

SEX WORK

Factors associated with sex trade involvement among male participants in a prospective study of injection drug users

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Objectives: While much research to date has examined female sex trade work, little has been done to evaluate factors associated with male sex trade involvement or to assess their health service needs. This is particularly true for male sex trade workers who are also injection drug users (IDUs). Therefore, the present analyses were undertaken to evaluate factors associated with sex trade work in a prospective cohort study of male IDUs.

Methods: We identified factors associated with sex trade involvement among male participants enrolled in the Vancouver Injection Drug Users Study (VIDUS). Since serial measures for each individual were available at semiannual intervals, variables potentially associated with sex trade involvement were evaluated with adjusted odds ratios (AOR) and 95% confidence intervals (CI) computed using generalised estimating equations (GEE).

Results: Between 1996 and 2003, 995 male IDUs were enrolled into the VIDUS cohort among whom 108 (11%) reported being involved in the sex trade at enrolment and 102 (10%) individuals initiated sex trade involvement during the follow up period. In multivariate analyses, factors independently associated with sex trade involvement included HIV positive serostatus (AOR: 1.77 (95% CI: 1.44 to 2.17)), daily cocaine injection (AOR: 1.37 (95% CI: 1.11 to 1.70)), daily crack smoking (AOR: 1.36 (95% CI: 1.07 to 1.72)), borrowing syringes (AOR: 1.73 (95% CI: 1.32 to 2.25)), and inconsistent use of condoms with casual sexual partners (AOR 0.66, CI 0.53 to 0.82). We also found that male sex trade workers were more likely to report having sought but been unable to access substance abuse treatment (AOR: 1.28 (95% CI: 0.98 to 1.67); $p=0.076$).

Conclusions: Males involved in the sex trade in this setting have higher levels of HIV infection and engage in risky injection behaviours at an elevated rate. Since these behaviours have major implications for HIV acquisition and public health, prevention efforts and targeted provision of addiction treatment to this population should be expanded.

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Sex trade workers represent an extremely marginalised segment of the general population.¹ Nevertheless, the physical dangers and elevated risk for HIV and other sexually transmitted infections (STIs) that are generally associated with sex trade involvement are increasingly becoming a focus of public attention.^{2,3} Despite the consistency of previous studies that indicate high frequencies of sex trade involvement and STIs among male injection drug users (IDUs), remarkably few studies have furthered our understanding of the relation between male sex trade involvement, injection drug use, and unprotected sexual intercourse.^{1,4–11}

Male sex trade involvement may in part account for the up to eightfold elevations in HIV seroprevalence and seroincidence among IDU men who have sex with men compared to other men who have sex with men^{10,12,13} and compared to other male IDUs.^{14–16} However, many IDU men who have sex with men do not self identify as gay and many report little contact with HIV preventive interventions that target male IDUs, so these men may not benefit from current HIV prevention programmes that target either men who have sex with men or male IDUs.^{11,16} Furthermore, there does not appear to be any controlled trial of a sexual intervention for male IDUs who have sex with men and only one published multivariate analysis of the relation between illicit substance use and the sexual behaviour of male IDUs who have sex with men.^{6,14} We therefore undertook the present analyses to identify factors associated with male sex trade involvement in a long term, prospective cohort study of male IDUs. We also attempted to identify unmet health service needs of this important subpopulation of IDUs.

METHODS

Beginning in May 1996, people who had injected illicit drugs in the previous month were recruited into the Vancouver Injection Drug User Study (VIDUS), a prospective cohort study that has been described in detail previously.^{17–19} Briefly, as of November 2003, 1560 study subjects had been recruited through self referral and street outreach, and data collection for the project is conducted in a storefront office. People were eligible for VIDUS if they had injected illicit drugs at least once in the previous month, resided in the greater Vancouver region, and provided written informed consent. Participants return semiannually to the study site for a follow up questionnaire and to provide a venous blood sample for HIV serology every 6 months. Participants were compensated \$20 (€13) for each study visit and blood draw. The study was approved by the University of British Columbia/Providence Health Care research ethics board.

The present analyses were restricted to male participants who were enrolled between May 1996 and November 2003. The primary end point in this analysis was self reported sex trade involvement during the previous 6 months. Sex trade involvement was defined as exchanging sex for money, goods, drugs, shelter, or anything else during the previous 6 months. Sexual behaviours with casual and regular sex partners were assessed separately, and sexual risk was

Abbreviations: AOR, adjusted odds ratios; CI, confidence intervals; GEE, generalised estimating equations; IDUs, injection drug users; IQR, interquartile range; STIs, sexually transmitted infections; VIDUS, Vancouver Injection Drug Users Study

defined as one or more instances of unprotected vaginal or anal intercourse. Regular partners were defined as “someone you have had a sexual relationship with for more than 3 months (not including clients/tricks)” and casual partners were defined as “someone you have had a sexual relationship with for less than 3 months (not including tricks/clients).” As previously,²⁰ unstable housing was defined as living in a single room occupancy hotel, transitional living arrangements, or homelessness. Difficulty accessing substance abuse treatment was assessed with the question, “Over the last 6 months, have you ever tried to access any alcohol or other drug treatment, but were unable to?”

Factors associated with sex trade involvement were identified using crude and adjusted odds ratios (AOR) with 95% confidence intervals that were computed using generalised estimating equations (GEE) with an exchangeable correlation structure.²¹ These methods are analogous to logistic regression methods but adjust standard errors to account for non-independence among repeat observations (study visits) from the same individual.²²

Potential correlates of male sex work evaluated in this analysis included age at enrolment as well as time updated factors, such as HIV infection, and behaviours relating to the previous 6 months, including unprotected vaginal or anal intercourse, unstable housing, incarceration, daily heroin and

cocaine injection, daily crack cocaine smoking, borrowing used syringes, lending used syringes, having sought but been unable to access substance abuse treatment, and current enrolment in methadone maintenance treatment.^{20 23}

Variables potentially associated with sex trade involvement were examined in bivariate analyses. In order to adjust for potential confounding we also fitted a multivariate model using the a priori defined model building approach in which we adjusted for all variables that were statistically significant at the $p < 0.05$ level in the bivariate analyses. Variables were considered if they were associated with infectious disease risk or known modifiers of this risk behaviour, and variables that were $p < 0.01$ in bivariate analyses, but were no longer significant after adjustment were retained in the final model to ensure maximal control of confounding. All statistical analyses were performed using SAS software version 8.0 (SAS, Cary, NC, USA). All p values are two sided.

RESULTS

Among the 995 male participants recruited into the VIDUS cohort between 1996 and 2003, the median age was 35 (interquartile range (IQR) 28–41), 191 (19%) were Aboriginal, 623 (63%) reported residing in unstable housing, 184 (19%) were HIV seropositive, and 108 (11%) reported being involved in the sex trade at enrolment. Table 1 shows

Table 1 Baseline demographics of 995 male IDUs stratified by sex trade involvement

Characteristic	Sex trade involved (n = 108)	Not sex trade involved (n = 887)	p Value
	No (%)	No (%)	
Age at enrolment			
Median	28	36	<0.001
IQR	24–35	29–42	
HIV positive at enrolment			
No	79 (73)	732 (83)	0.018
Yes	29 (27)	155 (17)	
Incarceration*			
No	64 (59)	574 (65)	0.265
Yes	44 (41)	313 (35)	
Unstable housing†			
No	41 (38)	331 (37)	0.896
Yes	67 (62)	556 (63)	
Daily heroin injection*			
No	72 (67)	631 (71)	0.335
Yes	36 (33)	256 (29)	
Daily cocaine injection*			
No	70 (65)	606 (68)	0.461
Yes	38 (35)	281 (32)	
Daily crack smoking*			
No	99 (92)	833 (94)	0.366
Yes	9 (8)	54 (6)	
Borrowed syringes*			
No	61 (56)	560 (63)	0.178
Yes	47 (44)	327 (37)	
Lent syringes*			
No	75 (69)	591 (67)	0.557
Yes	33 (31)	296 (33)	
Unable to access addiction treatment*			
No	84 (78)	722 (81)	0.365
Yes	24 (22)	165 (19)	
On methadone therapy†			
No	102 (94)	811 (91)	0.282
Yes	6 (6)	76 (9)	
Unprotected intercourse with regular sex partner*			
No	90 (83)	720 (81)	0.586
Yes	18 (17)	167 (19)	
Unprotected intercourse with casual sex partner*			
No	61 (56)	656 (74)	<0.001
Yes	47 (44)	231 (26)	

*Denotes activities or situations referring to previous 6 months.

†Denotes current activities.

Table 2 Bivariate analysis of factors associated with sex trade work among 995 male IDUs between 1996 and 2003*

Characteristic	Unadjusted odds ratio	GEE 95% CI	p Value
Age at enrolment (per year older)	0.93	0.92 to 0.94	<0.001
HIV positive at enrolment (yes v no)	1.70	1.39 to 2.07	<0.001
Incarceration‡ (yes v no)	1.63	1.34 to 1.98	<0.001
Unstable housing† (yes v no)	1.08	0.90 to 1.31	0.408
Daily heroin injection‡ (yes v no)	1.15	0.93 to 1.41	0.194
Daily cocaine injection‡ (yes v no)	1.67	1.36 to 2.04	<0.001
Daily crack smoking‡ (yes v no)	1.49	1.19 to 1.87	<0.001
Borrowed syringes‡ (yes v no)	2.06	1.66 to 2.56	<0.001
Lent syringes‡ (yes v no)	1.68	1.33 to 2.13	<0.001
Unable to access addiction treatment‡ (yes v no)	1.66	1.28 to 2.15	<0.001
On methadone therapy† (yes v no)	0.73	0.58 to 0.93	0.011
Unprotected intercourse with regular sex partner‡ (yes v no)	1.13	0.86 to 1.50	0.386
Unprotected intercourse with casual sex partner‡ (yes v no)	0.53	0.43 to 0.66	<0.001

GEE, generalised estimating equation; CI, confidence interval.

*Based on 8046 study visits.

†Current.

‡During the previous 6 months.

baseline characteristics of the participants stratified by sex trade involvement. As shown here, sex trade involved men were more likely to be younger, HIV positive, and have had unprotected intercourse with their casual partners during the previous 6 months than non-sex trade involved men. These groups did not differ with respect to any of the other variables measured.

Overall, the 995 participants were seen a total of 8046 times during the follow up period and sex trade involvement was reported at 447 (5.6%) of these visits. The median number of follow up visits among this group was eight. During the follow up period, 102 (10%) individuals initiated sex trade involvement and 70 (7%) became HIV infected. When we examined the gender of sex trade clients, sex with men was reported at 348 (78%) of the visits and with women at 99 (22%) of the visits.

The following bivariate and multivariate analyses were conducted by comparing the 210 men who were sex trade involved at some point during the entire study period with the 785 men who never reported being involved in the sex trade. As shown in table 2, in bivariate GEE analyses, factors associated with sex trade involvement among men included younger age and positive HIV serostatus. Drug related factors occurring during the previous 6 months that were associated with sex trade work included recent incarceration, injecting cocaine daily, smoking crack daily, borrowing syringes, lending syringes, and having sought but been unable to access substance abuse treatment. Both enrolment in

methadone maintenance treatment and unprotected intercourse with casual sexual partners were inversely associated with sex trade work.

In multivariate analyses shown in table 3, factors that were independently associated with sex trade work included age and positive HIV serostatus at enrolment. Drug related factors that were independently associated with sex trade work in multivariate analysis included injecting cocaine daily, smoking crack daily, and borrowing syringes. Sex trade involvement was inversely associated with unprotected intercourse with casual (but not regular) sexual partners. Although failing to reach conventional statistical significance, self reported inability to access substance abuse treatment was associated with male sex trade work. Though non-significant at the $p < 0.1$ level, variables adjusted for in the final model included recent incarceration, syringe lending, and current enrolment in methadone maintenance therapy. Lastly, we did test for statistical interactions in the multivariate model for terms defined as HIV status \times syringe borrowing and for HIV status \times unprotected intercourse and found no significant interactions.

DISCUSSION

Our results indicate that IDU men involved in the sex trade are more likely to be young, HIV seropositive, high intensity cocaine users who engage in risky injection behaviours including syringe borrowing. A particularly disturbing finding is that even after substantial covariate adjustment, sex

Table 3 Multivariate analysis of factors associated with sex trade work among 995 male IDUs between 1996 and 2003*

Characteristic	Adjusted† odds ratio	GEE 95% CI	p Value
Age at enrolment, per year older	0.93	0.92 to 0.94	<0.001
HIV positive at enrolment (yes v no)	1.77	1.44 to 2.17	<0.001
Daily cocaine injection‡ (yes v no)	1.37	1.11 to 1.70	0.004
Daily crack smoking‡ (yes v no)	1.36	1.07 to 1.72	0.011
Borrowed syringes‡ (yes v no)	1.73	1.32 to 2.25	<0.001
Unable to access addiction treatment‡ (yes v no)	1.28	0.98 to 1.67	0.076
Unprotected intercourse with casual sex partner‡ (yes v no)	0.66	0.53 to 0.82	<0.001

GEE, generalised estimating equation; CI, confidence interval.

*Based on 8046 study visits.

†Adjusted for incarceration, lending syringes, and methadone maintenance treatment.

‡During the previous 6 months.

workers also tended to be more likely to have sought but were unable to access substance abuse treatment, compared to their non-sex trade involved male IDU counterparts.

Our finding that male sex trade workers are more likely to be HIV seropositive than their non-sex trade involved counterparts is consistent with previous studies that have observed a relatively high prevalence of HIV infection among male and female sex trade workers.^{14 24 25} In the present study, syringe borrowing was independently associated with sex trade work, even after adjustment for HIV infection. We also observed elevated rates of syringe lending in unadjusted analyses. These findings demonstrate substantial risk for acquisition and perhaps transmission of HIV infection. The context of such syringe sharing requires more investigation, including the possibility that it occurs with sex trade clients who are men who have sex with men with a relatively high prevalence of HIV.²⁶

Interestingly, while we identified elevations in specific injection related risk behaviours among male sex workers, we also found that they were less likely than other male IDUs to report unprotected intercourse with their casual sex partners. Although we were unable to measure condom use directly, this finding may be the result of a greater proportion of male casual partners among the sex trade workers compared to their counterparts not involved in the sex trade. In two previous studies, restricting analyses to condom use with male casual partners only, we found that male sex trade workers were more likely to engage in unprotected anal sex with casual partners, compared to other men who have sex with men.²⁷ Together, these results suggest that the proportion of male sex trade workers who engage in such unprotected encounters is intermediate between the higher proportion of male IDUs and lower proportion of men who have sex with men but who are not engaged in sex trade work. However, a better understanding of this and related issues will only emerge from future studies that employ standardised survey instruments with all three groups of men.⁶

A surprising finding in the present study is that male sex trade workers reported being less able to access substance abuse treatment, although this variable just failed to reach statistical significance. This result could indicate that sex trade workers are more likely to seek substance abuse treatment as a strategy to exit the trade or it may indicate lower acceptance rates into such treatment programmes. The limited provision of substance abuse treatment in our setting has been previously described,^{28 29} and this problem may be particularly urgent given the greater likelihood of sex trade workers to report daily use of both injectable and crack cocaine in our study.

There are several limitations to this study. As with many other studies of IDUs, the study population was not a random sample, although the VIDUS cohort is believed to be broadly representative of IDUs in Vancouver's Downtown Eastside neighbourhood.³⁰ Nevertheless, our study is unlikely to generalise to non-IDU male sex trade workers. In addition, socially desirable reporting is always a possibility in such studies, and stigmatised behaviours such as involvement in sex trade work may have been under-reported.³¹ However, this type of under-reporting would have led to a reduction in the strength of associations in our study. Another limitation of the present study is that sex trade work was broadly defined as receiving money, goods, drugs, shelter, or anything else in exchange for sex, which may have raised the concern of construct validity. All definitions of sex trade behaviours have limitations but it is noteworthy that if misclassification resulted from our broad definition, this too would have attenuated the associations we report.^{1 32} Unfortunately, we did not collect a measure of sexual

Key messages

- Injection drug using (IDU) men involved in the sex trade in a Canadian setting are more likely than their non-sex trade male IDU counterparts to report high intensity cocaine use
- These men also engaged in significantly elevated injection related risk behaviours, including syringe borrowing
- Sex trade work among men tended to be associated with unsuccessful efforts to access substance abuse treatment, which could indicate that sex trade workers are more likely to seek substance abuse treatment as a strategy to exit the trade or it may indicate lower acceptance rates into such treatment programmes

identity of the participants, which precludes our examination of the relation among sexual identity, use of condoms, and HIV infection. For example, it is possible that more male IDUs who self identify as gay or bisexual trade sex, since several studies of male sex trade workers have reported that the majority of their participants used hard drugs and identified themselves as gay or bisexual.^{33 34} Therefore, it is probably that the IDUs in our study who self identify as gay or bisexual would be more likely to be involved in the sex trade.

In summary, our study demonstrates that IDU men involved in the sex trade in a Canadian setting are more likely than their non-sex trade male IDU counterparts to report high intensity cocaine use and significantly elevated injection related risk behaviours. In addition, we found that sex trade work among men tended to be associated with unsuccessful efforts to access substance abuse treatment. These findings suggest that HIV prevention interventions, as well as expanded substance abuse treatment targeted towards male sex trade workers, should be implemented to meet the unmet health service needs of this population.

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CONTRIBUTORS

LK, EW, and TL designed the present study and wrote the first drafts of the manuscript; KL performed all statistical analyses; PMS, RSH, and MTS contributed to the conceptualisation of the study and the writing of various drafts of the manuscript.

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REFERENCES

- 1 Spittal PM, Bruneau J, Craib KJ, et al. Surviving the sex trade: a comparison of HIV risk behaviours among street-involved women in two Canadian cities who inject drugs. *AIDS Care* 2003;15:187-95.

- 2 Lee J, Boei W. Man suspected of raping and torturing 51 women. *Vancouver Sun*, 2004, Jan 17.
- 3 Culbert L. Pickton to stand trial for murder in deaths of 15 sex-trade workers: Crown prepares seven additional counts based on new evidence. *Vancouver Sun*, 2003, July 24.
- 4 Elifson KW, Boles J, Sweat M. Risk factors associated with HIV infection among male prostitutes. *Am J Public Health* 1993;**83**:79–83.
- 5 Elifson KW, Boles J, Sweat M, et al. Seroprevalence of human immunodeficiency virus among male prostitutes. *N Engl J Med* 1989;**321**:832–3.
- 6 O'Connell JM, Lampinen TM, Weber AE, et al. Sexual risk profile of young men who have sex with men and inject drugs. *AIDS and Behavior* 2004;**8**:17–23.
- 7 Ross MW, Wodak A, Gold J, et al. Differences across sexual orientation on HIV risk behaviours in injecting drug users. *AIDS Care* 1992;**4**:139–48.
- 8 Diaz V, Vlahov D, Greenberg B, et al. Sexual orientation and HIV infection prevalence among young Latino injection drug users in Harlem. *J Womens Health Gend Based Med* 2001;**10**:371–80.
- 9 Deren S, Stark M, Rhodes F, et al. Drug-using men who have sex with men: sexual behaviours and sexual identities. *Culture, Health and Sexuality* 2001;**3**:329–38.
- 10 Crofts N, Marcus L, Meade J, et al. Determinants of HIV risk among men who have homosexual sex and inject drugs. *AIDS Care* 1995;**7**:647–55.
- 11 Bull SS, Piper P, Rietmeijer C. Men who have sex with men and also inject drugs—profiles of risk related to the synergy of sex and drug injection behaviors. *J Homosex* 2002;**42**:31–51.
- 12 Hogg RS, Weber A, Chan K, et al. Increasing incidence of HIV infections among young gay and bisexual men in Vancouver. *AIDS* 2001;**15**:1321–2.
- 13 Weber AE, Craib KJ, Chan K, et al. Determinants of HIV seroconversion in an era of increasing HIV infection among young gay and bisexual men. *AIDS* 2003;**17**:774–7.
- 14 Kral AH, Bluthenthal RN, Lorvick J, et al. Sexual transmission of HIV-1 among injection drug users in San Francisco, USA: risk-factor analysis. *Lancet* 2001;**357**:1397–401.
- 15 Strathdee SA, Sherman SG. The role of sexual transmission of HIV infection among injection and non-injection drug users. *J Urban Health* 2003;**80**(suppl 3):iii7–14.
- 16 Deren S, Estrada A, Stark M, et al. A multisite study of sexual orientation and injection drug use as predictors of HIV serostatus in out-of-treatment male drug users. *J Acquir Immune Defic Syndr Human Retrovir* 1997;**15**:289–95.
- 17 Tyndall MW, Currie S, Spittal P, et al. Intensive injection cocaine use as the primary risk factor in the Vancouver HIV-1 epidemic. *AIDS* 2003;**17**:887–93.
- 18 Miller CL, Johnston C, Spittal PM, et al. Opportunities for prevention: hepatitis C prevalence and incidence in a cohort of young injection drug users. *Hepatology* 2002;**36**:737–42.
- 19 Wood E, Kerr T, Spittal PM, et al. The potential public health and community impacts of safer injecting facilities: evidence from a cohort of injection drug users. *J Acquir Immune Defic Syndr* 2003;**32**:2–8.
- 20 Spittal PM, Craib KJ, Wood E, et al. Risk factors for elevated HIV incidence rates among female injection drug users in Vancouver. *CMAJ* 2002;**166**:894–9.
- 21 Diggle PJ, Liang K, Zeger SL. *Analysis of longitudinal data*. Oxford: Clarendon Press, 1994.
- 22 Hu FB, Goldberg J, Hedeker D, et al. Comparison of population-averaged and subject-specific approaches for analyzing repeated binary outcomes. *Am J Epidemiol* 1998;**147**:694–703.
- 23 Craib KJ, Spittal PM, Wood E, et al. Risk factors for elevated HIV incidence among Aboriginal injection drug users in Vancouver. *CMAJ* 2003;**168**:19–24.
- 24 Doherty MC, Garfein RS, Monterroso E, et al. Correlates of HIV infection among young adult short-term injection drug users. *AIDS* 2000;**14**:717–26.
- 25 Strathdee SA, Patrick DM, Currie SL, et al. Needle exchange is not enough: lessons from the Vancouver injecting drug use study. *AIDS* 1997;**11**:F59–65.
- 26 Spittal PM, Laliberte N, Brooks R, et al. Love, intimacy, violence, and needles: exploring the socio-cultural and relational contexts of risk in female injection drug users. *Can J Infect Dis* 2001;**12**(suppl B).
- 27 Weber AE, Craib KJ, Chan K, et al. Sex trade involvement and rates of human immunodeficiency virus positivity among young gay and bisexual men. *Int J Epidemiol* 2001;**30**:1449–54; discussion 55–6.
- 28 Wood E, Spittal PM, Li K, et al. Inability to access addiction treatment and risk of HIV-infection among injection drug users. *J Acquir Immune Defic Syndr* 2004;(in press).
- 29 O'Shaughnessy MV, Montaner JSG, Strathdee S, et al. Deadly public policy. In: International Conference on AIDS, 1998: 982 (abstract no 44233).
- 30 Tyndall MW, Craib KJ, Currie S, et al. Impact of HIV infection on mortality in a cohort of injection drug users. *J Acquir Immune Defic Syndr* 2001;**28**:351–7.
- 31 Des Jarlais DC, Paone D, Milliken J, et al. Audio-computer interviewing to measure risk behaviour for HIV among injecting drug users: a quasi-randomised trial. *Lancet* 1999;**353**:1657–61.
- 32 Culhane DP, Gollub E, Kuhn R, et al. The co-occurrence of AIDS and homelessness: results from the integration of administrative databases for AIDS surveillance and public shelter utilisation in Philadelphia. *J Epidemiol Community Health* 2001;**55**:515–20.
- 33 Belza MJ, Llacer A, Mora R, et al. Sociodemographic characteristics and HIV risk behaviour patterns of male sex workers in Madrid, Spain. *AIDS Care* 2001;**13**:677–82.
- 34 Williams ML, Timpson S, Klovdal A, et al. HIV risk among a sample of drug using male sex workers. *AIDS* 2003;**17**:1402–4.