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Correlates of perceived risk of HIV infection among persons who inject drugs in Tijuana, Baja California, Mexico

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Abstract

Objective—We identified correlates of perceived risk of HIV infection among persons who inject drugs (PWID) in Tijuana.

Materials and methods—PWID ≥18 years of age who injected drugs in the past month were recruited between 2006–2007 and completed risk assessment interviews and serologic testing for HIV, syphilis, and tuberculosis. Logistic regression was used to determine factors associated with high-perceived risk of HIV infection.

Results—Among 974 PWID, HIV prevalence was 4.4%; 45.0% of participants perceived themselves to be more likely to become HIV infected relative to other PWID in Tijuana. Participants who reported high-perceived risk of HIV infection participated in high-risk behaviors such as injecting with used syringes, transactional sex, and were less likely to have had an HIV test.

Conclusions—Recognition of HIV infection risk was associated with high risk behaviors and markers of vulnerability. Findings support efforts to encourage HIV testing and access to health care for this vulnerable population.

Keywords

HIV; risk perception and injection drug use; epidemiology; Mexico

In Mexico, the HIV epidemic is concentrated in core groups with elevated risk, including persons who inject drugs (PWID).[1] There are an estimated 10 000 PWID in Tijuana, Baja

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California, Mexico.[2] A longitudinal cohort study of street recruited PWID in Tijuana estimated the HIV prevalence as 5.4% among female PWID and 2.4% among male PWID.[2]

A number of factors, including poverty and the struggling economy, contribute to the growing problem of drug use in Tijuana.[3,4] Due to its position on a major drug trafficking route, illicit drugs are readily available in Tijuana, and drug trafficking routes and border regions often encompass areas of heightened HIV vulnerability. [5–7] Such structural factors contribute to high-risk behaviors (e.g. use of non-sterile syringes and injection paraphernalia) among PWID, which in turn increases PWID susceptibility to HIV infection.[8]

Studies among drug users indicate that low perceived risk of HIV infection is associated with riskier behaviors,[9] but that high risk perception does not always translate to protective behaviors.[10–12] One study in San Diego, CA found that PWID who perceived themselves at high risk of HIV infection were more likely to report receptive syringe and injection paraphernalia sharing.[12] Other studies among non-drug using populations found that those with higher perceived threat of HIV infection tended to participate in higher risk sexual behaviors, and that HIV knowledge was not associated with accurate self-assessment of risk.[13,14] Studies among men who have sex with men (MSM) demonstrate that men with higher risk-perception participated in higher risk sexual behaviors and had a higher prevalence of HIV.[15–18]

Knowledge of risky behaviors may not be enough to prevent engagement in such behaviors; therefore, it is important to understand factors associated with perceived HIV risk. Furthermore, the temporal relationship between HIV risk perception and HIV risk behaviors is poorly understood. Much of the research on risk perception focuses on increasing awareness of risk behaviors and increasing risk perception or the sense of vulnerability of HIV with the hope of decreasing high risk behaviors. As noted by Klein and colleagues, missing from the literature is information about factors associated with risk perception and differences between individuals who engage in high risk behaviors but perceive low risk, and those who engage in high risk behaviors and perceive high risk.[17] Among PWID, it is also important to understand how alcohol and drug use affect risk perception and sexual and drug related risk behaviors that PWID partake in.[9,19] Risk perceptions are relied on by individuals to make decisions about risky behaviors and by researchers when developing interventions; however, individual assessments of risk are often inaccurate.[20] Further, research has shown that those with persistent low risk perception tend to engage in more risk behaviors.[16] Though high risk perception itself is not sufficient to decrease risk behaviors, knowledge about risk behaviors and HIV risk perception are necessary for successful interventions.[21] Given the need to understand factors that influence HIV risk perception among high risk PWID, the purpose of this analysis was to identify factors associated with high-perceived risk of HIV infection among a cohort of PWID in Tijuana, Baja California, Mexico.

Materials and methods

Study population

Between April 2006 and April 2007, PWID were recruited using respondent driven sampling (RDS)[22] into a prospective study of behavioral and contextual factors associated

with HIV, TB, and syphilis, described in detail previously.[8] Eligibility criteria included being ≥18 years of age; having injected illicit drugs in the past 30 days confirmed by presence of track marks; the ability to speak Spanish or English; and having no plans to move out of Tijuana in the next 18 months.

Data collection

Data for this study were taken from the baseline computer assisted personal interview and included demographic information, drug use and sexual behaviors, and perceived risk of HIV infection. All participants were administered an HIV antibody test using the Determine Rapid test (Abbott Pharmaceuticals, Boston, MA). Reactive samples were confirmed at the San Diego County Department of Health using enzyme immunoassay and immunofluorescence assay. Those with positive tests were referred to the municipal health clinic in Tijuana for follow-up care. An incentive of 10 USD was given to participants for their time and transportation to complete this study. The dependent variable in this analysis was self perceived risk of HIV infection and was assessed using the following question: *"Compared to other drug users in this city, how likely do you think you are to get (infected with) HIV/AIDS?"* Responses were 0-Much more likely to 4-Much less likely. Participants could also refuse to answer. Responses were dichotomized into two risk perception categories: "more likely", which included participants who indicated they were much more likely or a bit more likely to get infected (responses 3–4); and "the same or less likely" (responses 0–2). While this is not a pre-validated scale of risk perception, this outcome has been used in other studies as a reliable measure of HIV risk perception.[23] The Institutional Review Boards at San Diego State University, the University of California, San Diego, and Tijuana General Hospital approved this study.

Statistical analysis

To identify correlates of perceived risk of HIV infection, PWID who reported higher perceived risk of HIV infection were compared with those who reported having the same or lower perceived risk of HIV infection. Participants who were missing data on the dependent variable, perception of HIV infection risk (n=75), or who were previously HIV positive and aware of their HIV status (n=7) were excluded. Thus, 974 PWID were included in this analysis. Descriptive statistics, such as frequencies and means, were calculated for variables potentially associated with HIV risk perception. The two groups were compared with respect to these variables using chi-squared and Fisher's exact tests for binary variables and Mann Whitney U test for continuous variables. Logistic regression with robust variance estimation via generalized estimating equation was used to examine bivariate relationships between perceived risk of HIV infection and factors potentially associated with it. All factors that yielded a p-value≤0.10 were considered for inclusion in the final multivariable model. To correct for sampling bias due to RDS, the multivariable model was adjusted by using RDS individualized weights derived using RDSAT software, as described elsewhere.[24] Forward stepwise model building was conducted to determine the final model and variables with a p-value≤0.05 were maintained in the final model. Interactions were tested and potential confounders were assessed. Collinearity was assessed and ruled out in the final model using variance inflation factors and condition indices.

Results

Of the 974 participants, 85.4% were male with a mean age of 37.1 (SD: 8.4). The prevalence of HIV was 4.4%, and a majority of participants (59.9%) had never previously been tested for HIV. In terms of risk perception, 438 (45.0%) of the participants thought they were more likely to get infected with HIV compared to other drug users in Tijuana, while 536 (55.0%) thought they were the same or less likely to get infected with HIV compared to other drugs users in Tijuana (table I).

In bivariate analysis, compared to PWID who perceived themselves at the same or lower risk of HIV than other PWID, those who perceived themselves as more likely to get infected were more likely to be male (88.8 vs. 82.6%), less likely to have an income less than 3 000 pesos (~$233 US dollars; 62.9 vs. 74.7%) monthly, and more likely to have been deported from the US (45.0 vs. 35.1%). Participants with high-risk perception were also more likely to report never having had a prior HIV test (66.9 vs. 54.1%), injected drugs less often (78.1 vs. 86.0% injected drugs four days per week or more), used new or sterile syringes less often (35.8 vs. 52.2%), and used a syringe to divide drugs more often (14.6 vs. 3.4%). Though sexual activity was not prevalent in this cohort, participants who reported high-perceived risk of HIV infection were less likely to report having sex in the past 6 months (17.4 vs. 34.5%), but more likely to report receiving something in exchange for sex in the past 6 months (14.8 vs. 8.0%) (table I; all *p*-values <0.01). Additional comparisons and results from bivariate analyses can be found in table I.

In the final multivariable model (table II), factors independently associated with high-perceived risk of HIV infection included having health insurance (adjusted odds ratio [AOR] = 3.95, 95% confidence interval [CI]: 1.96, 7.96), being homeless (AOR = 2.52, 95%CI: 1.32–4.81), ever being deported from the US (AOR = 2.46, 95%CI: 1.55–3.92), using a syringe to divide drugs at least half the time, compared to sometimes or never (AOR = 6.23, 95%CI: 2.11–18.41), never or sometimes using a new/sterile syringe to inject drugs compared to at least half the time (AOR = 2.33, 95%CI: 1.53–3.56), injecting drugs ≥4 days a week (AOR = 2.22, 95%CI: 1.24– 3.96), not having sex in the past six months (AOR = 3.41, 95%CI: 1.93–6.01), never having had a prior HIV test (AOR = 2.62, 95%CI: 1.62–4.22), and receiving something in exchange for sex in the past six months (AOR = 2.48, 95%CI: 1.17–5.25).

Discussion

We identified several factors associated with high-perceived risk of HIV infection, including having health insurance, being homeless, having ever been deported from the US, using a syringe to divide drugs at least half the time, never or sometimes using a new/sterile syringe to inject drugs, injecting drugs greater than four times per week, never having had a prior HIV test and receiving something in exchange for sex in the past six months.

Only 40.1% of participants had ever had an HIV test, and those who had not been tested were more likely to report high-perceived risk of HIV infection. One explanation is that those who receive a negative HIV test result might feel like they are at lower risk because,

while they are engaging in risky behaviors, they have yet to get infected with HIV. Another possible explanation of this finding is that PWID who have high-risk perception may avoid HIV testing out of fear of an HIV diagnosis.[25] Previous studies also found that people who receive abnormal test results, such as an HIV or HCV seropositive result, may adopt lifestyle and behavioral changes to protect themselves and others.[26,27]

PWID in Tijuana face many barriers to safe injection, including homelessness and having been deported from the US. These vulnerabilities may influence risk perception and lead to high-risk behaviors such as transactional sex for something they needed or sharing injection equipment. A study by Pinedo and colleagues among deportees in Tijuana found that 35% reported increased risk for HIV. Deportees who reported higher perceived risk of HIV had been injecting drugs for a shorter amount of time, lived in the US for a shorter duration, and were less likely to participate in high-risk sexual encounters.[23] Among vulnerable populations, such as deportees and the homeless, limited access to health care and education may lead to inaccurate perception of risk. Research has also shown that a lack of stable housing influences HIV risk, and that housing assistance may reduce risk behaviors.[28,29] Less than 10% of participants reported they had health insurance and having health insurance was positively associated with high-risk perception. Though we did not assess HIV knowledge in our population, health insurance may indicate increased awareness of HIV risk behaviors and better access to health care, thus, PWID with health insurance had higher risk perception. One study among MSM found that men with health insurance were less likely to engage in unprotected anal intercourse.[30] Studies also indicate that health insurance increases HIV testing rates among high-risk populations.[31] However, more research is needed to better understand the relation between risk perception and health insurance status.

Lastly, a majority of PWID in Tijuana had not had sex in the past six months (72.4%), and not having sex was associated with high-perceived risk of HIV infection. For some PWID, drug use may be more important than sex, leading to limited sexual activity. In our sample, the majority of participants were heroin users and heroin is associated with decreased libido.[32, 33] While some PWID may participate in highrisk sexual behaviors (such as transactional sex to obtain drugs or sex with a PWID), they may not necessarily perceive HIV risk from sexual behaviors.[34] A study by Tsui and colleagues found that PWID reported high levels of sexual risk behaviors (e.g. sex without a condom) but low levels of syringe sharing suggesting that PWID may underestimate their risk of contracting HIV from sexual encounters.[35] PWID who did not have sex may also have higher knowledge of HIV risk associated with sexual behaviors and refrain from engaging in sexual activities to prevent adverse outcomes. However, we do not know if high-risk perception precluded sexual activity.

The results of our study must be interpreted with some limitations in mind. The cross-sectional design of this analysis limits our ability to determine causal inferences and determine temporality. Therefore, we cannot assess whether self-perceptions of HIV risk among PWID is a precursor or a consequence of their risk behaviors and personal circumstances. Risk perception may also change rapidly based on individual, social, and environmental factors. Heightened perception of risk could lead to a change in injection and

sexual practices, or recent injection and sexual practices may heighten perceptions of risk among PWID. Although this study included a large sample of PWID, the results may not be generalizable to PWID outside of Tijuana. Given the sensitive nature of drug use and high-risk behaviors that could lead to disease transmission, this study may suffer from under-reporting of related behaviors. However, this study relied on highly trained interviewers that established a strong rapport with participants to increase the reliability of the data collected.

Conclusion

This study identified several correlates of self-perceived HIV risk that may help researchers better understand how PWID think about their risk behaviors to help shape intervention strategies. It is possible that PWID perceive increased risk of infection due to their participation in high-risk behaviors such as higher frequency of injection, participation in sex exchange, and high-risk injection behaviors. Though we did not assess knowledge of HIV, other studies show that knowledge is not associated with reduced risk behaviors.[36] This suggests that education programs are either not reaching certain high-risk populations or are not effective in such populations. [36] However, proxies for knowledge such as having health insurance were associated with high-risk perception. Our results indicate that intervention programs should address structural barriers to safe injection such as homelessness, deportation, health care access while providing education messages to prevent high-risk behaviors. Education and intervention programs should also emphasize continuity of HIV prevention messages, especially among deportees and PWID who report the riskiest behaviors. One such intervention is to increase HIV testing among PWID, which could also serve to provide needed prevention messages to high-risk individuals. Further research that assesses HIV knowledge and risk perception is warranted to better understand how they may influence PWID susceptibility to HIV infection. Lastly, studies that assess how risk perception changes in varying situations and over time are needed to better understand the relationship between engaging in high-risk behaviors and risk perception.

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Table I

Characteristics of PWID in Tijuana, BC, Mexico by HIV risk perception category. 2006–2007

(n=974)	Total n(%)	More likely n(%)	Same or less likely n(%)	Unadjusted odds ratio OR(95%CI)	p-value
Demographics					
Age (mean, SD)	37.09(8.4)	36.94(8.1)	37.21(8.6)	0.99(0.98–1.01)	0.69
Gender (male vs. female)	832(85.4)	389(88.8)	443(82.6)	1.67(1.15–2.42)	0.008
Income less than 3 000 *pesos* month	662(69.4)	269(62.9)	393(74.7)	0.57(0.43–0.76)	<0.001
Marital status (not married vs. married)	662(68.0)	312(71.2)	350(65.3)	1.32(1.00–1.73)	0.05
Did not complete high school	876(89.9)	400(91.3)	476(88.8)	1.33(0.87–2.03)	0.20
Have health insurance (yes vs. no)	96(9.9)	66(15.1)	30(5.6)	2.99(1.90–4.70)	<0.001
Homeless (yes vs. no)	131(13.4)	80(18.3)	51(9.5)	2.12(1.46–3.10)	<0.001
Deported from the US (yes vs. no)	385(39.5)	197(45.0)	188(35.1)	1.51(1.17–1.96)	0.002
Have not lived in TJ for whole life	226(23.2)	356(81.3)	392(73.1)	1.61(1.17–2.17)	0.003
Moved to TJ to cross border to US (yes vs. no)	56(5.8)	31(7.1)	25(4.7)	1.56(0.90–2.68)	0.13
Have not had a prior HIV test	583(59.9)	293(66.9)	290(54.1)	1.71(1.32–2.23)	<0.001
Injection drug use practices					
Inject drugs ≥4 days a week compared to ≤3 days a week	803(82.4)	342(78.1)	461(86.0)	1.72(1.24–2.41)	0.001
Did not inject heroin most often in last six months	411(42.4)	204(46.8)	207(38.8)	1.38(1.07–1.79)	0.01
Injected heroin and meth most often last six months	590(60.9)	250(57.3)	340(63.8)	1.31(1.01–1.70)	0.05
Did not inject with someone who lives in the US in the past 6 months	502(51.5)	240(54.8)	262(48.9)	1.26(0.98–1.63)	0.07
Used a new/sterile syringe never or sometimes vs. half the time or more	537(55.1)	281(64.2)	256(47.8)	1.98(1.52–2.56)	<0.001
Used drugs in the US past 6 months	565(58.0)	251(57.3)	314(58.6)	0.95(0.73–1.23)	0.70
Age of first injection (mean SD; n=965)	21.42(6.9)	21.50 (6.88)	21.35(6.85)	1.00(0.98–1.02)	0.70

Salud Publica Mex. Author manuscript; available in PMC 2017 October 27.

(n=974)	Total n(%)	More likely n(%)	Same or less likely n(%)	Unadjusted odds ratio OR(95%CI)	p-value
Injected most often at a shooting gallery past 6 months (n=969)	218(22.4)	96(21.9)	122(22.8)	0.95(0.70–1.29)	0.76
Injected most often at its own or someone else's home past 6 months	599(61.5)	261(59.6)	338(63.1)	0.86(0.67–1.12)	0.29
Injected on the streets most often	56(5.75)	32(7.3)	24(4.5)	1.68(0.97–2.90)	0.07
Used a syringe to divide drugs half the time or more vs. less than half the time (n=969)	82(8.4)	64(14.6)	18(3.4)	4.92(2.87–8.45)	<0.001
Sexual risk behaviors					
Did not have sex in past 6 months	713(73.2)	362(82.6)	351(65.5)	2.51(1.75–3.17)	<0.001
Did not have a regular sex partner in past 6 months	823(84.5)	400(91.3)	423(78.9)	2.81(1.83–3.93)	<0.001
Know someone with HIV (yes vs. no)	387(39.7)	192(43.8)	195(36.4)	1.36(1.05–1.77)	0.02
Received something in exchange for sex in past 6 months (yes vs. no)	108(11.1)	65(14.8)	43(8.0)	2.00(1.33–3.00)	<0.001
Had sex in the US in past year (yes vs. no)	41(4.21)	29(6.6)	12(2.2)	3.10(1.56–6.14)	0.001
Ever had unprotected sex with an HIV positive person yes vs. no)	22(2.3)	17(3.7)	6(1.1)	3.35(1.30–8.63)	0.009

PWID: Persons who inject drugs

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Table II

Final logistic regression model examining the correlates of perceived risk of HIV among PWID in Tijuana, Baja California, Mexico. 2006–2007

	Adjusted odds ratio	95% confidence interval	p-value
Have health insurance	3.95	1.96–7.96	<0.001
Homeless (yes vs. no)	2.52	1.32–4.81	0.01
Deported from US (yes vs. no)	2.46	1.55–3.92	<0.001
Used a syringe to divide drugs half the time or more vs. never or sometimes	6.23	2.11–18.41	<0.001
Used a new/sterile syringe never or sometimes vs. half the time or more	2.33	1.53–3.56	<0.0001
Inject drugs ≥4 days/week vs. ≤3 days/week	2.22	1.24–3.96	0.07
Did not have sex in past 6 months vs. had sex in past 6 months	3.41	1.93–6.01	<0.0001
No prior HIV test vs. had prior HIV test	2.62	1.62–4.22	<0.0001
Received something in exchange for sex (yes vs. no)	2.48	1.17–5.25	0.02

PWID: Persons who inject drugs