as the dependent variables. Stepwise forward entry methods based on the likelihood ratio were utilized in all models. Analyses of sex trade behaviors were stratified by gender, because gender would have accounted for most of the variance in these behaviors. Ordinal regression was used for ordinal dependent variables, which were number of sex partners in the last 6 months and 30 days. Logistic regression was used for dichotomous dependent variables, which were never using a condom in the last 30 days, history of each type of sex trade, and trading money for sex, drugs for sex, and sex for drugs in the last 30 days. Number of sex partners was treated as an ordinal variable (0–1 partner, 2–5 partners, >5 partners) because the original count variable was highly positively skewed. Condom use was treated as dichotomous, never vs. ever using a condom in the past 30 days, because differences between bingers and non-bingers on the 5-category condom use variable were due to different distributions in the “never” and “always” categories. Independent variables were recent binge, perceived homelessness, number of years using crack, risk-taking, need for help with drug problem, as well as age and gender significance ($P < 0.10$) in multivariable regression analyses. Recent binge was dichotomous, and no binge history was the referent category. In ordinal regression analyses, variables measured as continuous were categorized into quartiles to reduce the number of cells (i.e., dependent variable levels by combinations of predictor variables) with zero frequencies and enhance estimation. Other independent variables were treated as previously described.

Results

Binge Crack Use

Seventy-one percent ($n = 215$) reported a history of bingeing on crack. Of these, nearly three-quarters ($n = 155$) reported recent binge crack use (i.e., in the last 30 days) and another 14 ($n = 30$) reported binge use in the previous six months. Table 1 shows reported descriptors of a typical crack binge and the last binge. Nearly three-fourths ($n = 112$) of recent bingers reported having sex during a binge, and the median number of sex partners during a crack binge was two [$M (SD) = 3.1 (5.4)$].

Comparison of Recent Crack Bingers and Non-Bingers

Sociodemographics and HIV-Related Characteristics—A greater proportion of bingers than non-bingers were male (Table 2). More bingers considered themselves homeless (33% vs. 10%), had any source of income (92% vs. 83%), and had higher levels of income. Bingers reported lower levels of adherence but did not differ from non-bingers on other HIV-related characteristics.

Crack Cocaine and other Drug Use—Bingers and non-bingers reported initiation of crack use at similar ages, but bingers had used crack longer. A greater proportion of bingers than non-bingers reported more than daily use at their time of heaviest use (Table 3). Bingers and non-bingers reported similar frequencies of recent crack use.

Similar proportions of bingers and non-bingers reported recent use of other illicit drugs. More bingers than non-bingers reported prior receipt of drug treatment and lifetime use of

powder cocaine, speedball, and codeine syrup. Bingers' rankings of their heaviest use of several drugs indicated heavier use of marijuana, alcohol, and powder cocaine compared to non-bingers.

Psychosocial Functioning—Bingers had higher mean scores than non-bingers for anxiety, depression, hostility, risk-taking, drug problem recognition and desire for help with drug problem (Table 4). Non-bingers had higher mean scores for self-esteem and social conformity. Bingers and non-bingers were similar with respect to decision-making confidence and childhood problems.

Sexual Behaviors—Compared to non-bingers, bingers had a greater average number of sex partners in the previous 6 months (12.2 vs. 4.3) and in the last 30 days (4.5 vs. 2.6) (Table 5). Such differences were not seen when comparing the number of main and casual sex partners. It appears that some of bingers' partners, perhaps their trade partners, are viewed neither “main” nor “casual” partners.

Bingers' rankings of condom use in the last 30 days were toward less consistent condom use; specifically, a greater proportion of bingers reported never using condoms and a greater proportion of non-bingers reported always using a condom. A greater proportion of bingers than non-bingers reported a history of each type of sex trade behavior. A greater proportion of bingers than non-bingers reported trading sex for drugs, money for sex, and drugs for sex in the last 30 days. Frequency of sex trades in the previous 30 days appeared to be higher in non-bingers than bingers, but the small numbers of non-bingers reporting recent sex trade behaviors preclude drawing conclusions. Condom use with trade partners was inconsistent among bingers and non-bingers, with only about 50% of both groups reporting condom use with their last sex trade partner across different trade types.

Multivariable Analyses—The final logistic regression model predicting recent binge crack use included perceived homelessness (OR = 4.05, 95% CI = 1.71, 9.63), any income source (OR = 3.03, 95% CI 1.19, 7.69), need for help with drug problem (OR = 2.21, 95% CI = 1.42, 3.42), risk-taking (OR = 2.00, 95% CI = 1.26, 3.16), and years using crack (OR = 1.11, 95% CI = 1.06, 1.16). Overall, the amount of variance explained by the model was modest (Cox & Snell R^2 = 0.24, Nagelkerke R^2 = 0.32).

Multivariable regression analyses of sexual risk behaviors generally suggested that differences between bingers and non-bingers in sexual risk behaviors were not likely due to confounding by other measured factors. Only recent binge use of crack was retained in a model predicting no condom use in the last 30 days [OR (95% CI) = 2.47 (1.10, 5.52)]. Only recent binge use of crack and risk taking were retained in models predicting number of sex partners in the last 6 months and 30 days (respectively, Wald statistic for recent binge in each model, 8.43 and 7.92, $P < 0.01$).

Recent binge was retained in most models predicting sex trade behaviors, although estimates of association were fairly imprecise because separate models were run for male and female participants. Among male participants, recent binge, age, and homelessness were retained as predictors of ever trading money for sex and of trading money for sex in the last 30 days [respectively, for binge, OR (95% CI) = 4.16 (1.28, 13.58), and OR (95% CI) = 7.96 (0.96, 65.82)]. Similarly, among male participants, recent binge use and years using crack were predictors of a history of exchanging drugs for sex [for binge, OR (95% CI) = 9.58 (2.10, 43.74)], and recent binge and age were predictors of exchanging drugs for sex in the last 30 days [for binge, OR (95% CI) = 12.69 (1.63, 98.96)]. For male and female participants, recent binge use was the only predictor of ever trading sex for drugs [for males, OR (95% CI) = 5.37 (1.17, 24.60); for females, OR (95% CI) = 2.74 (1.29, 5.78)]. Recent binge was

not retained in models of history of trading sex for money. Recent binge was not retained in models predicting trade of sex for drugs in the last 30 days, but neared significance among male participants ($P = 0.06$).

Discussion

In this study, we used baseline data from an on-going sexual risk reduction intervention with African-American, HIV-positive crack smokers to describe binge use of crack cocaine, binge users, and their sexual risk behaviors. Binge was explained to participants as, “using as much drug as you can, until you run out of drug or are unable to use any more.” Seventy-one percent of our sample reported a history of binge crack use, and 51% reported binge crack use in the past 30 days. The high proportions of participants reporting lifetime or recent binge use of crack is consistent with the bulk of existing qualitative work that suggests a majority of crack users binge at some time in their drug using career. However, nearly one-third of our sample reported no history of crack binge behavior and, among those with a history of binge, 14% had not binge used in six months or more. Thus, our findings are also consistent with fairly recent research suggesting heterogeneous patterns of crack use across users and over time (Hoffman et al. 2000; German and Sterk 2002; Daniulaityte et al. 2007).

Recent binge users described aspects of their last crack binge and of a typical crack binge. The mean duration of a typical binge was 3.7 days and involved use of more than 40 crack rocks on average. Seventy-two percent had sex during their last binge, with an average of 3.1 partners. Nearly two-thirds reported their last binge was in their own or another's home, rather than in a hotel, crack house, or public setting. These data confirm that crack binge is a high risk context and raise questions about the impact or role of specific settings in promoting or inhibiting risks. For example, do those who binge at home have fewer partners? Are they more or less likely than those who binge elsewhere to use condoms? These and other questions may be asked and answered as conceptual definitions of binge, such as the one proposed here, are applied in future studies.

Overall, sexual risk appeared to be greater in bingers compared to non-bingers in our sample. Bingers had a greater number of sex partners in the previous 6 months and in the last 30 days and were more likely to have never used a condom in the last 30 days. Among male participants, recent bingers were more likely to report lifetime and recent exchange of money for sex and drugs for sex. Among both male and female participants, recent bingers were more likely to report lifetime trading of sex for drugs. Notably, in a recent study of binge injection drug use, similar associations were noted between binge behavior and sex trade behavior (Miller et al. 2006). These findings indicate that these binge users may be at increased risk for HIV transmission and re-infection compared to their non-bingeing counterparts. Investigations of the relationship between crack use patterns and sexual risk behaviors drug use may be a productive line of future research, and interventions targeting or tailored to bingers may be worth considering in the future.

Recent binge users were more likely than non-bingers to consider themselves homeless, to have an income source, to have used crack a greater number of years, and to score higher on scales of risk-taking and need for help with their drug problem. These findings imply potentially useful enhancements for risk-reduction interventions but also prompt a number of questions. For example, it is unclear whether having some type of regular income helps to facilitate binge use or if lack of income limits opportunities to binge. In either case, however, it would appear useful to include supervision of or assistance with income management as a component of interventions aimed at reducing binge-associated risks. Similarly, although the causal relationship between homelessness and binge use is unclear

and likely bidirectional, the strong relationship nonetheless suggests that provision of some sort of structured housing environment may be useful for reducing binge-associated risks.

Bingers, on average, had used crack longer than non-bingers, but it is not known, whether this suggests that (1) over time, crack users simply are presented with more opportunities to binge, such that given enough time, most users will binge, or (2) as crack addiction increases over time, binge behavior will inevitably occur and increase over time, or (3) some combination of time/opportunity and increasing addiction, along with a range of other sociodemographic and personal factors influence binge behavior. In general, very little is known about the trajectory of crack use over time, and further research is required for an adequate understanding of crack-using careers. Nonetheless, the relationship between binge behavior and number of years using crack in this sample may suggest severe addiction or deeply engrained behavioral patterns that require especially intensive intervention strategies.

Bingers' higher scores on need for help with their drug problem suggest that bingers may be open to interventions specifically aimed at reducing or stopping their crack use. Interventions with a dual focus on reducing crack use and sexual risk behaviors may be worthy of future consideration. To date, only a small number of sexual risk reduction interventions have specifically targeted or included a large proportion of crack users (Cottler et al. 1998; Hershberger et al. 2003; Sterk et al. 2003; Weschberg et al. 2004), and many questions remain about how to intervene effectively with these users, particularly across strata of drug use patterns, race/ethnicity, gender, and HIV status.

Although the main focus of the study was to describe binge crack use and binge users in a sample of African-American HIV-positive users, the study also provokes questions about the measurement of crack use more generally. Bingers and non-bingers were not different in the reported frequency of crack use over the previous 30 days, suggesting that this commonly used quantitative measure of crack use may be inadequate for measuring patterned or cyclical behavior such as bingeing, particularly in cross-sectional designs. Previously cited qualitative studies and the authors' experience with crack users suggest that crack use patterns are heterogeneous and some patterns may be cyclical. The inclusion of a measure of lifetime and recent binge behavior may potentially be a useful adjunct to 30-day frequency measures, but further refinements are needed. Adequate measurement of patterned or cyclical crack use may involve inquiring about crack use both in smaller increments of time and over longer periods of time. For example, the timeline follow-back method, originally proposed by Sobel and Sobel (1992) and widely used to examine alcohol use patterns, could be used with crack smokers to produce quantitative data comparable to 30-day frequency measures collected in previous studies, but could also produce data from which patterns or cycles of use over time could be identified.

The study has limitations. A convenience sample from the targeted population was used, so results may not generalize to all heterosexually active, African-American, HIV-positive crack users or to the various populations that maybe defined by strata of sexual behavior, race/ethnicity, and HIV status. However, a convenience sample is often necessary when studying a hidden and underserved population such as this one. Given the prejudices toward illicit drug users, especially among medical professionals, and the perceived need of drug users to hide their illicit drug use, selecting a representative sample from the target population appears impossible. Additionally, the small sample size may have obscured relationships between binge use and some variables, particularly those representing relatively rare characteristics or behaviors. Some variables that were not retained as predictors of binge in multivariable models may nonetheless represent important differences between bingers and non-bingers, such as differences in anti-HIV medication adherence or in psychosocial functioning. The cross-sectional design of the study limits inferences that

can be made regarding causal relationships between or among variables. All data were self-reported, and the reliability of crack users' responses may be questionable. Gender differences within patterns of use were not thoroughly examined, and it is possible that some differences between bingers and non-bingers could be partially related to gender differences. However, gender was not retained in the multivariable logistic regression analyses here, suggesting that the differences between bingers and non-bingers were not strongly influenced by gender. Finally, although a more thorough-going assessment of the validity of the binge concept is necessary and forthcoming, the definition of binge crack use employed in this study has shown divergent validity in several study samples and is consistent with qualitative descriptions of binge crack use in the literature. Our definition of binge is inclusive and potentially applicable across a range of crack users.

Despite its limitations, the study contributes to current knowledge about crack use patterns, particularly binge use, and sexual risk behaviors in a sample of African-American, HIV-positive users. The study indicates that African-American, HIV-positive crack users who binge are at increased risk of HIV transmission and re-infection compared to their non-bingeing counterparts. This study is the first, to our knowledge, that employs this conceptual definition of binge crack use in a quantitative study to further describe binge crack use and to assess its relationship with sexual risk behaviors and other characteristics in a high risk population. The study points to several areas of future research, including differences across gender in binge behavior and its correlates, heterogeneity in crack use patterns and their relation to sexual risk behaviors, measurement of crack use patterns and trajectories over time, and potential enhancements for sexual risk-reduction among HIV-positive crack users. Improving our understanding of variation in crack use patterns and related risk behaviors may ultimately inform HIV prevention efforts in high risk populations such as this one.

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Table 1Recent binge use of crack cocaine in a sample of African-American, HIV-positive users ($N = 155$)

	n (%)
Places where last binged	
At home	41 (26.5)
At a sex partner's house	13 (8.4)
At a friend's home	47 (30.3)
A hotel	41 (26.5)
In a crack house	17 (11.0)
Abandoned house, alley, park, public restroom or other	10 (6.5)
Reasons for stopping binge	
Run out of drug/money	74 (47.7)
Too tired/sick to keep using	81 (52.3)
Have sex during binge (yes)	112 (72.3)
	M (SD)
Number of crack rocks on typical binge ^a	41.3 (58.8)
Duration of typical binge (days) ^b	3.7 (3.3)
Number of sex partners during last binge ^c	3.1 (5.4)

^aMedian = 20^bMedian = 3^cMedian = 2

Table 2

Sociodemographic and HIV-related characteristics of recent crack cocaine bingers and non-bingers in a sample of African-American, HIV-positive users

	Bingers (<i>n</i> = 155) <i>M</i> (<i>SD</i>)	Non-bingers (<i>n</i> = 88) <i>M</i> (<i>SD</i>)	Test statistic <i>t</i>
<i>Sociodemographic characteristics</i>			
Age	43.2 (7.1)	41.03 (8.5)	1.97
Years of schooling	11.1 (2.2)	11.2 (2.2)	−0.49
Days worked last 30 days	2.6 (6.1)	2.0 (5.6)	0.81
How long lived in current residence (months)	40.5 (80.3)	53.0 (87.6)	−1.13
	<i>n</i> (%)	<i>n</i> (%)	<i>X</i> ²
Gender, male	82 (52.9)	33 (37.5)	5.34 *
Marital status			
Single	81(52.3)	53 (60.2)	
Married/living with partner ^a	40 (25.8)	20 (22.7)	
Separated/Divorced/Widowed	34 (21.9)	15 (17.0)	1.53
Living arrangements ^b			
Own house or apartment	58 (37.4)	43 (48.9)	-
Someone else's house or apt.	81 (52.3)	39 (44.3)	
Hotel, rooming/boardinghouse	7 (4.5)	2 (2.3)	
Shelter, streets, vacant building, etc.	7 (3.5)	2 (2.3)	
Treatment program/community	2 (1.3)	2 (2.3)	
Considers self homeless	51 (32.9)	9 (10.2)	15.52 ***
Any income source	143 (92.3)	73 (83.0)	7.16 **
Major income source ^b			
Employment	15 (9.7)	10 (11.4)	-
VA/Disability/SSI/other entitlements	87 (56.1)	46 (52.3)	
Spouse/partner(s)/family/friend(s)	14 (9.0)	10 (11.4)	
Trading sex for money	14 (9.0)	3 (3.4)	
Odd jobs/Other	13 (8.4)	4 (4.5)	
	<i>n</i> (%)	<i>n</i> (%)	<i>z</i> ^c
Amount of income			
<\$50	15 (9.6)	21 (23.8)	−2.12 *
\$50–99	10 (6.5)	6 (6.8)	
\$100–199	17 (11.0)	8 (9.1)	
\$200–399	26 (16.8)	12 (13.6)	
\$400–599	38 (24.5)	19 (21.6)	
\$600 or more	49 (31.6)	22 (25.0)	
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>t</i>
<i>HIV-related characteristics</i>			

	M (SD)	M (SD)	t
Number of years since HIV + diagnosis	9.3 (5.1)	8.8 (6.2)	-0.56
	n (%)	n (%)	X ²
Receiving HIV treatment from doctor ^d	130 (83.9)	78 (88.6)	1.03
Place being treated for HIV			
Private physician	5 (3.2)	3 (3.4)	
City or county clinic	145 (93.5)	84 (95.5)	1.02
Other	5 (3.2)	1 (1.1)	
Currently on HIV medications	94 (68.1)	57 (67.9)	0.04
	n (%)	n (%)	z ^c
About how often missed taking HIV medications			
Never	17 (15.3)	21 (34.4)	-2.81 **
<Half the time	52 (46.8)	25 (41.0)	
Half the time	22 (19.8)	10 (16.4)	
>Half the time	15 (13.5)	4 (6.6)	
Always	5 (4.5)	1 (1.6)	

* $P < .05$;

** $P < .01$;

*** $P < .001$

^a Four participants (3 bingers, 1 non-binger) reported living with same-sex partner

^b At least 20% of cell sizes have expected values of less than 5. No significant differences found when categories were collapsed

^c Z-score is from Mann-Whitney U test

^d Percent is of those reporting on item

Table 3

Crack cocaine and other drug use of recent crack cocaine bingers and non-bingers in a sample of African-American, HIV-positive users

	Bingers (<i>n</i> = 155) <i>M</i> (<i>SD</i>)	Non-bingers (<i>n</i> = 88) <i>M</i> (<i>SD</i>)	Test statistic <i>t</i>
<i>Crack use</i>			
Age first time smoked crack	26.5 (8.1)	26.4 (7.8)	1.41
Years using crack	15.4 (6.7)	11.4 (5.8)	4.75***
Times used crack, last 30 days	50.6 (68.0)	42.6 (65.2)	0.89
Times used crack, last 7 days	15.6 (20.1)	12.1 (17.5)	1.35
	n (%)	n (%)	<i>z</i>^a
Heaviest use			
<Once a day	27 (17.4)	26 (29.5)	
Once a day	7 (4.5)	10 (11.4)	-10.39**
More than once a day	121 (78.1)	52 (59.1)	
	n (%)	n (%)	<i>X</i>²
<i>Other drug use</i>			
Ever used			
Marijuana	129 (83.2)	64 (72.7)	3.79
Alcohol	132 (85.2)	68 (77.3)	2.40
Powder cocaine	82 (52.9)	33 (37.5)	5.34*
Heroin	27 (17.4)	11 (12.5)	1.03
Speedball	20 (12.9)	2 (2.3)	7.70**
Methamphetamine	13 (8.4)	0 (0)	-
Codeine syrup	45 (29.0)	9 (10.2)	11.48**
Currently using			
Marijuana	75 (48.4)	44 (50.0)	0.06
Alcohol	113 (72.9)	56 (63.6)	1.56
Powder cocaine	31 (20.0)	12 (13.6)	1.56
Heroin	4 (2.6)	5 (5.7)	1.51
Speedball	4 (2.6)	0 (0)	-
Methamphetamine	4 (2.6)	0 (0)	-
Codeine syrup	11 (7.1)	3 (3.4)	1.41
Ever injected drugs	67 (43.2)	21 (23.9)	9.11**
Ever in drug treatment	111 (71.6)	40 (45.5)	16.33***
	<i>z</i>^a		
Heaviest use ^b			
Marijuana	-3.35**		
Alcohol	-3.34**		

	z^a
Powder cocaine	-2.39*
Heroin	-0.18
Speedball	-0.30
Methamphetamine	-
Codeine syrup	-1.56

*
 $P < .05$;

**
 $P < .01$;

 $P < .001$

^aZ-score is from Mann-Whitney U test

^bFive category ordinal variable for heaviest use for each of these drugs. Proportions are reported in narrative

Table 4

Psychosocial measures^a of recent crack cocaine bingers and non-bingers in a sample of HIV-positive, African-American crack cocaine users^b

	Bingers (<i>n</i> = 145) <i>M</i> (<i>SD</i>)	Non-bingers (<i>n</i> = 85) <i>M</i> (<i>SD</i>)	<i>t</i>
Anxiety	3.2 (0.69)	3.0 (0.78)	2.31 [*]
Depression	3.3 (0.74)	3.0 (0.81)	2.57 [*]
Hostility	2.7 (0.69)	2.5 (0.86)	2.64 ^{**}
Self-esteem	3.0 (0.77)	3.3 (0.85)	-2.68 ^{**}
Risk-taking	3.0 (0.66)	2.7 (0.75)	3.25 ^{**}
Decision-making confidence	3.2 (0.59)	3.2 (0.66)	-0.07
Social conformity	3.5 (0.63)	3.7 (0.65)	-2.21 [*]
Childhood problems	2.8 (0.76)	2.6 (0.79)	1.66
Drug problem recognition	3.5 (0.76)	3.0 (0.79)	4.60 ^{***}
Need help with drug problem	3.7 (0.72)	3.3 (0.76)	3.87 ^{***}

^{*} $P < .05$;

^{**} $P < .01$;

^{***} $P < .001$

^a Psychosocial variables were normally distributed

^b These analyses include only those participants with complete data on psychosocial measures

Table 5

Sexual behaviors of recent crack cocaine bingers and non-bingers in a sample of African-American, HIV-positive users

	Bingers (<i>n</i> = 155) <i>M</i> (<i>SD</i>)	Non-bingers (<i>n</i> = 88) <i>M</i> (<i>SD</i>)	Test statistic <i>t</i>
<i>Sexual behaviors, all partner types</i>			
Number of times vaginal sex last 30 days	14.4 (13.7)	15.9 (18.3)	−0.74
	<i>n</i> (%)	<i>n</i> (%)	<i>z</i> ^a
Number of sex partners, last 6 months ^b			
0–1 partner	67 (46.2)	58 (68.2)	3.25**
2–5 partners	47 (32.4)	18 (21.2)	
>5 partners	31 (21.4)	9 (10.6)	
Number of sex partners, last 30 days ^b			
0–1 partner	53 (36.6)	49 (57.6)	3.57**
2–5 partners	36 (24.8)	21 (24.7)	
>5 partners	56 (38.6)	15 (17.6)	
Times used condom last 30 days ^b			
Never	40 (26.1)	13 (15.3)	
<Half the time	24 (15.7)	12 (14.1)	2.64**
Half the time	43 (28.1)	22 (25.9)	
>Half the time	19 (12.4)	11 (12.9)	
Always	27 (17.6)	27 (31.8)	
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>t</i>
<i>Sexual partners by type</i>			
Primary partners, last 6 months	1.0 (1.1)	0.9 (0.50)	0.91
Primary partners, last 30 days	0.91 (1.1)	0.83 (0.53)	0.64
Casual partners, last 6 months	5.1 (10.6)	2.9 (8.7)	1.63
Casual partners, last 30 days	2.7 (5.7)	1.7 (4.5)	1.46
	<i>n</i> (%)	<i>n</i> (%)	<i>X</i> ²
<i>Sex trade behaviors^b</i>			
Traded sex for money, ever	80 (51.6)	32 (36.4)	5.25*
Traded sex for drugs, ever	64 (41.3)	19 (21.6)	9.69**
Traded money for sex, ever	42 (27.1)	5 (5.7)	16.50***
Traded drugs for sex, ever	43 (27.6)	2 (2.3)	24.13***
Traded sex for money, last 30 days	57 (36.8)	23 (26.1)	2.88
Traded sex for drugs, last 30 days	42 (27.1)	11 (12.5)	7.01**
Traded money for sex, last 30 days	25 (16.1)	1 (1.1)	13.21***
Traded drugs for sex, last 30 days	28 (18.1)	1 (1.1)	15.31***

	M (SD)	M (SD)	t
Times traded sex for money, last 30 days	10.2 (11.6)	15.6 (22.4)	-1.09
Times traded sex for drugs, last 30 days	8.6 (11.3)	19.9 (21.5)	-1.68
Times traded money for sex, last 30 days	3.0 (2.7)	10 ^c	-
Times traded drugs for sex, last 30 days	4.6 (4.7)	10 ^c	-

	n (%)	n (%)	X ²
Used condom with last paying partner	30 (53.6)	13 (56.6)	0.57
Used condom with last money for sex partner	16 (64.0)	1 (100)	0.55
Used condom with last sex for drugs partner	21 (50.0)	4 (36.4)	0.65
Used condom with last drugs for sex partner	17 (60.7)	1 (100)	0.63

	n (%)	n (%)	X ²
Used condom > half the time with paying partner	21 (36.8)	11 (47.8)	0.82
Used condom > half the time with money for sex partner	6 (24.0)	1 (100)	2.82
Used condom > half the time with sex for drugs partner	13 (31.0)	2 (18.2)	0.72
Used condom > half the time with drugs for sex partner	10 (35.7)	1 (100)	1.70

* $P < .05$;

** $P < .01$;

*** $P < .001$

^aZ-score is from Mann-Whitney U test

^bPercent is of those reporting

^cOnly one non-binger reporting