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Physical Violence Among a Prospective Cohort of Injection Drug Users: A Gender-Focused Approach

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Abstract

Although dramatically heightened rates of violence have been observed among injection drug users (IDU), little is known about the gender differences associated with violence among this population. Employing a risk environment framework, we performed an analysis of the factors associated with experiencing violence among participants enrolled in a prospective cohort study of IDU during the years 1996-2005 using generalized estimating equations (GEE). Among 1114 individuals, 291 (66%) of females and 470 (70%) of males reported experiencing violence during the study period. In multivariate analyses, mental illness, frequent alcohol use, frequent crack use, homelessness, Downtown Eastside residency, and requiring help injecting were positively associated with experiencing violence for both sexes (all $p < 0.05$). For females, binge drug use (AOR = 1.30) and drug dealing (AOR = 1.42) were positively associated with violence, while younger age (AOR = 1.02), frequent heroin injection (AOR = 1.24), and incarceration (AOR = 1.50) were significant for males. Women were more likely to be attacked by acquaintances, partners, and sex trade clients, while men were more likely to experience violence from strangers and the police. These findings indicate that susceptibility to violence among IDU is structured by environmental factors such as homelessness and drug-related factors such as frequent alcohol use and involvement in drug economies. Furthermore, important gender differences with respect to the predictors and characteristics of violent attacks do exist. These findings indicate an urgent need for the development of comprehensive programs and structural interventions that take a gender-focused approach to violence among IDU.

Keywords

Violence; Gender; Injection Drug Use; HIV; Canada

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1. Introduction

Violence is a major cause of morbidity and mortality among injection drug users (IDU) that often manifests at the everyday, structural and symbolic levels (Bourgois et al., 2004; Kohli et al., 2005). Many studies have documented drastically elevated rates of physical violence among IDU recruited from both drug treatment programs and street-based settings (Chermack and Blow, 2002; Farris and Fenaughty, 2002; Vlahov et al., 1998). For example, a study of partner violence among women in methadone treatment found that over three-fourths reported ever experiencing violence, while over one quarter reported physical violence in the past year (El-Bassel et al., 2000). Beyond the direct physical injury that results from violence is a range of other health-related harms. Impairments in mental and emotional health resulting from violent encounters include depression, anxiety, suicidal ideation, posttraumatic stress disorder, mood and eating disorders, and substance dependence (Farley and Barkan, 1998; Fischbach and Herbert, 1997; Taylor and Jason, 2002).

The experience of violence among IDU has also been associated with an array of HIV-related risk behaviours (Braitstein et al., 2003; El-Bassel et al., 2000; Gilbert et al., 1997; Vlahov et al., 1998). The majority of these studies have focused on the past traumatic experiences and current social- and individual-level factors that result in a concomitant relationship between violence and HIV risk among marginalized, injection drug using women. For example, one study examining violence and HIV risk behaviours among female partners of male IDU observed that almost half had been physically assaulted by their sex partners; furthermore, those who had experienced physical violence were more likely to engage in unprotected anal intercourse (He et al., 1998). A study of IDU living in Vancouver found historical sexual abuse to be associated with sex trade work, sharing syringes with HIV-positive people, and other health-related harms such as accidental overdose (Braitstein et al., 2003). Intimate partner violence among women in methadone treatment has been associated with visiting shooting galleries, living with someone with drug or alcohol abuse problems, and exchanging sex for money or drugs (El-Bassel et al., 2000). Other risk factors and correlates of physical violence that have been documented among populations of drug-using women include: younger age (Vlahov et al., 1998); being separated or divorced (Gruskin et al., 2002); inconsistent condom use (El-Bassel et al., 2005); having multiple sex partners (Wenzel et al., 2004a); unstable housing (Wenzel et al., 2004b); marijuana use (Burke et al., 2005); and frequent alcohol use (Chermack and Blow, 2002). Childhood sexual and physical abuse is also commonly found to be a strong and independent predictor of adult physical violence among women currently using illicit drugs and among those enrolled in drug treatment programs (Gilbert et al., 1997).

Although few studies have examined the risk factors for received violence among male substance users, the prevalence of physical violence among this population is also strikingly high (Finlinson et al., 2003). One study examining received violence in a sample of individuals participating in substance abuse treatment found no gender difference in the proportion of participants reporting violence from partners (61% versus 65% among men and women, respectively), while males reported higher rates of violence from non-partners (75% versus 45% among men and women, respectively) (Chermack et al., 2001). Although the *expression* of violence has traditionally been associated with masculine gender roles, which in turn are at least partially responsible for the linking of partner violence perpetuation and sexual risk behaviours (Santana et al., 2006), *received* violence among male IDU is also common and likely underreported. As noted by Chermack et al. (2001), studies that do not include both male and female participants and do not examine violence outside of the partner or marital context result in a limited understanding of the gender-related issues that influence physical violence. Furthermore, studies that examine primarily individual-level factors (e.g., age, ethnicity, education) cannot account for the gendered structures and social relations within the drug

economy and street environment that perpetuate everyday violence experienced by IDU (Epele, 2002).

Over the past several decades, numerous theoretical models have been developed to guide our understanding of the complex relationship between drugs, alcohol and violence (Parker and Auerhahn, 1998). One of the most commonly used frameworks is that first proposed by Goldstein, in which three categories are used to describe the factors that link drugs and violence (Fagan, 1993; Goldstein, 1985; Goldstein et al., 1989): (1) pharmacological (i.e., pharmacological effect of substances enhance violent behaviour and individuals under the influence of drugs are less aware of surroundings making them vulnerable to violence); (2) economical compulsive (i.e., engagement in economically oriented violent crime to sustain drug use behaviours); and (3) systemic (i.e., the endemicity of violent interactions within the system of drug distribution and use). Although this framework is often used as a theoretical explanation for the observed link between violence, crime and substance use, several authors have noted that only limited empirical evidence exists to support all three components of the conceptual model (Martin and Bryant, 2001; Parker and Auerhahn, 1998). For example, in a review of illicit drug use and violence, Martin and Bryant (2001) found only limited evidence of a pharmacological basis for an association between illicit drug use and violence, and go on to suggest that most researchers emphasize a social rather than psychopharmacological basis for the link between cocaine use and violence. We hypothesize that “risk environment” theory may provide a more appropriate theoretical approach to understanding the multilevel factors which influence exposure to physical violence among IDU. Risk environment theory posits that the physical, social, economic, and policy environments in which drug use takes place structures and shapes the production and re-production of HIV risk (Rhodes, 2002). Given that this theory has been used effectively to conceptualize the multifactorial influences that produce HIV risk among IDU (Rhodes et al., 2005), a similar approach may be useful for describing the “risk environment” factors that structure susceptibility to physical violence among this population.

Although it has been shown in various settings that epidemics of HIV and violence are closely linked (Maman et al., 2000; Quinn and Overbaugh, 2005), little is known about the experiences of physical violence among IDU in the Downtown Eastside area of Vancouver, the city's drug scene epicenter. Given that an HIV epidemic among IDU in this area has persisted since the mid 1990s, with HIV prevalence rates estimated to be greater than 30% (Kuyper et al., 2004), characterizing physical violence and its potential association with HIV risk production may be useful for informing programs, policies and interventions targeting this population.

Furthermore, there is a lack of information regarding the gender differences associated with experiencing physical violence among individuals who inject drugs. In response to these concerns, the present study was conducted to examine physical violence, both partner violence and other types of assault, among a prospective community-recruited cohort of male and female IDU. Thus, the objectives of this study were to: (1) determine the prevalence of experiencing physical violence among this cohort of IDU; (2) examine the gender differences associated with risk factors for physical violence; and (3) compare the characteristics of experiencing violence, including the perpetrator and type of attack (beating, attack with a weapon, etc.) experienced by men and women in this setting.

2. Methods

The Vancouver Injection Drug Users Study (VIDUS) is an ongoing prospective cohort study of injection drug using individuals recruited through self-referral and street outreach from Vancouver's Downtown Eastside since May 1996. The study has been described in detail previously (Tyndall et al., 2003; Wood et al., 2001). Briefly, persons were eligible to participate in VIDUS if they had injected illicit drugs at least once in the previous six months, resided in

the Greater Vancouver region at time of enrolment, and provided written informed consent. At baseline and semi-annually, subjects provide blood samples and complete an interviewer-administered questionnaire. The questionnaire elicits demographic data as well as information regarding drug use, HIV risk behaviours, sexual activity, and drug or alcohol treatment. Participants receive \$20 (CDN) for each study visit. The study has been approved by the University of British Columbia's Research Ethics Board.

Reports of experiencing violence among men and women were identified by examining responses to the question, "Have you been attacked, assaulted, or suffered any kind of violence in the past six months?" Since this question has been asked consistently for over 5 years of follow-up, we were able to analyse these data longitudinally. In order to obtain more detailed information regarding the perpetrator and type of attacks, responses to the following questions were also examined for those who reported received violence during the last six months: 1) "Who has attacked you?" and 2) "What type of attack was it?" These questions were used to differentiate between partner and non-partner violence, as well as the many different forms of violent attack (i.e., beating, attack involving a weapon or gun, strangling, robbery, or being physically threatened). Participants were able to provide more than one answer to these additional questions. We restricted our analysis to reports of physical violence since a study examining the characteristics and predictors of sexual violence among this cohort of IDU has been reported previously (Braitstein et al., 2003).

Risk environment theory was used as the theoretical basis for the selection of primary predictors of interest in this study. Factors such as homelessness, Downtown Eastside (DTES) residency (i.e., Vancouver's epicenter of injection drug use and HIV and HCV outbreaks), current enrolment in any drug or alcohol treatment program, recent incarceration, requiring help injecting, sex trade involvement, and drug dealing were included to assess the potential impact of the social, environmental and economic conditions in which injection drug use and exposure to violence are situated. Other drug-related variables of interest included: years injecting, frequent cocaine injection, frequent heroin injection, frequent crack use, alcohol use of greater than four drinks per day, and binge drug use. Finally, factors that were included as potential confounders due to their known or *a priori* hypothesized relationship with both violence and one or more independent variables listed above included a range of socio-demographic and behavioural variables: age, ethnicity (Aboriginal versus other), marital status (married versus other), mental illness, and sexual abuse. To be consistent with our previous work (Craib et al., 2003; Wood et al., 2005; Wood et al., 2001), we defined: "mental illness" as self-reported depression, anxiety and/or other mental health illness in the past 6 months; "frequent use" to be daily injection of cocaine or heroin or daily smoking of crack; "binge drug use" to be self-reported periods when drugs were injected more frequently than usual; "sexual abuse" to be ever having been forced to have sex against one's will; and "incarceration" as being in detention, jail or prison overnight or longer. All drug use variables along with homelessness, DTES residency, recent incarceration, and sex trade involvement were treated as time-updated covariates that refer to activities or situations occurring during the past six months.

Initially, we examined bivariate associations between the risk environment, drug-related, and potentially confounding variables and reported violence using generalized estimating equations (GEE). We used GEE for binary outcomes with logit link for the analysis of correlated data since the factors potentially associated with violence during follow-up were serial (time-dependent) measures. GEE models account for the correlation between repeated measures for each subject, and as such data from every participant follow-up visit was considered in the analysis. Therefore, this technique permitted the determination of which factors were associated with received violence prior to the six-month follow-up interview throughout the 60-month observation period. The GEE method is commonly used for studies in which a repeated measure binary dependent variable is analysed longitudinally, and has been

described in our work previously (Kerr et al., 2005a). In order to construct gender-specific explanatory models for experiencing violence and to adjust for potential confounding, we also fit multivariate logistic GEE models adjusting for all variables that were found to be significantly associated ($p < 0.05$) with violence in bivariate analyses. To compare the characteristics of physical violence by sex, Chi-square tests were conducted. Fisher's exact test was also used to compute p -values when one or more of the observations was less than or equal to five. The Wilcoxon rank sum test was used to compare between men and women the median number of follow-up visits and the median number of violent experiences reported over the study period. All statistical analyses were performed using SAS software version 8.0 (SAS, Cary, NC), and all reported p -values are two-sided.

3. Results

A total of 1114 participants completed at least one follow-up interview during the period from December 2000 to December 2005 and were eligible for this analysis. Out of 10 interview periods, the median number of follow-up visits was 8 (interquartile range [IQR]: 4 – 10), with no significant difference in follow-up between men and women ($p = 0.99$). The median age was 36.8 (IQR: 28.3 – 44.2), 444 (40%) were women, and 346 (31%) were of Aboriginal ancestry. At baseline, we observed several gender differences with respect to the primary variables of interest. Men were more likely to report recent incarceration (22% vs. 14%, $p = 0.003$), while women were more likely to report recent sex trade involvement (31% vs. 4%, $p < 0.001$), drug dealing (34% vs. 21%, $p < 0.001$), enrolment in drug or alcohol treatment (56% vs. 49%, $p = 0.047$), and requiring help injecting (23% vs. 13%, $p < 0.001$). At baseline, 98 (22%) females and 138 (21%) males reported having suffered physical violence in the last six months ($p = 0.56$). Over the follow-up period, a further 193 (43%) females and 332 (50%) males reported experiencing physical violence. Therefore, over the entire study period, a total of 291 (66%) females and 470 (70%) males reported experiencing violence at least once ($p = 0.11$). Of those who reported at least once incident of violence, the median number of reports of violence over the study period was 2 (IQR: 1 – 3) for both men and women.

The bivariate GEE analyses of associations between variables of interest and self-reported violence are shown in Tables 1 and 2 for females and males, respectively. For females, the following variables were positively associated with experiencing violence: younger age (odds ratio [OR] = 1.03, 95% confidence interval [CI]: 1.01 – 1.05); mental illness (OR = 1.64, 95% CI: 1.34 – 2.00); sexual abuse (OR = 1.36, 95% CI: 1.10 – 1.69); alcohol use (OR = 1.51, 95% CI: 1.25 – 1.83); frequent heroin injection (OR = 1.64, 95% CI: 1.29 – 2.10); frequent cocaine injection (OR = 1.28, 95% CI: 1.02 – 1.62); frequent crack smoking (OR = 1.85, 95% CI: 1.48 – 2.33); binge drug use (OR = 1.60, 95% CI: 1.28 – 2.02); homelessness (OR = 1.93, 95% CI: 1.43 – 2.62); Downtown Eastside (DTES) residency (OR = 1.96, 95% CI: 1.56 – 2.46); incarceration (OR = 1.68, 95% CI: 1.28 – 2.21); sex trade involvement (OR = 1.59, 95% CI: 1.24 – 2.04); drug dealing (OR = 2.04, 95% CI: 1.62 – 2.58); and requiring help injecting (OR = 1.91, 95% CI: 1.47 – 2.49). Being married or common-law (OR = 0.76, 95% CI: 0.61 – 0.94) and current enrolment in a drug or alcohol treatment program (OR = 0.78, 95% CI: 0.63 – 0.99) were negatively associated with experiencing violence. Among women in the study, Aboriginal ethnicity and years injecting were not statistically associated with experiencing violence in bivariate analyses.

For males, the following variables were positively associated with experiencing violence: younger age (OR = 1.03, 95% CI: 1.02 – 1.04); mental illness (OR = 1.56, 95% CI: 1.33 – 1.83); alcohol use (OR = 1.39, 95% CI: 1.17 – 1.64); frequent heroin injection (OR = 1.57, 95% CI: 1.30 – 1.88); frequent cocaine injection (OR = 1.25, 95% CI: 1.04 – 1.51); frequent crack smoking (OR = 1.65, 95% CI: 1.39 – 1.96); homelessness (OR = 1.86, 95% CI: 1.48 – 2.35); DTES residency (OR = 1.59, 95% CI: 1.33 – 1.91); incarceration (OR = 1.77, 95% CI:

1.45 – 2.17); drug dealing (OR = 1.57, 95% CI: 1.29 – 1.91); and requiring help injecting (OR = 1.67, 95% CI: 1.36 – 2.06). Being married or common-law (OR = 0.79, 95% CI: 0.64 – 0.97) and years injecting (OR = 0.99, 95% CI: 0.97 – 1.00) were negatively associated with reported violence. Among men in the study, Aboriginal ethnicity, sex trade work, sexual abuse, binge drug use, and enrolment in any drug or alcohol treatment program were not statistically associated with experiencing violence in bivariate analyses.

The results of the multivariate GEE analyses are also shown in Tables 1 and 2 for females and males, respectively. For both sexes, mental illness (adjusted odds ratio for females [AOR_f] = 1.69, 95% CI_f: 1.35 – 2.10; adjusted odds ratio for males [AOR_m] = 1.54, 95% CI_m: 1.29 – 1.82), alcohol use (AOR_f = 1.49, 95% CI_f: 1.22 – 1.82; AOR_m = 1.42, 95% CI_m: 1.20 – 1.69), frequent crack smoking (AOR_f = 1.34, 95% CI_f: 1.04 – 1.73; AOR_m = 1.38, 95% CI_m: 1.15 – 1.65), homelessness (AOR_f = 1.43, 95% CI_f: 1.03 – 1.98; AOR_m = 1.53, 95% CI_m: 1.20 – 1.94), DTES residency (AOR_f = 1.48, 95% CI_f: 1.18 – 1.87; AOR_m = 1.38, 95% CI_m: 1.15 – 1.66), and requiring help injecting (AOR_f = 1.51, 95% CI_f: 1.15 – 1.99; AOR_m = 1.51, 95% CI_m: 1.22 – 1.87) were positively and independently associated with received violence. Predictors that were unique to females included binge drug use (AOR_f = 1.30, 95% CI_f: 1.03 – 1.65) and drug dealing (AOR_f = 1.42, 95% CI_f: 1.11 – 1.81). Predictors that were unique to males included: younger age (AOR_m = 1.02, 95% CI_m: 1.00 – 1.03); frequent heroin injection (AOR_m = 1.24, 95% CI_m: 1.02 – 1.51); and recent incarceration (AOR_m = 1.50, 95% CI_m: 1.22 – 1.84).

Acquaintances and strangers were the most commonly reported perpetrator of physical violence. As shown in Table 3, women were more likely than men to report being attacked by acquaintances (43.5% versus 37.0% of reports, $p = 0.017$), partners (5.2% vs. 2.6%, $p = 0.010$), and sex trade clients and workers (4.6% vs. 0.9%, $p < 0.001$), while men were more likely to report being attacked by strangers (40.7% vs. 31.7%, $p < 0.001$) and by the police (8.7% vs. 3.8%, $p < 0.001$). The most commonly reported type of attack for both genders was a beating (65.1% of reports from women and 61.1% of reports from men). Women were more likely to report being strangled (2.0% vs. 0.5%, $p = 0.014$) and physically threatened (2.4% vs. 0.4%, $p = 0.002$), while men were significantly more likely to report being attacked with weapons (22.6% versus 10.8%, $p < 0.001$).

4. Discussion

In the present study, we observed a very high prevalence of received physical violence among both male and female IDU. Similar proportions of men and women reported experiencing a recent violent attack at baseline (21% vs. 22%) and over the follow-up period (50% vs. 43%). These results are consistent with previous studies that have observed comparable overall rates of received violence among drug-using men and women (Chermack et al., 2001; Finlinson et al., 2003). In longitudinal multivariate analyses examining the risk factors associated with received violence, many similarities between sexes were observed. Mental illness, alcohol use, frequent crack smoking, homelessness, DTES residency, and requiring help injecting were positively and independently associated with experiencing violence for both sexes. Although many of the risk factors examined did not vary considerably by sex, several significant differences were observed. Factors that were positively and independently associated with violence for females included binge drug use and drug dealing, while risk factors unique to males included frequent heroin injection and recent incarceration. Several important gender differences were also observed when the perpetrator and nature of the violent experience were examined. Men were more likely to report being attacked by strangers and the police, while a greater proportion of women reported violence from acquaintances, partners, and individuals involved in the sex trade. Furthermore, men were significantly more likely to report being attacked with weapons, while women were more likely to report being strangled or physically threatened.

Consistent with other studies examining illicit drug use and violence (Martin and Bryant, 2001; Parker and Auerhahn, 1998), the frequent consumption of cocaine and heroin (i.e., the direct pharmacology of these substances) were poor predictors of experiencing violence among IDU. However, other drug-related factors more closely linked to the social and environmental characteristics of drug economies and substance use (e.g., drug dealing, requiring help injecting) were independently associated with experiencing violence and thus may play a larger role in the perpetuation of violence among IDU. An exception is the frequent smoking of crack, which was positively and independently associated with violence among both males and females. The association between daily women's crack use and violence has been noted in previous studies (Brewer et al., 2005; Vlahov et al., 1998; Wechsberg et al., 2003). Our results also suggest that frequent crack use is an equally strong predictor of experiencing violence among male IDU. Frequent alcohol use was also one of the strongest predictors of experiencing physical violence, with an adjusted odds ratio higher than that for frequent heroin, cocaine, or crack consumption. This finding is consistent with a previous study of HIV positive drug-using individuals that observed an association between recent received violence and alcohol use severity (Liebschutz et al., 2005).

Although the Goldstein tripartite model has been used extensively to understand the interaction of drugs and the expression of violence, we propose that the above results are better explained using a “risk environment” approach that accounts for the social, environmental and structural influences on violence and illicit drug use. Many factors that were associated with violence in our study appear to be closely related to the characteristics of the neighbourhood, physical environment, and social and economic context in which IDU are situated. For example, Downtown Eastside (DTES) residency was strongly and independently associated with received violence for both sexes. The DTES in Vancouver is one of the most economically disadvantaged neighbourhoods in Canada, and as such has the lowest per capita income of any urban region in the country (Statistics Canada, 1996). Homelessness, a common feature of this and many other impoverished neighbourhoods, has been recognized as a major determinant of poor health among IDU, including an elevated risk of HIV infection (Fisher et al., 1995; Rhodes et al., 2005; Zolopa et al., 1994). The observed association between homelessness and violence may be attributed to a variety of factors. First, individuals who are homeless are more susceptible to violence due to a lack of protective shelter. Second, homeless individuals may have to engage in income generation activities that carry increased risk for violence (e.g., petty crime, sex work) (Erickson, 2001; Johnson et al., 1985). Finally, homeless individuals are more likely to participate in the street-based drug economy (Fisher et al., 1995; Wechsberg et al., 2003), a culture which has been associated with the normalization of extreme levels of violence (Bourgois et al., 2004). Further research must be conducted to elucidate the multi-level factors that perpetuate both homelessness and violence within disadvantaged and drug using populations.

Risk environment theory also accounts for violence attributed to gender constructs which operate within unregulated drug-based cultures and economies (Rhodes et al., 2005). In elucidating the complex intersections of gender, HIV risk, and violence in the lives of injection drug using women, Epele (2002) has argued that gender inequality promotes HIV vulnerability as a consequence of multidimensional violence. The author argues that gender inequality results in both subordinated positions of women within the street-involved drug economy and precarious subsistence strategies such as sex trade work (Epele, 2002). In our study, we observed that drug dealing and binge drug use were positively associated with violence for women but not for men. These findings can be explained in terms of the social, economic, and structural gender inequalities described by Epele. For example, women are known to be systematically excluded from higher-level roles in the hierarchy of drug dealing due to a male-centered street ideology that enforces the perception that women should be denied power over resources derived from the illicit drug trade (Maher and Daly, 1996). Recent evidence has

suggested that this relegation of women to lower-level roles puts them at increased risk of violence and even death (Miller et al., 2007). We also postulate that the physical harms associated with sex trade work and its association with binge drug use may explain the connection between bingeing and exposure to violence among women in the cohort. Miller et al. (2006) have suggested that women on a binge may be more likely to encounter violence with “bad dates” due to lower selectivity of clients in an attempt to generate income quickly. Further research should be conducted to examine the multiple gender inequalities that perpetuate violence and HIV risk among injection drug using women who trade sex or deal drugs.

The finding that IDU who experience violence are more likely to require assistance injecting is of particular concern because violence may serve to compound the many other well-known harms associated with assisted injection, including risk for HIV infection (O’Connell et al., 2005; Wood et al., 2003). Recently, requiring assistance injecting has also been associated with injection in public (McKnight et al., 2007). Individuals injecting in public may be more distressed and agitated due to increased pressure to inject quickly in order to avoid police and other threats (Darke et al., 2001; Wood et al., 2004). Since IDU who inject in public are susceptible to and feel threatened by street violence from police and other street predators (Small et al., 2007), our results provide further evidence that heavy enforcement in areas where public and assisted injection is known to occur may only serve to increase the likelihood of violence and assault against IDU. Additionally, requiring assistance injecting often involves compensation to the individual who assists with the injection (i.e., a “hit doctor”), and disputes over what constitutes appropriate compensation may explain why assisted injection is associated with experiencing violence (Fairbairn et al., 2006).

The finding that almost 4% of violent attacks reported by women and 9% of attacks reported by men were attributed to interactions with police indicates that police presence is a contributing factor to violent experiences among IDU in this setting. This finding is consistent with previous reports of police-related violence in the DTES (Human Rights Watch, 2003; Pivot Legal Society, 2004). Beyond the direct result of violent interactions with police, the presence of heavy enforcement within unregulated drug market environments may indirectly impact the incidence of violence through a number of mechanisms (Erickson, 2001; Kerr et al., 2005c). For example, although increased policing (“crackdowns”) has been a common tactic aimed at upsetting illegal drug markets and restoring public order, the success of such interventions are often time-limited and can be completely offset by displacement of drug markets into non-public locations or neighbouring areas (Kerr et al., 2005c). As a result of the displacement of established relationships within the drug economy, drug market enforcement has also been associated with increased violence and volatility among drug users and dealers (Brownstein et al., 2000; Goldstein, 1989; Maher and Dixon, 1999; Small et al., 2006). These results provide further support to the notion that heavy drug market enforcement interacts with and transforms various practices and social dynamics within the broader risk environment of IDU (Rhodes et al., 2005), and thereby constitutes a potential source of violence that adversely affects the health of this population.

These findings have significant implications for education and prevention initiatives, harm reduction programs, and the development of policies and laws. Principally, our results suggest that structural and other non-individual level interventions may be effective in reducing the risk of violence among both male and female IDU. For example, an important way to diminish the risk of violence associated with the consumption of illicit drugs within dangerous environments such as the street is the provision of monitored enclosed spaces where individuals may use pre-obtained illicit drugs under the supervision of health care providers, (e.g., supervised injection facilities). Within such facilities, the risk of physical violence is diminished because injections take place in a supervised environment free of threats posed by

police and street predators. Since our results also indicate that frequent crack use is associated with experiencing violence, the implementation of safer smoking facilities, where individuals may smoke crack while supervised by health care providers, is an additional micro-environmental intervention that may reduce the risk of experiencing violence (Shannon et al., 2006). Furthermore, since requiring assistance injecting was associated with experiencing violence for both sexes, permitting assisted injection at these facilities may also provide an opportunity for IDU to learn to self-inject, or to receive injections in an environment where the harms associated with this dangerous practice are reduced (Kerr et al., 2005b; Wood et al., 2003). In light of the observed association between violence and homelessness, increased programming to provide supportive housing and emergency shelters are urgently needed to diminish the risk of violence among IDU who lack affordable housing. Since severity (frequency and duration) of homelessness has in itself been associated with experiencing violence among homeless women (Wenzel et al., 2001), access to safe and stable shelter is likely a necessary component of any intervention seeking to address this issue. Furthermore, since involvement in the drug trade and street economy appears to carry greater risks for women, gender-focused programming that addresses the economic and educational disadvantage of injection drug using women should be a priority. Given that improved economic status and decreased financial dependence on male partners have been associated with reduced HIV-related risks among women elsewhere (Blankenship et al., 2006), we suggest that income support and vocational programming would carry other benefits in terms of reducing women's exposure to violence. And finally, given the evidence indicating that escalated prohibition and police enforcement increases the level of violence between police and drug users and between individuals within the street-based drug market (Erickson, 2001; Kerr et al., 2005c), continued reliance on such measures to minimize drug-related violence is not recommended. Health-focused policies, interventions, and evidence-based harm reduction programming that addresses the social, structural, and environmental inequalities so pervasive in the lives of injection drug users may ultimately be more successful in reducing the high levels of physical violence observed in this setting.

There are several limitations to the present study. First, we have restricted our analysis to experiencing violence among IDU and have therefore not considered violence perpetuated by women or men. Second, as with many other prospective cohort studies of IDU, VIDUS is not a random sample, and as such these findings may not generalize to other IDU populations. Third, this study relied on self-reported information and is hence susceptible to socially desirable reporting. In the present study, this may have led to an underestimation of the prevalence of violence or other stigmatized activities among either male or female IDU. Previous studies have indicated that in certain settings violence against women and/or violence against men can be underreported (Koss, 1992; Watkins and Bentovim, 1992; Watts and Zimmerman, 2002).

In summary, the results of our study suggest that violence is a common experience among male and female IDU in Vancouver. Susceptibility to violence among this population is moderated by gender, and is driven by a combination of factors. Although mental illness, frequent alcohol use and crack use were associated with violence, structural and environmental factors such as homelessness, DTES residency and recent incarceration were also strong predictors of experiencing physical violence in this population. We have argued that such results support the adoption of a risk environment approach, which posits that the *interaction* of environmental factors with individual-level determinants structures susceptibility to physical violence among IDU. Furthermore, we recommend that frameworks which seek to describe violence among IDU should be updated to reflect the gendered influences on the social and structural production of violence. These results also indicate that IDU who experience physical assault are among the most marginalized, and as such violence should be a primary area of focus for prevention and support services. Such interventions include safe and stable housing options, educational

and economic programming, reforms to drug enforcement strategies, and the expansion of harm reduction programs such as supervised injecting facilities.

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Table 1

Bivariate and multivariate GEE^a analysis of factors associated with received violence for females during follow-up (n = 444)

Characteristic	Unadjusted Odds Ratio (95% CI) ^b	<i>p</i> - value	Adjusted Odds Ratio (95% CI) ^b	<i>p</i> - value
Age (per year younger)	1.03 (1.01 – 1.05)	0.001	1.02 (1.00 – 1.03)	0.084
Aboriginal ethnicity (yes vs. no)	0.75 (0.56 – 1.01)	0.059		
Married (yes vs. no)	0.76 (0.61 – 0.94)	0.012	0.82 (0.66 – 1.03)	0.083
Mental illness [†] (yes vs. no)	1.64 (1.34 – 2.00)	< 0.001	1.69 (1.35 – 2.10)	< 0.001
Sexual abuse [‡] (yes vs. no)	1.36 (1.10 – 1.69)	0.006	1.25 (0.99 – 1.58)	0.057
Years injecting (per year older)	0.99 (0.97 – 1.01)	0.271		
Alcohol use [†] (yes vs. no)	1.51 (1.25 – 1.83)	< 0.001	1.49 (1.22 – 1.82)	< 0.001
Frequent heroin injection [†] (> daily vs. < daily)	1.64 (1.29 – 2.10)	< 0.001	1.03 (0.78 – 1.36)	0.842
Frequent cocaine injection [†] (> daily vs. < daily)	1.28 (1.02 – 1.62)	0.037	0.91 (0.71 – 1.18)	0.483
Frequent crack smoking [†] (> daily vs. < daily)	1.85 (1.48 – 2.33)	< 0.001	1.34 (1.04 – 1.73)	0.023
Binge drug use [†] (yes vs. no)	1.60 (1.28 – 2.02)	< 0.001	1.30 (1.03 – 1.65)	0.027
Homelessness ^{††} (yes vs. no)	1.93 (1.43 – 2.62)	< 0.001	1.43 (1.03 – 1.98)	0.034
DTES^c residency ^{††} (yes vs. no)	1.96 (1.56 – 2.46)	< 0.001	1.48 (1.18 – 1.87)	0.001
Incarceration [†] (yes vs. no)	1.68 (1.28 – 2.21)	< 0.001	1.28 (0.96 – 1.72)	0.097
Sex trade involvement [†] (yes vs. no)	1.59 (1.24 – 2.04)	< 0.001	1.02 (0.78 – 1.33)	0.880
Drug dealing [†] (yes vs. no)	2.04 (1.62 – 2.58)	< 0.001	1.42 (1.11 – 1.81)	0.005
Any treatment ^{††} (yes vs. no)	0.78 (0.63 – 0.99)	0.037	0.82 (0.65 – 1.03)	0.089
Require help injecting [†] (yes vs. no)	1.91 (1.47 – 2.49)	< 0.001	1.51 (1.15 – 1.99)	0.003

^a GEE = Generalized Estimating Equation;

^b CI = Confidence Interval;

^c DTES = Downtown Eastside;

[†] Denotes activities in the previous 6 months;

^{††} Denotes current activities;

[‡] Denotes lifetime history; all variables significant at $p < 0.05$ in bivariate GEE analyses were included in the multivariate GEE analysis.

Table 2

Bivariate and multivariate GEE^a analysis of factors associated with received violence for males during follow-up (n = 670)

Characteristic	Unadjusted Odds Ratio (95% CI) ^b	p - value	Adjusted Odds Ratio (95% CI) ^b	p - value
Age (per year younger)	1.03 (1.02 – 1.04)	< 0.001	1.02 (1.00 – 1.03)	0.015
Aboriginal ethnicity (yes vs. no)	0.79 (0.60 – 1.04)	0.090		
Married (yes vs. no)	0.79 (0.64 – 0.97)	0.025	0.84 (0.68 – 1.03)	0.098
Mental illness [†] (yes vs. no)	1.56 (1.33 – 1.83)	< 0.001	1.53 (1.29 – 1.82)	< 0.001
Sexual abuse [‡] (yes vs. no)	1.23 (0.95 – 1.60)	0.109		
Years injecting (per year older)	0.99 (0.97 – 1.00)	0.011	1.00 (0.99 – 1.02)	0.960
Alcohol use [†] (yes vs. no)	1.39 (1.17 – 1.64)	< 0.001	1.42 (1.20 – 1.69)	< 0.001
Frequent heroin injection [†] (> daily vs. < daily)	1.57 (1.30 – 1.88)	< 0.001	1.24 (1.02 – 1.51)	0.029
Frequent cocaine injection [†] (> daily vs. < daily)	1.25 (1.04 – 1.51)	0.017	0.92 (0.75 – 1.13)	0.424
Frequent crack smoking [†] (> daily vs. < daily)	1.65 (1.39 – 1.96)	< 0.001	1.38 (1.15 – 1.65)	0.001
Binge drug use [†] (yes vs. no)	1.15 (0.94 – 1.42)	0.171		
Homelessness ^{††} (yes vs. no)	1.86 (1.48 – 2.35)	< 0.001	1.50 (1.20 – 1.94)	< 0.001
DTES^c residency ^{††} (yes vs. no)	1.59 (1.33 – 1.91)	< 0.001	1.38 (1.15 – 1.66)	< 0.001
Incarceration [†] (yes vs. no)	1.77 (1.45 – 2.17)	< 0.001	1.50 (1.22 – 1.84)	< 0.001
Sex trade involvement (yes vs. no)	1.08 (0.71 – 1.63)	< 0.728		
Drug dealing [†] (yes vs. no)	1.57 (1.29 – 1.91)	< 0.001	1.20 (0.97 – 1.48)	0.099
Any treatment ^{††} (yes vs. no)	1.01 (0.85 – 1.20)	0.909		
Require help injecting [†] (yes vs. no)	1.67 (1.36 – 2.06)	< 0.001	1.51 (1.22 – 1.87)	< 0.001

^a GEE = Generalized Estimating Equation;

^b CI = Confidence Interval;

^c DTES = Downtown Eastside;

[†] Denotes activities in the previous 6 months;

^{††} Denotes current activities;

[‡] Denotes lifetime history; all variables significant at $p < 0.05$ in bivariate GEE analyses were included in the multivariate GEE analysis.

Table 3**Physical abuse characteristics by gender**

Characteristic	Female (<i>n</i> = 501) [†]	Male (<i>n</i> = 929) [†]	<i>p</i> - value
Perpetrator of attack			
Stranger	159 (31.7%)	378 (40.7%)	< 0.001
Acquaintance	218 (43.5%)	344 (37.0%)	0.017
Partner	26 (5.2%)	24 (2.6%)	0.010
Friends/Family	22 (4.4%)	33 (3.6%)	0.431
Drug Dealer	18 (3.6%)	43 (4.6%)	0.355
Police	19 (3.8%)	81 (8.7%)	< 0.001
Sex trade client/worker	23 (4.6%)	8 (0.9%)	< 0.001
Other/Refused	16 (3.2%)	18 (1.9%)	0.137
Type of attack			
Beating	326 (65.1%)	568 (61.1%)	0.143
Attacked with weapons	54 (10.8%)	210 (22.6%)	< 0.001
Strangled	10 (2.0%)	5 (0.5%)	0.014
Attacked with a gun	4 (0.8%)	6 (0.6%)	0.747
Robbery	62 (12.4%)	110 (11.8%)	0.767
Physically threatened	12 (2.4%)	4 (0.4%)	0.002
Other/Refused	33 (6.6%)	26 (2.8%)	0.001

[†] Total number of reports of received violence over follow-up period. Fisher's exact test was used to compare proportions if one or more counts was less than or equal to five.