Sexual and Injection Risk among Women who Inject Methamphetamine in San Francisco

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ABSTRACT *Methamphetamine (MA) use is on the rise in the United States, with many cities reporting increases of 100% or more in MA-related Emergency Department (ED) mentions. Women are keeping pace with this trend: in 2003, 40% of ED mentions and 45% of MA-related treatment admissions were female. Although there have been extensive examinations of MA use and HIV/STI risk among gay men in recent years, literature regarding female MA users is scarce. This paper examines female methamphetamine injectors in San Francisco, CA, from 2003–2005. We assessed sexual and injection related risk behaviors, comparing female MA injectors to female injectors of other drugs. We also examined whether MA use was independently associated with specific sexual and injection risk behaviors. We found that female MA injectors were significantly more likely than non-MA injectors to report unprotected anal intercourse, multiple sexual partners, receptive syringe sharing and sharing of syringes with more than one person in the past six months. In multivariate analysis, MA use among female injectors was significantly associated with anal sex, more than five sexual partners, receptive syringe sharing, and more than one syringe-sharing partner in the past six months. Deeper exploration of the relationship between MA use and sexual risk among women would benefit HIV/STI prevention efforts. In addition, existing interventions for drug-injecting women may need to be adapted to better meet the risks of female MA injectors.*

KEYWORDS *Female injectors, Injection risk, Methamphetamine, Sexual risk*

INTRODUCTION

There is a growing concern regarding methamphetamine (MA) use in the United States. In recent years, MA use has spread from the West Coast to the South and the East, with many cities reporting increases of over 100% in MA-related emergency department (ED) mentions.¹ Women are keeping pace with national trends of increasing MA use. In 2003, females accounted for 40% of stimulant-related ED visits^{1,2} and 45% of MA-related treatment admissions in the United States.³ Between 2002 and 2003, MA-related treatment admissions for women rose 30%.² MA has been a prevalent drug of abuse on the West Coast for decades,^{4,5} and the Drug Enforcement Administration considers MA the “primary drug threat” in the state.⁶ In California, the rate of MA-related treatment admissions is double that of

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the nation as a whole.³ Among women in California, MA-related treatment admissions rose 35% between 2000 and 2002.² In San Francisco, the number of MA-related ED mentions among females increased 66% from 2000 to 2002.⁷

Numerous studies have been published since 2001 establishing links between MA use, unsafe sex and HIV/STI transmission among gay men in urban areas. Associations have been found between MA use and unprotected anal intercourse (UAI),^{8–10} UAI with HIV+ or unknown-status partners,^{11,12} multiple sexual partners,^{10,13} sexual disinhibition,^{8,14} HIV prevalence^{15,16} and STI incidence^{13,15,16} among gay/bisexual men.

Less abundant is research investigating links between MA and risk behavior among urban heterosexuals, injection drug users (IDUs) and/or women. In a study of heterosexual, non-injection drug users at publicly funded HIV test sites, Molitor et al.¹⁷ found that MA users had more sexual partners and were less likely to use condoms than non-MA users. Among women, MA use was independently associated with unprotected anal sex, unprotected vaginal sex, sex work and self-reported history of STIs. The self-reported prevalence of STIs in the past two months among heterosexual MA users was 28% and 29% in two studies by Semple.^{18,19} Results were not differentiated by gender. A study of out-of-treatment IDUs from the 1990s²⁰ found that female MA injectors engaged in significantly more acts of vaginal intercourse than female heroin injectors and used condoms with a smaller proportion of male partners. There were no differences between the two groups of women in the prevalence of anal sex or sex work. Among heterosexual IDUs, some studies have found syringe sharing more prevalent among heroin users,^{21,22} and other studies found sharing more prevalent among MA users.^{20,23}

Semple et al.²⁴ recently published a paper specifically on the topic of female MA users and sexual risk in San Diego. The women ($n = 98$) were participants in a sexual risk reduction intervention for MA-using heterosexuals. In the two months prior to baseline interview, the median number of sex partners was 7.8. The mean number of acts of unprotected vaginal sex was 27.1 and of unprotected anal sex was 6.7. Overall, 40% of the sample reported anal sex in the past 2 months, and 83% of anal sex encounters were unprotected.

These emerging findings, coupled with the rise of MA use among women in the U.S., indicate a need for greater examination of MA use and risk behavior. This paper examines MA use and infectious disease risk behavior among a street-recruited sample of female IDUs in San Francisco. Like Semple and colleagues, we seek to address the relative dearth of published findings regarding women who use MA. This paper focuses specifically on female MA injectors and includes findings relevant to both sexual and injection-related risk.

METHODS

Data presented here are from the Urban Health Study (UHS), a serial cross-sectional study of street-recruited IDUs in San Francisco. From 1986 until 2005, UHS conducted semi-annual “waves” of data collection, totaling 600–800 IDUs every 6 months. Respondents in each wave were recruited from four inner-city neighborhoods using targeted sampling methods.²⁵ After providing informed consent, research participants were interviewed in a one-on-one session using a standardized questionnaire with items on drug use, risk behavior and demographics. Participants were also tested for HIV, given pre- and post-testing counseling and

referrals as appropriate. Blood specimens were analyzed for HIV antibodies using enzyme immunoassay; positive specimens were confirmed using Western blot assay.²⁶ Study participants were paid \$15 for contributing to the research. For this analysis, we included women from five semi-annual cross-sections from 2003 to mid-2005. Duplicates were eliminated, leaving a sample of 477 female, street-recruited IDUs. The University of California, San Francisco Institutional Review Board approved all study procedures.

Outcome Variables

The sex risk outcome variables were unprotected vaginal intercourse, defined as any vaginal intercourse with a male partner without a condom in the past six months; anal intercourse, defined as any anal intercourse with a male partner in the past six months; unprotected anal intercourse, defined as any anal intercourse with a male partner without a condom in the past six months; and multiple sexual partners in the past six months, defined as five or more sexual partners of any type (casual, steady, paying) or gender. Women who reported no sex with male partners in the past six months were excluded from analyses of vaginal and anal sex. The injection risk outcome variables were “receptive” syringe sharing, defined as an answer greater than zero to the question, “In the last six months, how many times did you inject using works you know had been used by somebody else (including a close friend or lover),” and “distributive” syringe sharing, defined as an answer greater than zero to the question, “In the last six months, how many times did you give or loan needles that you had used to someone else who then used them (including a close friend or lover).” An additional injection risk variable was self-report of receptive and/or distributive sharing with more than one person in the past six months.

Statistical Analysis

In data analysis, we assessed whether female MA injectors had higher odds than other female IDUs of reporting various sex and injection risks. MA injectors were defined as women who reported any methamphetamine injection in the past six months. Other injectors were defined as women who reported injecting drugs, but not methamphetamine, in the past six months. All bivariate analyses testing differences between MA injectors and other female IDUs used the chi-square test or Fisher’s exact test, with $P < 0.05$ as the criterion for statistical significance. All variables that were statistically significant in bivariate analyses were candidates for the selection procedure in the multivariate models. Multivariate models were created using stepwise logistical regression analysis, forcing MA injection into each model. We then removed, one at a time according to the highest p -value, variables that were no longer independently statistically significantly associated with the outcome at the $P < 0.05$ level. Main effects were also tested for effect modification by creating interaction variables that were tested at $P < 0.05$ level. All statistics were computed using Statistical Analysis System software version 8.02 for Windows (SAS Institute Inc, Cary, NC).

RESULTS

Descriptive and demographic characteristics of the sample are provided in Table 1, which compares women who injected MA in the past six months to women who

TABLE 1 Characteristics of female MA injectors and non-MA injectors in San Francisco, CA 2003–2005 (*N* = 477)

Characteristic	MA injectors (<i>n</i> = 158) %	Non-MA injectors (<i>n</i> = 319) %	Total (<i>n</i> = 477) %
Age*			
Under 30	16	7	10
30–49	76	66	68
50 or older	8	28	21
Race/ethnicity*			
White	54	30	38
African American	22	42	35
Latino	6	12	10
Native American	6	5	6
Other	12	11	11
Sexual orientation*			
Lesbian	9	5	6
Bisexual	27	14	18
Heterosexual	63	81	75
Has steady sexual partner	56	50	52
Homeless	65	55	58
HIV-positive	9	11	10
HCV-ab positive (self-report)	75	74	73
Injected heroin past 6 months*	67	97	87
Injected speedball past 6 months*	55	39	44
Used crack past 30 days	66	75	72
Drank alcohol past 30 days	40	49	46
Drank alcohol daily	19	24	23
Injected daily or more	66	64	65

**P* < 0.05.

injected other drugs, but not MA. Overall, a third of the sample reported MA injection. MA injectors were significantly more likely to be under 30 years old, more likely to be White and more likely to identify as lesbian or bisexual than non-MA injectors. Overall, the sample had a high prevalence of homelessness and self-reported HCV infection.

Polydrug use was common among both MA injectors and non-MA injectors (Table 1). MA injectors were less likely to use heroin but more likely to use speedballs (heroin + cocaine mixture) than non-MA injectors. Prevalence of crack and alcohol use did not differ significantly between the groups. Median frequency of use in the past six months did not vary significantly between MA injectors and non-MA injectors for heroin, speedball, crack or alcohol. The median number of injections past 30 days was significantly higher among MA injectors (median = 23; interquartile range [IQR] = 14,31) than non-MA injectors (median = 19; IQR = 8,27).

With the exception of unprotected vaginal intercourse, sexual risk behavior was significantly more prevalent among female MA injectors than non-MA injectors (Table 2). Injection risk was also more prevalent among MA-injectors than non-MA injectors (Table 2). MA-injecting women were more likely than non-MA injectors to engage in receptive syringe sharing (using a needle after somebody else) and to share syringes with more than one person in the past six months.

TABLE 2 Risk behavior among female MA injectors and non-MA injectors in San Francisco, CA 2003–2005 (N = 477)

(Past 6 months)	MA injectors (n = 158) %	Non-MA injectors (n = 319) %	Total (n = 477) %
Unprotected vaginal intercourse	60	61	60
Anal intercourse*	22	11	14
Unprotected anal intercourse*	16	8	11
Sex for money or drugs*	50	31	38
≥5 sexual partners*	33	14	20
Receptive syringe sharing*	35	20	25
Distributive syringe sharing	27	19	22
Shared with >1 person*	27	14	18

*P < 0.05.

To assess whether MA injection was independently associated with sex risk, we conducted a number of bivariate and multivariate analyses (Table 3A). Only women who reported having one or more male sexual partners in the past six months (N = 352) were included in outcomes for vaginal and anal sex. There was no statistically significant association between unprotected vaginal sex and MA injection in bivariate (Odds Ratio [OR] = 1.4; 95% Confidence Interval [CI] = 0.97, 2.1) or multivariate analysis (Adjusted OR [AOR] = 1.1; 95% CI = 0.97, 2.1). MA injection was significantly associated with anal sex in bivariate (OR = 2.5; 95% CI = 1.5, 4.3) and multivariate analysis (AOR = 2.3; 95% CI = 1.3, 4.1), controlling for younger age and having a steady sexual steady partner. In bivariate analysis, MA injection was associated with unprotected anal sex (OR = 2.49; 95% CI = 1.37, 4.50). However, after controlling for age, alcohol use in the past 30 days, steady sex partner and sex with both men and women in the past six months, MA injection did not remain significantly associated with unprotected anal intercourse (AOR = 1.9; 95% CI = 0.96, 3.7). The odds ratio for MA injection was reduced significantly because it was highly correlated with the covariate of age; younger age had a strong association with unprotected anal sex. Odds of having had more than five sexual partners in the past 6 months were significantly higher among MA injectors than non-MA injectors in both bivariate (OR = 3.1; 95% CI = 1.9, 4.9) and multivariate analysis (AOR = 2.3; 95% CI = 1.3, 3.9), controlling for age, white race, homeless-

TABLE 3A Bivariate and multivariate analyses of the association of MA use with sex risk

Risk (past 6 months)	Odds ratio (95% C.I.)	Adjusted odds ratio (95% C.I.)
Unprotected vaginal	1.4 (0.97, 2.1)	1.1 (0.66, 1.8) ^a
Any anal	2.5 (1.5, 4.3)	2.3 (1.3, 4.1) ^b
Unprotected anal	2.5 (1.4, 4.5)	1.9 (0.96, 3.7) ^c
>5 sexual partners	3.1 (1.9, 4.8)	2.3 (1.3, 3.9) ^d

^aControlled for age (over 50), injected daily and steady sexual partner

^bControlled for age (30–39) and steady sexual steady partner

^cControlled for age (30–39), any alcohol use past 30 days, both female and male sex partners past 6 months and steady sex partner

^dControlled for age over 50, white race, homelessness, daily alcohol use, both female and male partners past 6 months and number of times injected past 30 days.

TABLE 3B Bivariate and multivariate analyses of the association of MA use with syringe sharing

Risk (past 6 months)	Odds ratio (95% C.I.)	Adjusted odds ratio (95% C.I.)
Receptive syringe sharing	2.2 (1.4, 3.6)	1.8 (1.1, 2.9) ^a
Distributive syringe sharing	1.5 (.97, 2.4)	1.2 (.71, 1.95) ^b
Shared w/ >1 person	2.3 (1.4, 3.7)	1.4 (.84, 2.4) ^c

^aControlled for African American race, homelessness, alcohol use past 30 days, drug treatment past year, female sex partners only past 6 months, male and female sex partners past six months

^bControlled for African American race, homelessness, alcohol use past 30 days and number of injections past 30 days

^cControlled for age over 50, African American race, homelessness and number of times injected past 30 days.

ness, daily alcohol use, sex with both men and women, and frequency of injection in the past 30 days.

Examining injection risk (Table 3B), MA injection was associated with receptive syringe sharing in bivariate (OR = 2.2; 95% CI: 1.4, 3.4) and multivariate analysis (AOR = 1.8; 95% CI: 1.1, 2.9) after controlling for African American race, homelessness, alcohol use in the past 30 days, drug treatment in the past year, female sex partners only in the past six months, and male and female partners in the past six months. MA injection was not significantly associated with distributive syringe sharing in bivariate (OR = 1.5; 95% CI: 0.97, 2.4) or multivariate analysis (AOR = 1.2; 95% CI = 0.71, 1.9). MA injection was associated with having more than one syringe-sharing partner in the past six months in bivariate analysis (OR = 2.3; 95% CI = 1.4, 3.7) but not in multivariate analysis (AOR = 1.4; 95% CI = 0.84, 2.4) after controlling for age over 50, African American race, homelessness and frequency of injection in the past 30 days.

DISCUSSION

Our paper makes a contribution to the literature by addressing an understudied yet sizable population involved in the rising trends of MA use—women. In addition, in terms of the study of female drug injectors, we show there are important differences between women who inject MA and women who inject other drugs. The findings in this paper indicate that women who inject MA in San Francisco engage in a range of sexual and injection behaviors that may have deleterious health outcomes, such as HIV, sexually transmitted infections (STI's) and viral hepatitis. Although the relationship between MA use and sexual risk has been extensively examined among gay and bisexual men, this is one of the few studies to explore these associations among women. In multivariate analysis, MA injection was independently associated with higher odds of anal sex and multiple sexual partners. Of particular importance is a better understanding of the relationship between MA use and heterosexual anal sex. Unprotected heterosexual anal sex puts women at risk for STI's more typically suffered by gay men, such as rectal gonorrhea, and is a more efficient mode of HIV transmission than vaginal sex. An important aspect of sexual risk behavior among women MA users may be the relationship between MA use, sexual disinhibition and sexual pleasure. Semple et al.²⁴ found a correlation between intensity of MA use and positive experiences of sex among women. A

better understanding of the links between pleasure, sexual disinhibition and MA use will contribute to efforts to reduce sex risk among MA-using women.

We also found that MA injection among female IDUs was associated with injection risks, specifically receptive syringe sharing and sharing with more than one person in the past six months. It is not immediately apparent why MA injecting women would be more likely to use other people's syringes than other female IDUs, especially after controlling for potential confounding variables such as homelessness and frequency of injection. Syringe exchange programs are widely available in SF, and the vast majority of women in our sample reported attending them. The persistence of injection risk among some MA injecting women indicates a need to situate these risk behaviors within a broader context that addresses issues specific to women and MA use. Specific factors that may relate specifically to aspects of MA use include 'speed runs' (binges), disinhibition, or MA-induced disorganization. Or there may be other aspects of MA use that lead to lack of control over the circumstances of injection. Drug dependence, poverty, and gender are powerful factors that may interact to shape the risk behavior of women, especially those without stable housing or income. As described by Epele,²⁷ everyday violence under conditions of gender inequality and scarcity of resources create multiple threats and dangers for women. In the context of life on the street, HIV may be secondary in the hierarchy of risk. Increased odds of HIV risk suggest that women in our sample may be experiencing other forms of risk that take precedence. A more nuanced understanding of the circumstances of risk behavior can lead to the adaptation or development of specific strategies to increase the safety of MA-injecting women.

In San Francisco and many other cities, HIV prevention efforts for heterosexual IDUs are oriented towards heroin users. With the rise of MA use, it is important to review strategies, such as outreach, HIV testing and counseling, and syringe exchange programs, and modify them to better serve the needs of MA users. In this sample, female MA users were younger than heroin injectors, more likely to be white, and over one-third identified as lesbian or bisexual. To be successful, HIV prevention strategies and messages need to appropriately target MA users. In addition, the context of MA use—and associated risks—appears to be substantially different from that of heroin use. For example, the apparent relationship between MA and sex risk indicates a need for greater emphasis on STI screening and more discussion about safer anal sex in heterosexual encounters.

This study has several important limitations, some related to the fact that data were not collected specifically for the purpose of understanding female MA injectors. The criterion used for MA injector (any MA injection past six months) is broad, and results may reflect a spectrum of use from monthly or less to daily or more. Sexual and injection risk data would be more illustrative if they were more directly linked to MA use, e.g., if risk behavior information included whether or not subjects were 'high' on speed at the time of risk. Similarly, these data would better indicate the potential for HIV exposure if we had information on the types of partners with whom risk behavior occurred. Not all the women in this sample are at equal risk for HIV; for example, women with bisexual male partners are potentially at greater risk than women with heterosexual male partners. In addition, there are many important mediating factors that influence the risk of female injectors, such as interpersonal violence, history of abuse, and mothering responsibilities,^{28–32} that have proven important in other studies but which are not included in this dataset. Except for HIV status, data in this paper are based on self-report and therefore are subject to recall bias and social desirability effects.

Participants were recruited using non-random sampling techniques, which means findings cannot be generalized to female MA injectors in general.

This paper provides evidence of important associations between MA injection and sexual risk among female IDUs. It also indicates that injection risk is higher among female MA injectors than non-MA injectors. The study points to a need for a more focused and nuanced understanding of the relationship between MA use, sex risk and injection risk among women to facilitate the development of strategies to reduce transmission of HIV, hepatitis and STI's among female MA injectors.

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