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Residential eviction and exposure to violence among people who inject drugs in Vancouver, Canada

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Abstract

Background—People who inject drugs (PWID) experience markedly elevated rates of physical and sexual violence, as well as housing instability. While previous studies have demonstrated an association between homelessness and increased exposure to violence among PWID, the relationship between residential eviction and violence is unknown. We therefore sought to examine the association between residential eviction and experiencing violence among PWID in Vancouver, Canada.

Methods—Data were derived from two open prospective cohort studies of PWID: the Vancouver Injection Drug Users Study (VIDUS) and the AIDS Care Cohort to evaluate Exposure to Survival Services (ACCESS). We used generalized estimating equations (GEE) to estimate the relationship between residential eviction and experiencing violence among male and female PWID, respectively.

Results—Between June 2007 and May 2014, 1689 participants were eligible for the analysis, contributing a median of 5.5 years of follow-up. Of these, 567 (33.6%) were female. In total, 259 (45.7%) of females and 566 (50.4%) of males experienced at least one incident of violence over the study period. In multivariable GEE models, residential eviction was independently associated with greater odds of experiencing violence among both females (Adjusted Odds Ratio [AOR] =

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2.09; 95% confidence interval [CI]: 1.39–3.13) and males (AOR = 1.95; 95% CI = 1.49–2.55), after adjustment for potential confounders.

Conclusion—Residential eviction was independently associated with an increased likelihood of experiencing violence among both male and female PWID. These findings point to the need for evidence-based social-structural interventions to mitigate housing instability and violence among PWID in this setting.

Keywords

injection drug use; eviction; housing; violence; generalized estimating equations; Canada

INTRODUCTION

Violence remains a key driver of morbidity and mortality among people who inject drugs (PWID) (Degenhardt & Hall, 2012). Studies from diverse settings have described disproportionately high levels of exposure to violence among PWID (Chermack & Blow, 2002; Finlinson et al., 2003; Marshall, Fairbairn, Li, Wood & Kerr, 2008), with one recent study finding that 52% of PWID experienced at least one incident of physical or sexual violence over a seven-year study period (Richardson et al., 2015). Such exposure to violence has been shown to have adverse consequences for PWID that extend beyond immediate physical injuries to include an array of severe health and social harms. Specifically, previous studies of drug-using populations have documented associations between violent encounters and mental health concerns such as posttraumatic stress disorder, suicidal ideation, depression, anxiety, substance dependence and eating disorders (Farley & Barkan, 1998; Fischbach & Herbert, 1997; Taylor & Jason, 2002). Exposure to violence among PWID has also been linked to an increased likelihood of engaging in unsafe injection practices, including syringe sharing, as well as drug-related harms such as overdose (Braitstein et al., 2003). Further, recent qualitative research suggests that experiencing violence may impede access to harm reduction services among those who occupy marginal positions within drug economies, such as women and people with disabilities, by constraining the geographic scope of their activities (McNeil, Shannon, Shaver, Kerr & Small, 2014).

To date, research on exposure to violence among PWID has predominantly focused on sociodemographic and behavioural correlates, including drug use and sexual behaviours (Vlahov et al., 1998; Gruskin et al., 2002; Tucker, Wenzel, Elliott, Marshall & Williamson, 2004; Wenzel, Tucker, Elliott, Marshall & Williamson, 2004a). However, in recent years, efforts to understand experiences of violence among PWID have expanded beyond the individual level to investigate the role of social-structural determinants. One heuristic that has informed this work is the Risk Environment framework (Rhodes, 2002; Rhodes et al., 2012). This framework describes how social, structural and environmental factors interact at macro- and micro-environmental levels to shape the health of PWID (Rhodes, 2002; Rhodes et al., 2012). The purpose of the Risk Environment framework is not to provide a comprehensive classification system for the complex, multifaceted aspects of the risk environment of PWID, but to instead shift attention away from the level of the individual to facilitate recognition and understanding of the role of environmental influences on health and risk (Goldenberg et al., 2011; McNeil et al., 2014; Richardson et al., 2013). Although

first applied in the study of the risk of HIV acquisition (Rhodes, 2002), this framework has recently been extended to describe how contextual factors interact at various levels of influence to shape susceptibility to violence among PWID (Lorvick et al., 2014; Marshall et al., 2008). In addition to factors such as socioeconomic marginalization, incarceration and exposure to street-based drug scenes, this research has identified housing status as an important risk factor for exposure to violence among drug-using populations (Klein & Levy, 2003; Lorvick et al., 2014; Marshall et al., 2008; Richardson et al., 2015; Wenzel, Leake & Gelberg, 2001; Wenzel et al., 2004b). For example, one study found that homelessness was associated with an elevated likelihood of experiencing violence among both male and female PWID (Marshall et al., 2008). Another study found that sheltered homeless drug-using women were more likely to experience physical and sexual violence compared to those who were stably housed (Wenzel et al., 2004b).

The Risk Environment framework has also informed understanding of the role of sex and gender in structuring susceptibility to violence within drug economies and street environments. For instance, several qualitative studies have elucidated how female PWID are often relegated to subordinate roles in street-based drug scene hierarchies, thereby increasing their vulnerability to violence (Epele, 2002; Maher & Daly, 1996; McNeil et al., 2014; Miller, Kerr, Strathdee, Li & Wood, 2007). Additionally, other quantitative studies have demonstrated how experiences of violence may vary by sex or gender. For example, a study examining sex-based differences in violent encounters among PWID in Vancouver found that although a similar proportion of males and females experienced violence over the study period, sources of violence differed by sex. A greater proportion of males reported being attacked by police officers and strangers, while female PWID were more likely to report being attacked by acquaintances, intimate partners and people involved in the sex industry (Marshall et al., 2008). Moreover, male and female PWID were found to have distinct sets of multi-level risk factors for exposure to violence (Marshall et al., 2008).

While this research has provided insight into how gendered structures and social context within drug scenes may shape experiences of violence among PWID, the contribution of other distinct elements of the risk environment of PWID remain poorly understood. Notably, we know of no studies that have investigated the relationship between residential eviction (i.e., forced displacement of a tenant from leased residential premises through legal or extra-legal mechanisms) and experiencing violence among PWID. This is an important gap in current knowledge given the documented association between unstable housing and exposure to violence among PWID (Marshall et al., 2008; Wenzel et al., 2001; Wenzel et al., 2004b), and given evidence suggesting that housing displacement may have health and social impacts distinct from those related to homelessness (Cooper et al., 2012; Desmond & Kimbro, 2015; Kennedy et al., 2016; Pollack & Lynch, 2009). Moreover, residential eviction is common among PWID, particularly among those living in inner-city neighbourhoods characterized by ongoing gentrification and redevelopment (Chum, 2015; Kennedy et al., 2016). One such neighbourhood is Vancouver's Downtown Eastside (DTES), a postindustrial area marked by an open drug market, poverty and increasing levels of homelessness and housing instability (Kennedy et al., 2016; Sutherland, Swanson & Herman, 2013). Indeed, in recent years, the expansion of redevelopment projects has resulted in the loss of hundreds of affordable housing units in the DTES, located in a

surrounding city with one of the lowest rental vacancy rates and highest costs of living in North America (Sutherland et al., 2013).

Gaining a better understanding of the role of residential eviction in shaping susceptibility to violence among PWID in a setting undergoing extensive redevelopment may provide important public health information to inform the development of social-structural interventions designed to mitigate violence and housing instability among this population. Drawing on the Risk Environment framework, we therefore sought to examine the relationship between residential eviction and self-reported exposure to physical and sexual violence among two community-recruited prospective cohorts of PWID in Vancouver, Canada. As previous research has demonstrated that correlates of violence may vary by sex, we examined this relationship separately for males and females.

METHODS

Data for this study were derived from Vancouver Injection Drug Users Study (VIDUS) and the AIDS Care Cohort to Evaluate access to Survival Services (ACCESS). VIDUS and ACCESS are two community-recruited open prospective cohort studies of people who use illicit drugs operating in Vancouver, Canada. These cohorts have been described in detail previously (Strathdee et al., 1998; Wood et al., 2001). In brief, participants have been recruited through self-referral, snowball sampling, and street outreach since May 1996. VIDUS is a cohort of HIV-negative adult PWID who have injected illicit drugs at least once in the month prior to enrolment. ACCESS is a cohort of HIV-positive adult drug users who have used illicit drugs (other than or in addition to cannabis) in the previous month at baseline. VIDUS participants who seroconvert to HIV following recruitment are transferred into the ACCESS study. The two studies employ harmonized data collection and follow-up procedures to allow for combined analyses. Specifically, at baseline visit and semi-annually thereafter, participants complete an interviewer-administered questionnaire and provide blood samples for serologic analyses. The questionnaire elicits information about socio-demographic characteristics, drug use and other behavioural patterns, housing status, engagement with healthcare services, and experiences with the criminal justice system. At each study visit, participants are offered a nominal honorarium (\$40 CAD). The VIDUS and ACCESS studies have received approval from the University of British Columbia/ Providence Health Care Research Ethics Board.

The present analyses were restricted to participants who reported having ever injected drugs at baseline and completed at least one study visit between June 2007 and May 2014. The primary outcome for this analysis was response to the question: "Have you been attacked, assaulted (including sexual assault) or suffered any kind of violence in the last six months?" (yes vs. no). The primary explanatory variable of interest was recent residential eviction, defined as self-reporting being unwillingly evicted from one's residence in the six months prior to the study interview. This variable was measured longitudinally at each follow-up and was included in the analysis as a time-varying measure. To estimate the independent association between residential eviction and exposure to violence, we considered secondary explanatory variables that may potentially confound this relationship. These variables were informed by the Risk Environment framework (Rhodes, 2002; Rhodes et al., 2012) and

previous literature on housing status and violence among drug-using populations (Marshall et al., 2008; Richardson et al., 2015; Wenzel et al., 2001; Wenzel et al., 2004b) and included a range of demographic, social-structural and behavioral variables: age (per year older); ancestry (Caucasian vs. non-Caucasian); education (high school diploma vs. <high school diploma); childhood emotional abuse (moderate/severe vs. none/low); DTES residence (yes vs. no); relationship (legally married/common law/regular partner vs. other); employed (regular job/temporary job/self-employed vs. no); non-injection crack cocaine use (daily vs. <daily); injection heroin use (daily vs. <daily); injection cocaine use (daily vs. <daily); heavy alcohol use (yes vs. no); enrollment in addiction treatment (yes vs. no); sex work involvement (yes vs. no); drug dealing (yes vs. no); and incarceration (yes vs. no). As with previous studies (Lake et al., 2014), childhood emotional abuse was defined as reporting a score of ≥ 13 (moderate/severe) vs. <13 (none/low) on the emotional abuse subscale of the Childhood Trauma Questionnaire (Bernstein & Fink, 1998). Heavy alcohol use was defined as an average of >3 alcoholic drinks per occasion or >7 drinks per week in the past six months for women, and an average of >4 alcoholic drinks per occasion or >14 drinks in total per week in the past six months for men (National Institute on Alcohol Abuse and Alcoholism, 2011). All behavioural and drug use variables were treated as time-updated and refer to the six-month period prior to the follow-up interview unless otherwise indicated.

As a first step, we examined the baseline characteristics of our sample, stratified by biological sex at birth (female vs. male). Categorical variables were analyzed using Pearson's χ^2 test and continuous variables were analyzed using the Wilcoxon Rank-Sum test. Next, we used generalized estimating equations (GEE) for binary outcomes with a logit link function and exchangeable working correlation structure to estimate unadjusted odds ratios (OR) for the association between experiencing violence and each explanatory variable, stratified by biological sex at birth. We used GEE for the analysis of correlated data given that the factors potentially associated with experiencing violence during follow-up were time-dependent measures. GEE analyses allowed for consideration of factors associated with experiencing violence over the full length of the study period, with standard errors calculated using an exchangeable correlation structure adjusted for multiple observations for each individual (Lee, Herzog, Meade, Webb & Brandon, 2007).

To estimate the independent association between residential eviction and exposure to violence, we constructed two multivariable models using an *a-priori* variable selection process described previously by Maldonado and Greenland (1993). In this process, we fit a full model, for males and females, respectively, including all explanatory variables, noting the value of the coefficient associated with residential eviction in each model. In a stepwise manner, we removed the secondary explanatory variable corresponding to the smallest relative change in the residential eviction coefficient from further consideration. We continued this iterative process until the maximum change of the value of the residential eviction coefficient from the full model exceeded 5%. Remaining variables were considered confounders in the multivariable model. We have previously used this approach to estimate the independent relationship between a primary explanatory variable and an outcome of interest (Kennedy et al., 2016). We conducted all statistical analyses with SAS software version 9.4 (SAS Institute Inc., Cary, DC, USA). All *p*-values were two-sided.

RESULTS

Between June 2007 and May 2014, 1689 PWID met the inclusion criteria for this analysis. Participants contributed 7298.3 person-years of follow-up over the study period with a median follow-up time of 67.2 months (interquartile range [IQR] = 40.7–77.0) per participant. The median age at baseline was 43 years (IQR= 37–49), 567 (33.6%) were female and 1000 (59.2%) were of Caucasian ancestry. In total, 259 (45.7%) of females and 566 (50.4%) of males reported experiencing at least one incident of physical or sexual violence over the study period, accounting for a total of 825 (48.8%) participants in the study sample. Of the total 13732 observations during the study period, there were 1805 six-month periods including at least one reported incident of violence. A total of 397 (23.5%) participants reported having been evicted at least once over the study period, 126 (31.7%) of whom were female. Table 1 presents the baseline characteristics of the study sample stratified by biological sex at birth.

Table 2 presents the results of the crude and adjusted longitudinal estimates of the odds of experiencing violence, stratified by biological sex at birth. As shown, in unadjusted analyses, residential eviction was associated with significantly higher odds of experiencing violence (OR = 2.02, 95% confidence interval [95% CI]: 1.37–2.99) among females. In addition, DTES residence, crack cocaine use, injection heroin use, injection cocaine use, heavy alcohol use, sex work involvement, drug dealing, childhood emotional abuse, and incarceration were positively associated with experiencing violence among females in unadjusted analyses.

Among males, residential eviction (OR = 2.23, 95% CI: 1.74–2.87) was associated with elevated odds of experiencing violence in unadjusted analyses. Other variables that were positively associated with experiencing violence among males in unadjusted analyses included Caucasian ancestry, DTES residence, crack cocaine use, injection heroin use, heavy alcohol use, drug dealing, childhood emotional abuse, and incarceration. Age was negatively associated with experiencing violence among males in unadjusted analyses.

In the final multivariable models, residential eviction remained independently associated with significantly higher odds of experiencing violence among females (adjusted odds ratio [AOR] = 2.09, 95% CI: 1.39–3.13), after adjustment for drug dealing. Among males, residential eviction remained independently associated with higher odds of experiencing violence (AOR = 1.95, 95% CI: 1.49–2.55) after adjustment for drug dealing and incarceration.

DISCUSSION

In the present study, we observed high levels of exposure to violence among a prospective community-recruited cohort of 1689 PWID in Vancouver, Canada, with almost half of the study participants reporting experiencing at least one incident of physical or sexual violence over a median of 5.5 years of follow-up. In addition, we found that residential eviction was relatively common, with over one-fifth of participants reporting at least one eviction over the study period. In adjusted analyses, residential eviction was independently associated with

significantly greater odds of experiencing violence, with similar estimates of association for male and female PWID.

Our findings are consistent with previous studies reporting high levels of exposure to violence among PWID (Degenhardt & Hall, 2012; Chermack & Blow 2002; Finlinson et al., 2003; Richardson et al., 2015). However, to our knowledge, this is the first study to document an association between residential eviction and elevated exposure to violence among a prospective cohort of male and female PWID. This finding builds on previous research identifying homelessness and lack of stable housing as correlates of experiencing violence among drug-using populations (Marshall et al. 2008; Wenzel et al., 2004b; Wenzel et al., 2001). In addition, this finding is consistent with a small body of research documenting the adverse health and social impacts of involuntary housing displacement among marginalized groups. For example, a recent nationally-representative study of low-income urban mothers in the United States found that, compared to those who had not been evicted, mothers who had been evicted from their homes were more likely to report having depressive symptoms, parental stress, material hardship and poorer general health for themselves and their children (Desmond & Kimbro, 2015). Moreover, housing displacement has been linked to other adverse outcomes among low-income populations including residential instability (Kleysteuber, 2007; Desmond, Gershenson & Kiviat, 2015), relocation to poorer and higher-crime neighbourhoods (Desmond & Shollenberger, 2015), loss of employment (Desmond & Gershenson, 2016), restricted access to healthcare (Cooper et al., 2012), and incomplete prescription adherence (Kennedy et al., 2016; Pollack & Lynch, 2009).

This study reinforces the need to understand individual experiences of violence in relation to dynamics in the broader risk environment of PWID. In particular, given the ongoing implementation of gentrification and redevelopment initiatives in Vancouver's Downtown Eastside, our finding of an association between residential eviction and exposure to violence may reflect how such multifaceted contextual forces interact to contribute to eviction and, in turn, shape individual behaviours and experiences to increase vulnerability to violence. However, further research is needed to better understand the potential role of macro- and meso-level structural forces such as redevelopment, rental vacancy rates, rental costs, and housing policies in influencing residential eviction and experiences of violence among PWID.

There are several plausible explanations for the observed association between residential eviction and exposure to violence. First, it may be that evicted PWID are more likely to become homeless or unstably housed (Kleysteuber, 2006; Desmond et al., 2015), thereby increasing their susceptibility to violence due to a lack of stable protective shelter and a greater amount of time spent in public settings (Parkin & Coomber, 2011). In addition, given that eviction has been associated with loss of employment (Desmond & Gershenson, 2016) and economic hardship (Desmond & Kimbro, 2015), evicted PWID may become more heavily involved in the street-based drug economy, sex work, theft, and other prohibited income generation activities, all of which have been associated with an increased likelihood of experiencing violence (Richardson et al., 2015). Furthermore, displacement of PWID to neighbourhoods characterized by higher levels of crime (Desmond & Shollenberger, 2015)

may also partially explain the observed association between eviction and exposure to violence. Alternatively, given issues of temporality in measurement, this association may reflect how experiences of violence, such as domestic violence (Baker, Billhardt, Warren, Rollins & Glass, 2010) and violence related to involvement in the drug economy (Richardson et al., 2015), render PWID more vulnerable to residential eviction. However, it remains unclear which of these interpretations best explain the association between eviction and violence, and therefore further empirical and qualitative examination of the mechanisms underlying this association is warranted.

The present study underscores the need for interventions that address social-structural factors in the broader risk environment of PWID as a means for mitigating exposure to violence and associated harms among this population. First and foremost, our results support the further development, implementation and evaluation of interventions designed to promote housing stability among PWID. For example, future studies should investigate if the provision of housing aid or expansion of low-threshold and affordable housing may help to reduce susceptibility to violence among PWID, given the other known health benefits of such initiatives (Wolitski et al., 2010). In addition, our findings suggest the need for interventions to better support the health and safety of PWID who have been evicted or are experiencing housing instability. For instance, previous research has demonstrated the critical role of supervised injection facilities in enhancing the physical safety of PWID, including by reducing vulnerability to violence associated with exposure to street-based drug scenes (Fairbairn, Small, Shannon, Wood & Kerr, 2008; McNeil, Small, Lampkin, Shannon & Kerr, 2013; McNeil and Small, 2014). However, there are presently only two legal supervised injection facilities operating in Vancouver. Thus, the broader expansion of supervised injection services may afford greater environmental and structural supports to better protect PWID who lack safe indoor spaces in which to use drugs.

The present study has several limitations that should be noted. First, the study sample was not randomly recruited. Although a number of techniques were used in effort to derive a representative sample, including recruiting from community settings, our findings may not be generalizable to PWID in this setting. In addition, this study relied on self-reported data and therefore participants' responses may be subject to reporting bias, including social desirability bias. Furthermore, the temporality of the association between residential eviction and exposure to violence cannot be fully determined from the present analyses. We also recognize that our reliance on a measure of biological sex in this study precluded examination of the association between eviction and violence specifically for those whose assigned biological sex at birth is not congruent with their current gender identity, including transgender people, and further research in this area is needed. We should note that although we employed a measure of biological sex, we were primarily interested in considering the role of gender, including gender power relations, in shaping eviction and violence experiences. We do not wish to imply that any gender-based variation in these experiences reflects differences at the biological level. Finally, as with all observational studies, we cannot exclude the possibility that the observed association between residential eviction and experiencing violence is explained by residual confounding.

In summary, almost half of PWID in the present study reported experiencing violence over a median 5.5 years of follow-up. Residential eviction was found to be associated with a greater likelihood of experiencing violence among both male and female PWID. These findings raise concerns about the contribution of residential eviction to the production of physical, psychological, social and structural harms among PWID and underscore the need for further development and evaluation of social-structural interventions designed to mitigate susceptibility to housing instability and violence among PWID in this setting.

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TABLE 1

Baseline characteristics, stratified by sex, of 1689 people who inject drugs in Vancouver, Canada (2007–2014).

Characteristic	Total <i>n</i> (%)	Males <i>n</i> (%)	Females <i>n</i> (%)	<i>p</i> - value
	1689 (100)	1122 (66.4%)	567 (33.6%)	
Median age (IQR) †	43 (37–49)	45 (38–50)	40 (33–46)	<0.001
Caucasian ancestry	1000 (59.2)	734 (65.4)	266 (46.9)	<0.001
High school education	826 (48.9)	578 (51.5)	248 (43.7)	0.003
Childhood emotional abuse	693 (41.0)	426 (38.0)	267 (47.1)	<0.001
In a stable relationship *	493 (29.2)	273 (24.3)	220 (38.8)	<0.001
Downtown Eastside residence *	1103 (65.3)	713 (63.5)	390 (68.8)	0.033
Employed *	404 (23.9)	324 (28.9)	80 (14.1)	<0.001
HIV seropositive	693 (41.0)	453 (40.4)	240 (42.3)	0.441
Residential eviction *	115 (6.8)	75 (6.7)	40 (7.1)	0.775
Daily crack cocaine use *	608 (36.0)	338 (30.1)	270 (47.6)	<0.001
Daily heroin injection *	332 (19.7)	196 (17.5)	136 (24.0)	0.001
Daily cocaine injection *	139 (8.2)	93 (8.3)	46 (8.1)	0.897
Heavy alcohol use *	281 (16.6)	179 (16.0)	102 (18.0)	0.275
Enrolment in addiction treatment *	949 (56.2)	603 (53.7)	346 (61.0)	0.005
Sex work involvement *	209 (12.4)	31 (2.8)	178 (31.4)	<0.001
Drug dealing *	440 (26.1)	261 (23.3)	179 (31.6)	<0.001
Incarceration *	222 (13.1)	170 (15.2)	52 (9.2)	<0.001
Experienced violence *	356 (21.1)	245 (21.8)	111 (19.6)	0.282

† Interquartile range

* Refers to 6 month period prior to interview

Bivariable and multivariable generalized estimating equations of factors associated with experiencing violence, stratified by sex, among 1689 people who inject drugs in Vancouver, Canada (2007–2014).

TABLE 2

Characteristic	Males (n=1122)		Females (n=567)	
	Unadjusted OR [†] (95% CI) [‡]	Adjusted OR [†] (95% CI) [‡]	Unadjusted OR [†] (95% CI) [‡]	Adjusted OR [†] (95% CI) [‡]
Residential eviction * (yes vs. no)	2.23 (1.74 – 2.87)	1.95 (1.49–2.55)	2.02 (1.37 – 2.99)	2.09 (1.39–3.13)
Age (per year old)	0.96 (0.95 – 0.97)		0.99 (0.97 – 1.00)	
Caucasian ancestry (yes vs. no)	1.27 (1.04 – 1.55)		1.26 (0.96 – 1.66)	
High school education (yes vs. no)	0.90 (0.75 – 1.08)		0.90 (0.68 – 1.19)	
Childhood emotional abuse (yes vs. no)	1.37 (1.14 – 1.64)		1.89 (1.42 – 2.50)	
In a stable relationship * (yes vs. no)	0.97 (0.82 – 1.15)		1.10 (0.90 – 1.34)	
Downtown Eastside residence * (yes vs. no)	1.43 (1.22 – 1.67)		1.65 (1.30 – 2.11)	
Employed * (yes vs. no)	0.91 (0.79 – 1.06)		0.96 (0.73 – 1.27)	
HIV seropositive * (yes vs. no)	0.93 (0.77 – 1.12)		0.79 (0.60 – 1.05)	
Daily crack cocaine use * (yes vs. no)	1.69 (1.45 – 1.98)		1.61 (1.33 – 1.95)	
Daily heroin injection * (yes vs. no)	1.25 (1.03 – 1.52)		1.52 (1.21 – 1.90)	
Daily cocaine injection * (yes vs. no)	1.04 (0.80 – 1.36)		1.59 (1.15 – 2.20)	
Heavy alcohol use * (yes vs. no)	1.67 (1.43 – 1.96)		1.44 (1.12 – 1.84)	
Enrolment in addiction treatment * (yes vs. no)	1.05 (0.90 – 1.22)		0.82 (0.65 – 1.04)	
Sex work involvement * (yes vs. no)	1.34 (0.83 – 2.17)		1.70 (1.34 – 2.16)	
Drug dealing * (yes vs. no)	2.29 (1.97 – 2.67)	2.10 (1.79–2.46)	1.85 (1.53 – 2.25)	1.79 (1.47–2.19)
Incarceration * (yes vs. no)	2.32 (1.93 – 2.80)	2.10 (1.73–2.56)	2.22 (1.61 – 3.06)	

[†] Odds ratio

[‡] 95% confidence interval

* Refers to 6 month period prior to interview