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Risky Sexual Behaviors and Sexually Transmitted Diseases: A Comparison Study of Cocaine-Dependent Individuals in Treatment versus a Community-Matched Sample

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Abstract

Cocaine users routinely engage in high-risk sexual behaviors that place them at an elevated risk of contracting HIV and other blood-borne infections. The purpose of the present study was to compare trading sex for drugs and/or money, having 10 or more sexual partners in 1 year, and sexually transmitted diseases (STDs) of cocaine-dependent individuals in treatment for their dependence across race and gender and against participants who live in their community. Cocaine-dependent individuals ($n = 459$) were identified through nine publicly and privately funded inpatient and outpatient chemical dependency treatment centers in the St. Louis area during 2001–2006. Community-based participants ($n = 459$) were matched to cocaine-dependent participants on age, ethnicity, gender, and zip code of residence. Mean age of the sample was 36 years old, 50% were Caucasians, 50% were African American, and 47% were male. Nearly half of cocaine-dependent participants in treatment had traded sex for drugs and/or money and over one-third had more than 10 sexual partners in 1 year with a risk concentrated among African Americans even after controlling for income and educational attainment. Participants recruited from the community with some exposure to cocaine reported similar rates of high risk sexual behaviors as the cocaine dependent subjects from treatment settings. It is important for clinicians to recognize that once released from treatment, cocaine-dependent individuals may be returning to high-risk environments where sexual risk behaviors are occurring in the context of cocaine use.

Introduction

Many cocaine users routinely engage in high-risk sexual behaviors that put their health at risk. Inconsistent condom use, multiple sexual partnerships, consuming drugs during sex, and having sex with other drug users are commonly reported by cocaine users.[1–7] A motivation to support drug use habits also make the likelihood for exchanging sex for drugs and/or money pronounced.[8–14] A disregard for the potential dangers of unprotected sex that often accompanies substance dependence coupled with anonymous sexual partners, sex with those who inject drugs, and/or persons with HIV or other sexually transmitted diseases (STDs) compounds the harmful effects of sex work when it occurs in the context of cocaine dependence.[15–18]

The wide spectrum of cocaine use ranges from casual, infrequent use to regular, compulsive use that is escalated in degree and frequency to a dependence level.[19] Individuals with a cocaine dependence diagnosis often have a worse prognosis and more severe condition than cocaine users without a dependence diagnosis[20–22] possibly due to being psychologically or physically dependent on cocaine and neurochemical and molecular changes in their brain. Many also exhibit compulsive cocaine seeking and persistent cocaine use despite a host of medical and psychosocial complications.[19] Cocaine users, especially those with a dependence diagnosis, are more likely to miss regular medical appointments and have less access to a regular health care provider and support services (i.e., housing, financial assistance, employment assistance).[23–27] Providing psycho-education and screening, testing, and treating HIV or other STDs of individuals in treatment for cocaine dependence may be a promising strategy to intervene in the spread of STDs/HIV for infected individuals and/or those engaging in sexual risk behaviors.[28]

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A growing number of studies recognize that social forces within one's community can reinforce and sustain drug dependence and related risk behaviors.[29–31] For instance, epidemiologic studies report that economically disadvantaged urban populations and exposure to drug trafficking are associated with high rates of drug use.[30,31] Moreover, increased opportunities to interact with drug users, the presence of institutions such as churches, liquor stores, and community-based organizations, and variability in policing patterns can impact drug use patterns.[32–34] Community characteristics also can be a critical factor in the association between cocaine dependence and risky sexual behaviors. Yet, no studies to date have compared the high-risk sexual behaviors and STDs of individuals receiving care in treatment centers for their cocaine dependence with community-matched counterparts despite this strategy being an effective way to underscore the role of "community" factors and cocaine dependence on high-risk sexual behaviors and STDs.

The current study contributes to the literature on risky sexual behaviors and cocaine use in three ways. Our first objective is to document the prevalence of high-risk sexual behaviors and STDs in a cocaine-dependent population in treatment and examine differences among racial groups and by gender. Then, we assess the prevalence of cocaine dependence in the community-matched sample only and examine further the nature and severity of their high-risk sexual behaviors and STDs and whether they vary by race, gender, and/or spectrum of cocaine use (nonusers, experimental cocaine users without a cocaine dependence diagnosis, and cocaine dependents). Last, we compare the high-risk sexual behaviors and STDs of the cocaine-dependent population in treatment with their community-matched counterparts classified at each level of cocaine exposure (noncocaine users, experimental cocaine users without a cocaine dependence diagnosis, and cocaine dependents). Thus, we anticipate that our findings will provide insights that can lead to more effective STD/HIV prevention among high-risk cocaine-dependent patients.

Materials and Methods

Participants and procedures

The study participants are from the Family Study of Cocaine Dependence, a community-matched study designed to control for community and family factors associated with cocaine dependence that took place from 2001–2006.[35] This study was approved by the Washington University Institutional Review Board (IRB) and written informed consent was obtained from all participants.

Index cases were identified through nine publicly and privately funded inpatient and outpatient chemical dependency treatment centers in the St. Louis area. Index cases met lifetime *DSM-IV* cocaine dependence,[36] were 18 years of age or older, and spoke fluent English. Because the participants in the present study were recruited in the context of a research project examining community and family factors associated with cocaine dependence, additional inclusion criteria for index cases included having a full sibling within 5 years of their age who was willing to participate. However, sibling data were not examined in the present study because it did not address our research questions. The majority (55.1%, $n = 545$) of the eligible cocaine-dependent participants took part in the study. Reasons for nonparticipation included inability to locate a subject after initial contact (57.0%), not having an available and/or willing sibling to participate (26.4%), subject refusal (5.9%), and other miscellaneous reasons (10.6%).

Community-based comparison subjects were recruited through driver's license and state identification records from the Missouri Family Registry maintained by Washington University in St. Louis for research purposes.

Community-based comparison participants were individually matched to cocaine dependent subjects based on date of birth (within 1 year), race/ethnicity, gender, and zip code of residence. A random list of individuals who met matching criteria was provided to the investigators by the registry and the first eligible person who agreed to participate was interviewed for this study. Community-matched participants were not matched on dependence criteria; however, we did not exclude community subjects with substance dependence or other psychiatric disorders. Approximately 80% of the screened and eligible community individuals participated in the study. As with the cocaine-dependent participants, community-based participants also were required to be 18 years of age or older, speak fluent English, and have a full sibling within 5 years of their age who was willing to participate. Community-based participants were matched for 96.5% of cocaine dependent cases. The current analyses focused on only matched cocaine dependent participants in treatment and community-based participants. The total sample included 918 participants: 459 cocaine-dependent participants in treatment (cases) and 459 community-based comparison participants.

All participants who gave written informed consent completed the Semi-Structured Assessment for the Genetics of Alcoholism-II (SSAGA) a highly reliable and valid interview designed to assess the physical, psychosocial and psychiatric manifestations of alcohol abuse and dependence and related psychiatric disorders.[37,38] This instrument provided a detailed lifetime account of alcohol and other drug use and a comprehensive assessment of their consequences.

Primary outcomes. The primary outcome variables were dichotomous measures of high-risk sexual behaviors including: trading sex for drugs and/or money at least once during their lifetime, trading sex for drugs and/or money three or more times (to document a pattern of these behaviors), and having had at least 10 sexual partners in 1 year. A dichotomous measure of self-reported past STD diagnosis was also queried. Participants who had never engaged in sexual intercourse were only 1.4% of the total sample and were included in all analyses to maintain matched comparisons across all analyses.

Independent variables. The primary independent variable assessed was lifetime diagnosis for cocaine dependence. Cocaine dependence is defined by three or more of the following seven criteria, including tolerance, withdrawal as defined by the syndrome or withdrawal relief, using cocaine in larger amounts or over a longer period than intended, persistent desire or unsuccessful efforts to cut down or control cocaine use, spending a great deal of time obtaining cocaine or recovering from cocaine binges, giving up or reducing important social, occupational, or recreational activities in order

to use cocaine, and continued cocaine use despite physical or psychological problems worsened by using cocaine.[36] This diagnosis was made using a computer algorithm following the *DSM-IV* criteria.[36] All participants were given the same interview and diagnoses were made using the same algorithm regardless of case or community status. Additional covariates often associated with high-risk sexual behaviors were demographic characteristics, including race, gender, household income, and educational attainment.[39]

Data analysis

Analyses were performed using the SAS version 9.1 (SAS Institute, Cary, NC). All tests of significance were two-tailed with $\alpha = 0.05$. All analyses were conducted separately for males and females because of the known gender variations in high-risk sexual behaviors and STDs.[40]

χ^2 square analyses were utilized to assess prevalence differences of high-risk sexual behaviors and STDs in the cocaine-dependent treatment population across race and gender and versus community-matched participants. Multivariable logistic regressions were conducted to examine the independent relationship between cocaine-dependent status, race, and the outcomes of interest while controlling for gender, income, and educational attainment. Only cocaine-dependent participants in treatment were examined for these analyses. To capitalize on the 1:1 community-matched design, McNemar tests were used to investigate whether cocaine-dependent participants in treatment have an increased risk of high-risk sexual behaviors and STDs first compared with noncocaine-dependent community-matched members and then compared with cocaine-dependent community-matched members.

Results

The demographic characteristics of the study groups are shown in Table 1. As expected, no differences in age, race, gender, and zip code of residence were present between the cocaine dependent participants in treatment and community-based participants because they were matched on these variables. Significant differences were still found in marital status, years of education, employment, disability status, and income between the two groups. In addition, cocaine-dependent participants in treatment were approximately 1 year younger than community-based participants due to the lag time needed to recruit the matched individuals ($p < 0.05$).

The majority of the community-matched participants had never used cocaine ($n = 301$, 65.6%). Seventy-one (15.5%) of the community-matched participants had used cocaine at least once but did not meet criteria for cocaine dependence; most of these individuals had used cocaine 10 times or less ($n = 49$). Eighty-seven (19.0%) of the community-matched participants met diagnostic criteria for lifetime diagnosis of cocaine dependence. Most cocaine-dependent community-matched participants (89.7%) and cocaine-dependent participants in treatment (89.1%) were unable to provide an actual number of times they used cocaine during their lifetime. We speculate that the frequency of cocaine use was too high for these cocaine dependent individuals to provide an accurate count of past cocaine uses.

Table 2 contains prevalence rates of high-risk sexual behaviors and STDs for cases in treatment and community members by gender and across racial groups. Many cocaine dependent participants in treatment engaged in elevated rates of high-risk sexual behaviors. In fact, nearly one half of these individuals reported having traded sex for drugs and/or money at least one time ($n = 203$, 44.2%). Over one third of cocaine dependent participants in treatment had traded sex for drugs and/or money three or more times ($n = 165$, 35.9%), had more than 10 sexual partners in 1 year ($n = 178$, 38.8%), and reported a past STD diagnosis ($n = 157$, 34.2%).

Although reports of participation in high risk sexual behaviors among cocaine dependent men in treatment and the community were less than those for their female counterparts, they engaged in each specific activity at relatively high rates of frequency, especially cocaine-dependent African American males. Participants diagnosed with HIV (<2.0%) were too few to make comparisons.

Cocaine-dependent women in treatment and the community were more likely than their male counterparts to exchange sex for drugs and/or money, have more than 10 sexual partners in 1 year, and report a past STD diagnosis. Among the cocaine dependent participants in treatment, prevalence

Table 1. Demographics

	Participants in treatment (N = *459*)	*Community* (N = *459*)
Gender		
Male	47.1% ($n = 216$)	47.1% ($n = 216$)
Female	52.9% ($n = 243$)	52.9% ($n = 243$)
Race		
African American	50.3% ($n = 231$)	50.3% ($n = 231$)
Caucasian	49.7% ($n = 228$)	49.7% ($n = 228$)
Age, mean (SD), years	35.9 (8.7)	36.9 (8.9)
Birth cohort		
Before 1961	30.7% ($n = 141$)	30.1% ($n = 138$)
1961–1968	34.9% ($n = 160$)	34.9% ($n = 160$)
After 1968	34.4% ($n = 158$)	35.1% ($n = 161$)
Marital status[a]		
Married/widowed	13.5% ($n = 62$)	39.7% ($n = 182$)
Separated/divorced	34.0% ($n = 156$)	20.0% ($n = 92$)
Never married	52.5% ($n = 241$)	40.3% ($n = 185$)
Education		
<High school	26.6% ($n = 122$)	8.1% ($n = 37$)
GED/high school	54.7% ($n = 251$)	47.5% ($n = 218$)
Some college	14.2% ($n = 65$)	16.3% ($n = 75$)
College graduate or higher	4.5% ($n = 21$)	28.1% ($n = 129$)
No. years completed, mean (SD)[a]	11.7 (2.0)	13.6 (2.2)
Employment[a]		
Full-time	25.8% ($n = 118$)	59.3% ($n = 272$)
Part-time	11.6% ($n = 53$)	13.1% ($n = 60$)
Disabled	10.7% ($n = 49$)	6.5% ($n = 30$)
Unemployed	44.3% ($n = 203$)	11.3% ($n = 52$)
Other[b]	7.6% ($n = 35$)	9.8% ($n = 45$)
Income[a]		
< $10,000	40.5% ($n = 186$)	12.2% ($n = 56$)
$10,000–$29,999	25.9% ($n = 119$)	20.0% ($n = 92$)
$30,00–$49,999	11.5% ($n = 53$)	24.0% ($n = 110$)
≥ $50,000	13.3% ($n = 61$)	40.7% ($n = 187$)
Unknown or refused	8.7% ($n = 40$)	3.1% ($n = 14$)

[a]Significantly different between cocaine dependent participants in treatment and community comparisons, $p < .05$.
[b]Includes homemaker, student, and retired.

Table 2. Gender and racial differences

	Community							
	Participants in treatment (n = 459)		*Cocaine Dependent* (n = 87)		*Experimental cocaine use* (n = 71)		*Never used cocaine* (n = 301)	
All participants	*Caucasian* n = *110*	*African American* n = *106*	*Caucasian* n = *10*	*African American* n = *49*	*Caucasian* n = *31*	*African American* n = *13*	*Caucasian* n = *69*	*African American* n = *44*
Men								
Traded sex for drugs and/or money	20.0% ($n = 22$)[a]	52.8% ($n = 56$)	0% ($n = 0$)	24.5% ($n = 12$)	3.2% ($n = 1$)[a]	30.8% ($n = 4$)	0.0% ($n = 0$)	6.8% ($n = 3$)
Traded sex for drugs and/or money ≥ 3 times	10.0% ($n = 11$)[a]	41.5% ($n = 44$)	0% ($n = 0$)	20.4% ($n = 10$)	3.2% ($n = 1$)	23.1% ($n = 3$)	0.0% ($n = 0$)	0% ($n = 0$)
10 sexual partners in 1 year	31.8% ($n = 35$)	45.3% ($n = 48$)	10.0% ($n = 1$)[a]	49.0% ($n = 24$)	12.9% ($n = 4$)[a]	46.2% ($n = 6$)	7.2% ($n = 5$)[a]	27.3% ($n = 12$)
Past STD diagnosis	15.5% ($n = 17$)[a]	48.6% ($n = 51$)	0% ($n = 0$)[a]	44.9% ($n = 22$)	6.5% ($n = 2$)[a]	46.2% ($n = 6$)	1.4% ($n = 1$)[a]	25.0% ($n = 11$)
Women	$n = 118$	$n = 125$	$n = 4$	$n = 24$	$n = 16$	$n = 11$	$n = 98$	$n = 90$
Traded sex for drugs and/or money	40.2% ($n = 47$)[a]	62.4% ($n = 78$)	0% ($n = 0$)	58.3% ($n = 14$)	0% ($n = 0$)	18.2% ($n = 2$)	0% ($n = 0$)[a]	5.6% ($n = 5$)
Traded sex for drugs and/or money ≥ 3 times	33.1% ($n = 39$)[a]	56.8% ($n = 71$)	0% ($n = 0$)	54.2% ($n = 13$)	0% ($n = 0$)	18.2% ($n = 2$)	0% ($n = 0$)	3.3% ($n = 3$)
10 sexual partners in 1 year	35.6% ($n = 42$)	25.6% ($n = 32$)	50.0% ($n = 2$)	20.8% ($n = 5$)	25.0% ($n = 4$)	0% ($n = 0$)	3.1% ($n = 3$)	2.2% ($n = 2$)
Past STD diagnosis	35.3% ($n = 41$)[a]	55.2% ($n = 69$)	50.0% ($n = 2$)	66.7% ($n = 16$)	25.0% ($n = 4$)	36.4% ($n = 4$)	8.2% ($n = 8$)[a]	34.8% ($n = 31$)

[a]Significantly different comparisons between Caucasians and African Americans, $p < 0.05$.

rates of sexual risk behaviors and STDs were most pronounced for cocaine-dependent African American women.

More African American men and women in the community were diagnosed with cocaine dependence compared to Caucasian men and women in the community with a history of cocaine use. High-risk sexual behaviors were concentrated in the cocaine-using community participants (those diagnosed with cocaine dependence or experimental cocaine users) compared to community participants who never used cocaine, regardless of race or gender. However, past STD diagnosis rates remained relatively substantial for both community African American men and women noncocaine users.

For cocaine-dependent participants in treatment, multivariable logistic regression analyses revealed that being African American was a robust predictor of trading sex for drugs and/or money at least one time (odd ratio [OR] = 2.8, confidence interval [CI] = 1.8–4.4; Table 3) and three or more times (OR = 3.3, CI = 2.0–8.8), and having a past STD diagnosis (OR = 3.4, CI = 2.1–5.5) after controlling for gender, income, and educational attainment. Cocaine-dependent African Americans in treatment also had an intermediate risk of having had 10 or more sexual partners within one year (OR = 1.3, CI = 0.8–2.1) when compared against cocaine-dependent Caucasians in treatment that did not reach statistical significance ($p = 0.25$) after controlling for gender, income, and educational attainment.

To examine more closely the differences between cocaine-dependent participants in treatment and their community-matched counterparts, additional tests of significance were completed which capitalized on the 1:1 community-matched design. Cocaine-dependent participants in treatment were assessed against their community-matched counterpart stratified by each level of cocaine use (nonusers, experimental cocaine users without a cocaine dependence diagnosis, and cocaine dependents).

Using the McNemar test or Exact Equivalent (i.e., Binomial) when a frequency equaled zero, cocaine-dependent men in treatment were at substantially greater risk for having traded sex for drugs and/or money at least once (27.4% versus 1.8%, $p < 0.001$) and three or more times (22.1% versus 0%, $p < 0.001$) when compared with their community matched male counterparts who had never used cocaine.

Significant differences between the two groups were also found for having had 10 or more sexual partners within one year (39.8% versus 15.0%, $p < 0.001$) and reporting a past STD diagnosis (23.9% versus 10.6%, $p = 0.002$). Cocaine dependent women in treatment were at considerably greater risk for having traded sex for drugs and/or money at least once (46.3% versus 0%, $p < 0.001$) and three or more times (40.4% versus 0%, $p < 0.001$) in comparison to community-matched women who had never used cocaine. Significant differences between the two groups were also found for having had 10 or more sexual partners within 1 year (31.9% versus 2.7%, $p < 0.001$) and reporting a past STD diagnosis (43.6% versus 20.7%, $p < 0.001$).

No significant differences in risky sexual behaviors (i.e., having traded sex for drugs and/or money once and/or 3 or more times and having 10 or more sexual partners in 1 year) or past STD diagnosis between cocaine dependent men in treatment and community-matched men who were experimental cocaine users (i.e., had used cocaine at least once but did not have a cocaine dependence diagnosis). Cocaine de-

Table 3. Participants in Treatment: Multivariable Logistic Regression Models Predicting High-Risk Sexual Behaviors and Sexually Transmitted Diseases

	Traded sex for drugs and/or money		*Traded sex for drugs and/or money ≥3 times*		*10 sexual partners in 1 year*		*Past STD diagnosis*	
	Odds ratio	*95% CI*	*Odds ratio*	*95% CI*	*Odds ratio*	*95% CI*	*Odds ratio*	*95% CI*
Race								
Caucasians	1.0		1.0		1.0		1.0	
African Americans	2.8	1.8–4.4	3.3	2.0–8.8	1.3	0.8–2.1	3.4	2.1–5.5
Gender								
Male	1.0		1.0		1.0		1.0	
Female	1.9	1.2–2.8	2.6	1.6–3.3	0.7	0.5–1.1	1.9	1.2–3.0
Income								
≥ $50,000	1.0		1.0		1.0		1.0	
$30,00–$49,999	1.1	0.5–2.6	1.4	0.6–3.6	0.6	0.3–1.3	2.1	0.9–4.9
$10,000–$29,999	1.5	0.8–3.1	1.4	0.6–3.2	0.7	0.3–1.3	1.5	0.7–3.3
< $10,000	1.4	0.7–2.8	1.5	0.7–3.5	0.6	0.3–1.1	1.7	0.8–3.7
Educational attainment								
College graduate or higher	1.0		1.0		1.0		1.0	
Some college	1.5	0.5–4.7	1.9	0.5–6.9	0.9	0.3–2.7	0.8	0.2–2.6
GED/high school	1.2	0.4–3.5	1.4	0.4–4.8	0.7	0.3–1.9	1.1	0.4–3.4
<High school	1.3	0.4–3.9	1.3	0.4–4.8	0.8	0.3–2.2	0.5	0.2–1.7

CI, confidence interval; STD, sexually transmitted disease.

pendent women in treatment were at considerably greater risk for having traded sex for drugs and/or money at least once (51.9% versus 9.3%, $p < 0.001$) and three or more times (45.3% versus 7.4%, $p < 0.001$) in comparison to community-matched men who were experimental cocaine users. No significant differences between the two groups were found for having had 10 or more sexual partners within 1 year and reporting a past STD diagnosis.

Many people in the community had cocaine dependence ($n = 87$, 19% of the community sample). Thus, the high-risk sexual behaviors and STDs of cocaine-dependent men and women in treatment were also compared against community recruited participants with cocaine dependence. Cocaine-dependent men in treatment were at substantially greater risk for having traded sex for drugs and/or money when compared with their cocaine dependent community matched male counterparts (37.3% versus 17.0%, $p = 0.02$). No significant differences were found for all other risky sexual behaviors (i.e., having traded sex for drugs and/or money 3 or more times and having 10 or more sexual partners in 1 year) or past STD diagnosis. In further examination of the cocaine-dependent community-matched subjects, most reported a history of chemical dependency treatment (75% of males and 60% of females).

Discussion

The results of this research indicated that cocaine-dependent individuals in treatment were at elevated risk of engaging in high-risk sexual behaviors relative to demographically and geographically matched controls. Nearly half of cocaine-dependent participants in treatment had traded sex for drugs and/or money and over one third had more than 10 sexual partners in 1 year. Sex trade and/or being paid for sex were often reported to have occurred three or more times which suggests a pattern of these high-risk behaviors. In addition, cocaine-dependent individuals in treatment reported a high rate of an STD diagnosis, an outcome highly correlated with HIV diagnosis.[41] Our results further revealed that cocaine-dependent individuals in treatment were at greater risk for engaging in high-risk sexual behaviors and having a past STD diagnosis compared to noncocaine using individuals recruited from their communities. Our findings are consistent with past studies that identify cocaine use as being associated with an increased rate of high-risk sexual behaviors.[5–7,9] However, we move beyond reports of heavy and/or frequent cocaine use to utilizing a clinical diagnosis of cocaine dependence in order to improve understanding of how regular and compulsive cocaine use that is escalated in degree and frequency to a dependence level is linked with risky sexual behaviors and reports of an STD diagnosis.

The design of this study allowed for the recruitment of cocaine-dependent community subjects. Nearly 20% of the matched people in the community had cocaine dependence. On further examination of the data, it became clear that many of the high-risk sexual behaviors reported by the community-based subjects occurred in those with cocaine dependence and/or those who had used cocaine at least once. For instance, most men and women in the community who reported trading sex for drugs had some exposure to cocaine. Further analysis demonstrated that participants recruited from the community with a lifetime history of cocaine dependence had similar rates of high-risk sexual behaviors as the cocaine-dependent subjects who were recruited from the treatment settings, with the exception of trading sex for drugs and/or money among cocaine-dependent men. This suggests that "community" factors contributed much less to the elevated rates of high-risk sexual behaviors than cocaine dependence.

Our findings demonstrate a risk that is concentrated in cocaine-dependent individuals and especially among cocaine-dependent women. About half of cocaine dependent women in treatment had traded sex for drugs and/or money

and nearly one third had 10 or more sexual partners in 1 year. It may be that one's source of cocaine access is via sex work, such that crack/cocaine is considered "currency" and sex a "commodity."[42–44] Males may be less reliant on sex work to obtain cocaine because of greater income.[45] However, our findings suggest that these factors may only lessen the risk for sex work among males but do not remove it completely. In fact, nearly a quarter of cocaine-dependent men in treatment reported having traded sex for drugs and/or money and over one third had 10 or more sexual partners during the course of 1 year. The present analysis indicated that cocaine dependence is an important risk factor for high-risk sexual behaviors as well as a past STD diagnosis for both men and women.

In addition, our findings demonstrated an even greater risk for high-risk sexual behaviors and STDs among cocaine-dependent African Americans in treatment. Indeed, the risk for trading sex for drugs and/or money was nearly three times greater for cocaine-dependent African Americans in treatment when compared against cocaine-dependent Caucasians in treatment. The findings persisted even after controlling for sociodemographic variables such as income and educational attainment.

Moreover, our results documented that being African American and a women act cumulatively to increase the risk of trading sex for drugs and/or money (on one occasion and 3 or more times) and having a past STD diagnosis among cocaine-dependent individuals in treatment. The combined effect of these two conditions on high-risk sexual behaviors and STDs demonstrated that African American cocaine-dependent women in treatment are at especially high risk of trading sex for drugs and/or money and reporting a past STD. The associations were significant even after controlling for income and educational attainment.

The majority of the participants in this study (90%) reported having experienced one or more traumatic events during their lifetime; yet, certain trauma types may be associated with differences in sexual risk behaviors. For instance, exposure to violence, racism, and sexism tend to fuel both cocaine use and sex work.[46–47] This might explain why African Americans, especially women, bear the burden of risk in this study. It may also be that burdens of poverty coupled with marginal attributes exacerbate feelings of powerlessness and perpetuate the likelihood for risky sexual behaviors among African Americans. Whatever the explanation, the present analysis indicated that the interplay of cocaine dependence with race and gender is an important risk factor for high-risk sexual behaviors as well as a past STD diagnosis, above and beyond socioeconomic factors including income and educational attainment.

The results of the present study are subject to limitations that should be considered when interpreting the findings. We used zip codes to recruit community-matched participants. The use of zip codes as an indicator for area-based socioeconomic context has received criticism in the scientific literature due to variations over time, size inconsistencies, and the neglect of other political, statistical, or administrative boundaries.[48] However, recent research has found that associations at the zip code level were similar to those found at smaller geographic definitions of neighborhood such as census tract and census block group levels.[49,50] Regardless of this support for the use of matching zip codes, we recognize that residual confounding could still occur and is a limitation of this study. Despite the potential for residual confounding, this design allowed us to compare risk behaviors while accounting for the potential confounding effects of community characteristics. Beyond income and educational attainment, we did not control for other socioeconomic differences like marital status and employment disability status.

Nonetheless, the use of cases and comparison participants that resemble each other in almost every respect leads to overmatching which can result in biased odds ratios and problems with identifying real differences between groups.[51] The data analyzed in the current study were collected from an intended sample of cocaine dependent participants attending treatment centers within the St. Louis area and this population may differ from cocaine-dependent populations in other cities. Our conclusions are also limited by the use of self-reported sexual behavior that may either underestimate or inflate true risk behaviors. Participants may not feel comfortable responding truthfully or they may exaggerate the sensitive areas of our survey.[52] Details about sexual intercourse including more accurate estimates of the risk behaviors and types of high-risk sexual behaviors were not queried nor were issues related to sexual orientation or identity. In addition, we did not control for exposure to traumatic experiences in any of the analyses because the majority of participants in this study (90%) had been exposed to at least one traumatic event. Lastly, most participants were dependent on multiple substances (i.e., nicotine, marijuana, opiate, other drugs like stimulants, sedatives, hallucinogens, PCP, and/or intravenous drugs) that may be contributing to the prevalence of risky sexual behaviors.

Findings from this study have relevant implications for prevention and intervention efforts. The current study confirms that many cocaine dependent individuals who access treatment centers engage in patterns of high risk sexual behaviors that place them at risk for HIV transmission and infection. Therefore, risky sexual behaviors should be thoroughly assessed and treated as part of one's participation in a drug rehabilitation program. Providing these individuals with information about HIV and safe sex practices in the context of treatment programs can be an effective way to reach individuals who are not accessing care in a traditional health setting. Recent research has documented the efficacy of behavioral drug abuse treatments that simultaneously reduce substance use and sexual risk behaviors; yet, empirically validated drug rehabilitation treatments addressing sexual risks are still lacking.[53]

In addition, community outreach efforts, like mobile van services[54] and street outreach,[55–61] have demonstrated effectiveness in targeting, testing, and screening individuals who report high rates of substance use and HIV-related sexual transmission behaviors; these promising strategies could also work to triage individuals into drug treatment programs. Last, it is important for clinicians to recognize that once released from treatment, cocaine-dependent individuals may be returning to high-risk environments where sexual risk behaviors are occurring in the context of cocaine use. Thus, not all communities are equally at risk and STD prevention programs and clinics as well as substance treatment centers should understand the role of cocaine dependence and community factors as part of a comprehensive strategy for reducing STD transmission.

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Author Disclosure Statement

Dr. Bierut is listed as an inventor on a patent (US 20070258898) held by Perlegen Sciences, Inc., covering the use of certain SNPs in determining the diagnosis, prognosis, and treatment of addiction. Dr. Bierut has acted as a consultant for Pfizer, Inc. in 2008.

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