

Factors Associated with Positive HIV Serostatus Among Women Who Use Drugs: Continued Evidence for Expanding Factors of Influence

KATHERINE P. THEALL, MPH^a
CLAIRE E. STERK, PhD^a
KIRK W. ELIFSON, PhD^b
DANIEL KIDDER, PhD^c

SYNOPSIS

Objective. To identify risk factors associated with positive HIV serostatus among African American women who smoke crack and/or inject drugs and who are not enrolled in drug treatment or another institutional setting.

Methods. Baseline interviews were conducted from June 1998 to June 2000 with 379 heterosexually active women (ages 18 to 59) who had been recruited for potential enrollment into an HIV intervention trial.

Results. Adjusted for age and drug using status, women who expressed more difficulty saying no to sex with male partners were more likely to be HIV-positive (adjusted odds ratio [aOR]=3.08, 95% confidence interval [CI] 2.02, 4.83). Similarly, those who indicated greater communication with casual sex partner(s) were less likely to test positive (aOR=0.29, 95% CI 0.10, 0.89). Lower HIV internal control and a history of cuts or burns on lips due to crack smoking were also associated with positive serostatus, and were important confounders in the final multivariate model. A higher level of internal control was associated with a decreased likelihood of positive serostatus, while a history of cuts or burns on the lips was associated with an increased likelihood of HIV antibodies, even after controlling for the amount of oral sex.

Conclusions. A broad array of factors may promote or avert infection with HIV. The degree to which personal attributes and beliefs, and relationship characteristics contribute to the likelihood of infection must continue to be addressed. The importance of oral sex and presence of oral sores and their potential role in transmission was suggested.

^aEmory University Rollins School of Public Health, Department of Behavioral Sciences and Health Education, Atlanta, GA

^bGeorgia State University, Department of Sociology, Atlanta, GA

^cOpinion Research Corporation Company (ORC Macro), Atlanta, GA

Address correspondence to: Claire E. Sterk, Emory Univ., Rollins School of Public Health, 1518 Clifton Rd. NE, Atlanta GA 30322; tel. 404-727-9124; fax 404-727-1369; e-mail <csterk@sph.emory.edu>.

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Despite numerous advances in human immunodeficiency virus (HIV) prevention, risk reduction, treatment, and other biological and epidemiological research, many populations continue to be affected by the HIV/AIDS epidemic. Women are increasingly at risk for HIV and AIDS in the United States and other geographic regions of the world. The percentage of AIDS cases among women in the U.S. has increased from 7% in 1986 to 26% in 2000, with African-American women accounting for almost two-thirds (63%) of all female AIDS cases.¹ Although a disproportionate burden of HIV and AIDS is reflected among African American women, all women may be at greater risk of contracting HIV due to a host of factors such as those related to transmissibility and sociocultural issues.²⁻⁵ It is important, in this stage of the epidemic, that we continue to identify factors that influence HIV transmission among women.

Salient HIV transmission risk behaviors have been identified, with injection drug use and heterosexual contact (e.g., unprotected sex, incidence of sexually transmitted infections) as the major exposure categories for women acquiring HIV.^{1,4,6} Among women in the U.S., the primary route of exposure for reported and diagnosed AIDS incidence in 2000 was heterosexual contact (38% reported and 64% diagnosed). The proportion of cases related to injection drug use reported and diagnosed among women was also substantial—25% and 33%.¹ Heterosexual and injection risk behaviors continue to play a role in transmission, and often occur in the same context.⁷ However, there is a need to address such factors separately for men and women, and to examine additional individual, interpersonal, and sociocultural influences for more effective interventions.^{2,4,8} Additional evidence for other routes of transmission (e.g., oral sex) must also be explored, particularly if individuals increase their sexual behavior while decreasing other, potentially riskier behaviors.⁹⁻¹⁰ Similarly, psychosocial determinants of risk behavior such as depression, physical and sexual abuse, or condom negotiation skills can play a key role in prevention and risk reduction efforts,¹¹⁻¹² particularly among women.^{6,13-15}

In the present study, we examine an array of factors and their association with HIV seropositivity among a group of African American women who are active crack cocaine smokers and/or injection drug users in an attempt to: (a) identify factors that may have played a role in transmission, and (b) determine which factors account for the greatest variance in seropositivity when all are considered in a multivariate model.

METHODS

Sample

Subjects were enrolled between June 1998 and June 2000 as part of a larger HIV risk reduction trial among HIV-negative, heterosexually active, African American women who use drugs.^{16,17} Women were recruited in inner-city neighborhoods in the city of Atlanta, Georgia, using street outreach techniques, including ethnographic mapping and targeted sampling.¹⁸ Recruitment communities were areas within the metropolitan area known for drug use, as demonstrated by epidemiological indicators and previous ethnographic studies.^{19,20}

To be eligible for recruitment, women had to be 18 years of age or older, reside in the one of the study communities, be out of drug treatment or any other institutional setting, be proficient in English, have had vaginal sex with a man at least once during the month prior to the interview, and be an active illegal drug user—measured as having smoked crack cocaine or having injected drugs at least three times in the 30 days prior to the baseline interview. HIV counseling and testing using Orasure (Epitope Inc., Beaverton, OR)²¹ were performed following the baseline interview, and women who tested positive were given appropriate referral and health information. The Emory University Human Investigations Committee and the Georgia State University Review Board reviewed treatment procedures. Participants were reimbursed \$15 for their participation in the interview.

The present analysis was based on the sample of women at baseline, before notification of HIV serostatus and randomization to intervention conditions (for HIV-negative participants). The sample consists of 379 African American female drug users, 46 (12%) of whom tested positive and the remaining 333 negative for HIV antibodies. According to past 90-day drug histories, 30 participants (8%) were injection-only drug users, 297 (78%) were non-injecting crack cocaine smokers, and 52 (14%) were injection drug users (IDU) who also smoked crack.

Measures

Data were collected using an instrument developed specifically for the study, based on formative research among a similar population of women.²² Participants provided information on demographics, general and reproductive health, sexual behavior, drug use, HIV-related information, and psychosocial characteristics, as well as information on abuse, victimization, and criminal activities. In addition to examining sociodemographic items, key variables addressing drug using behaviors, HIV characteristics, and sexual behaviors

were chosen for this analysis based on their possible association with HIV infection as identified in the existing literature.

Key drug using behaviors include: past 30-day cigarette use (number of cigarettes per day); alcohol use (number of days the subject had one or more alcoholic drinks); past 30-day use (yes/no) and injection (yes/no) of crack cocaine, powder cocaine, heroin, and speedball (heroin and cocaine combination, not limited to injection only,) and the average number of days used; the number of injections in the last 30 days; the number of injections with used needles/syringes in the last 30 days; the number of times drug using works/injection equipment or rinse water was shared in the past 30 days; ease of obtaining drug using works (yes, easy/no, not easy); use of drugs in a crack house or shooting gallery in the past 30 days (yes/no); the number of people drugs were shared/used with in the last 30 days; oral cuts, defined as cutting or burning lips while smoking crack in the past year (yes/no); and lifetime drug treatment of any type (yes/no).

HIV/AIDS-related characteristics examined included: the level of risk perception for contracting the virus (range 0 to 5: 0=no chance or 0%, 5=sure chance or 91–100%); lifetime HIV testing—ever (yes/no), and the number of times tested; level of HIV knowledge, ranging from 0 (no knowledge) to 7 (highly knowledgeable), and comprised of items covering issues of transmissibility, general symptomatology, and virus information; social closeness of HIV/AIDS, using knowing anyone with HIV or AIDS (yes/no) as an indicator of closeness; and internal and external health locus of control as related to HIV infection, derived from Rotter's internal-external locus of control.²³ Factor scores for locus of control were generated for two subscales: (1) Internal (ranging from 0 to 8=higher control), and (2) Powerful Others (ranging from 0 to 8=higher control). Internal control captures the belief that the locus of control for, in this case, contracting HIV is internal and that one stays or becomes healthy or sick as a result of her behavior. A sample item is, "my own behavior determines whether or not I get the HIV virus." Powerful Others refers to the expectancy that others play a role in her contracting HIV. For example: "whether or not I get the HIV virus depends on what my sex partner wants to do." The internal and external constructs have both been reported as valid and reliable measures.²⁴

Sexual behaviors examined included: the number of sex partners in the past year; the degree of difficulty saying no to sex with male sex partners (0=strongly disagree, 4=strongly agree); fidelity with steady partner, including whether or not they had ever cheated

on their partner (yes/no) and whether their most recent steady partner had ever been unfaithful to them (yes/no); and personalized norms regarding male condom use, including condom use self-efficacy and condom perception of attitudes toward the male condom. Condom use self-efficacy was based on eight items from Brafford and Beck's Condom Use Self-Efficacy Scale,²⁵ ranging from 0 to 32, with higher scores representing greater self-efficacy (Cronbach's $\alpha=0.88$). Condom perception represented the respondent's level of agreement with five statements about the male condom, which were adopted from Brown's Attitudes Toward Condom Scale²⁶ (Cronbach's $\alpha=0.74$). A higher score represented a more positive attitude toward the male condom (range, 0 to 20).

Additional sexual behavior items included: the number of vaginal and oral sex partners by partner type (main, casual, or paying) in the last 30 days (yes/no and number of partners); male condom use by partner type for vaginal and oral sex in the last 30 days (ranging from never=0 to always=4); the number of times of vaginal, oral, or anal sex 30 days prior to interview, regardless of partner type; having any type of sex in the last 30 days while high (ranging from never=0 to always=4); the frequency of sex with an injection drug user (IDU) or a man who may have had sex with another man (MSM) (both ranging from never=0 to always=4); trading sex for crack, for other drugs, or for money (yes/no for each) 30 days prior to interview; the use of alcohol before sex (ranging from never=0 to always=4) in the last 30 days. Communication with most recent steady and casual partner(s) was also examined, and measures were derived from single item responses on communication (yes/no) with most recent partner about drug use, sexually transmitted disease (STD) history, HIV status, past sex partners, expectations for the relationship, finances, and opinion about monogamy. Scores for each scale ranged from 0 to 7 (high level of communication) and both exhibited sufficient reliability ($KR_{20}=0.82$ steady and 0.90, for casual partners).

Statistical analyses

Mantel-Haenszel chi-square or Fisher's Exact test of independence and one-way analyses of variance for continuous measures were used to identify factors associated with HIV-positive serostatus. Variables found to be marginally significant ($p<0.10$) in bivariate analyses were examined multivariately, as independent variables associated with the outcome—HIV-positive serostatus (positive=1, negative=0; $n=301$ due to missing data). Unconditional multivariate logistic regression was used to assess the independent contribution of

each independent variable in predicting positive HIV serostatus. Using a stepwise regression approach, variables were entered into multivariate models in domains of sociodemographic, drug using, HIV-related, and sexual behavior items. Variables within each domain were retained if they were statistically ($p < 0.05$) or marginally ($0.10 > p > 0.05$) significant, or were found to confound the relationship between other covariates and the outcome. At each step of multivariate analysis, Bonferroni adjustments were made to p -values to prevent any spurious findings due to the number of tests performed. Confounding was considered to be occurring when exclusion of a variable (or combination of variables) in the initial multivariate models resulted in a change of more than 10% in estimates of key factors already present in the model.

After retaining variables in each domain, a backward elimination approach was used to develop a best-fit regression model.²⁷ Hosmer-Lemeshow goodness-of-fit statistic ($n.s.$ = adequate fit), R -square estimates, crude and adjusted multivariate odds ratios, and 95 percent confidence intervals were used to quantify the

variation in estimates of all logistic models. The contribution to the explained variance (via estimated coefficients and R -square values) was also taken into account when evaluating models. Marginally significant ($0.10 > p > 0.05$) and statistically significant ($p < 0.05$) relationships are reported below.

RESULTS

Baseline sociodemographic characteristics of participants are presented in Table 1. Ages of respondents ranged from 18 to 59 years, with a mean age of 38. A substantial proportion of both HIV-positive (43%) and negative (33%) participants completed high school or obtained a GED. Approximately 40% of both positive and negative respondents were married or living as married. Roughly 50% in each group indicated that they had worked legally in the past year, and fewer than 10% percent in either category were homeless at baseline. HIV-positive and negative participants differed sociodemographically only on sexual orientation ($p < 0.05$) and being in prison or jail in the year

Table 1. Baseline sociodemographic characteristics of participants according to serostatus (N=379)

Study variables	n	Positive serostatus (n=46) Percent	Negative serostatus (n=333) Percent	p-value ^a
Sociodemographic				
Age	379			N.S.
18–29		8.9	12.4	
30–39		51.1	45.9	
40=		40.0	41.7	
Mean age ($\pm$ SD)	379	38.3 $\pm$ 6.5	38.0 $\pm$ 7.5	N.S.
Education	362			N.S.
<High school diploma		43.2	53.1	
High school diploma/GED		43.2	32.7	
Some college or college degree		13.6	14.2	
Married or living as married (% yes)	379	41.3	38.1	N.S.
Sexual orientation	378			<0.05
Heterosexual		78.3	87.7	
Homosexual		0.0	1.2	
Bisexual		21.7	11.1	
Worked legally, past year (% yes)	379	52.2	48.1	N.S.
In prison and/or jail in past year (% yes)	379	50.0	37.2	<0.10
Mean number of offensive acts ($\pm$ SD)	379	4.2 $\pm$ 2.6	4.5 $\pm$ 2.9	N.S.
Homeless (% yes) ^b	379	6.5	5.1	N.S.

n = number of participants who responded to the given item

N.S. = not significant

^a p -value for Mantel-Haenszel chi-square, Fisher's Exact, or one-way ANOVA test statistics where appropriate.

^b Defined as living on streets, shelter, or hotel.

prior to interview ($p<0.10$), with more positive respondents of bisexual orientation and in jail than negative respondents.

As shown in Table 2, participants who tested positive for HIV at baseline were more likely to have used crack in a crack house or shooting gallery 30 days prior to interview (67% vs. 57%; $p<0.10$) and to have experienced a cut or burn on lips due to crack use (42% vs. 28%; $p<0.01$). Among intravenous drug users (IDUs), HIV-positive participants were less likely to report it being easy to obtain clean works (43% vs. 64%; $p<0.05$), and reported greater frequency (i.e., number of days in last 30) of crack ($p<0.10$) and powder cocaine ($p<0.05$) injection.

Baseline HIV-related characteristics and sexual be-

havior are presented in Table 3. Respondents with positive serostatus were less likely to have ever been tested for HIV (83% vs. 93%; $p<0.05$), and demonstrated a lower level of internal control of whether or not she contracts HIV ($p<0.01$). Participants also differed in the extent of communication with most recent casual sex partner(s) about sensitive issues ($p<0.01$). HIV-positive respondents indicated a more positive attitude toward the male condom and reported more frequent use of the male condom for vaginal sex with casual paying and non-paying partners, but also reported more paying vaginal sex partners and expressed more difficulty saying no to male sex partners (see Table 3). HIV-positive participants also had a greater amount of oral and anal sex overall, and indi-

Table 2. Drug using behavior of participants according to serostatus (N=379)

Drug using behavior (last 30 days)	n	Positive serostatus (n=46) Percent	Negative serostatus (n=333) Percent	p-value ^a
Mean number of cigarettes per day ($\pm$ SD)	357	16.0 $\pm$ 14.1	15.4 $\pm$ 11.1	N.S.
Mean number of days had one or more alcoholic drinks ($\pm$ SD)	360	11.8 $\pm$ 12.0	14.5 $\pm$ 12.6	N.S.
Use of: ^b				
Crack (% yes)	379	93.5	92.5	N.S.
Mean number of days crack ($\mu \pm$ SD)		16.3 $\pm$ 10.4	16.8 $\pm$ 10.4	N.S.
Powder cocaine (% yes)	379	26.1	17.2	N.S.
Mean number of days cocaine ($\mu \pm$ SD)		3.2 $\pm$ 8.1	1.8 $\pm$ 6.3	N.S.
Heroin (% yes)	379	17.4	18.0	N.S.
Mean number of days heroin ($\mu \pm$ SD)		2.2 $\pm$ 7.1	3.3 $\pm$ 8.5	N.S.
Speedball (% yes)	379	13.0	12.3	N.S.
Mean number of days speedball ($\mu \pm$ SD)		2.5 $\pm$ 7.8	2.0 $\pm$ 6.7	N.S.
Injection of: (% yes)				
Crack	379	6.5	1.0	<0.10
Powder cocaine	379	19.6	8.7	<0.05
Heroin	379	13.0	12.0	N.S.
Speedball	379	10.9	8.1	N.S.
Mean number of injections ($\mu \pm$ SD)	234	8.5 $\pm$ 20.3	17.5 $\pm$ 40.0	N.S.
Mean number of injections with used needles or syringes ($\mu \pm$ SD)	234	0.7 $\pm$ 2.3	0.7 $\pm$ 4.7	N.S.
Mean number of times shared works/water ($\mu \pm$ SD)	234	2.7 $\pm$ 7.4	1.4 $\pm$ 8.9	N.S.
Easy to get works (% yes)	103	43.8	64.4	<0.05
Used drugs in shooting gallery or crack house (% yes)	379	67.4	57.1	<0.10
Mean number of people shared/used drugs with ($\mu \pm$ SD)	363	1.6 $\pm$ 1.6	2.0 $\pm$ 1.6	N.S.
Cut or burned lips smoking crack (% yes)	362	42.2	27.8	<0.01
Ever in drug treatment (% yes)	379	45.7	58.9	N.S.

n = number of participants who responded to the given item

N.S.= not significant

^a p-value for Mantel-Haenszel chi-square, Fisher's Exact, or one-way ANOVA test statistics where appropriate.

^b May include non-injection routes of administration.

Table 3. Baseline HIV-related characteristics and sexual behavior of participants according to serostatus (N=379)

	n	Positive serostatus (n=46) Percent	Negative serostatus (n=333) Percent	p-value ^a
HIV-related characteristics				
Mean level of HIV risk perception ($\pm$ SD)	379	2.1 $\pm$ 1.6	1.9 $\pm$ 1.5	N.S.
Ever tested for HIV (% yes)	379	82.6	92.8	<0.05
Mean number of times tested for HIV ($\pm$ SD)	379	3.6 $\pm$ 4.8	4.6 $\pm$ 4.9	N.S.
Mean HIV internal locus of control ($\pm$ SD) ^b	379	4.7 $\pm$ 1.7	6.8 $\pm$ 1.5	<0.01
Mean HIV external locus of control ($\pm$ SD) ^b	379	5.6 $\pm$ 2.5	5.4 $\pm$ 2.5	N.S.
Mean level of HIV knowledge ($\pm$ SD)	379	5.1 $\pm$ 1.4	5.5 $\pm$ 1.2	N.S.
Know anyone with HIV (% yes)	379	63.0	100	N.S.
Sexual behavior and characteristics				
Mean number of sex partners, past year ($\pm$ SD)	379	12.9 $\pm$ 33.5	17.7 $\pm$ 52.6	N.S.
Condom use self-efficacy (0 to 32)	374	23.1 $\pm$ 4.2	23.4 $\pm$ 4.8	N.S.
Condom perception (0 to 20) ^b	377	13.8 $\pm$ 3.6	12.8 $\pm$ 3.9	<0.10
Difficulty saying no to male sex partner(s) ($\pm$ SD) ^b	376	2.5 $\pm$ 1.1	1.3 $\pm$ 1.0	<0.001
Ever cheated on steady (% yes)	375	69.6	72.0	N.S.
Steady ever cheat on you (% yes)	374	84.8	79.6	N.S.
Sexual behavior, past 30 days				
Number of partners (vaginal sex):				
Steady (≥ 1)	365	50.0	3.8	N.S.
Casual (≥ 1)	306	15.2	14.5	N.S.
Casual ($\mu \pm$ SD)	306	0.2 $\pm$ 0.4	0.2 $\pm$ 0.5	N.S.
Paying (≥ 1)	374	38.6	37.6	N.S.
Paying ($\mu \pm$ SD)	374	3.5 $\pm$ 9.7	2.7 $\pm$ 6.5	<0.01
Mean frequency of male condom use (vaginal sex): ($\mu \pm$ SD)				
Steady ($\mu \pm$ SD)	235	1.4 $\pm$ 1.6	1.2 $\pm$ 1.7	N.S.
Casual ($\mu \pm$ SD)	57	3.7 $\pm$ 0.8	2.4 $\pm$ 1.8	<0.05
Paying ($\mu \pm$ SD)	148	3.8 $\pm$ 0.6	3.1 $\pm$ 1.3	<0.05
Number of partners (oral sex):				
Steady (≥ 1)	357	19.6	22.8	N.S.
Casual (≥ 1)	357	2.2	4.5	N.S.
Casual ($\mu \pm$ SD)	357	0.2 $\pm$ 0.5	0.1 $\pm$ 0.3	N.S.
Paying (≥ 1)	356	23.9	23.1	N.S.
Paying ($\mu \pm$ SD)	356	1.8 $\pm$ 4.8	2.2 $\pm$ 6.5	<0.10
Mean frequency of male condom use (oral sex): ($\mu \pm$ SD)				
Steady ($\mu \pm$ SD)	86	1.6 $\pm$ 1.7	1.1 $\pm$ 1.7	N.S.
Casual ($\mu \pm$ SD)	19	0.0 $\pm$ 0.0	2.3 $\pm$ 1.9	N.S.
Paying ($\mu \pm$ SD)	93	2.6 $\pm$ 1.3	3.0 $\pm$ 1.3	N.S.
Total amount of: ^c				
Vaginal sex ($\mu \pm$ SD)	374	3.4 $\pm$ 5.9	4.3 $\pm$ 5.6	N.S.
Oral sex ($\mu \pm$ SD)	357	2.0 $\pm$ 5.7	1.8 $\pm$ 4.7	<0.10
Anal sex ($\mu \pm$ SD)	82	0.8 $\pm$ 2.2	0.03 $\pm$ 0.3	<0.01
Context of sex:				
Frequency of sex while high ($\mu \pm$ SD)	379	2.2 $\pm$ 1.1	1.9 $\pm$ 1.0	<0.05
Frequency of sex with IDU ($\mu \pm$ SD)	376	0.4 $\pm$ 0.9	0.8 $\pm$ 1.4	<0.10
Frequency of sex with MSM ($\mu \pm$ SD)	372	0.1 $\pm$ 0.5	0.1 $\pm$ 0.3	N.S.
Sex for crack (% yes)	361	52.3	44.2	N.S.
Sex for other drugs (% yes)	361	6.8	10.4	N.S.
Sex for money (% yes)	361	65.9	70.0	N.S.
Frequency of alcohol before sex ($\mu \pm$ SD)	307	1.8 $\pm$ 1.4	1.4 $\pm$ 1.3	<0.10

continued

Table 3 (continued). Baseline HIV-related characteristics and sexual behavior of participants according to serostatus (N=379)

	n	Positive serostatus (n=46) Percent	Negative serostatus (n=333) Percent	p-value ^a
Mean level of communication with:				
Steady partner(s) ($\mu \pm$ SD)	363	5.5 $\pm$ 1.9	5.2 $\pm$ 2.3	N.S.
Casual partner(s) ($\mu \pm$ SD)	302	2.5 $\pm$ 2.6	3.6 $\pm$ 2.7	<0.01

^ap-value for Mantel-Haenszel chi-square, Fisher's Exact, or one-way ANOVA test statistics where appropriate.

^bHigher levels of internal or external HIV control = greater control; higher levels of perception = more negative attitude toward the male condom; difficulty saying no to partners, 0=strongly disagree to 4=strongly agree.

^cNumber of times vaginal, oral, or anal sex was had, regardless of partner type.

n = number of participants who responded to the given item

IDU = injection drug users

MSM = man who may have had sex with another man

cated a greater frequency of having sex while high or using alcohol before sex compared to those who tested negative for HIV.

Various psychosocial measures such as self-esteem and depression were evaluated, but are not presented here since we found that these measures did not vary by HIV status.

Multivariate results

The results of the final multivariate logistic model, with serostatus as the dependent variable, are presented in Table 4. All items included in the final multivariate model, including age and past 90-day drug using status, were found to be important contributors in the model (confounders or significantly associated with status). Factors associated with positive serostatus among the women in our sample included the level of HIV internal locus of control, ease of saying no to male sex partners, having a cut or burn on lip due to crack smoking, and the degree of communication with most recent casual partner about sensitive issues.

Women who had more self or internal control in their contracting HIV were less likely to be HIV-positive than those with lower levels of control (aOR=0.80), although this difference was only marginally significant ($p<0.10$). Respondents who felt more difficulty saying no to male sex partners were more likely to have a positive serostatus (aOR=3.08; $p<0.001$). Similarly, the likelihood of positive serostatus decreased with every increase in the level of communication with most recent casual sex partner(s) (aOR=0.29; $p<0.05$). Furthermore, women who cut or burned lips in the previous year from crack smoking were more likely to be HIV-positive than those who did not (aOR=2.05; $p<0.10$), even after controlling for the total amount of oral sex (see Table 4).

The final multivariate logistic model shows that the data provide a good fit ($p<0.05$ for Hosmer-Lemeshow test statistics) and that the items retained explain a substantial proportion of the variance in positive HIV serostatus (psuedo R -square=0.34).

DISCUSSION

This study contrasted sociodemographic, sexual, drug using, and HIV-related characteristics between HIV-positive and negative active female drug users. Results highlight the importance of considering (e.g., in prevention research) an array of factors that may promote or avert infection with HIV—in particular, the degree to which personal attributes and beliefs, and relationship characteristics (sexual or other) may contribute to the likelihood of infection. Furthermore, the significance of oral sex and presence of oral sores and the potential role in transmission was revealed.

Although the risk of infection from orogenital sex is low and difficult to assess,^{28,29} the role of oral sex, predominantly receptive oral sex, in HIV transmission should not be discounted, especially if many individuals may increase the amount of oral sex as opposed to vaginal sex as a method of HIV prevention.^{9,10,30,31} HIV is present in semen³² and pre-ejaculatory fluid³³ of HIV-infected men, and oral sores may facilitate HIV transmission by acting as a gateway for infected cells.³⁴ The association between oral sores, crack cocaine use, and HIV risk has been suggested,^{35–37} since many individuals who use crack often experience cuts, burns, sores, or blisters on their lips and in the oral cavity from crack smoking paraphernalia.^{38,39} Injection drug users may also experience oral sores for a variety of reasons¹⁰ and, like many non-injecting female crack smokers, they may frequently be involved in sex work

Table 4. Factors associated with HIV-positive serostatus—results from final multivariate logistic model

	HIV-positive serostatus (n=301) ^a	
	Crude odds ratio	Adjusted odds ratio (95% CI)
Age (years)	1.01	1.02 (0.96, 1.08)
Drug using status ^b		
IDU only	0.84	0.6 (0.13, 3.54)
CCU only	1.18	0.38 (1.10, 3.49)
IDU/CCU (referent)		
HIV internal locus of control ^c	0.75 ^d	0.80 (0.70, 1.05) ^e
Difficulty saying no to sex partners ^f	2.58 ^g	3.08 (2.02, 4.69) ^g
Cut or burned lips from smoking crack	1.90 ^h	2.05 (0.90, 4.83 0) ^e
Communication with casual sex partner(s) ⁱ	0.83 ^d	0.29 (0.10, 0.89 0) ^h
Amount of oral sex, regardless of partner type ^j	1.07 ^e	0.99 (0.92, 1.07)
Equation statistics:		
–2 log likelihood		1.45 ^g
Hosmer-Lemeshow goodness-of-fit		4.25 (N.S.)
Max-rescaled R-square		0.34

^aUnconditional Maximum Likelihood Estimation logistic model^bParticipants who reported in the past 90 days: injection only (IDU), crack cocaine smoking only (CCU), injection drug use and crack smoking (IDU/CCU, or smoking IDUs).^cHigher levels of internal HIV control = greater control.^d $p < 0.01$ ^e $p < 0.10$ ^fDifficulty saying no to partners, 0=strongly disagree to 4=strongly agree.^g $p < 0.001$ ^h $p < 0.05$ ⁱHigher levels of communication = greater communication with casual partner(s).^jAmount of oral sex = number of times had oral sex, regardless of partner type.

and engage in receptive oral sex.^{38,40} All of the women in our sample were crack smokers and/or IDUs, and those who experienced cuts or burns on the lips due to crack smoking were more likely to test positive for HIV antibodies at baseline. This univariate association held, albeit not as strongly, in multivariate analyses even after controlling for the amount of oral sex. Although we were unable to determine whether the oral sex was receptive or the frequency of cuts or burns, results highlight the important role oral sex may play in HIV transmission.

Results also underscore the need to address individual beliefs and attitudes in HIV prevention and risk reduction campaigns, particularly as they relate to relationship characteristics. An inability to say no to male sex partners was the strongest predictor of positive serostatus among the women in our sample. Women who expressed more difficulty saying no were more

likely to be HIV-positive. Similarly, those who indicated greater communication with casual sex partner(s) were less likely to test positive. The ability to negotiate and communicate with sexual partners must remain a primary focus of prevention efforts among women.⁴ Findings also suggest that internal beliefs surrounding HIV transmission play an important role and must also be addressed in prevention campaigns. Women who expressed more internalized control (e.g., believing that their own behavior influences their risk) in their likelihood of contracting the virus were less likely to be positive at baseline.

Many of the presumed risk factors for HIV were not statistically different between seropositive and negative participants. Such factors include the frequency of injection with used needles or sharing of injection works and water, and having sex with an IDU. Although the sample did include injection drug users,

the proportion of IDUs compared to crack cocaine-smoking non-IDUs was small. This may have affected the association between serostatus and many previously documented IDU-related risk factors. Participants did differ on their use of the male condom for vaginal sex with casual paying and non-paying partners, but with positive respondents reporting more frequent use for these partners in general. However, they also reported more paying vaginal sex partners and had a greater amount of oral and anal sex overall compared to those who tested negative for HIV. Based on findings of this analysis, it appears that sexual risk behavior (e.g., frequency of sex, number of sexual partners) may have played a greater role in HIV infection than did injection-related behavior, and this is probably due to the characteristics of the sample.

Despite significant findings, this study was not without limitations. Results were based on cross-sectional data, and we therefore cannot determine the direction of causality in positive serostatus. The data used were also based on self-reports, which may be affected by recall, social desirability, or additional types of bias. However, the types of drug using^{41,42} and sexual^{42,43} behaviors measured here have been consistently reported as both valid and reliable among similar populations. Due to the nature of the population, results may not be generalizable to all women at risk for HIV infection, but they do stress important factors related to HIV risk among women.

The degree of internal control in women's lives as it relates to HIV risk is an important consideration in HIV prevention and risk reduction efforts. Women who are unable to resist certain sexual acts due to drug use or other barriers, who are unable to negotiate condom use and safer sex, and who are unable to control their own drug behavior (e.g., likelihood of sharing needles, always being injected by partner, or being dependent on male partners for drugs) or to obtain clean drug using equipment are often rendered powerless to protect themselves against HIV infection. Prevention campaigns must strive to take into account the reality of the daily lives of women most at risk and the difficulties they may face in their own sexual, individual, social, and family lives.

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