Characterizing Men who have Sex with Men and Use Injection Drugs in Vancouver, Canada

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Abstract

We examined factors associated with reporting sex with men among men who inject drugs in Vancouver, Canada. Data were drawn from three open prospective cohorts of people who use drugs between 2005 and 2014. Generalized estimating equations were used to identify factors associated with reporting non-transactional sex with men (MSM) in the previous six months. Of 1663 men who used injection drugs, 225 (13.5%) were MSM over the study period. Sex with men was independently associated with younger age (Adjusted Odds Ratio [AOR]=0.96), childhood sexual abuse (AOR=2.65), sex work (AOR=3.33), crystal methamphetamine use (AOR=1.30), borrowing used syringes (AOR=1.39), inconsistent condom use (AOR=1.76), and HIV seropositivity (AOR=3.82). MSM were less likely to be Hepatitis C-positive (AOR=0.43) and to have accessed addiction treatment in the previous six months (AOR=0.83) (all p<0.05). Findings highlight vulnerabilities and resiliencies among MSM-PWID and indicate a need for trauma-informed and affirming harm reduction and substance use treatment services for MSM-PWID.

Introduction

Men who have sex with men[1] and who use injection drugs (MSM-PWID) are, across a range of settings, a population at high risk of HIV infection compared to other male PWID and non-injecting MSM (1-8). This HIV burden is driven by dual sexual and injection-related

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[1]"MSM" is the term that is most likely to be used when searching literature databases, and sex with men is our primary outcome variable, and thus we have chosen to use this term for the purpose of presenting this analysis. Nevertheless, we recognize the term "MSM" has limitations, including that it tends to lead to a focus on proximal determinants of risk (e.g., behavior) while disregarding other considerations (e.g., sexual identity).

risks. In addition to the higher HIV transmission risk associated with anal intercourse (9), MSM are known to be more likely to engage in high-risk injection and sexual behaviors than other male PWID, including receptive syringe sharing and condomless sex (2, 10, 11). Within samples of gay, bisexual, and other MSM, injection drug use has been associated with bisexual identity and behavior (6, 12, 13), sex work (6, 14, 15), and higher HIV and HCV risks and prevalence (6, 13, 16).

MSM-PWID also face greater socio-structural adversities as compared to their MSM counterparts, including economic disadvantage, homelessness, criminalization, stigma, and violence (6, 12, 15, 16). With the exception of differences in HIV risk behavior, however, less is known about how MSM-PWID may differ from other male PWID. A 2000 review on substance use among MSM noted that the vast majority of literature on MSM-PWID concerned behavioral risks for HIV transmission (17), and this continued to be a primary focus in subsequent research (18, 19). Although both PWID and MSM face heightened socio-structural vulnerabilities and victimization (e.g., childhood trauma; (20, 21) as well as barriers to health services (22, 23), little is known about these determinants of HIV vulnerability among MSM-PWID. To address these gaps, we examined demographic, social-structural, behavioral, and health care factors associated with reporting sex with men among male PWID in Vancouver, Canada.

Methods

Participants and data collection

Data were collected from 2005-2014 as part of three harmonized open prospective cohort studies of people who use illicit drugs in Vancouver, Canada. The Vancouver Injection Drug Users Study (VIDUS) includes adults (18+) who reported past-month injection drug use at enrolment. The AIDS Care Cohort to Evaluate Exposure to Survival Services (ACCESS) enrolls HIV-positive adults reporting past-month illicit drug use, and the At-Risk Youth Study (ARYS) enrolls street-involved youth (aged 14-26) reporting past-month illicit drug use.

Details of recruitment and data collection procedures for each cohort have been described previously (24-26). Briefly, participants are recruited through extensive street-based outreach and snowball sampling. At baseline and subsequent biannual study follow-ups, participants in each cohort complete a harmonized interviewer-administered questionnaire and serology to test for HIV and HCV. Participants received a $30CDN stipend for each visit. The study questionnaires are harmonized across the three cohorts and collect information on demographics, health behaviors, social-structural exposures, and access to care. The studies have been approved by the University of British Columbia/Providence Health Care Research Ethics Board.

The present analyses were limited to participants assigned a male sex at birth with a history of injection drug use who were seen for a study visit between December 1, 2005 and November 30, 2014.

Measures

The main outcome of interest was current MSM status, defined as reporting non-transactional sex with men over the previous six months. Participants were asked separately about non-transactional and transactional sex with men (in exchange for money or other resources). Variables of interest potentially associated with MSM status were included in the analysis. Demographic measures included age (per year older), white race/ethnicity (yes vs. no), high school completion (yes vs. no), residence in the Downtown Eastside (Vancouver's epicenter of drug use and related HIV infections), homelessness or unstable housing (e.g., living in a single-room occupancy hotel, in a car, staying with friends; yes vs. no), and relationship status (partnered vs. not). Socio-structural factors included a history of being in foster care (yes vs. no) and childhood sexual abuse as assessed through the sexual abuse subscale of the validated Childhood Trauma Questionnaire (27). Following previous research with this population (in which childhood maltreatment is highly prevalent), scores were dichotomized to reflect "no to low" (5-12) versus "moderate to extreme" (13-25) abuse (28). Recent socio-structural exposures included: incarceration (any time spent in detention, prison, or jail); sex work (engaging in sexual activities in exchange for money or goods), experiencing physical violence, and experiencing sexual violence (all yes vs. no).

Drug use and sexual behaviors included any use of specific substances (heroin, prescription opioids, cocaine, crack cocaine, crystal methamphetamine), lending or borrowing used syringes, and inconsistent condom use (all yes vs. no). Lastly, health and health care access variables included HIV and Hepatitis C virus (HCV) serostatus, use of a supervised injection facility, both recent and lifetime utilization of addiction treatment, and self-reported inability to access addiction treatment. Unless otherwise specified, all measures reflect behaviors or activities over the previous six-month period.

Statistical analyses

To begin, we stratified baseline characteristics by reporting non-transactional sex with men (at least once over the study period). Pearson's chi-squared test (for binary variables), Fisher's exact test (for binary variables with counts <5), and the Mann-Whitney test (for continuous variables) were used to test for significant baseline differences between MSM and non-MSM male PWID. Bivariable and multivariable generalized estimating equations (GEE) with a logit link were used to identify factors associated with reporting non-transactional sex with men in the previous six months. This approach accounts for correlations between repeated measurements, providing adjusted standard errors using an exchangeable correlation structure. The multivariable model was fit using an a priori-defined backwards selection protocol, with the Quasi-likelihood under the Independence model Criterion (QIC) statistic used to select the model with the best fit. The initial multivariable model included all explanatory variables associated with recent sex with men in the bivariable analyses at $p<0.10$. Reduced models were built by removing the variable with the highest p-value at each stage, and the final model included the set of variables with the lowest QIC value. All analyses were conducted in R 3.5.0 (R Foundation for Statistical Computing, Vienna, Austria). All P-values are two-sided.

Results

Of 1663 male participants, 514 (30.9%) were from the ACCESS cohort, 802 (48.2%) were from VIDUS, and 347 (20.9%) were from ARYS. Participants were followed for a median of 54.3 months (Interquartile range [IQR]= 13.2-93.8) and had a median of 7 study visits (IQR=3-13). Over the study period, 225 (13.5%) participants reported sex with another man at least once and were therefore classified as MSM. As shown in Table 1, at baseline the median age of participants was 40 (IQR= 28-47), with MSM being younger (34; IQR= 24-43) than non-MSM (41; IQR=30-48). There were numerous other baseline differences between MSM and non-MSM, including that MSM were less likely to live in the Downtown Eastside and more likely to report moderate-to-extreme childhood abuse.

In bivariable analyses (Table 2), MSM had higher unadjusted odds of being in a relationship; reporting moderate-to-extreme childhood sexual abuse; and experiencing physical violence, sexual violence, and sex work in the previous six months. Behavioral differences included greater crack cocaine use, crystal methamphetamine use, syringe sharing, and inconsistent condom use among MSM. Access to health services also varied, with MSM being less likely to have ever utilized addictions treatment and more likely to report recent inability to access treatment. In addition, MSM were more likely than non-MSM to be HIV-seropositive, but less likely to be Hepatitis C-positive.

In the multivariable GEE model (Table 2), factors independently and negatively associated with sex with men in the previous six months were age (AOR= 0.96, 95% CI= 0.95-0.98); HCV positivity (AOR=0.43, 95% CI=0.29-0.64), and recent use of addictions treatment (AOR=0.83, 95% CI= 0.69-0.99). Factors positively associated with sex with men were being in a relationship (AOR=1.49, 95% CI: 1.19-1.87); moderate to extreme childhood sexual abuse (AOR=2.65, 95% CI=1.83-3.83); sex work (AOR=3.33, 95% CI=1.80-6.17); crystal methamphetamine use (AOR=1.30, 95% CI=1.05-1.62); borrowing used syringes (AOR=1.39, 95% CI=1.05-1.84); inconsistent condom use (AOR=1.76, 95% CI=1.36-2.27); and HIV positivity (AOR=3.82, 95% CI=2.43-6.01).

Discussion

Across three cohorts of people who use illicit drugs in Vancouver, about 1 in 7 male PWID reported non-transactional sex with other men. MSM-PWID differed from non-MSM with respect to some demographic, social-structural, behavioral, and health care characteristics. Specifically, MSM were more likely to report childhood sexual abuse, to be HIV-positive, and to engage in sexual and drug use risk behaviors and less likely to have accessed addictions treatment in the previous six months. However, MSM were also more likely to be in a relationship and had lower HCV prevalence, indicating potential resiliencies.

The proportion of MSM in this sample was high compared to the local male population overall; 2.9% of adult males in Vancouver are estimated to be MSM (29). As recently shown by Lyons et al. (30), sexual minorities are also overrepresented among women who use drugs in this setting, consistent with higher rates of substance use among sexual minorities as compared to their heterosexual counterparts in the broader population (17). Further, it is

well-established that sexual minorities report more childhood sexual abuse than their heterosexual counterparts (20, 31). It is notable that MSM-PWID reported higher levels of abuse despite already high baseline levels among PWID (28). Consistent with previous research (2, 4, 10, 11), we found that MSM-PWID were at greater behavioral risk for both sexual and parenteral HIV transmission.

To our knowledge, this was the first study to examine access to substance use disorder treatment for MSM-PWID in Canada, and we found that sex with men was independently negatively associated with accessing treatment in the previous six months. This may be related to the relative dearth of stimulant-focused treatment services, as well as intersecting forms of stigma that MSM-PWID encounter in treatment settings (32). Addictions treatment is critical to HIV prevention among people who use drugs (33) and inability to access treatment has been associated with HIV risk (34). Thus, increasing access to treatment for MSM-PWID should be prioritized, both for overall well-being and to prevent HIV transmission. Although effective pharmacological treatments for stimulant use disorders remain elusive, psychosocial interventions that simultaneously address drug-related and sexual risks may be beneficial for MSM-PWID who use stimulants (37). However, data on long-term benefits of psychosocial interventions for stimulant dependence are currently lacking.

Interestingly, at baseline and over time, MSM-PWID were considerably less likely than non-MSM-PWID to be Hepatitis C antibody-positive, despite greater injection-related risk behavior. To better understand this apparent paradox, the injecting networks and practices of local MSM-PWID warrant further investigation. For example, it may be the case that MSM-PWID tend to inject with each other rather than with non-MSM, limiting HCV transmission between their injecting networks. Alternatively, MSM-PWID may have different substance use patterns that reduce their risk of HCV acquisition.

Our findings underscore the ongoing need to capture data on sexual orientation in research on injection drug use. In particular, multiple dimensions of sexual orientations should be considered in future research, as sexual attraction, behavior, and identity need not coincide, and can be differentially associated with health outcomes (35). For instance, one study in San Francisco found important differences among MSM-PWID based on sexual orientation identity, with greater sexual risk and HIV prevalence among gay and bisexual MSM but greater injection-related risk and socio-economic vulnerability among heterosexual-identified MSM (19).

Limitations

Some limitations of this study should be noted. First, only one dimension of sexual minority status was measured, precluding our ability to examine the impacts of sexual orientation identity. The observational nature of the data limit causal inference and despite extensive multivariable adjustment, residual confounding may exist. With the exception of serostatus, variables were self-reported and thus may be subject to socially desirable reporting. Specifically, sex with men may be underreported, particularly as the survey was interviewer-administered, and such under-reporting may attenuate associations between exposures of

interest and MSM status (36). Finally, participants were not randomly recruited, and thus results cannot be generalized to all PWID in Vancouver.

Conclusion

The present study adds to existing knowledge by demonstrating that sex with men is relatively common among male PWID in Vancouver and associated with specific resiliencies and vulnerabilities, including lower HCV prevalence and reduced engagement in addictions treatment. Findings indicate a need for trauma-informed, affirming, and culturally-relevant harm reduction and substance use treatment services for MSM-PWID.

Acknowledgements:

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Table 1.

Baseline characteristics of men who inject drugs in Vancouver, Canada stratified by sex with men

Characteristic	Total (%) (*n* = 1663)	Sex with men[*]		*p* - value
		No (%) (*n* = 1438)	Yes (%) (*n* = 225)	
Demographic characteristics				
Age (med, IQR)	40 (28-47)	41 (30-48)	34 (24-43)	**<0.001**
White race/ethnicity	1115 (67.0)	972 (67.6)	143 (63.6)	0.231
Completed high school	796 (47.9)	687 (47.8)	109 (48.4)	0.864
Downtown Eastside residence	859 (51.7)	766 (53.3)	93 (41.3)	**0.001**
In a relationship	389 (23.4)	331 (23.0)	58 (25.8)	0.272
Social-structural exposures				
Ever in foster care	560 (33.7)	470 (32.7)	90 (40.0)	0.267
Childhood sexual abuse [†]	327 (19.7)	244 (17.0)	83 (36.9)	**<0.001**
Homeless or unstable housing	1279 (76.9)	1107 (77.0)	172 (76.4)	0.878
Incarceration, past 6 mo.	322 (19.4)	292 (20.3)	30 (13.3)	**0.013**
Physical violence, past 6 mo.	483 (29.0)	406 (28.2)	77 (34.2)	0.066
Sexual violence, past 6 mo.	5 (0.3)	1 (0.1)	4 (1.8)	**0.002**
Sex work, past 6 mo.	102 (6.1)	25 (1.7)	77 (34.2)	**<0.001**
Drug use and sexual behaviors[‡]				
Heroin use	980 (58.9)	858 (59.7)	122 (54.2)	0.135
Prescription opioid use	379 (22.8)	345 (24.0)	34 (15.1)	0.102
Cocaine use	847 (50.9)	736 (51.2)	111 (49.3)	0.643
Crack cocaine use	1222 (73.5)	1054 (73.3)	168 (74.7)	0.665
Crystal methamphetamine use	564 (33.9)	435 (30.3)	129 (57.3)	**<0.001**
Lent syringes	99 (6.0)	80 (5.6)	19 (8.4)	0.091
Borrowed syringes	136 (8.2)	103 (7.2)	33 (14.7)	**<0.001**
Inconsistent condom use	582 (35.0)	485 (33.7)	97 (43.1)	**0.006**
Health status and access to care				
HIV-positive	518 (31.1)	425 (29.6)	93 (41.3)	**<0.001**
Hepatitis C-positive	1198 (72.0)	1074 (74.7)	124 (55.1)	**<0.001**
Accessed supervised injection facility in past 6 mo.	748 (45.0)	666 (46.3)	82 (36.4)	**0.005**
Ever accessed addiction treatment	1305 (78.5)	1142 (79.4)	163 (72.4)	**0.016**
Accessed treatment in past 6 mo.	788 (47.4)	682 (47.4)	106 (47.1)	0.908
Unable to access treatment in past 6 mo.	135 (8.1)	108 (7.5)	27 (12.0)	**0.022**

[*] At least once over the study period, excluding sex work partners

[†] Score of 13-25 (moderate to extreme) vs. 5-12 (none to low) on Childhood Trauma Questionnaire

[‡] Yes vs. no, over the previous six months

Table 2.

Bivariable and multivariable GEE of factors associated with sex with men among men who inject drugs in Vancouver, Canada (n=1663)

Characteristic	Unadjusted		Adjusted	
	Odds Ratio (95% CI)	*p* - value	Odds Ratio (95% CI)	*p* - value
Demographics				
Age (one-year increase)	0.95 (0.94 – 0.96)	**<0.001**	0.96 (0.95 – 0.98)	**<0.001**
White race/ethnicity (yes vs. no)	0.77 (0.56 – 1.07)	0.117	--	--
Completed high school (yes vs. no)	1.13 (0.82 – 1.55)	0.449	--	--
Downtown Eastside residence (yes vs. no)	0.93 (0.81 – 1.07)	0.285	--	--
In a relationship (yes vs. no)	1.56 (1.31 – 1.85)	**<0.001**	1.49 (1.19 – 1.87)	**0.001**
Social-structural exposures				
Ever in foster care (yes vs. no)	1.11 (0.78 – 1.57)	0.576	--	--
Childhood sexual abuse† (moderate-to-extreme vs. none-to-low)	3.32 (2.38 – 4.64)	**<0.001**	2.65 (1.83 – 3.83)	**<0.001**
Homeless or unstable housing (yes vs. no)	1.09 (0.95 – 1.25)	0.205	--	--
Incarceration, past 6 mo. (yes vs. no)	1.03 (0.88 – 1.21)	0.712	--	--
Physical violence, past 6 mo. (yes vs. no)	1.21 (1.06 – 1.37)	**0.005**	--	--
Sexual violence, past 6 mo. (yes vs. no)	3.78 (1.04 – 13.69)	**0.043**	*	*
Sex work, past 6 mo. (yes vs. no)	4.51 (2.41 – 8.45)	**<0.001**	3.33 (1.80 – 6.17)	**<0.001**
Drug use and sexual behaviors‡				
Heroin use (yes vs. no)	1.05 (0.92 – 1.20)	0.484	--	--
Prescription opioid use (yes vs. no)	0.95 (0.81 – 1.11)	0.541	--	--
Cocaine use (yes vs. no)	1.08 (0.94 – 1.26)	0.276	--	--
Crack cocaine use (yes vs. no)	1.32 (1.13 – 1.54)	**<0.001**	--	--
Crystal methamphetamine use (yes vs. no)	1.85 (1.58 – 2.18)	**<0.001**	1.30 (1.05 – 1.62)	**0.018**
Lent syringes (yes vs. no)	1.39 (1.01 – 1.92)	**0.043**	--	--
Borrowed syringes (yes vs. no)	1.82 (1.45 – 2.30)	**<0.001**	1.39 (1.05 – 1.84)	**0.023**
Inconsistent condom use (yes vs. no)	1.90 (1.60 – 2.26)	**<0.001**	1.76 (1.36 – 2.27)	**<0.001**
Health status and access to care				

Characteristic	Unadjusted		Adjusted	
	Odds Ratio (95% CI)	*p* - value	Odds Ratio (95% CI)	*p* - value
HIV-positive (yes vs. no)	1.88 (1.38 – 2.57)	**<0.001**	3.82 (2.43 – 6.01)	**<0.001**
Hepatitis C-positive (yes vs. no)	0.35 (0.26 – 0.48)	**<0.001**	0.43 (0.29 – 0.64)	**<0.001**
Used supervised injection facility, past 6 mo. (yes vs. no)	0.95 (0.84 – 1.07)	0.395	--	--
Addiction treatment ever (yes vs. no)	0.69 (0.55 – 0.86)	**0.001**	--	--
Treatment, past 6 mo. (yes vs. no)	0.89 (0.78 – 1.00)	0.054	0.83 (0.69 – 0.99)	**0.038**
Unable to access treatment, past 6 mo. (yes vs. no)	1.25 (1.01 – 1.55)	**0.038**	--	--

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Not included in multivariable analyses due to small counts