A Comparison of the Social and Sexual Networks of Crack-Using and Non-Crack Using African American Men who Have Sex with Men

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ABSTRACT *The role of crack cocaine in accelerating the HIV epidemic among heterosexual populations has been well documented. Little is known about crack use as an HIV risk factor among African American men who have sex with men (AA MSM), a group disproportionately infected with HIV. We sought to compare the social and sexual network characteristics of crack-using and non-crack using AA MSM in Baltimore, MD, USA and to examine associations of crack use with sexual risk. Participants were recruited using street-based and internet-based outreach, printed advertisements, and word of mouth. Inclusion criteria were being aged 18 years or older, African American or of black race/ethnicity, and having self-reported sex with another male in the prior 90 days. Crack use was operationalized as self-report of crack in the prior 90 days. Logistic regression was used to identify variables that were independently associated with crack use. Of 230 enrolled AA MSM, 37% (n=84) reported crack use. The sexual networks of crack-using AA MSM were composed of a greater number of HIV-positive sex partners, exchange partners, and partners who were both sex and drug partners and fewer networks with whom they always use condoms as compared to non-crack using AA MSM. Crack use was independently associated with increased odds of bisexual identity and networks with a greater number of exchange partners, overlap of drug and sex partners, and lesser condom use. Results of this study highlight sexual network characteristics of crack-smoking AA MSM that may promote transmission of HIV. HIV interventions are needed that are tailored to address the social context of crack-smoking AA MSM risk behaviors.*

KEYWORDS *African American men who have sex with men, Crack use, Social networks, HIV risk*

INTRODUCTION

The role of crack in accelerating the HIV epidemic, especially among the heterosexual population, has been well documented.¹⁻⁴ Use of crack cocaine is

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strongly associated with having greater number of sexual partners,⁵⁻⁷ including exchange sex partners, increased sexually transmitted diseases (STIs), and decreased condom use.^{8,9} Disparities in HIV incidence, prevalence, and disease progression by race among men who have sex with men (MSM) have been well documented and are persistent,¹⁰⁻¹⁵ with African American MSM (AA MSM) having higher HIV rates compared to white MSM (W MSM). These disparities are not explained by riskier sexual or drug-use behaviors.¹⁶

Overall rates of substance use among AA MSM have been reported to be lower, as compared to W MSM.¹⁶ In a meta-analysis comparing drug use by race, use of club drugs (e.g., poppers) and methamphetamine were greater among W MSM.¹⁷ However, a number of studies have reported that rates of crack and cocaine use among AA MSM are higher compared to W MSM.^{5,17-19} In a study among older AA MSM in Massachusetts, crack use before or during sexual episodes was associated with unprotected anal or vaginal sex with a female partner.²⁰ Although methamphetamine has received considerable attention as an HIV risk factor among white gay men,²¹ little is known about the relationship between crack use and HIV risk, especially among AA MSM. Insight into the social context of crack use among AA MSM is needed to understand the potential of HIV and STI risk exposure and transmission to sexual partners.

Social networks have been found to be powerful influences on individuals' behaviors, through social interactions that provide opportunities to meet sex partners and through social norms and social support.²²⁻²⁵ Network characteristics such as number of drug users and density have been found to be associated with HIV risk behaviors.²⁶⁻³⁰ Studies among non-MSM populations show that crack users' social networks include more drug users (injection and non-injection) and HIV-positive individuals, and crack use among network members is associated with multiple partners.³¹

The aim of the present study is to compare the social and sexual networks of AA MSM crack smokers (CUs) to AA MSM who were not crack smokers (NCUs) in Baltimore, MD, USA and to examine associations of crack use with sexual risk behavior.

METHODS

The Unity in Diversity study was a culturally tailored HIV prevention intervention designed for AA MSM. The study was conducted in Baltimore from August 2008 to June 2009. Two types of participants were recruited: Indexes and Networks. Index participants were recruited using a variety of methods including street-based outreach by trained field recruiters, word of mouth, advertisements in the local papers, and active internet-based recruitment on websites and chat rooms for AA MSM. Index inclusion criteria were: 18 years old or older, identify as a male, self-report black or African American race/ethnicity, report having at least two sex partners in the prior 3 months (at least one of which must be a male), report unprotected anal sex with a male in prior 3 months, willingness to take an HIV test, and identify and recruit social network members into the study. Eligible Index participants provided written informed consent and completed a baseline survey using audio computer-assisted self-interview (ACASI) concerning HIV risk behaviors, sociodemographics (age, employment status, highest educational level attained, and history of incarceration), and use of drugs and alcohol. A social network inventory was then administered face-to-face by a trained research assistant. The

inventory consisted of a set of 18 questions to elicit the names of individuals from whom they received and provided support, with whom they have used drugs (drug network) or had sex in the past 3 months (sex network). The total size of the network was the sum of the number of people listed. Once the network was elicited, participants were asked about characteristics of each listed network member such as their age, race, employment status, type and frequency of drug use, and perceived serostatus. Participants were asked to indicate the network members whom they are “not on good terms with or disagree or fight [with]” as a measure of conflict network. Participants were also asked to indicate who on their network list “knew they had sex with men.” Density of a network is a measure of connectedness among network members. Density scores range from 0 indicating that no network members know others to 1.00 indicating that all network members know each other. At the end of the baseline visit, Index participants were asked to invite network members listed on their inventory into the study.

Inclusion criteria for Network participants were: 18 years old or older and invited by his Index. Network participants who were enrolled in the study completed the same baseline procedures as the Index participants (e.g., ACASI risk assessment and social network inventory).

Data for the present study are from Index ($n=187$) and Network ($n=43$) male participants who completed the baseline visit, reported black or African American race/ethnicity, and had at least one male sex partner in the prior 90 days.

Measures

Outcome Participants were asked about use of marijuana, powdered cocaine, crack, heroin, club drugs (GHB, ecstasy), methamphetamine, poppers, and Viagra/Levitra in the prior 90 days. Responses were recoded to indicate no use versus any use in the prior 90 days. Among those who reported use of any drug, frequency was assessed (monthly or less, 1–3 days a week; ≥ 4 days a week).

Sexual Identity To measure sexual identity, participants were asked, “Do you consider yourself to be: heterosexual or straight; bisexual; queer, homosexual, gay, same-gender loving; not sure/questioning?” One nominal variable was created for descriptive and bivariate analysis where 0=gay/homosexual/same-gender loving, 1=bisexual/not sure/questioning, and 2=heterosexual or straight. For use in the multivariate model, two indicator nominal variables were created so that comparisons could be made between gay and bisexual categories and gay and heterosexual categories.

HIV Serostatus Participants who self-reported negative or unknown serostatus provided an oral specimen to be tested using Oraquick rapid HIV antibody testing kits (Orasure technologies). Preliminary positive results were confirmed using Western blot assay. Participants who self-reported HIV-positive serostatus were asked to provide documentation such as medications or clinical test results for validation or to provide an oral specimen for HIV antibody testing. HIV-seropositive status was defined if participants tested positive by confirmatory tests or provided documentation of an HIV-positive test result.

Sex Network Characteristics. Type of sex partner (main, casual, or exchange) and condom use were assessed. To measure concurrency of sex partnerships, participants provided the date of first and most recent sexual episode for each sex network

member listed. Overlap of these dates indicated concurrency.³² Sex partners who were also listed as a drug use partner were categorized as multiple risk network members. For each sex partner listed, participants were asked to describe their condom use as never using condoms, used condoms at first but no longer, use condoms every now and then, and always use condoms for all types of sex.

Analysis

T tests and chi-square statistics were used to evaluate bivariate differences in network characteristics between CU MSM and NCU MSM. Variables that were statistically significant in the bivariate models ($p < 0.05$) were entered into a multivariate model that used backward stepwise selection ($p < 0.20$) with forced inclusion of the sex identity nominal indicator variables (gay versus heterosexual and gay versus bisexual) considered to be theoretically important to include in the model to assess independent associations with crack use. The “number of network members who knows participant was MSM” variable was not included in the multivariate model due to collinearity with the sexual identity variable. All study procedures were approved by the Johns Hopkins Bloomberg School of Public Health and the Centers for Disease Control and Prevention Institutional Review Boards.

RESULTS

The mean age of the sample was 37.8 years (Table 1). The majority had 12 years or General Educational Development (GED) level education and were not working. Approximately half were HIV-seropositive (46%). Of these, 91% self-reported HIV positive status and 9% ($n=9$) tested HIV positive with confirmed Western Blot. Over one-half reported using marijuana in the prior 90 days. A minority reported use of ecstasy (10%), methamphetamine (3%), poppers (10%), and Viagra (11%). Over one-third reported use of crack in the prior 90 days ($n=84$; 37%). Among crack users, frequency of use was high with 42% using 1–3 days a week and 20% using ≥ 4 days a week (data not shown). CU MSM were older (mean age 44 versus 34 years; $p < 0.001$) and a greater proportion identified as bisexual compared to NCU (44% versus 28%, $p = 0.01$).

Bivariate Comparisons of the Social Network Characteristics

Table 2 presents comparisons of the social network characteristics of CU and NCU. The total size of CU social network was smaller compared to NCU MSM (mean number of network members 7.63 versus 8.78 network members; $p = 0.05$) and older (mean = 44.3 versus 36.9 years, $p < 0.01$). CUs reported a greater number of drug-using network members (2.08 versus 0.55; $p < 0.001$). More network members of NCU knew about the same-sex behavior of the participant and themselves sought sex partners on the internet (data not shown). There were no differences between groups in the density of the networks or number of network members with whom there was conflict.

Bivariate Comparisons of the Sexual Network Characteristics

There were no statistical differences between groups in the total size of the sex networks (mean CU sex network = 3.02 versus mean NCU sex network = 3.03, $p = 0.97$) or the number of female sex network members (CU mean number

TABLE 1 Bivariate comparison of sociodemographic characteristics and drug use of crack-using versus non-crack using AA MSM, Baltimore, MD, USA (2007–2010)

	Total sample	Non-crack using MSM	Crack-using MSM	
Variable <i>n</i> (%)	N = 230	N = 146	N = 84	<i>p</i> value
Mean age (years, SD)	37.8 (6.92)	34.3 (10.6)	44.0 (6.92)	<0.001
Educational level				
Grade 11 or less	50 (22)	29 (20)	21 (25)	
12th grade or GED	83 (36)	55 (38)	28 (33)	
Some college or higher	97 (42)	62 (42)	35 (42)	0.65
Employment status				
Not working	99 (43)	64 (44)	35 (42)	
Disabled	68 (30)	36 (25)	32 (38)	
Working (full time or part time)	63 (27)	46 (32)	17 (20)	0.06
Currently have health insurance				
History of incarceration				
Never in lifetime	69 (30)	55 (38)	14 (17)	
Lifetime, not in past 3 months	126 (55)	73 (50)	53 (63)	
In the past 3 months	35 (15)	18 (12)	17 (20)	<0.01
Homeless in past 3 months				
No	199 (87)	129 (88)	70 (83)	
Yes	31 (13)	17 (12)	14 (17)	0.32
Sexual identity				
Gay, SGL, homosexual	135 (59)	96 (66)	39 (46)	
Bisexual	78 (34)	41 (28)	37 (44)	
Straight, heterosexual	16 (7)	8 (6)	8 (10)	0.01
HIV status				
Negative/unknown	125 (54)	81 (55)	44 (52)	
Positive	105 (46)	65 (45)	40 (47)	0.65
Substance use in past 3 months				
Alcohol	190 (83)	113 (77)	77 (92)	<0.01
Marijuana	119 (52)	73 (50)	46 (55)	0.50
Ecstasy	24 (10)	18 (12)	6 (7)	0.27
Cocaine	54 (23)	20 (14)	34 (40)	<0.001
Methamphetamine	7 (3)	0 (0)	7 (8)	0.001
Poppers	22 (10)	10 (7)	12 (14)	0.10
Club drugs (special K, GHB)	0 (0)	0 (0)	0 (0)	–
Heroin	45 (20)	12 (8)	33 (39)	<0.001
Viagra	24 (11)	11 (8)	13 (16)	0.07
Inject any drug	24 (10)	8 (5)	16 (19)	<0.01

female sex network=0.39 versus NCU=0.62; $p=0.09$) (Table 3). The sex network members of CUs had a greater number of HIV seropositives (0.81 versus 0.47, $p=0.02$), sex exchange partners (0.87 versus 0.23, $p<0.001$) and network members that were both sex and drug partners (1.40 versus 0.47, $p<0.001$) compared to NCUs. CUs also reported more network members on whom they were dependent for food and/or shelter.

NCU sex networks had a greater number of sex partners with whom the participant always used condoms (1.33 versus 0.74, $p=0.001$) compared to CUs. Over half of the entire sample (53%) reported overlapping (concurrent) sexual partnerships within their network. No group differences of concurrency were observed.

TABLE 2 Bivariate comparisons of social network characteristics of crack-using versus non-crack using AA MSM, Baltimore, MD, USA (2007–2010)

Variable	Total sample	Non-crack using MSM	Crack-using MSM	<i>p</i> value
	<i>N</i> =230	<i>N</i> =146	<i>N</i> =84	
	Mean (SD)	Mean (SD)	Mean (SD)	
Total network size	8.36 (3.27)	8.78 (4.77)	7.63 (3.27)	0.05
Support network members	4.44 (2.79)	4.65 (3.10)	4.07 (1.93)	0.12
Age of network members	39.6 (8.69)	36.9 (8.69)	44.3 (6.45)	<0.001
African American network members	7.44 (3.89)	7.73 (4.17)	6.94 (3.30)	0.14
Network members who use heroin, cocaine, crack	1.11 (1.74)	0.55 (1.28)	2.08 (2.00)	<0.001
Network members who know participant has sex with men	6.33 (4.71)	6.88 (5.18)	5.36 (3.60)	0.02
Network members with whom participant experiences conflict	0.94 (1.04)	0.91 (1.00)	0.99 (1.11)	0.59
Density* of network	0.42 (0.26)	0.44 (0.26)	0.40 (0.28)	0.25

*density score ranges from 0=no connection between network members to 1=100% connection

TABLE 3 Bivariate comparisons of sex network characteristics of crack-using versus non-crack using AA MSM, Baltimore, MD (2007–2010)

Variable	Total sample	Non-crack using MSM	Crack-using MSM	<i>p</i> value
	<i>N</i> =230	<i>N</i> =146	<i>N</i> =84	
	Mean (SD)	Mean (SD)	Mean (SD)	
Sex network members	3.03 (1.77)	3.03 (1.03)	3.02 (1.67)	0.97
Mean number female sex network members	0.49 (0.95)	0.39 (0.95)	0.62 (0.94)	0.09
HIV positive sex network members	0.60 (1.03)	0.47 (0.79)	0.81 (1.32)	0.02
Male HIV positive sex network members	0.52 (0.91)	0.43 (0.77)	0.68 (1.10)	0.05
Female HIV positive sex network members	0.05 (0.28)	0.02 (0.16)	0.08 (0.42)	0.15
Main sex partners	0.73 (0.64)	0.81 (0.61)	0.58 (0.66)	0.01
Casual sex partners	1.82 (1.70)	1.97 (1.82)	1.55 (1.43)	0.07
Exchange partners	0.46 (1.12)	0.23 (0.72)	0.87 (1.50)	<0.001
Multiple risk (sex and drug partners)	0.81 (1.24)	0.47 (1.03)	1.40 (1.35)	<0.001
Partners dependent on for food/shelter	1.72 (1.07)	1.61 (0.99)	1.91 (1.18)	0.05
Partners that participant always uses condoms	1.11 (1.35)	1.33 (1.44)	0.74 (1.15)	0.001
Sexual partnerships concurrent <i>n</i> (%)				
Yes	122 (53)	73 (50)	49 (58)	0.22

Multivariate Logistic Regression of Network Characteristics on Crack Use

Crack use was independently associated with increased odds of bisexual identity, older-aged networks, greater number of drug-using network members, exchange-sex network members, and multiple-risk network members (Table 4). In the same model, crack use was associated with condom use with fewer sex partners in the network.

DISCUSSION

This study focused on the social and sexual networks of crack-using AA MSM, particularly older crack-using AA MSM, a potentially high-risk subgroup that has not been well-described in the literature. Findings reveal that sex networks of crack-using AA MSM were diverse, consisting of both male and female members and main and exchange partners. Moreover, crack use was independently associated with increased odds of having drug-using and sexual networks overlap. As Baltimore ranks among the most burdened city with gonorrhea, syphilis, and chlamydia among African American women³³ and HIV incidence among AA MSM,³⁴ the present findings are a cause for concern. These sexual mixing patterns suggest a potential role that crack-using AA MSM have in bridging networks that may vary in prevalence of HIV and other STIs, and underscores the importance of sexual transmission of HIV even among drug users.^{35–38} Consistent with results from a study in Los Angeles where Gorbach et al.³⁹ describes a “concentration of HIV risk” among a sample of low-income, minority drug-using men who have sex with men and women, our findings suggest potential capacity of these sexual networks to facilitate spread of HIV to other sexual and drug-using networks. Moreover, overlap of social ties (e.g., sex and drug ties) has been shown to increase risk of HIV.⁴⁰

It is well established in the literature that crack use is associated with increased sexual risk behaviors, namely exchanging sex and decreased condom use. In the present study, we report that after controlling for sex exchange and main sex partners, condom use with fewer partners remained associated with crack use. Interventions that have been implemented for predominately white, methamphetamine-using MSM have focused on increasing condom use self-efficacy and lowering drug-and-alcohol-influenced sex.^{41,42} While these interventions would require tailoring for crack-using AA MSM, they may offer a future direction for decreasing sexual risk. For example, given that the sexual networks consisted of both male and female sex partners and multiple-risk partners, interventions tailored for drug-using AA MSM should include activities to develop

TABLE 4 Independent associations with crack use in prior 3 months among AA MSM (2007–2010)

	Adjusted odds ratios (95% confidence interval)
Bisexual identity (ref: gay)	2.76 (1.23–6.17)
Heterosexual identity (ref: gay)	1.85 (0.37–9.40)
Participant age	1.12 (1.07–1.17)
Networks who use heroin, cocaine, and crack	1.69 (1.07–2.68)
Exchange partner sex networks	1.52 (1.01–2.28)
Multiple risk partners	1.92 (1.29–2.87)
Main partner sex networks	0.60 (0.28–1.26)
Sex networks with whom always use condoms	0.54 (0.39–0.75)

proper male and female condom use skills in both drug-involved and non-involved contexts. Research on prevention norms about condom use among crack-using AA MSM may also suggest potential targets for intervention.²⁵

AA MSM in this sample were older and two-fifths did not identify as gay. Although bisexual identity was strongly and independently associated with crack use, there were no differences in sizes of male and female sexual networks after adjusting for numerous network characteristics. We did not measure the level of social integration of CUs with other AA MSM within the larger community and how crack use may influence their identities.

It was surprising that the HIV rates did not vary by crack use. This lack of difference may be due to the high prevalence of HIV among AA MSM. Although no difference was observed between CU and NCU groups, it is also concerning that over half of the full sample reported sexual concurrency (53%; i.e., overlap in the time period of their sex partnerships). Concurrency is a significant factor associated with rapid transmission of HIV and STIs in sexual networks^{32,43} and has been hypothesized as a contributing factor to the disparity in HIV among African Americans compared to white samples.⁴⁴ Promoting consistent and proper condom use in all sexual partnerships is a critical message in addition to encouraging frequent HIV and STI testing.

Limitations of this study should be noted. The sample is comprised of older men living in Baltimore who reported having unprotected sex in the prior 90 days. Generalizability of the findings to younger men and AA MSM in other areas of the country is limited. Additionally, analysis was conducted using cross-sectional data which limits our ability to draw causal inference from the results.

These limitations notwithstanding, findings suggest that crack use is an HIV risk factor among AA MSM and networks of crack-using AA MSM would be optimal targets for testing and behavioral interventions that focus on increasing skills for HIV risk reduction and HIV and STI testing. Crack-using AA MSM in this study was embedded within high-risk networks consisting of other drug users. Given these social contacts, crack-using MSM may be an ideal source to recruit other high-risk networks for HIV testing and risk-reduction interventions. Considerations for implementing these interventions should include a range of settings such as drug treatment centers and other venues where non-gay-identified AA MSM frequent.

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