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HIV, the Clustering of Sexually Transmitted Infections, and Sex Risk Among African American Women Who Use Drugs

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Background: **African American women have high rates of most sexually transmitted infections (STIs), including HIV. STIs have been associated with increased HIV transmission risk.**

Methods: **Two hundred twenty-eight black women who used drugs completed a structured questionnaire in a central Brooklyn, NY-based research center between March 2003 and August 2005. Women were screened for HIV, herpes simplex virus-2, syphilis, gonorrhea, chlamydia, and trichomoniasis. This analysis determined if STIs cluster within individuals and if clustering and sex practices or partnerships differ by HIV status.**

Results: **Thirty-eight (17%) women tested HIV seropositive and STI prevalence was herpes simplex virus-2 (79%), trichomoniasis (37%), chlamydia (11%), and gonorrhea (2%). Few women knew themselves to be infected with STIs other than HIV. Excluding HIV, the mean number of STIs per woman was 1.3 (SD 0.7). HIV-infected women were significantly more likely than uninfected women to have multiple positive screens (1.6 vs. 1.2, $P = 0.002$). Women reported having both lower and higher risk sex partners. HIV-infected women were 2 times more likely than uninfected woman to report current sex work ($P = 0.05$), the only difference in sex risk. In a linear regression model, crack cocaine use was uniquely associated with multiple positive STI screens, excluding HIV ($P = 0.002$).**

Conclusions: **Several STIs, including HIV, seem to be endemic among black women who use drugs in this community. In addition to the known geographical clustering of HIV and STIs, STIs were also found to cluster at the individual level. Multiply STI infected individuals may unknowingly, but efficiently, contribute to high STI and HIV rates.**

BLACK WOMEN ARE BECOMING HIV infected at rates 3 to 4 times higher than other women in the United States.[1,2] Heterosexual acquisition has been the primary cause of infection for black women for well over a decade.[3] In addition, black women have the highest rates for the majority of bacterial sexually transmitted infections (STIs) among women and for the viral STI herpes simplex virus-2 (HSV-2).[4–7] Increasingly, data suggest that black women bear the burden of trichomoniasis,[8] and that this STI is significantly more prevalent than that of gonorrhea and chlamydia combined.[9,10] Moreover, all of these STIs have been individually associated with an increased risk of HIV acquisition and, potentially, with an increased risk of HIV transmission.[11–14] Therefore, the high prevalence and incidence of the major STIs in black communities has the potential to make HIV another endemic STI, unless interventions are developed that explicitly identify and treat infected individuals.

To date, research has focused on coinfections between HIV and only one other STI in primarily high-risk populations (e.g., STI clinic patients). However, it is possible that individuals who are coinfected with HIV and another STI may have additional STIs, which may further alter STI natural history and enhance transmission synergy.[14] Moreover, sex mixing patterns in black communities suggest that high-risk individuals (e.g., those more likely to have STIs) are just as likely to have sex with low, medium, or other high-risk individuals.[6] A dynamic of multiply infected individuals interacting with both lower- and higher-risk sex partners could contribute to the high STI incidence consistently observed in black communities.

A possible caveat to this scenario is that HIV-infected individuals with multiple STIs may suffer increased morbidity and, therefore, be less sexually active than others. However, given the high prevalence of asymptomatic infection, particularly for women (40% asymptomatic with gonorrhea,[15] 75% with chlamydia,[16] 50% with *Trichomonas vaginalis*,[17] and 85% with HSV-2[18]) and a subsequent lack of infection status knowledge, morbidity may not be a potent barrier to sexual activity. Furthermore, the association among HIV, substance use, and sex risk,[19,20] combined with the high cost of drug use could compel some HIV-infected individuals to be more sexually active than others. This may be particularly true for low income HIV-infected women, since they often rely on sex as a primary means to support their drug use.[21]

The current study examines the prevalence of multiple STIs among urban black women who use drugs, whether HIV-infected women are more likely than uninfected women to have multiple STIs and any differences in sex risk practices and partnerships between HIV-infected and uninfected women in a high-HIV prevalence community in New York City. In addition, since STI testing

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and treatment require access to medical care, women's current utilization of the health care system is also assessed.

Materials and Methods

Participants were black women recruited in central Brooklyn, NY, where active drug markets have been established for many years. Detailed recruitment methods have been reported elsewhere.[22] In brief, eligible women self-identified as black, were aged 18 (or aged 16 and 17 and living as emancipated minors), used heroin, crack, or noncrack cocaine in the past 30 days or used marijuana daily, and had no plans to change residence. Eligibility was determined through screening interviews and urine toxicologies that screened for cocaine, opiate, and tetrahydrocannabinol metabolites. A broad drug use eligibility criterion was instituted to capture a range of women, as well as to limit incentives to lie about drug use.

Data were collected as part of a social network cohort study initiated in 2002. Additional funds were secured to screen for treatable STIs (i.e., gonorrhea, chlamydia, and trichomoniasis) and for HSV-2. Data collection for this component of the study began in March 2003 and continued through August 2005; 232 eligible black women were interviewed. Of these, 228 (98%) were screened for the full panel of STIs. This analysis is a cross-section of women at the time of their first full STI screening panel. Data were drawn from 147 baseline interviews and 81 follow-up interviews.

Women were administered a standardized questionnaire at a community based research site. Sociodemographics, health status, including self-reported HIV, STI and STI symptom status, and recent health care access were assessed. Questions assessing 30-day sex risk practices included the number of sex partners, condom use (i.e., consistent vs. inconsistent) and sex partner aggregate characteristics (e.g., 3 male partners and 1 female partner). Women's 30-day drug use practices included type of drug used (e.g., heroin, crack, or cocaine), frequency of use (i.e., daily or less than daily), mode of administration (e.g., injected or smoked) and drug treatment history. With few exceptions, (e.g., number of sex partners, which was examined as both a dichotomous and a continuous variable), variables were dichotomized to facilitate comparisons of the presence or absence of a risk factor with STI status.

Postinterview, women received pretest counseling and screening for a panel of STIs, including HIV, HSV-2, primary or secondary (1°/2°) syphilis, gonorrhea, chlamydia, and trichomoniasis. Blood specimens for HIV, HSV-2, and 1°/2° syphilis serotesting were collected using venipuncture. Women self-administered vaginal swabs to collect specimens for gonorrhea, chlamydia, and trichomoniasis.[23] Women who were menstruating agreed to either provide a urine sample for STI testing or to return when they were no longer menstruating; all but 4 respondents complied; less than 5% of samples were urine. At the completion of screening, women were scheduled to return for their results. Respondents who screened positive were referred to local health care providers. Women were compensated for study participation. All respondents provided informed consent and the study protocol was approved by the Columbia University Institutional Review Board.

A repeated enzyme immunoassay (Vironostika; Durham, NC) with Western blot confirmation (Bio-Rad; Redmond, WA) was administered to detect HIV antibodies. The HSV-2 type-specific IgG antibody test (HerpeSelect HSV-2 ELISA, Focus Technologies, Cypress, CA) was used for HSV-2 screening; specimens with an index ratio $\geq$1.1 were designated HSV-2 seropositive. The IMPACT rapid plasma reagin card test and confirmatory fluorescent treponemal antibody absorption assay were used to detect antibodies to *Treponema pallidum* (i.e., syphilis). Among participants with a reactive fluorescent treponemal antibody absorption assay, an rapid plasma reagin titer $\geq$1:8 was classified as 1°/2° syphilis, and a titer $<$1:8 indicated tertiary, latent, or resolved syphilis. Specimens for gonorrhea and chlamydia were detected using real-time polymerase chain reaction (BDProbeTec ET CT/NG amplified DNA assays, BD, Franklin Lakes, NJ). Trichomoniasis specimens were resuspended in 200 μL of Tris-EDTA buffer and extracted via the Roche Magna Pure LC Robot with a positive processing control and a negative processing control. Extracted specimens and controls were subsequently analyzed on the Roche Lightcycler for detection of trichomoniasis by FRET-based real-time polymerase chain reaction assay.[24,25]

The primary goals of this study were to (a) describe the extent of STI coinfection and risk practices among urban black women who use drugs and (b) test the hypothesis that HIV-infected women are more likely to have multiple STIs than HIV-uninfected women. An "Index of Infection" was created to describe the extent of coinfection by summing the number of positive STI screens, (excluding HIV), for a possible score range of 0 to 5 (i.e., HSV-2, 1°/2° syphilis, gonorrhea, chlamydia, and trichomoniasis). This synthetic methodology has previously been used to describe the extent of antibiotic resistance of *Staphylococcus aureus* in a drug using population, as well as to compare the extent of *S. aureus* antibiotic resistance by HIV serostatus.[26] Chi-square tests were used to examine differences between categorical variables in univariate analyses and the Student *t* test was used to examine differences between means of continuous dependent variables (e.g., the Index of Infection). The Wilcoxon 2-sample test was used to compare the medians of nonnormally distributed variables (e.g., number of sex partners) and Spearman's correlation was used to compare relationships between the Index of Infection and continuous variables. Linear regression models were developed to identify correlates of the Index of Infection in addition to HIV status. All sociodemographic, health status, sex risk, and drug use practices that were statistically significant at $P < 0.20$ in univariate analyses were entered into a multivariate linear regression model, which used stepwise backward elimination to arrive at a final model. Factors believed to be associated with multiple STIs and HIV status a priori (i.e., age, STI symptoms, and income) were also forced into the model. Two-tailed *P* values are significant at $P < 0.05$; Fisher exact test *P* values are reported when cells have expected counts of less than five. SAS version 9.1.3 was used for all statistical analysis (SAS Institute; Cary, NC).

Results

Sociodemographics

Table 1 compares the sociodemographic characteristics of the 228 eligible black women by HIV status. The women had a mean age of 34 (SD 10; range 17–57). The mean income from legal or informal employment and public benefits in the past 30 days was $468 (SD $668; range $0–$4183).

HIV Infection

Most (n = 202, 89%) women reported having ever been tested for HIV infection; 138 (61%) had been tested in the year before interview. Thirty-eight (17%) women tested HIV seropositive; 29 (13%) women knew themselves to be HIV infected. Among the 29 women who knew themselves to be HIV infected, 12 (41%) reported receiving antiretroviral therapy.

TABLE 1. Sociodemographics of 228 Urban Black Women Who Use Drugs

Variable	Subjects No. (%) HIV+ (N = 38)	HIV− (N = 190)	OR (95% CI)
Age			
≤30	4 (10.5)	88 (46.4)	0.1 (0.1–0.4)*
>30	34 (89.5)	102 (53.6)	—
HS/GED			
Yes	21 (55.3)	103 (54.2)	1.0 (0.5–2.1)
No	17 (45.7)	87 (45.8)	—
Employed			
Yes	3 (7.9)	33 (17.4)	0.4 (0.1–1.4)
No	35 (92.1)	157 (82.6)	—
Benefits			
Yes	28 (73.7)	110 (57.9)	2.0 (0.9–4.4)
No	10 (26.3)	80 (42.1)	—
Income			
>$500	20 (52.6)	51 (26.8)	3.0 (1.5–6.2)†
≤$500	18 (47.4)	139 (73.2)	—
Homeless			
Yes	12 (31.6)	55 (29.0)	1.1 (0.5–2.4)
No	26 (68.4)	135 (71.0)	—

*P <0.001.
†P <0.05.
OR indicates odds ratio; 95% CI, 95% confidence interval.

Sexually Transmitted Infections

The prevalence of the 5 other STIs is as follows: HSV-2 (n = 180, 79%), 1°/2° syphilis (n = 2, <1%), trichomoniasis (n = 84, 37%), chlamydia (n = 25, 11%), and gonorrhea (n = 5, 2%). Excluding HIV, the mean number of STIs was 1.3 (SD 0.7; range 0–3). Few women knew they were currently infected: HSV-2 (n = 16, 7%), 1°/2° syphilis (n = 1, <1%), trichomoniasis (n = 6, 3%), chlamydia (n = 8, 4%), and gonorrhea (n = 4, 2%), despite the fact that 76 (33%) women reported receiving medical care in last 30 days and two-thirds (64%) had received care in the past 3 months.

HIV-infected women were significantly more likely to have multiple positive test results than uninfected women (Table 2). However, HIV-infected women were no more likely than uninfected women to report STI symptoms (21% vs. 26%, P = 0.50). Excluding HIV therapy, none of the HIV-infected women and only 1 uninfected woman reported having been treated for STIs in the 6 months before interview.

Sex Practices and Partnerships

The majority (190% or 83%) of women were sexually active in the last 30 days: 163 (71%) women reported sex exclusively with men, 15 (7%) reported sex exclusively with women and 12 (5%) reported sex with both men and women. Almost three-quarters (n = 129, 74%) of 175 women who were sexually active with men reported inconsistent condom use. There were no significant differences in sexual activity or condom use between HIV infected and uninfected women (Table 3).

In the past 30 days, women reported 2.6 male sex partners on average (SD 8, median 1.0; range 0–100); no differences in the mean (or median) number of male sex partners between HIV infected and uninfected women were observed (mean 2.5 vs. 2.7, P = 0.89; median 1 vs. 1, P = 0.89). Moreover, there were no differences in the mean (or median) number of male sex partners not known to be HIV infected between HIV-infected and uninfected women (mean 2.0 vs. 2.6, P = 0.46; median 1 vs. 1, P = 0.50), although HIV-infected women were more likely to report sex with male partners known to be HIV infected. The only other significant in sex practices observed was current participation in sex work: HIV-infected women were more likely to report current sex exchanges than uninfected women (P = 0.05). This remained true for women who knew themselves to be HIV infected (38% vs. 20%, P = 0.03).

Thirty-Day Drug Use Practices

Recent drug use practices by HIV status are described in Table 4. Almost one-third of women (73 or 32%) reported daily hard drug use (i.e., crack, heroin or cocaine) in the past 30 days, and 61 (27%) used crack daily. Few (9%) women currently injected drugs, though 43 (19%) indicated a lifetime history of intravenous drug use; 12 (32%) HIV-infected women reported a history of intravenous drug use. Alcohol and marijuana use were ubiquitous in this population: 164 (72%) women drank alcohol and 186 (82%) smoked marijuana in the 30 days before interview. Just over half (n = 124, 54%) of the women had a history of attending drug treatment programs.

Correlates of the Index of Infection

A linear regression model was developed to examine the correlates of the Index of Infection in addition to HIV status. Variables considered in model development were sociodemographic measures, sex practices, STI symptoms, and drug use practices. In univariate analyses, only age and crack use were associated with the Index of Infection, though 3 additional variables satisfied model development criteria (P <0.20) and were included in preliminary modeling (i.e., number of male sex partners, age as a continuous variable and sex work; daily hard drug use was not included because of a high correlation with crack use). Univariate relationships between the potential risk factors examined and the Index of Infection, as well as the final statistical model are presented in Table 5. Crack use, but not HIV status, was significantly associated with the Index of Infection.

Discussion

Almost one-fifth (17%) of the women in this study who are vulnerable to both acquiring and transmitting STIs were HIV infected. HIV-infected women were significantly more likely than uninfected women to screen positive for multiple STIs (other than HIV). The overwhelming majority of women were currently sexually active; almost all women sexually active with men had partners not known to be HIV infected and consistent condom use was rare. HIV-infected women were similar to uninfected women in sex practices and partnerships, with the notable exception of sex work in which almost twice as many HIV-infected women reported participation. Current crack use was the only significant correlate of screening positive for multiple STIs after controlling for other risk factors thought to contribute to STI positive status, including HIV seropositive status.

A range of STIs seem to be endemic in this population: 4 in 5 women screened positive for HSV-2, 2 in 5 for trichomoniasis and nearly 1 in 5 for HIV. Although HIV-infected women were significantly more likely than uninfected women to screen positive for multiple STIs, only 17% of HIV-seronegative women screened negative for all STIs examined in this study. In fact, 3 quarters of HIV-seronegative women were seropositive for HSV-2. HSV-2 has been strongly implicated in the acquisition of HIV and re-

TABLE 2. Sexually Transmitted Infections (STIs) and Symptoms of 228 Urban Black Women Who Use Drugs

	N (%)			
	HIV+ (N = 38)	HIV− (N = 190)	OR (95% CI)	*P*
STI				
HSV-2				
+	36 (94.7)	144 (75.8)	5.8 (1.3–24.8)	0.009
−	2 (5.3)	46 (24.2)	—	—
1°/2° syphilis				
+	1 (2.6)	1 (0.5)	5.1 (0.0–191.9)	0.20
−	37 (97.3)	189 (99.5)	—	—
Trichomonas				
+	20 (52.6)	64 (33.7)	2.2 (1.1–4.4)	0.03
−	18 (47.4)	126 (66.3)	—	—
Chlamydia				
+	2 (5.3)	23 (12.1)	0.4 (0.09–1.8)	0.27
−	36 (94.7)	167 (87.9)	—	—
Gonorrhea				
+	1 (2.6)	4 (2.1)	1.3 (0.1–11.6)	1.00
−	37 (97.4)	186 (97.9)	—	—
Symptoms				
Sores, ulcers or rash in genital area				
Yes	2 (5.3)	9 (4.7)	1.1 (0.2–5.4)	1.00
No	36 (94.7)	181 (95.3)	—	—
Abnormal discharge				
Yes	6 (15.8)	29 (15.3)	1.0 (0.4–2.7)	0.93
No	32 (84.2)	161 (84.7)	—	—
Genital soreness, swelling or painful sex				
Yes	4 (10.5)	21 (11.0)	0.9 (0.3–2.9)	1.00
No	34 (89.5)	169 (89.0)	—	—
Burning or difficulty urinating				
Yes	1 (2.6)	8 (4.2)	0.6 (0.1–5.1)	1.00
No	37 (97.4)	182 (95.8)	—	—
Vaginal odor				
Yes	2 (5.3)	23 (12.1)	0.4 (0.1–1.8)	0.27
No	36 (94.5)	167 (87.9)	—	—
Index of Infection*				
Multiple STIs				
0 STIs	1 (2.6)	32 (16.8)		0.01
1 STI	14 (36.9)	85 (44.8)	8.6†	—
2 or more STIs	23 (60.5)	73 (38.4)	—	—
Mean number of STIs (SD)	1.6 (0.6)	1.2 (0.8)	−2.99‡	0.002

*Excluding HIV infection.
†Chi square.
‡*t* value.
OR indicates odds ratio; 95% CI, 95% confidence interval.

search suggests it may facilitate HIV transmission as well.[13,27] Effective, relatively low-cost HSV-2 suppressive therapy is currently available; however, most women were unaware of their HSV-2 seropositive status, although many reported symptoms. This was also true of trichomoniasis, for which treatment is inexpensive, of short duration, and curative.[28] A high prevalence of STIs has also been documented in other research conducted among subgroups of the population who use drugs.[8,29–31] Even more troubling is the fact that two-thirds of women reported receiving medical care in the past 3 months. Although women reported accessing health care, there seems to be no concerted effort by practitioners to address sexual health, a particularly shocking fact in light of surveillance statistics that document a high prevalence of HIV and all other reportable STIs in this community[2] (J. Schillinger, MD, NYC DOHMH, October 11, 2007, personal communication).

The majority of women in this study were sexually active and at levels higher than other comparable cohorts of black women who use crack cocaine.[20] Moreover, there were few differences in sex risk between HIV-infected and uninfected women, with the exception of greater sex work participation by HIV-infected women. Although there is clearly a need for intervention, the outcomes of sex risk reduction interventions for HIV-seropositive women have been mixed, documenting both increased[32–34] and decreased sex risk.[35] Crack use has been implicated in sex risk in this research; over half of the women in this study reported current crack use. Although some research suggests that crack is no longer the public health issue that it once was,[36] it was found to be uniquely and strongly associated with screening positive for multiple STIs in this study. This suggests that crack use remains a localized but intransigent public health problem that may contribute to sustaining STI epidemics. Moreover, crack use deserves special attention

TABLE 3. Thirty-Day Sex Practices and Partner Characteristics of 228 Urban Black Women Who Use Drugs

	Subjects No. (%)		
	HIV+ (N = 38)	HIV− (N = 190)	OR (95% CI)
Orientation (self-report)			
Lesbian/bisexual	10 (26.3)	44 (23.2)	1.2 (0.5–2.6)
Heterosexual	28 (73.7)	146 (76.8)	—
Sexually active with male sex partner			
Yes	28 (73.7)	147 (77.4)	0.8 (0.4–1.8)
No	10 (26.3)	43 (22.6)	—
Condom use with male partners			
Inconsistent	17 (44.7)	112 (59.0)	0.6 (0.3–1.1)
Consistent/no partners	21 (55.3)	78 (41.0)	—
≥2 male sex partners			
Yes	14 (36.8)	66 (34.7)	1.1 (0.5–2.3)
No	24 (63.2)	124 (65.3)	—
Any HIV− (or unknown status) male partners			
Yes	25 (65.8)	147 (77.4)	0.6 (0.3–1.2)
No	13 (34.2)	43 (22.6)	—
Any HIV+ male partners			
Yes	6 (15.8)	4 (2.1)	8.7 (2.3–32.6)*
No	32 (84.2)	186 (97.9)	—
Sex for money or drugs			
Yes	13 (34.2)	38 (20.0)	2.1 (1.0–4.4)†
No	25 (65.8)	152 (80.0)	—
New sex partners (past 3 mo)			
Yes	9 (23.7)	41 (21.7)	1.1 (0.5–2.6)
No	29 (76.3)	148 (78.3)	—

*P <0.001.
†P ≤0.05.
OR indicates odds ratio; 95% CI, 95% confidence interval.

TABLE 4. Thirty-Day Drug Use Practices of 228 Urban Black Women

	Subjects No. (%)		
Variable	HIV+ (N = 38)	HIV− (N = 190)	OR (95% CI)
Crack use			
Yes	32 (84.2)	101 (53.2)	4.7 (1.9–11.8)*
No	6 (15.8)	89 (46.8)	—
Heroin use			
Yes	21 (55.3)	78 (41.0)	1.8 (0.9–3.6)
No	17 (44.7)	112 (59.0)	—
Other cocaine use			
Yes	10 (26.3)	47 (24.7)	1.1 (0.5–2.4)
No	28 (73.7)	143 (75.3)	—
Daily hard drug use			
Yes	18 (47.4)	55 (29.0)	2.2 (1.1–4.5)*
No	20 (52.6)	135 (71.0)	—
Daily marijuana use			
Yes	8 (21.0)	74 (39.0)	0.4 (0.2–1.0)*
No	30 (79.0)	116 (61.0)	—
Current intravenous drug use			
Yes	6 (15.8)	14 (7.4)	2.4 (0.8–6.6)
No	32 (84.2)	176 (92.6)	—
Current drug treatment			
Yes	8 (21.0)	46 (24.2)	0.8 (0.4–1.9)
No	30 (79.0)	144 (75.8)	—

*P <0.05.
OR indicates odds ratio; 95% CI, 95% confidence interval.

because over the past 2 decades it has devastated the primarily black, low-income communities where its use is most prevalent and likely accounts at least in part for the disparities seen not only in health, but also in the crime, violence, and poverty that fuels both drug use and the sex trade.[37]

The spatial clustering of STIs in well-defined geographical locations has increasingly become a focus in prevention planning.[38,39] This study sought to determine if STIs clustered at the individual level in a geographically well defined community of high HIV and STI prevalence. As hypothesized, HIV-infected women were significantly more likely than uninfected women to test positive for multiple STIs. This finding suggests that both the source and the means of epidemic potential and maintenance may be quite concentrated. Multiply infected individuals may represent members of core groups that constitute reservoirs of infection within geographical locations of STI clustering.[40,41]

Core group members with multiple STIs may be identified through increased STI testing. In addition to improved STI screening procedures at medical settings in high prevalence communities, prevention strategies that include screening at nonclinical settings could contribute significantly to the disruption of STI and HIV transmission. In fact, women in this study who returned for their test results reported a 6-fold increase in STI treatment over time, even in the absence of on-site treatment.[42] Rapid point of care tests and treatment implemented in novel settings, including those where street based sex workers and their clients may be found, could disrupt STI transmission.[43,44] Moreover, this approach is consistent with national recommendations for HIV-infected individuals.[45] However, and in addition, it will be necessary to address the extensive substance use problems that often occur in tandem with STI epidemics, in order to effectively disrupt disease transmission.[46]

Much of the data used in this cross-sectional study are based on self-report and, therefore, should be interpreted with caution. Although these data do not directly address the increase in biologic synergism that may occur with multiple STIs, multiply STI-infected individuals are expected to experience at least the transmission potential established for those who are coinfected with HIV and one other STI. The Index of Infection developed for this analysis is a simple risk indicator and does not differentiate among viral, bacterial or parasitical STIs, which each have different capabilities for increasing HIV transmission potential. Therefore, it is difficult to determine if transmission is mediated by biologic factors, increased exposure to infection through sex work, or simply through the high background STI prevalence, (of predominantly asymptomatic individuals), that increases all individual's risk of acquiring (or transmitting) STIs. The 30-day risk assessment period provides a snapshot of risk and may be a conservative estimate of sex mixing patterns. Although a variety of strategies were used to access women in this hidden community, future research efforts should consider other recruitment methodologies,[47,48] as well as conducting multisite studies to increase sample size and diversity.

Several STIs, including HIV, seem to be endemic among black women who use drugs in this community. Many women were coinfected with multiple STIs, particularly those who

TABLE 5. Correlates of the Index of Infection for 228 Urban Black Women Who Use Drugs

	Student *t* Test		Linear Regression Model	
	Index Mean (SD)	*P*	F Value	*P*
HIV status		0.002	—	—
Seropositive	1.6 (0.6)			
Seronegative	1.2 (0.8)			
Age		0.01	—	—
<30	1.4 (0.6)			
≤30	1.1(0.9)			
Income		0.87	—	—
≤$500/mo	1.3 (0.8)			
>$500/mo	1.3 (0.7)			
≥2 male sex partner		0.56	—	—
Yes	1.3 (0.8)			
No	1.3 (0.7)			
Sex work		0.14	—	—
Yes	1.4 (0.7)			
No	1.2 (0.8)			
STI symptoms		0.71	—	—
Yes	1.3 (0.7)			
No	1.3 (0.7)			
Daily hard drug use		0.17	—	—
Yes	1.4 (0.7)			
No	1.3 (0.8)			
Crack use		0.004	9.15	0.003
Yes	1.4 (0.6)			
No	1.1 (0.8)			
	Spearman Correlations	*P*		
Age	0.15	0.02		
Income	−0.05	0.45		
No. male sex partners	0.12	0.08		

were HIV seropositive. Therefore, in addition to the known geographical clustering of HIV and STIs, STIs were also found to cluster at the individual level. Although participation in high-risk sex practices with both higher- and lower-risk sex partners was common, few women knew themselves to be infected with STIs other than HIV. Core groups of multiply STI infected individuals may unknowingly but efficiently contribute to high STI incidence rates. Innovative methods to rapidly screen and treat STI-infected individuals may prove to be a cost-effective use of HIV prevention resources. In addition, the simultaneous provision of treatment for crack cocaine use is advisable, since crack use seems to exacerbate STI transmission potential.

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