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## Incarceration Among Street-Involved Youth in a Canadian Study: Implications for Health and Policy Interventions

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### Abstract

**Background**—Risk factors for incarceration have been well described among adult drug using populations; however, less is known about incarceration among at-risk youth. This study examines the prevalence and correlates of incarceration among street-involved youth in a Canadian setting.

**Methods**—From September 2005 to May 2012, data were collected from the At-Risk Youth Study, a prospective cohort of street-involved youth aged 14 – 26 who use illicit drugs. Generalized estimating equation (GEE) logistic regression was used to identify factors associated with recent incarceration defined as incarceration in the previous six months.

**Results**—Among 1019 participants, 362 (36%) reported having been recently incarcerated during the study period. In multivariate GEE analysis, homelessness (adjusted odds ratio [AOR]= 1.60), daily crystal methamphetamine use (AOR= 1.56), public injecting (AOR= 1.33), drug dealing (AOR= 1.48) and being a victim of violence (AOR= 1.68) were independently associated with incarceration (all  $p < 0.05$ ). Conversely, female gender (AOR= 0.48), lesbian, gay, bisexual, transgender or two-spirited (LGBT) identification (AOR= 0.47) and increasing age of first hard drug use (AOR= 0.96) were negatively associated with incarceration (all  $p < 0.05$ ).

**Conclusion**—Incarceration was common among our study sample. Youth who were homeless, used crystal methamphetamine, and engaged in risky behaviors including public injection and drug dealing were significantly more likely to have been recently incarcerated. Structural

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interventions including expanding addiction treatment and supportive housing for at-risk youth may help reduce criminal justice involvement among this population and associated health, social and fiscal costs.

### Keywords

street youth; incarceration; drug use; homeless

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## INTRODUCTION

Incarceration is a well established risk factor for various negative outcomes among illicit drug using populations including: blood-borne infections such as HIV and hepatitis C (HCV) (Massoglia, 2008); relapse and persistent drug use (DeBeck et al., 2009; Galea & Vlahov, 2002); and unemployment (Western, 2002). Although incarceration has not been demonstrated to effectively reduce problematic drug use (DeBeck et al., 2009), people who use drugs continue to be incarcerated at a staggering rate (Milloy et al., 2008). This is of particular concern as it pertains to youth as evidence suggests that placing high-risk adolescents in close proximity such as in prison facilities may inadvertently reinforce problem behavior and elevate risk for various adverse health outcomes (Dishion, McCord, & Poulin, 1999). In light of these facts, policy makers in the United States have begun to recognize the importance of preventing the unnecessary and inappropriate incarceration of youth (U.S. House of Representatives Committee on Government Reform - Minority Staff Special Investigations Division, 2004).

Despite this awareness, the prevalence of youth incarceration in North America remains high. In 2010, the United States (US) federal juvenile justice system incarcerated approximately 70,000 youth (Sickmund, Sladky, Kang, & Puzanchera, 2011). In Canada, on any given day between 2010–2011 approximately 14,800 youth were housed in the correctional system (aged 12–17 years at the time of offence), representing a rate of 79 youth per 10,000 youth population (Munch, 2011). For street-involved youth specifically, survey data from a cohort study of street youth in Vancouver found that 80.5% reported having ever being incarcerated overnight or longer (Milloy, Kerr, Buxton, Montaner, & Wood, 2009). Marginalized ethnic minority groups are also overrepresented amongst incarcerated youth. In the US, 69% of incarcerated youth are black or Hispanic (Sickmund et al., 2011) and in Canada 26% are of Aboriginal ancestry (Munch, 2011).

While the negative impact of incarceration on street youth is increasingly understood, risk factors for youth incarceration remain poorly studied. To date, much research on this topic has focused on offending or delinquent behaviors (Baron & Hartnagel, 1998; Heinze, Toro, & Urberg, 2004). Analyses that identify such behaviors in homeless and incarcerated youth are useful in demonstrating that risky behaviors appear to increase once a youth becomes immersed in street life (Thompson, Bender, Windsor, Cook, & Williams, 2010). However, they fail to capture the broader social, behavioral and environmental context in which youth incarceration occurs. Furthermore, studies that do address these more distal factors tend to be limited by recall bias and cross-sectional designs. To better understand risk factors for incarceration amongst at-risk youth, we sought to longitudinally examine the prevalence and correlates of incarceration among a prospective cohort of street-involved youth in Vancouver, Canada.

## METHODS

Data for this study was collected from the At-Risk Youth Study (ARYS), a prospective cohort of street-involved youth in Vancouver, Canada. The study has previously been

described in detail (Wood, Stoltz, Montaner, & Kerr, 2006). Eligibility criteria include youth between the ages of 14–26 at enrolment, who have used illicit drugs in the past 30 days and provide written informed consent. In summary, interviews are conducted at baseline and semi-annually for follow-up. Participants complete an interviewer-administered questionnaire and provide blood samples for HIV and HCV serology. The survey includes items on sociodemographic information, drug use patterns, sexual and drug-related risk behaviours, and engagement with the criminal justice system. Participants receive a \$20 CAD monetary compensation at each study visit. The ARYS cohort has been approved by the research ethics board of Providence Health Care and the University of British Columbia.

Data for this study was collected from September 2005 to May 2012. The primary outcome was reported incarceration in the past six months. This was defined as responding “yes” to the question “Have you been in detention, prison or jail in the last 6 months?” The comparison group was youth who reported no incarceration in the last six months.

Explanatory variables of interest included socio-demographic data including: age (per year older); gender (male vs. female); sexual orientation (lesbian, gay, bisexual, transgender, two-spirit (LGBT) vs. heterosexual); Caucasian ethnicity (yes vs. no); homelessness, defined as having no fixed address, sleeping on the street, couch surfing, or staying in a shelter or hostel at some point in the previous six months (yes vs. no); and residence in Vancouver's drug use epicenter at some point in the previous six months, which is a well-described and defined area of the city referred to as the 'Downtown Eastside' (DTES) (yes vs. no). Substance use variables referring to behaviours in the previous six months included: daily crystal methamphetamine use, injection or non-injection (yes vs. no); daily crack cocaine smoking (yes vs. no); daily cocaine use, injection or non-injection (yes vs. no); daily heroin use, injection or non-injection (yes vs. no); any injection drug use (yes vs. no); daily marijuana use (yes vs. no); and heavy alcohol use, defined for females as four drinks in one day in the last week or seven drinks containing alcohol per week and for males as five drinks in one day in the last week or fourteen drinks containing alcohol per week (yes vs. no). Risk factors referring to behaviours in the previous six months included: public injection, defined as injecting drugs in public environments including streets, public lavatories, alleys, parks, parking lots, abandoned buildings, and other public settings (any vs. never); syringe sharing, defined as having lent a used rig to someone else or fixed with a syringe that had already been used by someone else (yes vs. no); unprotected sex, defined as vaginal or anal sex without using a condom (yes vs. no); sex work, defined as having received money, gifts, food, shelter, clothing or drugs in exchange for sex (yes vs. no); drug dealing, defined as selling drugs as a source of income (yes vs. no); and victim of violence, defined as having been attacked, assaulted, or suffered violence (yes vs. no). Other factors include: age of first hard drug use (per year older) which included crack cocaine, cocaine (sniffed or snorted), heroin (sniffed, snorted or smoked) or crystal methamphetamine (smoked or snorted); and methadone program use, defined as ever participating in a methadone program (yes vs. no).

Since analyses of factors potentially associated with incarceration included serial measures for each subject, we used generalized estimating equations (GEE) for binary outcomes with logit link for the analysis of correlated data. These methods determine factors associated with incarceration throughout the six year and nine month follow-up period and provide standard errors adjusted by multiple observations per person using an exchangeable correlation structure. Therefore, this analysis considered data from every participant follow-up visit. Missing data was addressed through the GEE estimating mechanism which uses all available pairs method for missing data from dropouts or intermittent missing. All non-missing pairs of data are used in the estimators of the working correlation parameters. First, we used GEE bivariate analysis to determine factors associated with incarceration. To adjust

for potential confounding, all variables that were  $p < 0.10$  in GEE bivariate analyses were considered in a full model. Quasilielihood under the Independence model Criterion (QIC) statistic with a backward model selection procedure was used to screen all possible combinations of candidate variables and identify the model with the best overall fit as indicated by the lowest QIC value. Statistical analyses were performed using SAS software version 9.3 (SAS, Cary, NC). All reported  $p$ -values are two-sided and considered significant at  $p < .05$ .

## RESULTS

A total of 1019 street-involved youth were enrolled in the study between September 2005 and May 2012. Among this sample, 320 (31%) were female, 686 (67%) were of Caucasian ethnicity, and the median age was 21 years at baseline (interquartile range [IQR] = 19–23). This sample contributed a total of 3347 observations. The median number of follow-up visits was 3 (IQR=1–5). The number of youth who reported having ever been incarcerated at baseline was 638 (63%) and 189 (19%) reported having recently been incarcerated at baseline. Over the study period, 362 (35%) participants reported having been recently incarcerated and overall, a total of 610 (18%) observations included a report of incarceration.

The baseline characteristics of all participants stratified by self-reported incarceration in the previous six months are presented in Table 1. The results of the bivariate and multivariate GEE analyses are presented in Table 2. In multivariate GEE analysis, factors that remained independently associated with incarceration included: homelessness (adjusted odds ratio [AOR]= 1.60, 95% Confidence Interval [CI]: 1.28 – 1.99), daily crystal methamphetamine use (AOR= 1.56, 95% CI: 1.18 – 2.08), public injecting (AOR= 1.33, 95% CI: 1.04 – 1.72), drug dealing (AOR= 1.48, 95% CI: 1.20 – 1.84) and being a victim of violence (AOR= 1.68, 95% CI: 1.38 – 2.06). Conversely, female gender (AOR= 0.48, 95% CI: 0.36 – 0.65), LGBTT identification (AOR= 0.47, 95% CI: 0.30 – 0.72) and increasing age of first hard drug use (AOR= 0.96, 95% CI: 0.92 – 0.99) were negatively associated with incarceration.

## DISCUSSION

In the present study, we observed a high proportion of youth who reported being in detention, prison or jail in the last six months. Factors positively and most strongly associated with incarceration included homelessness, drug dealing and being a victim of violence. Daily crystal methamphetamine use and public injecting were also independently associated with incarceration. Factors negatively and most strongly associated and thus protective from incarceration were female gender and LGBTT identification. Increasing age of first hard drug use was also independently associated with incarceration.

The frequency with which youth in our study were incarcerated is concerning, although largely consistent with prior figures (Milloy et al., 2009; Munch, 2011; Sickmund et al., 2011). Male youth are known to experience higher rates of incarceration, which was also indicated in our data (Barrett, Katsiyannis, & Zhang, 2006). Our findings are also similar to previous studies demonstrating an association between incarceration and crystal methamphetamine use in youth (Milloy et al., 2009). This association may highlight a specific drug-use risk factor for youth incarceration, given previous links between crystal methamphetamine use and initiation of injection drug use (Wood et al., 2006). The trend towards significance of daily crack cocaine use in our study warrants further examination as an added potential drug-use risk factor for incarceration among youth. Together these findings point to opportunities to expand addiction treatment options for youth that may help reduce problematic stimulant drug use and the subsequent risk of incarceration. Given that

increased age of first hard drug use was negatively associated with incarceration, our study also highlights that upstream prevention efforts that delay or prevent early initiation of hard drug use may reduce interactions with the criminal justice system later in life. This also stresses the importance of ensuring that age restrictions do not limit access to early addiction treatment for youth.

The strong association found in this analysis between homelessness and incarceration is consistent with existing literature and has been reported amongst incarcerated adults (Greenberg & Rosenheck, 2008). Homelessness is also associated with injection drug use, injection initiation and high intensity drug use amongst street-involved youth, although it may be that homeless individuals are more visible to police and therefore more vulnerable to arrest and incarceration (Baron, 1999; Feng et al., 2013; E. Roy et al., 2003; É. Roy, Haley, Leclerc, Boudreau, & Boivin, 2007). Together these findings highlight the role of housing as a determinant of youth health and reinforce the importance of supporting this at-risk population through housing efforts. (E. Roy et al., 2004). Indeed, supportive housing interventions may have the potential to prevent youth incarceration and its associated adverse effects by reducing the need for income generation (Debeck, Wood, et al., 2011), reducing high intensity drug use (Feng et al., 2013), and reducing interactions with police on streets (Ti, Wood, Shannon, Feng, & Kerr, 2013). Moreover, since incarceration is known to impose high costs on public-sector spending (Henrichson & Delaney, 2012; Miller, Fisher, & Cohen, 2001), our data suggests that investments in housing to reduce youth incarceration could help minimize its fiscal burden. Although homelessness may increase vulnerability to incarceration, it is also possible that incarceration leads to homelessness. Incarceration has been shown to be a disruptive life event that can result in loss of housing and increased economic insecurity (Freudenberg, Daniels, Crum, Perkins, & Richie, 2005; Pager, 2003). Given the established harms associated with homelessness, providing youth who exit the criminal justice system with supportive housing should be a public health priority. It is noteworthy that incarceration was also strongly associated with being a victim of violence. This further highlights the vulnerability of these youth and underscores the importance of ensuring that appropriate health and social supports are readily available.

In addition to housing, another socioeconomic risk factor linked to youth incarceration in our study was drug dealing. Drug dealing is prevalent in social environments where individuals have few legitimate means of generating income (DeBeck et al., 2007). Individuals who have been incarcerated are known to be more vulnerable to economic instability (Bushway, 1998), and prior studies demonstrate that drug dealing is a frequent source of income generation among people who use injection drugs (Kerr et al., 2008). Although law enforcement is typically the dominant response to address drug dealing, alternative interventions that are less hazardous and potentially of greater societal benefit have been identified. Specifically, one study reported that a high proportion of illicit drug users were willing to cease engaging in drug dealing, if they had options for low-threshold employment (Debeck, Wood, et al., 2011). By providing alternative methods of income generation for economically vulnerable individuals (Reif, Horgan, Ritter, & Tompkins, 2004), interventions such as low-threshold employment may reduce engagement in drug dealing and subsequent interactions with the criminal justice system.

The identified association between incarceration and public injecting likely reflects the high-risk profile of individuals who inject in public areas (Darke, Kaye, & Ross, 2001), and the fact that those who inject in public are more visible to police. While this may make public injectors more susceptible to incarceration, the association may also reflect the destabilizing influence of incarceration on the lives of young people (Darke et al., 2001; B. D. Marshall, Kerr, Qi, Montaner, & Wood, 2010).

Our finding that street-involved LGBTT youth are much less likely to experience incarceration has not been previously demonstrated. This is an optimistic finding since as a population LGBTT youth are often found to be at high risk for numerous negative health and social outcomes including incarceration (Himmelstein & Bruckner, 2011). The exact nature of this relationship and its underlying mechanism warrants further investigation.

This study has several limitations. First, our sample was not random and therefore may not be generalizable to other populations. Second, data was collected using self reported interviews and is thus vulnerable to response bias. Given the sensitive nature of some interview questions, respondents may be inclined to report socially desirable responses leading to under reporting of stigmatizing behaviors such as illicit drug use and incarceration. As a result, our findings are likely conservative estimates. Third, given the non-randomized nature of this study, the relationships studied may be influenced by confounders not measured.

Our study demonstrates that incarceration is highly prevalent amongst street-involved youth in our setting, an important consideration given the known health and social harms associated with incarceration. This study identifies risk factors for youth incarceration, including homelessness, crystal methamphetamine use and engaging in risky behaviors such as public injection and drug dealing. These findings support the need for the expansion of youth-focused evidence-based addiction treatment options in addition to other structural interventions available regardless of age. In particular, options include supportive housing and economic empowerment through programs such as low-threshold employment. These public health oriented interventions may help this high-risk population avoid incarceration as well as mitigate its potential subsequent negative consequences.

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**Table 1**

Characteristics of study sample at baseline stratified by reported incarceration in the last six months (n= 1019).

Characteristic	Incarcerated in the last 6 months at baseline			
	Yes n= 189	No n= 830	OR (95% CI)	p-value
<b>Median age (IQR)</b>	22 (20–24)	21 (19–23)	1.05 (0.99 – 1.12)	0.086
<b>Gender, n (%)</b>				
Female	42 (22.2)	278 (33.5)	0.57 (0.39 – 0.82)	0.003
Male	147 (77.8)	552 (66.5)		
<b>Sexual Orientation, n (%)</b>				
LGBTB	15 (7.9)	149 (18.0)	0.39 (0.23 – 0.69)	< 0.001
Heterosexual	174 (92.1)	681 (82.0)		
<b>Caucasian ethnicity, n (%)</b>				
Yes	128 (67.7)	558 (67.2)	1.02 (0.73 – 1.43)	0.896
No	61 (32.3)	272 (32.8)		
<b>Dropped out of high school, n (%)</b>				
Yes	152 (80.4)	616 (74.2)	1.43 (0.96 – 2.11)	0.074
No	37 (19.6)	214 (25.8)		
<b>Homeless<sup>a</sup>, n (%)</b>				
Yes	154 (81.5)	589 (71.0)	1.80 (1.21 – 2.68)	0.003
No	35 (18.5)	241 (29.0)		
<b>Living in DTES<sup>a</sup>, n (%)</b>				
Yes	53 (28.0)	231 (27.8)	1.01 (0.71 – 1.44)	0.953
No	136 (72.0)	599 (72.2)		
<b>Heavy alcohol use<sup>b</sup>, n (%)</b>				
Yes	66 (34.9)	311 (37.5)	0.90 (0.64 – 1.25)	0.512
No	123 (65.1)	519 (62.5)		
<b>Daily marijuana use<sup>a</sup>, n (%)</b>				
Yes	94 (49.7)	401 (48.3)	1.06 (0.77 – 1.45)	0.724
No	95 (50.3)	429 (51.7)		
<b>Daily crystal methamphetamine use<sup>a,c</sup>, n (%)</b>				
Yes	30 (15.9)	102 (12.3)	1.35 (0.87 – 2.09)	0.185
No	159 (84.1)	728 (87.7)		
<b>Daily crack smoking<sup>a</sup>, n (%)</b>				
Yes	51 (27.0)	127 (15.3)	2.05 (1.41 – 2.97)	< 0.001
No	138 (73.0)	703 (84.7)		
<b>Daily cocaine use<sup>a,c</sup>, n (%)</b>				
Yes	8 (4.2)	34 (4.1)	1.03 (0.47 – 2.27)	0.932
No	181 (95.8)	796 (95.9)		
<b>Daily heroin use<sup>a,c</sup>, n (%)</b>				

Characteristic	Incarcerated in the last 6 months at baseline			
	Yes <i>n</i> = 189	No <i>n</i> = 830	OR (95% CI)	<i>p</i> -value
Yes	35 (18.5)	91 (11.0)	1.85 (1.20 – 2.83)	0.004
No	154 (81.5)	739 (89.0)		
<b>Injection drug use<sup>a</sup>, <i>n</i> (%)</b>				
Yes	67 (35.5)	231 (27.8)	1.42 (1.02 – 1.99)	0.038
No	122 (64.6)	599 (72.2)		
<b>Median age of first hard drug use (IQR)</b>				
	15 (13–16)	15 (14–17)	0.94 (0.88 – 0.99)	0.030
<b>Methadone program, <i>n</i> (%)</b>				
Yes	22 (11.6)	54 (6.5)	1.89 (1.12 – 3.19)	0.015
No	167 (88.4)	776 (93.5)		
<b>Public injection<sup>a</sup>, <i>n</i> (%)</b>				
Yes	57 (30.2)	166 (20.0)	1.73 (1.21 – 2.46)	0.002
No	132 (69.8)	664 (80.0)		
<b>Shared syringes<sup>a</sup>, <i>n</i> (%)</b>				
Yes	23 (12.2)	60 (7.2)	1.78 (1.07 – 2.96)	0.025
No	166 (87.8)	770 (92.8)		
<b>Unprotected sex<sup>a</sup>, <i>n</i> (%)</b>				
Yes	112 (59.3)	455 (54.8)	1.20 (0.87 – 1.65)	0.268
No	77 (40.7)	375 (45.2)		
<b>Sex work<sup>a</sup>, <i>n</i> (%)</b>				
Yes	23 (12.2)	78 (9.4)	1.34 (0.82–2.19)	0.250
No	166 (87.8)	752 (90.6)		
<b>Drug dealing<sup>a</sup>, <i>n</i> (%)</b>				
Yes	122 (64.5)	416 (50.1)	1.81 (1.31 – 2.52)	< 0.001
No	67 (35.5)	414 (49.9)		
<b>Victim of violence<sup>a</sup>, <i>n</i> (%)</b>				
Yes	106 (56.1)	348 (58.1)	1.77 (1.29 – 2.43)	< 0.001
No	83 (43.9)	482 (41.9)		

<sup>a</sup>Denotes activities in the previous six months

<sup>b</sup>Denotes activities in the previous week

<sup>c</sup>Refers to any route of consumption (i.e., sniffing, snorting, smoking or injecting)

**Table 2**

Univariate and multivariate GEE analysis of factors associated with incarceration among street-involved youth in Vancouver (n=1019).

Characteristic	Unadjusted		Adjusted	
	OR (95% CI)	<i>p</i> -value	AOR (95% CI)	<i>p</i> -value
<b>Age</b>				
Per year older	1.06 (1.01 – 1.11)	0.013		
<b>Gender</b>				
Female vs. male	0.42 (0.31–0.55)	< 0.001	0.48 (0.36 – 0.65)	< 0.001
<b>Sexual orientation</b>				
LGBTT vs. heterosexual	0.44 (0.29 – 0.67)	<0.001	0.47 (0.30 – 0.72)	< 0.001
<b>Caucasian ethnicity</b>				
Yes vs. No	0.90 (0.71 – 1.14)	0.391		
<b>Dropped out of high school</b>				
Yes vs. No	1.43 (1.09 – 1.89)	0.011	1.30 (0.97 – 1.75)	0.084
<b>Homeless<sup>a</sup></b>				
Yes vs. No	2.02 (1.65 – 2.47)	< 0.001	1.60 (1.28 – 1.99)	< 0.001
<b>Living in DTES<sup>a</sup></b>				
Yes vs. No	1.20 (0.98 – 1.48)	0.085		
<b>Heavy alcohol use<sup>b</sup></b>				
Yes vs. No	1.12 (0.92 – 1.37)	0.270		
<b>Daily marijuana use<sup>a</sup></b>				
Yes vs. No	1.13 (0.92 – 1.38)	0.250		
<b>Daily crystal methamphetamine use<sup>a, c</sup></b>				
Yes vs. No	1.69 (1.31 – 2.20)	< 0.001	1.56 (1.18 – 2.08)	0.002
<b>Daily crack smoking<sup>a</sup></b>				
Yes vs. No	1.59 (1.24 – 2.04)	< 0.001	1.31 (1.00 – 1.72)	0.053
<b>Daily cocaine use<sup>c</sup></b>				
Yes vs. No	1.19 (0.71 – 1.98)	0.517		
<b>Daily heroin use<sup>a, c</sup></b>				
Yes vs. No	1.46 (1.10 – 1.92)	0.008	1.28 (0.93 – 1.77)	0.129
<b>Injection drug use<sup>a</sup></b>				
Yes vs. No	1.41 (1.14 – 1.75)	0.002		
<b>Age of first hard drug use</b>				
Per year older	0.93 (0.90 – 0.98)	0.002	0.96 (0.92 – 1.00)	0.045
<b>Methadone program</b>				
Yes vs. No	1.06 (0.78 – 1.15)	0.688		
<b>Public injection<sup>a</sup></b>				
Yes vs. No	1.71 (1.40 – 2.10)	< 0.001	1.33 (1.04 – 1.72)	0.025

Characteristic	Unadjusted		Adjusted	
	OR (95% CI)	<i>p</i> -value	AOR (95% CI)	<i>p</i> -value
<b>Shared syringes</b> <sup>a</sup>				
Yes vs. No	1.57 (1.11 – 2.22)	0.011		
<b>Unprotected sex</b> <sup>a</sup>				
Yes vs. No	1.07 (0.88 – 1.29)	0.505		
<b>Sex work</b> <sup>a</sup>				
Yes vs. No	1.11 (0.79 – 1.57)	0.536		
<b>Drug dealing</b> <sup>a</sup>				
Yes vs. No	2.00 (1.64 – 2.43)	< 0.001	1.48 (1.20 – 1.84)	< 0.001
<b>Victim of violence</b> <sup>a</sup>				
Yes vs. No	1.83 (1.52 – 2.20)	< 0.001	1.68 (1.38 – 2.06)	< 0.001

<sup>a</sup>Denotes activities in the previous six months

<sup>b</sup>Denotes activities in the previous week

<sup>c</sup>Refers to any route of consumption (i.e., sniffing, snorting, smoking, or injecting)