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Factors Associated with Illicit Methadone Injecting in a Canadian Setting

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Abstract

Background and Objectives—While methadone is well established as an evidence-based treatment for opioid use disorder, safety concerns persist regarding its diversion. We examine the prevalence of and risk factors associated with injection of methadone in an urban population.

Methods—Between December 2005 and November 2013, data were derived from two open prospective studies of persons who inject drugs (PWID) in Vancouver, Canada. Generalized estimating equations (GEE) logistic regression was used to determine factors independently associated with illicit methadone injecting.

Results—During the study, 1911 individuals (34% women) were recruited; 134 (7%) participants reported methadone injecting at least once. In multivariable analysis, Caucasian ethnicity [adjusted odds ratio (AOR) = 1.90, 95% confidence interval (CI) = 1.20 – 3.00]; homelessness (AOR = 1.46, 95% CI = 1.09 – 1.95); drug dealing (AOR = 2.10, 95% CI = 1.50 – 2.93); daily heroin injection (AOR = 1.57, 95% CI = 1.08 – 2.26); daily crack smoking (AOR = 2.06, 95% CI = 1.44 – 2.95); being a victim of violence (AOR = 1.48, 95% CI = 1.04 – 2.12); and non-fatal overdose (AOR = 1.67, 95% CI = 1.00 – 2.79) were independently and positively associated with methadone injection; female gender (AOR = 0.47, 95% CI = 0.30 – 0.75) was negatively associated.

Discussion and Conclusion—The diversion of methadone for illicit injection in this urban setting was associated with several markers of addiction severity and other health and social vulnerabilities.

Scientific Significance—These findings underscore the need to ensure methadone accessibility while limiting diversion-related risk.

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Declaration of Interest:

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

Keywords

methadone; opioids; prescription drug abuse

1. INTRODUCTION

Opioid dependence is a global problem affecting upwards of 15 million people worldwide, and is associated with significant morbidity and mortality [1, 2]. In the United States in 2012, the Substance Abuse and Mental Health Services Administration estimated that 669,000 people used heroin in the previous year, marking five consecutive years of increases [3].

Methadone is well established as an effective treatment for patients with opioid use disorder [4]. Methadone is also used for the treatment of cancer pain and chronic non-cancer pain in a variety of settings [5–7]. However, the risk of sedation and respiratory depression with improper methadone dosing remains. Specifically, despite precautions for methadone prescription such as the dispensing of methadone under daily witnessed supervision in unstable patients and regular urine drug screen testing to verify compliance, fatalities associated with methadone have increased markedly across numerous jurisdictions in recent years [8–11].

The diversion and illicit use of methadone prescribed for opioid use disorders or for pain constitutes a major risk for fatal overdose involving methadone [9, 12]. The prevalence of non-prescription methadone use has not been well described and the factors associated with injection of street obtained methadone have yet to be well defined, particularly in settings where methadone is widely available through programs that allow primary care physician prescription. Therefore, we undertook this study to evaluate the prevalence and factors associated with methadone injection in an urban Canadian setting with widespread access to methadone prescribed through primary care physicians and dispensed via a network of community pharmacies.

2. METHODS**Study Sample**

This study made use of two open prospective cohorts of persons who use drugs in Vancouver, Canada: the Vancouver Injection Drug Users Study (VIDUS), and AIDS Care Cohort to Evaluate exposure to Survival Services (ACCESS). VIDUS and ACCESS follow identical recruitment and follow-up procedures, allowing for combined analysis; the cohorts differ in that HIV-positive individuals who used illicit drugs other than cannabis in the previous month are eligible for ACCESS, whereas HIV-negative individuals who injected drugs in the month prior to the enrollment are followed in VIDUS. Participants 18 years of age or older who reside in the greater Vancouver region are eligible for enrollment in the two cohorts via self-referral, word of mouth, and street outreach. All participants provided written informed consent; they receive a stipend (\$20 CDN) at each study visit for their time and transportation. The VIDUS and ACCESS sampling and recruitment procedures have

been described previously [13, 14]. VIDUS and ACCESS have received ethics approval from the University of British Columbia/Providence Healthcare Research Ethics Board. The present study was restricted to individuals with a history of drug injecting and who were recruited between December 2005 and November 2013. The formulation of methadone available in the community over the study period as part of the Province of British Columbia's Methadone Maintenance Program, or as prescribed for pain, was a compounded 1mg/ml solution dispensed as an orange flavored drink. During the study period, the average dose of methadone prescribed to individuals enrolled in the Methadone Maintenance Program within the province was 75mg/day [15].

Outcome Measures

Participants completed an interviewer-administered questionnaire at baseline and at six-month intervals that elicited data concerning demographic characteristics, injection and non-injection drug use patterns, and various risk behaviors. In addition, HIV and hepatitis C virus (HCV) antibody testing was performed at baseline and at each follow-up visit for individuals with negative test results to date. Interviews were conducted in private, and included comprehensive pre- and post-test counseling by trained nurses.

The primary outcome of interest was self-reported illicit methadone injection in the previous six months (yes vs. no). The following demographic characteristics, drug use patterns, social and structural-level risk factors were considered to be potentially associated with the outcome: gender (male vs. female), age (per year older), ethnicity (Caucasian vs. non-Caucasian), homelessness (yes vs. no), drug dealing (yes vs. no), daily heroin injection (yes vs. no), daily crack smoking (yes vs. no), daily cocaine injection (yes vs. no), sex work (yes vs. no), legal charges of assault (yes vs. no), incarceration (yes vs. no), subject of violence (yes vs. no), non-fatal overdose (yes vs. no), and enrollment in methadone maintenance treatment (yes vs. no). Except for age, gender and ethnicity, all variables were treated as time-updated and referred to behaviors and activities in the six months predating the interview. Sex work was defined as exchanging sex for money, gifts, food, shelter or other commodities, as in previous analyses [16].

Statistical Analysis

We first compared variables of interest at baseline stratified by baseline injection methadone use in the past six months using Pearson's Chi-square test (or Fisher's exact test) for categorical variables and the Wilcoxon rank-sum test for continuous variables. Next, variables potentially associated with active injection methadone use during follow-up were evaluated using generalized estimating equations (GEE) with a logit link function for this binary outcome, since serial measures for cohort participants were available. This method provides standard errors adjusted by multiple observations per person using an exchangeable correlation structure, making it possible to consider data from every participant follow-up visit in this analysis. This approach serves to examine behaviors and characteristics that correlated with times when methadone injection was used within and between individuals.

Subsequently, we used bivariable GEE analyses to determine potential factors associated with injection methadone use. Next, we fitted a multivariable model, considering all

variables with $p < 0.05$ in bivariable GEE analysis in the full model. A backward model selection procedure was used to construct the final model, as indicated by the lowest quasi-likelihood under the independence model criterion (QIC) value [17]. All statistical analyses were performed using the SAS software version 9.3 (SAS, Cary, NC, USA). All p -values are two sided.

3. RESULTS

Between December 2005 and November 2013, 1911 persons who inject drugs (PWID) were enrolled in the VIDUS and ACCESS cohorts. Of the 1911, 1713 (90%) participants returned for at least one follow-up visit. The median number of study visits was 9 (interquartile range [IQR]: 4 – 13) between December 2005 and November 2013. These participants generated 15,984 observations for this analysis. There were 134 (7%) participants who reported methadone injecting at least once during the study period.

The median age of the cohort at baseline was 41 years (IQR: 35 – 47), 1162 (61%) of respondents were Caucasian, and 645 (34%) were female. The characteristics of the study sample, stratified by individuals reporting injection methadone use in the previous six months at baseline are found in Table 1. As shown here, at baseline, those reporting methadone injecting were more likely to report being homeless, drug dealing, daily heroin injection, daily crack cocaine smoking, experiencing recent violence and being enrolled in methadone maintenance therapy (all $p < 0.05$).

The results of the bivariable and multivariable GEE analyses of factors associated with injection of illicit methadone are shown in Table 2. In the bivariable GEE logistic analysis, age, Caucasian ethnicity, being homeless, drug dealing, being the subject of violence, incarceration, daily heroin injection, daily cocaine injection, daily crack smoking, and non-fatal overdose were significantly associated with methadone injection, while female gender was negatively associated. In the multivariable GEE analysis, Caucasian ethnicity, being homeless, drug dealing, being the subject of violence, daily heroin injection, daily crack smoking, and non-fatal overdose remained independently associated with methadone injection, while female gender remained negatively associated.

4. DISCUSSION

This study of PWID in Vancouver, Canada, found that 7% of participants reported methadone injecting over the study period, and that this behavior was independently associated with both markers of socioeconomic vulnerability (homelessness, being the victim of violence) and of addiction severity/entrenchment (daily heroin injection, daily crack smoking, drug dealing, non-fatal overdose) in multivariable analyses. Our findings of an association between non-fatal overdose and injection of methadone are consistent with the known heightened risks of methadone injection [18]. Interestingly, in keeping with methadone's role in addiction treatment, injection of methadone was not associated with enrollment in a methadone program after adjustment for other variables. We posit therefore that individuals injecting methadone may represent a sub-population of PWID for whom evidence-based addiction treatment services remain out of reach; future research may

elucidate possibilities for improved access to effective treatment services, including methadone maintenance programs, for this population.

The diversion of prescribed, un-witnessed, methadone doses for illicit use has long been an identified potential collateral problem of methadone maintenance programs [19, 20], and methadone prescribed for pain also constitutes an importance source of illicit methadone [9]. Other studies have found the prevalence of nonprescription methadone use to be high, and also to vary widely depending on geographic area. For instance, lifetime prevalence of illicit methadone use by PWID was found to be 52.6% in New York City in 2008, while a 2013 study found that 94.6% of drug users in rural Kentucky reported ever using illicit methadone [21, 22]. A 1994 study of PWID in Montreal reported illicit methadone use by 42% of respondents in the preceding 6 months [23]. However, the route of administration of diverted methadone was not differentiated in these earlier studies [21–23]. It is possible that PWID are purchasing and using street methadone as a strategy to reduce heroin consumption and self treat opioid withdrawal symptoms. While this may be viewed as a harm reduction strategy, the risks of street methadone use on fatal overdoses have been well described previously [9, 11, 18]. Similarly, as we have shown in the present study, this practice is associated with several other high-risk behaviors. Therefore, these observations would appear to call for optimizing access to methadone programs while also seeking to limit instances of diversion to the street.

Injection methadone use among heroin users in Sydney, Australia was reported to be 52% in a cohort of 312 individuals in 1996 [24]. In contrast with our study, researchers there found that enrolment in a methadone maintenance program was associated with injection methadone use [24]. A more recent study reported 18% of PWID in Adelaide, Australia had injected methadone at least once over the course of the study [25]. It has been postulated that local differences in practise regulations might account for the discrepancies [26]. Another Australian group found that banning of injection materials resulted in greater harm for PWID that injected methadone, as users were more likely to re-use contaminated equipment [27]. Additionally, several other studies monitoring diverted methadone use have pointed to attempts at self-treatment and to assist others in opiate withdrawal as possible motivations for diverting and/or illicitly consuming methadone [28, 29].

The present study highlights the challenges with providing access to methadone for patients with opioid use disorder while at the same time preventing diversion of methadone to the street. Current guidelines compiled by the College of Physicians and Surgeons of British Columbia stipulate that patients enrolled in the province's methadone maintenance program must have demonstrated stability across several biopsychosocial parameters and have supplied appropriate urine drug test results for a minimum of 12 weeks to qualify for initiation of non-witnessed carry doses [30]; thus achieving carry privileges is a marker of success for patients. It is possible that prohibiting carry doses of methadone may diminish the supply of methadone for illicit use, however past studies have demonstrated that receiving take home doses is highly appreciated by methadone patients [31], and has been associated with decreased medical hospitalizations and [32]. Nevertheless, rates of diversion clearly demonstrate the need to identify and implement tools that can allow for more flexible program rules for patients at low risk of diversion, while ensuring daily witnessed ingestion

for patients at risk of selling their medication on the street [33]. The implementation of physician prescription monitoring programs and comprehensive risk management programs have proven effective as measures to minimize prescription opioid diversion [34, 35], however extremely rigid restrictions concerning methadone prescribing can result in harmful public health outcomes [36].

This study has several limitations. Firstly, participants enrolled in the cohort do not represent a random sample. Further, we were able to measure various factors associated with methadone injection, however, given the observational nature of this study, we were not able to establish cause-effect relationships. It is possible that cofounders not measured in our study have influenced findings. Also, both the possible reluctance of participants to reveal personal behaviors during interviews as well as recall deficiencies could have led to underreporting of associated risks [37]. A future study involving qualitative measures might elucidate how illicit methadone was obtained. The current study did not measure the frequency of methadone injection; future research might describe with what intensity and frequency methadone was injected, and might assess risks associated with more entrenched use. Finally, the results in this study may be influenced by the local availability of addiction services generally and of opioid replacement therapy specifically, which may differ between various health jurisdictions, regionally, at the provincial or state level, or internationally.

In conclusion, this study serves to further describe the problem of illicit methadone injecting and the factors that shape the practice. We found that among our sample of PWID in Vancouver, greater levels of personal vulnerability, and more marked intensity of addiction disease, were associated with injection of diverted methadone. This study contributes to the understanding of the prevalence and context of intravenous illicit methadone use in urban settings, and highlights the need for careful policy decision-making around the provision and availability of methadone-based opioid replacement therapy, particularly in populations with high intensities of socioeconomic stress and opioid addiction.

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BIBIOGRAPHY

1. Degenhardt L, et al. The global epidemiology and burden of opioid dependence: results from the global burden of disease 2010 study. *Addiction*. 2014; 109(8):1320–1333. [PubMed: 24661272]
2. Whiteford HA, et al. Global burden of disease attributable to mental and substance use disorders: findings from the Global Burden of Disease Study 2010. *Lancet*. 2013; 382(9904):1575–1586. [PubMed: 23993280]
3. Substance Abuse and Mental Health Services Administration, O.o.A.S. Results from the 2012 National Survey of Drug Use and Health: Summary of National Findings. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2013.
4. Mattick RP, et al. Methadone maintenance therapy versus no opioid replacement therapy for opioid dependence. *Cochrane Database Syst Rev*. 2009; (3):CD002209. [PubMed: 19588333]

5. Shir Y, et al. Methadone is safe for treating hospitalized patients with severe pain. *Can J Anaesth*. 2001; 48(11):1109–1113. [PubMed: 11744587]
6. Leppert W. The role of methadone in cancer pain treatment--a review. *Int J Clin Pract*. 2009; 63(7): 1095–1109. [PubMed: 19570126]
7. Trescot AM, et al. Opioids in the management of chronic non-cancer pain: an update of American Society of the Interventional Pain Physicians' (ASIPP) Guidelines. *Pain Physician*. 2008; 11(2 Suppl):S5–S62. [PubMed: 18443640]
8. Pilgrim JL, McDonough M, Drummer OH. A review of methadone deaths between 2001 and 2005 in Victoria, Australia. *Forensic Sci Int*. 2013; 226(1–3):216–222. [PubMed: 23419969]
9. Madden ME, Shapiro SL. The methadone epidemic: methadone-related deaths on the rise in Vermont. *Am J Forensic Med Pathol*. 2011; 32(2):131–135. [PubMed: 21030851]
10. King NB, et al. Determinants of increased opioid-related mortality in the United States and Canada, 1990–2013: a systematic review. *Am J Public Health*. 2014; 104(8):e32–e42. [PubMed: 24922138]
11. Bernard JP, et al. Methadone-related deaths in Norway. *Forensic Sci Int*. 2013; 224(1–3):111–116. [PubMed: 23246070]
12. Weimer MB, et al. The source of methadone in overdose deaths in Western Virginia in 2004. *J Addict Med*. 2011; 5(3):188–202. [PubMed: 21844834]
13. Tyndall MW, et al. Intensive injection cocaine use as the primary risk factor in the Vancouver HIV-1 epidemic. *Aids*. 2003; 17(6):887–893. [PubMed: 12660536]
14. Strathdee SA, et al. Barriers to use of free antiretroviral therapy in injection drug users. *Jama*. 1998; 280(6):547–549. [PubMed: 9707146]
15. Nosyk B, et al. Trends in methadone maintenance treatment participation, retention, and compliance to dosing guidelines in British Columbia, Canada: 1996–2006. *J Subst Abuse Treat*. 2010; 39(1):22–31. [PubMed: 20418051]
16. Ti L, et al. Suboptimal plasma HIV-1 RNA suppression and adherence among sex workers who use illicit drugs in a Canadian setting: an observational cohort study. *Sex Transm Infect*. 2014; 90(5):418–422. [PubMed: 24523347]
17. Cui J. QIC program and model selection in GEE analyses. *Stata Journal*. 2007; 7(2):209–220.
18. Iwersen-Bergmann S, et al. Intravenous methadone application as a serious risk factor for an overdose death: methadone-related fatalities in Hamburg from 2007 to 2012. *Int J Legal Med*. 2014; 128(5):751–764. [PubMed: 24859230]
19. Heinemann A, et al. Methadone-related fatalities in Hamburg 1990–1999: implications for quality standards in maintenance treatment? *Forensic Sci Int*. 2000; 113(1–3):449–455. [PubMed: 10978661]
20. Neale J. Methadone, methadone treatment and non-fatal overdose. *Drug Alcohol Depend*. 2000; 58(1–2):117–124. [PubMed: 10669062]
21. Ompad DC, et al. Correlates of illicit methadone use in New York City: a crosssectional study. *BMC Public Health*. 2008; 8:375. [PubMed: 18957116]
22. Hall MT, Leukefeld CG, Havens JR. Factors associated with high-frequency illicit methadone use among rural Appalachian drug users. *Am J Drug Alcohol Abuse*. 2013; 39(4):241–246. [PubMed: 23841864]
23. Lauzon P, et al. Illicit use of methadone among i.v. drug users in Montreal. *J Subst Abuse Treat*. 1994; 11(5):457–461. [PubMed: 7869467]
24. Darke S, Ross J, Hall W. Overdose among heroin users in Sydney, Australia: I. Prevalence and correlates of non-fatal overdose. *Addiction*. 1996; 91(3):405–411. [PubMed: 8867202]
25. Humeniuk R, et al. Prevalence and correlates of intravenous methadone syrup administration in Adelaide, Australia. *Addiction*. 2003; 98(4):413–418. [PubMed: 12653811]
26. Lintzeris N, Lenne M, Ritter A. Methadone injecting in Australia: a tale of two cities. *Addiction*. 1999; 94(8):1175–1178. [PubMed: 10615732]
27. Hopwood M, et al. The injection of methadone syrup in New South Wales: patterns of use and increased harm after partial banning of injecting equipment. *Aust N Z J Public Health*. 2003; 27(5):551–555. [PubMed: 14651404]

28. Davis WR, Johnson BD. Prescription opioid use, misuse, and diversion among street drug users in New York City. *Drug Alcohol Depend.* 2008; 92(1–3):267–276. [PubMed: 17913395]
29. Duffy P, Baldwin H. The nature of methadone diversion in England: a Merseyside case study. *Harm Reduct J.* 2012; 9:3. [PubMed: 22243982]
30. Columbia, C.o.P.a.S.o.B. Methadone Maintenance Program: Clinical Practice Guideline. Vancouver, BC: 2014.
31. Peles E, et al. Achievement of take-home dose privileges is associated with betterperceived sleep and with cognitive status among methadone maintenance treatment patients. *World J Biol Psychiatry.* 2014
32. Walley AY, et al. Methadone dose, take home status, and hospital admission among methadone maintenance patients. *J Addict Med.* 2012; 6(3):186–190. [PubMed: 22694929]
33. Strang J, et al. Impact of supervision of methadone consumption on deaths related to methadone overdose (1993–2008): analyses using OD4 index in England and Scotland. *Bmj.* 2010; 341:c4851. [PubMed: 20847018]
34. Inciardi JA, et al. The "black box" of prescription drug diversion. *J Addict Dis.* 2009; 28(4):332–347. [PubMed: 20155603]
35. Reifler LM, et al. Do prescription monitoring programs impact state trends in opioid abuse/misuse? *Pain Med.* 2012; 13(3):434–442. [PubMed: 22299725]
36. Dole VP. Methadone treatment in British Columbia: bad medicine? *Cmaj.* 1987; 136(8):798. [PubMed: 3567785]
37. Perlis TE, et al. Audio-computerized self-interviewing versus face-to-face interviewing for research data collection at drug abuse treatment programs. *Addiction.* 2004; 99(7):885–896. [PubMed: 15200584]

TABLE 1

Baseline characteristics of Vancouver injection drug users stratified by methadone injecting.

Characteristic	Total (%) (<i>n</i> = 1911)	Methadone injecting		<i>p</i> -value
		Yes (%) (<i>n</i> = 60)	No (%) (<i>n</i> = 1851)	
Age				
Median (IQR)	41 (35 – 47)	44 (38 – 48)	41(35 – 47)	0.092
Gender				
Female	645 (33.75)	18 (30.00)	627 (33.87)	0.532
Male	1266 (66.25)	42 (70.00)	1224 (66.13)	
Caucasian ethnicity				
Yes	1162 (60.81)	43 (71.67)	1119 (60.45)	0.080
No	749 (39.19)	17 (28.33)	732 (39.55)	
Homeless[†]				
Yes	673 (35.22)	29 (48.33)	644 (34.79)	0.033
No	1230 (64.36)	31 (51.67)	1199 (64.78)	
Drug dealing[†]				
Yes	637 (33.33)	34 (56.67)	603 (32.58)	<0.001
No	1274 (66.67)	26 (43.33)	1248 (67.42)	
Daily heroin injection[†]				
Yes	490 (25.64)	27 (45.00)	463 (25.01)	0.001
No	1421 (74.36)	33 (55.00)	1388 (74.99)	
Daily crack smoking[†]				
Yes	741 (38.78)	39 (65.00)	702 (37.93)	<0.001
No	1167 (61.07)	21 (35.00)	1146 (61.91)	
Daily cocaine injection[†]				
Yes	180 (9.42)	10 (16.67)	170 (9.18)	0.051
No	1730 (90.53)	50 (83.33)	1680 (90.76)	
Sex work[†]				
Yes	275 (14.39)	8 (13.33)	267 (14.42)	0.782
No	1612 (84.35)	52 (86.67)	1560 (84.24)	
Charged with assault[†]				
Yes	73 (3.82)	3 (5.00)	70 (3.78)	0.506
No	1799 (94.14)	57 (95.00)	1742 (94.11)	
Incarceration[†]				
Yes	320 (16.75)	11 (18.33)	309 (16.69)	0.763
No	1574 (82.37)	49 (81.67)	1525 (82.39)	
Subject of violence[†]				
Yes	426 (22.29)	21 (35.00)	405 (21.88)	0.016
No	1456 (76.19)	38 (63.33)	1418 (76.61)	

Characteristic	Total (%) (<i>n</i> = 1911)	Methadone injecting		<i>p</i> -value
		Yes (%) (<i>n</i> = 60)	No (%) (<i>n</i> = 1851)	
Non-fatal overdose[†]				
Yes	133 (6.96)	10 (16.67)	123 (6.65)	0.007
No	1767 (92.46)	50 (83.33)	1717 (92.76)	
MMT participation[†]				
Yes	783 (40.97)	34 (56.67)	749 (40.46)	0.010
No	1108 (57.98)	25 (41.67)	1083 (58.51)	

NOTE: Percentages may not necessarily sum to 100% due to missing data or rounding error

IQR = Interquartile Range. MMT = methadone maintenance therapy

[†] Denotes activities in last 6 months

TABLE 2

Bivariable and multivariable generalized estimating equations analyses of factors associated with methadone injecting in Vancouver, Canada, 2005 – 2013.

Characteristic	Odds Ratio (OR)	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age		
Per year older	0.96 (0.94 – 0.98)	
Gender		
Female vs. male	0.52 (0.34 – 0.81)	0.47 (0.30 – 0.75)
Caucasian ethnicity		
Yes vs. no	2.32 (1.49 – 3.61)	1.90 (1.20 – 3.00)
Homeless[†]		
Yes vs. no	2.23 (1.69 – 2.94)	1.46 (1.09 – 1.95)
Drug dealing[†]		
Yes vs. no	3.51 (2.58 – 4.77)	2.10 (1.50 – 2.93)
Daily heroin injection[†]		
Yes vs. no	2.34 (1.62 – 3.39)	1.57 (1.08 – 2.26)
Daily crack smoking[†]		
Yes vs. no	2.93 (2.10 – 4.10)	2.06 (1.44 – 2.95)
Daily cocaine injection[†]		
Yes vs. no	1.82 (1.12 – 2.94)	
Sex work[†]		
Yes vs. no	1.55 (0.97 – 2.47)	
Charged with assault[†]		
Yes vs. no	1.51 (0.69 – 3.28)	
Incarceration[†]		
Yes vs. no	2.15 (1.54 – 3.02)	
Subject of violence[†]		
Yes vs. no	2.08 (1.47 – 2.96)	1.48 (1.04 – 2.12)
Non-fatal overdose[†]		
Yes vs. no	2.29 (1.34 – 3.89)	1.67 (1.00 – 2.79)
MMT participation[†]		
Yes vs. no	1.13 (0.77 – 1.64)	

CI = Confidence Interval. MMT = methadone maintenance therapy

[†] Denotes activities in last 6 months