

# Variations in Sexual Risks in Drug Users: Emerging Themes in a Behavioral Context

*David D. Celentano, ScD, MHS, Amanda D. Latimore, MA,  
and Shruti H. Mehta, PhD, MPH*

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## Corresponding author

David D. Celentano, ScD, MHS  
Department of Epidemiology, Johns Hopkins Bloomberg School of  
Public Health, 615 North Wolfe Street (Suite E-6547), Baltimore,  
MD 21205, USA.  
E-mail: dcelenta@jhsph.edu

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Drug users are an especially complex population among those studied in HIV risk behavior research. Although injection drug use accounts for over one third of the cumulative HIV transmission in the United States, the scope of the direct and indirect impacts of all drug use is difficult to quantify, especially in relation to attributing HIV to drug use directly, via parenteral exposures, or indirectly, through unsafe sex. Important behavioral issues such as social and drug network overlaps, partner selection, and the combinations of illicit drugs with erectile dysfunction medications have added complexity to the study of sexual behavior in drug users. This review covers recent substantive research in the United States and Canada on current themes in sexual risk behavior in injection drug and non-injection drug users. We address gender, situational, and sexual preference factors that may influence sexual behaviors affecting HIV risk by class of drug and route of administration. Special attention is paid to minority populations, both sexual and racial/ethnic, as their marginalized role in contemporary society places special barriers to risk reduction.

## Introduction

In the early years of the HIV epidemic, the sexual risks experienced by drug users were ignored. Only recently have researchers noted that drug users may acquire HIV sexually. Because the primary route of HIV transmission among injection drug users (IDUs) was parenteral, the research community failed to investigate the role of sexual behavior in HIV transmission among injectors. The advent of crack use in the early 1990s changed this perspective, with the recognition that women were rapidly acquiring HIV due to transactional sex.

Sexual risks associated with drug use vary by the type of drug used and route(s) of administration, gender, and types of sexual interactions. In a recent cross-sectional, event-based study of drug users, those who smoked or injected amphetamines or heroin were less likely to use condoms at their last sexual encounter, whereas no associations were observed for cocaine, marijuana, and amphetamine by ingestion [1••]. Drug use during a recent sexual encounter was associated with decreased condom use in men but not women. It is evident that “drug” use is far too generic a term to fully address the complexities of “sexual risks.”

Until recently, it was difficult to ascertain whether risky sex was antecedent to or a result of drug use, or if both behaviors were concomitantly associated with other factors. This difficulty was partly the result of the research methods used (largely cross-sectional designs) and the complexity in studying these dynamic associations. Researchers have begun to disentangle these relationships, taking into account confounding and temporal considerations using longitudinal cohort studies. Several key studies of IDUs have reported factors related to sexual risk rather than drug use practices as the leading predictors of HIV seroconversion [2,3]. This review covers recent North American research by addressing current themes of sexual risk behavior in drug users; within each type of drug administration, the article addresses gender, situational, and sexual preference factors that may influence sexual behavior.

## Injection Drug Users

Male and female IDUs represent an estimated 17% and 26%, respectively, of those living with HIV/AIDS in the United States today [4]. Although parenteral frequency is the primary driver of HIV acquisition, IDUs acquire and transmit HIV and sexually transmitted infections (STIs) sexually as well. Holmberg et al. [2,5] suggest that IDUs account for more than half of all HIV seroconversions each year due to direct and indirect transmission. Despite knowledge of their HIV-positive status, one quarter (26%) of IDUs reported unprotected sex, partially attributed to initiation of highly active antiretroviral therapy.

In addition, longitudinal studies of IDUs have demonstrated associations between HIV incidence and sexual risk factors such as male same-sex contact, history of STIs [2,6••], and sex with an IDU [7].

### Heterosexual males

Inconsistent condom use is common among heterosexual male IDUs and serves as a bridge for transmission to non-IDU sexual partners. Among a sample of heterosexual IDUs, only 12% of men with a main partner and 17% of men with multiple partners reported consistent condom use [8•]. Male IDU characteristics associated with consistent condom use vary by sexual partner type, but having peers engaged in sexual risk reduction, involvement in IDU risk reduction [9], and perceived support from partners [8•] have been described. Inverse associations also have been observed between condom use and needle sharing with sexual partners and intimate partner violence [8•] among IDUs.

Numbers of sexual partners may also alter drug-related HIV risk. Younger age, injecting daily, less education, shooting gallery attendance, injecting cocaine, and same-sex activity were predictive of HIV seroconversion in a large prospective cohort study [2]. Those with one or more partners had a reduced risk of HIV seroconversion, a finding that could be the result of greater drug dependence by those without sexual partners and the social support conferred by having a sexual partner [2]. Alternatively, those with only one sexual partner could potentially share injection equipment with a smaller number of people [7]; note that differential risk for those with one or multiple partners could not be determined.

Among newly initiated male IDUs, sex with other men, African American race, younger age, and needle sharing in the past 6 months were associated with HIV infection [10]. As expected, recently initiated IDUs had a higher prevalence of hepatitis C virus than did non-IDUs (55.23% vs 3.04%); however, a higher prevalence of syphilis antibodies was observed in non-IDUs (4.38%) compared with IDUs (1.48%), results indicative of sexual transmission [10]. New IDUs are often initiated into injection by older IDUs, who have a higher prevalence of STIs, and sexual mixing of younger IDUs with older IDUs [11,12] has also been implicated in seroconversion and as a bridge for sexual transmission to non-IDUs [11].

Male sex workers comprise a population whose risk is a neglected area in HIV risk research. In a longitudinal study of male IDUs in Canada, 11% of the men reported sex trade at baseline, which was associated with HIV serostatus, injecting cocaine, smoking crack, inconsistent condom use with casual partners, and frequent reports of borrowing syringes [13].

### Men who have sex with men

In 2008, the Centers for Disease Control and Prevention reported that 46% of HIV/AIDS diagnoses between 2001

and 2006 were in men who have sex with men (MSM) and 4% were in MSM engaging in injection drug use [14]. Overall, 6% of MSM reported any injection for nonmedical purposes and 2% reported injection in the prior 12 months [15]. MSM IDUs visit shooting galleries [16] and share needles [17] more frequently than non-MSM. Incident HIV was 2.5 times greater for male IDUs who had sex with men [2] and MSM were 8.8 times more likely than heterosexual men to seroconvert in a case-control study in San Francisco [3]. HIV prevalence is markedly higher among MSM IDUs than male IDUs who do not report sex with men (47% vs 8%) [10], suggesting an important epidemiologic risk factor.

### Females

Female IDUs acquire HIV from risky sex and drug use. In a sample of drug users, female IDUs had a 13% higher incidence than non-IDUs of syphilis, gonorrhea, and *Chlamydia* infection, STIs not directly transmitted by injection drug use [18•]. Recent cohort studies have refined our understanding of the relationship between risky sexual behavior and drug use, particularly among women. After accounting for confounding, Strathdee et al. [10] demonstrated that sexual risk, not drug use behavior, was an independent predictor of HIV incidence in female IDUs. A recent STI, an indicator of risky sexual behavior, more than doubled the HIV seroconversion rate in IDUs (rate ratio, 2.52; 95% CI, 1.39, 4.58), whereas in men, drug-related behavior and having sex with other men were important risk factors for HIV seroconversion [2], highlighting the different mechanisms by which men (via drug and male-to-male sex risks) and women (via heterosexual sex risks) acquire HIV. Among recently initiated IDUs, HIV prevalence was higher in females than males (12% vs 6%); HIV prevalence was associated with having an IDU sex partner, having had an STI, and initiating sex before age 15 in women but not men [10].

In a nested case-control study of IDUs, Kral et al. [3] found that HIV risk in women was primarily attributable to sexual risks, as sex trade in the previous year (adjusted odds ratio [AOR], 5.10; 95% CI, 1.90–13.70) was the strongest predictor of HIV seroconversion. Having a steady sex partner who also injected drugs was protective against HIV seroconversion (AOR, 0.32; 95% CI, 0.11–0.92), suggesting that sexual transmission among closed networks reduced risk. Multiple sex partners may confer a risk for female IDUs above and beyond the risk associated with the injection drug use history of their sexual partners. Female IDUs with steady sexual partnerships may be less likely to have other risky sexual or drug-related behavior [3]. Moreover, high-frequency sex trade (exchanging money or drugs with 50 or more partners in the past 10 years) was associated with HIV seropositivity in a longitudinal study of female IDUs after adjusting for other drug use behaviors [19].

### Women who have sex with women

Of the 246,461 women with HIV up to the end of 2004, only 3.0% reported having sex with a woman; most of this subgroup reported injection drug use or sex with men as well, leaving only 534 women (0.2%) with infection attributable to sex with women only [20]. Very little research exists to clarify the risks of women who have sex with women (WSW) and even fewer data are available for women who have sex with women only (WSWO). Limited reports, riddled with measurement and sampling issues, do suggest a negligible HIV risk for female-to-female transmission [20]. A sample of women (69.3% IDUs) who did and did not initiate injection showed that sex trade (AOR, 4.02; 95% CI, 1.67–9.68) and living without one's parents as a child (AOR, 3.05; 95% CI, 1.07–9.59) predicted recent WSW status whereas sex trade predicted former WSW status (AOR, 3.97; 95% CI, 1.65–9.59) when compared with women who never had sex with women [21]. These women differed significantly with regard to several sexual behaviors, including age at sexual debut, proportion having more than one steady male partner, and having had a partner with an STI as well as their own STI history, all of which were greater in former and current WSW than women who never had sex with women.

Similarly, in a Canadian study of female IDUs, WSW IDUs were more likely to engage in sex work, although consistent condom use by regular, casual, and male sex-trade clients was similar [22]. The limited number of women exclusively having sex with women in most samples does not allow for drawing strong conclusions about this population. However, it is clear that drug-using WSW have a number of sexual risk factors that should not be ignored.

## Non-Injection Drug Users

### Heterosexual males

Heterosexually identified men have the lowest frequency of condom use and safer sex compared with MSM, who have the highest frequency of condom use, and bisexual men [23]. Some drug use may precede inconsistent condom use and is often associated with prolonged intercourse. Although cocaine and heroin have been reported to increase as well as depress sexual arousal, with each effect often coupled with a decrease in performance [18•,23], methamphetamine has been reported to increase libido without hindering sexual performance, prolonging stamina [18•]. Methamphetamine use in non-IDUs has been associated with several HIV risk behaviors, such as sex with multiple partners and decreased condom use, as well as trauma associated with prolonged intercourse [24].

Concurrent sexual relationships have emerged as an important topic in HIV and STI behavioral research. In a national survey, 11% of US men reported having multiple sex partners concurrently; risk factors included unmarried

status, non-Hispanic black or Hispanic race/ethnicity, incarceration in the previous year, sex while drunk or high, sex with nonmonogamous female partners, and a history of engaging in sex with a man [25••]. Given the multiple STI risk factors in this population, men with concurrent sexual partners present a significant risk to their female sex partners. Adimora et al. [26] appropriately suggest that concurrent sexual relationships may contribute to the rapid dissemination of STI infection within networks. Among African Americans, concurrent sexual relationships have been reported as an independent risk factor for HIV infection.

Some evidence also exists for the importance of partner selection in the transmission of HIV and STIs. Although results failed to attain statistical significance, a trend was observed for urban young men diagnosed with asymptomatic *Chlamydia* infection or gonorrhea to select partners within the social network, which was subsequently associated with an increased risk for sexually transmitted disease (STD) reinfection [27•]. When placed in the context of the high levels of within-race partner selection observed in the African American community [28] and the disproportionate rate of incarceration, which is six times higher in black than white men in the United States [29], this evidence implicates sexual networks as a significant factor explaining the higher rates of HIV infection observed in African American communities. Such network-level variables may be particularly relevant in drug-using populations because of their isolation and marginalization.

### Men who have sex with men

Young minority MSM have come to the forefront in the past decade as an especially high-risk population of interest in STI and HIV research [30]. Many studies have reported a higher prevalence and incidence of STIs [31•] and HIV [32•] in black MSM compared with non-black MSM. In one multicenter longitudinal study of young men in five US metropolitan areas, almost half of all black MSM were HIV positive and more than two thirds of black MSM were unaware of their HIV status [33]. Based on data from the Young Men's Health Survey sites in Baltimore and New York, the adjusted odds of prevalent HIV was 12.5 times greater in black MSM and 8.6 times greater in MSM identifying themselves as "other/mixed" than in white MSM. Racially/ethnically disparate HIV rates are not likely the result of differences in HIV risk behaviors such as having unprotected anal intercourse [32•], needle sharing, frequency of risky sexual behavior, or number of partners [31•,34], but reflect patterns of sexual partner selection that are limited to partners who may already be HIV infected.

There is empirical evidence for three hypotheses proposed to explain the higher rates of HIV in black MSM. First, higher rates of STI acquisition in black MSM facilitate the disproportionate HIV seroconversion rates; second,

others suggest that although black MSM are just as likely to get tested for HIV, they may test less frequently and present at later stages of HIV than other MSM, thereby inadvertently transmitting HIV to their sex partners as a result of their higher HIV viral load [31•]. Third, evidence suggests that because non-Hispanic black MSM are more likely to have non-Hispanic black sexual partners, sexual networks [32•] and partner selection [35] may play a significant role in the HIV prevalence and incidence disparities. Among drug-using MSM, Rhodes et al. [36] (p. 629) reported a “distinct preference for having sex when high” and the experience in which “drug use rather than sexual orientation formed the core of personal identity.” Based on focus groups and individual structured interviews, the researchers described the association of drug-using MSM with primarily other drug users, often other MSM, limiting “contact with people who did not use drugs and the mainstream gay community” [36] (p. 629). These data and others have suggested that some MSM use drugs to replace intercourse and the “gay scene” [23,36]. However, among MSM, drug and alcohol use are strongly associated with being sexually active [37].

Circuit parties are often viewed as an escape from stigma and the HIV epidemic, associated with promotion of “gay” self-identity and self-expression [18•]. Crystal methamphetamine entered the circuit party scene in the 1990s, following the earlier rampant use of cocaine, and amplified unsafe sex because of its association with libido enhancement, loss of time reference, and decreases in inhibition and control, often leading to prolonged sexual behavior with multiple partners. In the context of circuit parties, where such disinhibition (sexual and otherwise) is encouraged, the risk of unsafe sex is high. Mattison et al. [38] reported that 50% of MSM used alcohol and club drugs (eg, ecstasy, ketamine) at circuit parties. Reported reasons for attending parties (eg, “to have sex,” “to look and feel good,” “to be uninhibited and wild”) suggest that sexual expectations that proceed unsafe sex may have more to do with subsequent risky behavior than the concurrent drug use and decreased inhibition [23,38]. Longitudinal studies of sexual behavior among men participating in this activity are needed to confidently determine the true risks involved.

Sildenafil, commonly prescribed to alleviate erectile dysfunction, is used illicitly, abused as a prescribed drug, and sometimes taken in combination with club drugs to counteract the depressive effects of drug use on sexual behavior [39]. Sildenafil was associated with amphetamine use before or during sex in a sample of men [40], resulting in prolonged and sometimes aggressive sexual encounters. In addition, among MSM, sildenafil is often taken in combination with amyl or butyl nitrates (poppers) and/or methamphetamine, which are thought to relax sphincter muscles [41] and aid in achieving and maintaining an erection [42]. Methamphetamine use, particularly among MSM, may be “emerging as a response to and a facilitator of HIV risk” [43].

Unpredictable combinations of drugs and intentions to “get out of it” [23] (p. 298) have also been associated with unsafe sex at circuit parties. Twenty-eight percent of MSM engaged in unprotected anal sex during circuit parties, wherein the number of MSM who engaged in unprotected sex increased with the frequency of drug use [39].

### **Heterosexual females**

Illicit drugs have been associated with risky sexual behavior in women. After adjusting for other factors, Lorvick et al. [44] found that females injecting methamphetamine were more likely than non-methamphetamine injectors to engage in anal sex, to report sex with multiple partners, to engage in receptive needle sharing, and to share needles with more than one partner. In a cross-sectional study of drug users in Long Beach, California, methamphetamine use was one of the strongest predictors of heterosexual anal sex (HAS) in women and those who engaged in HAS were more likely to have STIs than those who did not [45•]. Increased sexual activity and sex trade also have been reported for women using crack cocaine [23]. Using heroin with sex partners is associated with higher acquisition of STIs in non-IDU women [10], which may be partially explained by the overlapping nature of female drug and sexual networks [16,46]. Alcohol intake has also been associated with elevated sexual HIV risk among women [47].

For women who do not inject drugs, their injecting partners pose a significant risk for acquiring HIV. In one national survey study, the effects of having an IDU partner on health and sexual risk behaviors varied by the nature of the sexual relationship (ie, whether the woman had a single IDU partner, had multiple partners, or reported trading sex with multiple partners for drugs or money). Women with a single IDU partner were the least likely of the three groups to use a condom during sexual activity [48], as has been reported for monogamous men and drug-using women.

Trading sex for money or drugs is also not uncommon among drug users, particularly among women using crack cocaine. In a prospective study of drug users, participants who smoked crack were most likely to be involved in trading sex for drugs or money and to have multiple sex partners [49]. Similarly, stimulants are associated with an increased number of partners, decreased condom use, and more commonly reported exchange of sex for drugs or money [50]. However, some evidence indicates that female drug users trading sex may use condoms with sex-trading clients but not with regular sex partners, who may in fact impose as great a risk as paying clients [10].

Negotiating safe sex requires that a woman surmount gender roles imposed by society, her culture, and her relationships. In one study of low-income, sexually active women attending family planning and STD clinics in Miami, Hispanic women were significantly less comfortable than African American or white women in talking

to their partners about sex and condoms [51]. In addition, women who did not participate in financial decision making in the relationship were 90% less likely to use condoms consistently than women who made such financial decisions independently. For sex workers, particularly those selling sex for drugs, the challenge of negotiating condom use is even greater. Power issues, drug cravings, possible cognitive impairment, and lack of inhibition are serious barriers to condom negotiation by women trading sex for crack [52].

Managing sexual risk presents special hurdles for minority women, as high incarceration rates of minority men have led to limited partner choices, especially in the inner-city environment, and may compromise acceptable levels of sexual risk [28]. African American females also typically report having older sexual partners, who are associated with greater odds of unprotected sex [53] and hence increased risk of STI and HIV transmission.

#### **Women who have sex with women**

The majority of research on WSW focuses on IDUs. A recent investigation of the HIV risk behaviors of drug-using WSW indicates that the risk profiles of WSW IDUs and WSW may be similar [54]. In one study, WSW were more likely than WSMO to trade sex, to have had an early (before age 15) sexual debut, and to have multiple sexual partners [55]. Other differences included greater cocaine and crack dependence and a greater likelihood of sex with MSM or, for females having sex with women, with hepatitis B- or HIV-positive partners. Although risks for HIV acquisition would therefore appear to be increased among WSW relative to WSMO, there are no data showing a higher HIV burden attributable to their sexual activity.

#### **Conclusions**

Epidemiologically, it is clear that drug use increases the risk of HIV and STI transmission. Parenteral drug use is much more efficient than indirect transmission in establishing viral infections, particularly HIV, among drug users. However, indirect transmission accounts for a substantial proportion of the risk in IDU populations and even more so among non-injection drug-using populations, through sexual risks. It is evident in reviewing the literature on drug use and HIV and STI that the assumptions researchers bring to their investigations (eg, the lack of recognition among the research community that IDUs have a risk of sexual HIV acquisition) and the research methods and designs they employ to study these associations limit our knowledge. Researchers investigating sexual behavior in drug-using populations must continue to focus on traditional themes of elevated rates of unprotected sex, concurrency, and partner selection factors while incorporating the emerging concepts of sexual risk outlined in this review.

Of importance, factors related to differential sexual partner selection associated with overlaps among social and drug networks may lead to either risk for or protection from HIV. Although we have demonstrated that women with IDU partners are at elevated risk for HIV, they are at risk only if their partner has other concurrent partners. Similarly, risks are elevated in minority populations to the extent to which their sexual networks are broad or limited to the same race/ethnicity. Partner choices may also reflect a limited availability of sexual partners, as has been seen among African American women in inner-city areas, where a large proportion of the male population is or has been incarcerated, an acknowledged risk factor for HIV transmission.

Different drug-using populations differ in their epidemiologic risk factors and reflect the dominant culture of their group. MSM who are IDUs are very different from MSM who are not, and their HIV prevalence rates clearly show their risk. Nevertheless, MSM differ widely in terms of race/ethnicity, and black MSM have a vastly increased HIV prevalence compared with their white counterparts. This may represent partner selection, the elevated stigma and discrimination toward MSM in the black community, or the higher rate of bisexuality in this population.

It is also clear that differentiating risk associated with sexual practices from that associated with ongoing drug use is especially difficult given the time-varying nature of both behaviors. Only with the use of longitudinal cohort studies can we effectively untangle these risks; however, the varying nature of each behavior presents researchers with a number of challenges, such as how frequently these behaviors should be addressed, which methods of elicitation should be used, and with what degree of confidence these sensitive practices can be determined. These issues must be resolved before we can determine the temporal ordering and magnitude of the HIV and STI risks imposed by sexual practices and drug use.

Finally, special attention should be given to vulnerable groups of drug users, including the special issues noted among black MSM, as well as neglected groups such as WSW, in whom current data are insufficient to determine whether this population is at elevated risk. Approaching populations that are both sexual minorities and racial/ethnic minorities in a culturally sensitive and relevant manner is essential to determine the context of HIV risk and to collaborate in developing risk reduction strategies. Recent attention has also been given to the use of the terms MSM and WSW, with consideration to variations in identity and social interactions of members within each group [56], a limitation of this paper recognized by the authors yet restricted by the specificity of current research. We need to focus on the “edges” of the risk continuum if we are to effectively respond to the neglected peoples most affected by HIV.

## Disclosures

No potential conflicts of interest relevant to this article were reported.

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- Of major importance

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