

HIV Prevalence, Risk Behaviors, and High-Risk Sexual and Injection Networks Among Young Women Injectors Who Have Sex With Women

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Women injection drug users who have sex with women (WSW IDUs) constitute 20% to 30% of American women IDUs.¹ Compared with other women IDUs, WSW IDUs have higher HIV prevalence and incidence rates and a greater likelihood of engaging in high-risk injection and sexual practices with men.^{1–16}

Previous reports suggested that WSW IDUs may be particularly likely to engage in drug injection and sex with men who have sex with men (MSM)^{1,2,5,6,9,17–19} and to be subordinated and isolated within drug users' social milieus and more generally.^{1,20,21} Historical and generational factors may have changed some relationships as a consequence of the HIV epidemic itself, however. Ethnographic data from New York City and Boston, Mass, suggest that many older MSM IDUs and WSW IDUs who injected drugs together may have died earlier in the epidemic, which might reduce the extent to which WSW IDUs currently engage in drug injection and sex with MSM. To further examine HIV risk

TABLE 1—Association Between Being Women Injection Drug Users Who Have Sex With Women (WSW IDUs) and Selected Variables, Controlling for Recruitment Site: 6 Sites in 5 US Cities, July 1997–March 1999

	Odds Ratio (or Linear Regression Coefficient β)	95% Confidence Interval
Mean age	$\beta = -0.642$	-1.208, -0.076
Race/ethnicity		
White	1.245	0.893, 1.736
Black	0.835	0.533, 1.309
Hispanic	0.612	0.369, 1.013
Other	1.379	0.772, 2.461
Housing status		
Homeless, past 6 mos	1.772	1.275, 2.462
Lived on the street (park, bus or train station, under highway overpass, alleys, rooftops), past 6 mos	0.954	0.582, 1.564
Income		
Most money from state or federal benefits, welfare, or public assistance, past 6 mos	0.380	0.207, 0.697
Most money from selling sex, past 6 mos	1.888	1.270, 2.805
Completed high school or received general equivalency diploma	1.175	0.864, 1.597
Mean age at first injection	$\beta = -1.001$	-1.587, -0.415
Institutionalization experience		
Ever in mental health ward or facility	1.855	1.339, 2.571
Ever spent time in correctional facility, jail, juvenile detention center or juvenile hall, or prison	1.630	1.157, 2.295
In drug detoxification, drug treatment, or Narcotics Anonymous, past 6 mos	0.934	0.684, 1.276
Infections		
Hepatitis B core antibody positive	1.770	1.222, 2.563
Hepatitis C positive	0.921	0.660, 1.285
Chlamydia	0.753	0.365, 1.553
Gonorrhea	0.134	0.017, 1.037
HIV seropositive	1.828	0.987, 3.384
Site HIV prevalence, %		
≤ 10	1.129	0.433, 2.945
>10	2.636	1.175, 5.915
Risk and transmission behaviors, past 6 mos		
Injected at least daily	1.152	0.846, 1.570
Engaged in receptive syringe sharing	1.692	1.241, 2.306
Shared rinse water	1.540	1.135, 2.090
Backloaded	1.171	0.843, 1.628
Received money or drugs for sex	2.201	1.557, 3.112
Shared cooker	1.300	0.942, 1.792
Shared cotton	1.305	0.963, 1.768
Put drugs together at least half the time	1.205	0.868, 1.674
Obtained most syringes from a syringe exchange, past 6 mos	1.160	0.824, 1.633
Networks		
Ever injected with MSM IDU	2.792	1.900, 4.104
Ever had unprotected sex with MSM IDU	3.423	2.079, 5.636
Ever injected with WSW IDUs	5.133	3.629, 7.260

Continued

among WSW IDUs, we compared social situations, injection and sexual networks, and behaviors of young WSW IDUs with those of other young women IDUs.

METHODS

A post hoc analysis was conducted of data collected from July 1997 to March 1999 from street-recruited women IDUs (predominantly heroin and cocaine injectors) aged 18 to 30 years near 6 research sites in 5 US cities.^{22–24} Trained research staff conducted face-to-face interviews and collected blood and urine samples after obtaining informed consent.

Women who reported having had sex with a woman during the preceding 6 months or who self-identified as lesbian or bisexual were classified as WSW ($n=274$). Classifications as WSW or non-WSW could be made for 803 participants. Proportions of WSW among women IDUs varied by site (20%–54%). Because sites also varied on many other variables, statistical analyses controlled for site.

Because predictors of HIV seroconversion among IDUs (and, therefore, prevalence among new injectors) differ by local prevalence,⁵ we analyzed HIV serostatus separately within 4 sites with HIV prevalence lower than 6% in the total sample and within 2 sites with HIV prevalence greater than 10%.

The questionnaire covered sociodemographic characteristics and sexual and drug-using behaviors and partnerships, usually for the 6 months before the interview. Sera were tested for antibody against HIV-1, hepatitis B virus, and hepatitis C virus; urine was tested for chlamydia and gonorrhea with ligase chain reaction.^{22–24}

RESULTS

Of the 803 women IDUs, 45% reported having been homeless in the prior 6 months, and 28% reported having received money for sex during this period. Controlling for site, WSW IDUs were slightly younger than non-WSW IDUs (Table 1). WSW IDUs were more likely to have been recently homeless, to have ever been institutionalized in a men-

TABLE 1—Continued

Ever injected with an IDU who was at least 5 years older	1.599	1.149, 2.224
Ever injected with anyone who had hepatitis	1.764	1.154, 2.699
Ever had sex with an IDU	1.734	1.163, 2.587
Ever had sex with someone you knew or thought had HIV	2.504	1.547, 4.053
Ever injected with anyone who had HIV	1.422	0.933, 2.169
Ever had sex with someone you knew or thought had AIDS	1.831	0.857, 3.912
Ever had sex with someone you knew or thought had hepatitis B or C	1.165	0.737, 1.840
Ever had sex with someone you knew or thought had gonorrhea	2.127	0.917, 4.936
Ever had sex with someone you knew or thought had chlamydia	1.584	0.853, 2.941
Mean no. of male sex partners	$\beta = 10.596$	1.519, 19.673

Note. MSM = men who have sex with men. Backloading refers to injecting drugs using drugs from another user's syringe.

tal health facility, and to have ever been incarcerated. They were less likely to receive most of their income from welfare, a relatively stable income source for young IDUs, and more likely to receive most of their income from selling sex.

WSW IDUs were more likely to have positive test results for hepatitis B virus (but not for hepatitis C virus, chlamydia, or gonorrhea) and were more likely to be infected with HIV in high-prevalence, but not low-prevalence, sites. WSW IDUs were more likely to engage in high-risk behaviors (receptive syringe sharing, sharing rinse water, and sex trading) and reported having more male sexual partners. WSW IDUs were more likely to report having unprotected sex with MSM; having sex with an IDU or someone they knew or thought was infected with HIV; and injecting drugs with MSM, WSW IDUs, someone at least 5 years older, and someone who "had hepatitis." They were more likely to have ever injected drugs with MSM in low-HIV-prevalence, but not high-HIV-prevalence, sites.

Significant associations were analyzed further, controlling for both site and receiving money or drugs for sex (Table 2). WSW IDUs remained significantly more likely to have been institutionalized, to have been homeless, to have engaged in receptive syringe sharing, to have shared rinse water, and to have had high-risk partners (such as MSM IDUs, older IDUs, WSW IDUs, and IDUs who had HIV or hepatitis) in their injection and sexual networks. In high-HIV-

prevalence sites, WSW IDUs were more likely to have injected drugs with a person who is HIV positive (adjusted odds ratio = 3.95) and to be HIV seropositive (adjusted odds ratio = 2.55).

DISCUSSION

Compared with other young women IDUs, WSW IDUs were more likely to have been institutionalized or homeless, to have engaged in riskier behaviors, to have had high-risk sexual and injection networks (as described in the previous paragraph), and to have been anti-hepatitis B virus-positive. In high-HIV-prevalence sites, they were more likely to have been infected with HIV. These differences cannot be accounted for by their greater involvement in sex work.

Interpretation must take account of study limitations. Some data, including questions used to define WSW IDUs, were collected for other purposes. Analyses of interactions by site, sometimes limited by small cell numbers, indicate local variation in some relationships. Underreporting of same-sex sexual behavior or other variables may affect statistical associations. Reporting bias may have occurred if WSW IDUs were more likely than the non-WSW IDUs to know that their male injection or sexual partners have had sex with men.

Studies of drug users and other populations^{2,25–30} should consider sexual identity and sex between women, which may help ex-

plain variations in homelessness, institutionalization, behavior, networks, and infection rates. Research and interventions targeting IDUs should incorporate issues of sexual identity and same-sex sexual behaviors among women and find ways to deal with related social and economic issues. ■

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Contributors

S.R. Friedman conceived of the brief and wrote it. D.C. Ompad, C. Maslow, and T. Perlis worked on analyses and interpretation. R. Young, P. Case, and A. Hollibaugh, who were part of an ethnographic study of women injection drug users who have sex with women, contributed to the initial conception for the brief and also to the analyses. S.M. Hudson, T. Diaz, E. Morse, S. Bailey, and D.C. Des Jarlais were site representatives for this multisite project and also provided constant feedback as we wrote the brief. R.S. Garfein was the Centers for Disease Control project officer for the multisite project; he was deeply involved in writing the questionnaire, in other aspects of study design, and in the process of writing the brief.

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TABLE 2—Adjusted Odds Ratios and Confidence Intervals for Association Between Being Women Injection Drug Users Who Have Sex With Women (WSW IDUs) and Selected Dependent Variables, Controlling for Site, and Having Traded Sex for Money or Drugs in the Past 6 Months: 6 Sites in 5 US Cities, July 1997–March 1999

Dependent Variable	Adjusted Odds Ratio	95% Confidence Interval
Personal characteristics		
Most money from selling sex, past 6 mos	1.093	0.665, 1.797
Ever spent time in a correctional facility, jail, juvenile detention center or juvenile hall, prison, mental health ward of hospital, mental health facility, or other institution	1.686	1.151, 2.470
Ever incarcerated	1.525	1.074, 2.164
Ever in mental health ward or facility	1.747	1.253, 2.435
Homeless, past 6 mos	1.755	1.257, 2.451
Risk behaviors		
Engaged in receptive syringe sharing	1.690	1.234, 2.316
Shared rinse water	1.549	1.360, 2.112
Shared cotton	1.309	0.962, 1.783
Mean no. of male sexual partners	$\beta = 3.505$	-5.145, 12.154
Risk networks		
Ever injected with anyone who had hepatitis	1.680	1.093, 2.580
Ever injected with another IDU who was at least 5 years older	1.423	1.016, 1.994
Ever injected with other WSW	4.923	3.466, 6.992
Ever had sex with an IDU	1.726	1.152, 2.586
Ever injected with MSM IDU	2.824	1.910, 4.177
Ever had unprotected sex with MSM IDU	3.470	2.088, 5.767
Ever had sex with someone you knew or thought had HIV	2.207	1.353, 3.601
Ever injected with someone who had HIV	1.298	0.844, 1.996
Ever had sex with someone you knew or thought had AIDS	1.479	0.679, 3.218
Ever had sex with someone you knew or thought had chlamydia	1.713	0.727, 4.037
Infections overall		
Hepatitis B core antibody positive	1.548	1.059, 2.263
HIV seropositive ^a	1.607	0.857, 3.013
In the 2 sites with HIV prevalence >10%		
Ever injected drugs with a person who was HIV positive	3.951	1.463, 10.672
HIV seropositive	2.548	1.120, 5.797
In the 4 sites with HIV prevalence <10%		
Ever injected drugs with a person who was HIV positive	1.018	0.632, 1.640
HIV seropositive ^a	0.865	0.323, 2.318

Note. MSM = men who have sex with men.

^aData for New Orleans, La, were omitted from the analyses of HIV prevalence because the lack of any infected subjects from that location led to quasi-complete separation in the estimates.

References

- Young RM, Friedman SR, Case PL, Asencio MW, Clatts M. Women injection drug users who have sex with women exhibit increased infection and risk behaviors. *J Drug Issues*. 2000;30:499–524.
- Solarz A, ed. *Lesbian Health: Current Assessment and Directions for the Future*. Washington, DC: National Academy Press; 1999.
- Bevier PJ, Chiasson MA, Heffernan RT, Castro KG. Women at a sexually transmitted disease clinic who reported same-sex contact: their HIV seroprevalence and risk behaviors. *Am J Public Health*. 1995;85:1366–1371.
- Ehrhardt AA, Noestlinger C, Meyer-Bahlburg HFL, Exner TM. Sexual risk behavior among women with injected drug use histories. *J Psychol Hum Sexuality*. 1995;7:99–119.
- Friedman SR, Jose B, Deren S, Des Jarlais DC, Neaigus A. Risk factors for human immunodeficiency virus seroconversion among out-of-treatment drug injectors in high and low seroprevalence cities. The National AIDS Research Consortium. *Am J Epidemiol*. 1995;142:864–874.
- Friedman SR, Curtis R, Neaigus A, Jose B, Des Jarlais DC. *Social Networks, Drug Injectors' Lives, and HIV/AIDS*. New York, NY: Kluwer Academic/Plenum Publishers; 1999.
- Harris NV, Thiede H, McGough JP, Gordon D. Risk factors for HIV infection among injection drug users: results of blinded surveys in drug treatment centers, King County, Washington 1988–1991. *J Acquir Immune Defic Syndr*. 1993;6:1275–1282.
- Jose B, Friedman SR, Neaigus A, et al. Syringe-mediated drug-sharing (backloading): a new risk factor for HIV among injecting drug users. *AIDS*. 1993;7:1653–1660.
- Lemp GF, Jones M, Kellogg TA, et al. HIV seroprevalence and risk behaviors among lesbians and bisexual women in San Francisco and Berkeley, California. *Am J Public Health*. 1995;85:1549–1552.
- Reardon J, Wilson MJ, Lemp GF, et al. HIV-1 infection among female injection drug users (IDU) in the San Francisco Bay Area, California 1989–1991. In: Program and abstracts of the VIII International Conference on AIDS; July 19–24, 1992; Amsterdam, the Netherlands. Abstract ThC1553.
- Ross MW, Wodak A, Gold J, Miller ME. Differences across sexual orientation on HIV risk behaviours in injecting drug users. *AIDS Care*. 1992;4:139–148.
- Williams ML, Elwood WN, Weatherby NL, et al. An assessment of the risks of syphilis and HIV infection among a sample of not-in-treatment drug users in Houston, Texas. *AIDS Care*. 1996;8:671–682.
- Deren S, Estrada AL, Stark M, Goldstein M. Sexual orientation and HIV risk behaviors in a national sample of injection drug users and crack smokers. *Drugs Soc*. 1996;9:97–108.
- Kral AH, Lorrwick J, Bluthenthal RN, Watters JK. HIV risk profile of drug-using women who have sex with women in 19 United States cities. *J Acquir Immune Defic Syndr Hum Retrovirol*. 1997;16:211–217.
- Weissman G. Drug use patterns among gay and bisexual men and lesbians in a national study. Paper

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Human Participant Protection

Potential participants in the study received information about the study and provided informed consent in the local study office or mobile van. They were also given a small honorarium for their time and travel after completion of an interview. Face-to-face interviews were then conducted by trained research staff; thereafter, with informed consent, blood was drawn for testing. Institutional review boards for the Centers for Disease Control and Prevention and for each local site approved the study and its procedures.

presented at: National Gay and Lesbian Health Forum; July 19, 1990.

16. Young RM, Weissman G, Cohen JB. Assessing risk in the absence of information: HIV risk among women injection-drug users who have sex with women. *AIDS Public Policy J.* 1992;7:175–183.
17. Case P, Downing M, Ferguson B, Lorvick J, Sanchez L. The social context of AIDS risk behavior among intravenous drug using lesbians in San Francisco. In: Program and abstracts of the IV International Conference on AIDS; June 12–16, 1998; Stockholm, Sweden. Abstract ThC1553.
18. Young RM. Methodology at the margins: researching lesbian health. Paper presented at: 121st Annual Meeting of the American Public Health Association; October 24–28, 1993; San Francisco, Calif. Abstract 1170.
19. Hollibaugh RM, Vazquez C. The myth of invulnerability: lesbians and HIV disease. *FOCUS: A Guide to AIDS Research and Counseling.* 1994;8:1–4.
20. Cochran SD, Mays VM. Depressive distress among homosexually active African American men and women. *Am J Psychiatry.* 1994;151:524–529.
21. Zierler S, Krieger N. Reframing women's risk: social inequalities and HIV infection. *Annu Rev Public Health.* 1997;18:401–436.
22. Latka M, Ahern J, Garfein RS, et al. Prevalence, incidence, and correlates of chlamydia and gonorrhea among young adult injection drug users. *J Subst Abuse.* 2001;13(1–2):73–88.
23. Kapadia F, Vlahov D, Des Jarlais DC, et al. Does bleach disinfection of syringes protect against hepatitis C infection among young adult injection drug users? *Epidemiology.* 2002;13:738–741.
24. Diaz T, Vlahov D, Greenberg B, Cuevas Y, Garfein R. Sexual orientation and HIV infection prevalence among young Latino injection drug users in Harlem. *J Womens Health Gender-Based Med.* 2001;10:371–380.
25. Aaron DJ, Markovic N, Danielson ME, Honnold JA, Janosky JE, Schmidt NJ. Behavioral risk factors for disease and preventive health practices among lesbians. *Am J Public Health.* 2001;91:972–975.
26. Cochran BN, Stewart AJ, Ginzler JA, Cauce AM. Challenges faced by homeless sexual minorities. *Am J Public Health.* 2002;92:773–777.
27. Gilman SE, Cochran SD, Mays VM, Hughes M, Ostrow D, Kessler RC. Risk of psychiatric disorders among individuals reporting same-sex sexual partners in the National Comorbidity Survey. *Am J Public Health.* 2001;91:933–939.
28. Gruskin EP, Hart S, Gordon N, Ackerson L. Patterns of cigarette smoking and alcohol use among lesbians and bisexual women enrolled in a large health maintenance organization. *Am J Public Health.* 2001;91:976–979.
29. Mays VM, Yancey AK, Cochran SD. Heterogeneity of health disparities among African American, Hispanic, and Asian American women: unrecognized influences of sexual orientation. *Am J Public Health.* 2002;92:632–639.
30. Meyer IH. Why lesbian, gay, bisexual, and transgender public health? *Am J Public Health.* 2001;91:856–859.

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2. Carol Goodenow, Laura A. Szalacha, Leah E. Robin, Kim Westheimer. 2008. Dimensions of Sexual Orientation and HIV-Related Risk Among Adolescent Females: Evidence From a Statewide Survey. *American Journal of Public Health* **98**:6, 1051-1058. [[Abstract](#)] [[Full Text](#)] [[PDF](#)] [[PDF Plus](#)]
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