



Risk factors for progression to regular injection drug use among street-involved youth in a Canadian setting



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ABSTRACT

Background: Street-involved youth are at high risk for experimenting with injection drug use; however, little attention has been given to identifying the factors that predict progression to on-going injecting.

Methods: Logistic regression was used to identify factors associated with progression to injecting weekly on a regular basis among a Canadian cohort of street-involved youth.

Results: Among our sample of 405 youth who had initiated injecting at baseline or during study observation, the median age was 22 years (interquartile range [IQR] = 21–24), and 72% (293) reported becoming a regular injector at some point after their first injection experience. Of these, the majority ($n = 186$, 63%) reported doing so within a month of initiating injection drug use. In multivariate analysis, the drug used at the first injection initiation event (opiates vs. cocaine vs. methamphetamine vs. other; all $p > 0.05$) was not associated with progression; however, younger age at first injection (adjusted odds ratio [AOR] = 1.13), a history of childhood physical abuse (AOR = 1.81), prior regular use of the drug first injected (AOR = 1.77), and having a sexual partner present at the first injection event (AOR = 2.65) independently predicted progression to regular injecting.

Conclusion: These data highlight how quickly youth progress to become regular injectors after experimentation. Findings indicate that addressing childhood trauma and interventions such as evidence-based youth focused addiction treatment that could prevent or delay regular non-injection drug use, may reduce progression to regular injection drug use among this population.

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1. Introduction

Injection drug use is a significant public health problem and is associated with a range of adverse health and social outcomes, including blood-borne disease transmission, fatal overdose, and engagement in criminal activity (DeBeck et al., 2007; Marshall et al., 2011; Miller et al., 2009; Werb et al., 2008). Among young people, the use of drugs via injection is of particular concern, since youth have been found to be more likely to share contaminated syringes (Kipke et al., 1996; Lloyd-Smith et al., 2008) and drug injection has been shown to be an independent predictor of mortality among street-involved youth (Roy et al., 1998).

Preventing youth from initiating injection drug use remains a key public health priority; however, little information is available on the frequency of experimentation with injecting and whether this translates into high rates of sustained injection drug use. We undertook this study to assess experimentation with injecting and factors associated with progression to regular injection drug use among a Canadian cohort of drug-using street-involved youth.

2. Methods

Data for this study was obtained from the At-Risk Youth Study (ARYS), an open prospective cohort of street-involved youth who use illegal drugs in Vancouver, Canada. The study methods have been described in detail previously (Wood et al., 2006). In brief, study recruitment involved extensive street-based outreach and snowball sampling of street-involved youth. "Street-involved" was defined as being absolutely, periodically or temporally at risk of being homeless, or using services for vulnerable youth and spending a substantial amount of time on the street or heavily involved in the street economy (Daly, 1998; Marlatt et al., 2011; Marshall et al., 2009). To be eligible, participants at baseline must have been age 14–26, reported use of illegal drugs (other than or in addition to marijuana) in the last 30 days, and provided written informed consent. At enrollment and on a bi-annual basis, participants complete an interviewer-administered questionnaire and provide a blood sample

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for serologic testing. All participants are compensated with a nominal stipend (\$20 CDN) for their time.

To assess progression to regular injection drug use after injection initiation, the present analysis included participants who reported ever having injected illicit drugs at baseline or at some point during study follow-up (between September 2005 and November 2012), defined as an affirmative response to the question, "Have you ever used a needle to chip, fix, or muscle even once?" Study participants who were injection naïve at baseline and remained injection naïve throughout the entire study period were excluded from the analysis. Since a number of variables of interest were based on the circumstances of youth's first injection event, data from the first study visit that included a report of injection drug use were used in our analysis to minimize potential recall issues. The primary outcome of interest was progression to becoming a regular injector after the first injection event. Specifically, participants were asked to indicate how much time had passed after the first time they injected before becoming a "regular injector", defined as injecting at least once a week on average on a regular basis. Potential response categories included: never, next day to less than one week, more than one week but less than one month, one month to one year, longer than one year. Explanatory variables of interest included the following sociodemographic factors: age at first injection (per year older); gender (female vs. male); and Aboriginal ancestry (self identify as Inuit, Métis, First Nations vs. others). To assess the potential role of drug types, we also considered the drug used at the first injection event. The most common drug type used was opiates, so it was defined as the reference category; this approach is consistent with previous studies of street-involved youth in other settings (Steensma et al., 2005). The 'opiate' category included reports of the following drugs used at first injection: heroin; heroin mixed with methamphetamine; heroin mixed with cocaine; Dilaudid (hydromorphone); morphine; and codeine. Other mutually exclusive categories were: 'cocaine', which included reports of cocaine and crack; 'methamphetamine', which included reports of crystal methamphetamine, methamphetamine, and speed; and 'other' which included Talwin (pentazocine), Ritalin (methylphenidate), steroids, adrenaline, alcohol, dimethyltryptamine (DMT), MDMA (ecstasy), ketamine, and phencyclidine (PCP). Other variables of interest included five forms of childhood maltreatment, derived from the Childhood Trauma Questionnaire (CTQ), which has been shown to be valid and reliable among substance-using youths (Bernstein et al., 2003; Fink et al., 1995). The CTQ is a 28-item survey that measures the following five forms of maltreatment: physical abuse, sexual abuse, emotional abuse, physical neglect, and emotional neglect. Five subscales on the CTQ survey with predetermined cut-off scores are thus used to define trauma levels for each form of maltreatment. The four levels of trauma are: none (to minimal), low (to moderate), moderate (to severe), and severe (to extreme). As in previous work, we have collapsed the trauma levels into two categories, 'none/low' and 'moderate/severe' (Kerr et al., 2009; Stoltz et al., 2007). Lastly, other factors considered relate to the circumstances of the first injection event and include: prior regular use of drug first injected, defined as at least weekly use of the drug in the month preceding injection initiation (yes vs. no; note: if the first injection event was reported as poly-drug use, regular use of any one of the drugs that was injected was considered prior regular use of drug first injected); duration of illicit hard drug use prior to first injection event, defined as the number of years between the age at injection initiation and the age at first non-injection hard drug use ('hard' drugs defined as heroin, cocaine, crack, or crystal methamphetamine) per additional year; being alone at first injection event (yes vs. no); having a family member present at first injection event, family members included parent(s), sibling, or other family members (yes vs. no); having a sexual partner present at first injection event (yes vs. no); having older people present at first injection event (yes vs. no); and requiring assistance to inject at first injection event (yes vs. no).

Logistic regression was used to determine factors associated with progression to regular injection drug use. In bivariate analysis, categorical explanatory variables were analyzed using Pearson's chi-square test and continuous variables were analyzed using the Mann–Whitney test. To evaluate factors independently associated with our outcome of interest, all variables with p -values that were $p < 0.1$ in bivariable analyses were considered in a multivariate logistic regression. The model selection procedure was done based on the Akaike Information Criterion (AIC) with the best subset selection procedure (Shtatland et al., 2001). All statistical analyses were performed using SAS software version 9.2 (SAS, Cary, NC). All p -values are two sided.

3. Results

Over our study period, 1029 individuals were enrolled, among whom 405 (39%) participants experimented with injection drug use, either before study enrollment or over the study follow-up, and completed all items on the CTQ and other measures of interest. Among this sample, 131 (32%) were female, the median age was 22 years (interquartile range [IQR] = 21–24), and the median number of years since their first injection experience was 4.0 (IQR = 1.0–7.0). Subsequent to their first injection, 293 (72%) participants progressed to become a regular injector. Among this group, after the

first injection experience, 151 (51%) were regular injectors within one week, and a cumulative total of 186 (63%) were regular injectors within a month, and 253 (86%) were regular injectors within a year; only 40 (14%) of participants took longer than one year to transition to regular injection.

As shown in Table 1, opiates were the most common category of drug used at injection initiation (49%, $n = 197$), followed by methamphetamine (24%, $n = 97$), cocaine (21%, $n = 85$), and other (6%, $n = 26$). Bivariate and multivariate results are also displayed in Table 1. As shown, factors associated with progression to regular injection drug use in bivariable analysis included age at first injection, female gender, moderate to severe childhood physical abuse, moderate to severe childhood emotional neglect, prior regular use of drug first injected, duration of illicit hard drug use prior to first injection event, and having a sexual partner present at the first injection event (all $p < 0.05$; Table 1). Factors found to be independently associated with progression to regular injection drug use in the final multivariable model included: younger age at first injection (adjusted odds ratio [AOR] = 1.13, 95% confidence interval [CI]: 1.05–1.22); a history of childhood physical abuse (AOR = 1.81, 95% CI 1.07–3.07); prior regular use of drug first injected (AOR = 1.77, 95% CI 1.07–2.93) and having a sexual partner present at first injection event (AOR = 2.65, 95% CI 1.16–6.04).

4. Discussion

We found that 72% of street-involved youth who experimented with injecting progressed to regular injection drug use, and the majority transitioned in less than one week. Although the type of drug first used to inject was not associated with progression, younger age at first injection, prior regular use of the drug first injected, a history of childhood physical abuse, and having a sexual partner present at injection initiation all significantly increased the odds of becoming a regular injector.

The frequency and speed with which youth in our study transitioned to regular injection drug use is alarming and confirms the importance of early interventions for at-risk youth (Novelli et al., 2005; Roy et al., 2007; Vlahov et al., 2004). Delaying injection initiation also appears to have a protective influence on whether youth become a regular injector. This highlights a potential role for secondary prevention efforts for youth who have already initiated hard drug use but have not progressed to injection. Recent studies among street-involved youth suggest that structural factors, such as a lack of housing, play a role in facilitating injection initiation among youth who use illicit hard street drugs (Feng et al., 2013). Our findings suggest that if interventions such as housing are able to prevent or even delay injection initiation, this could have a significant impact on preventing regular injection drug use among vulnerable youth.

The association between childhood physical abuse and drug injecting has been reported elsewhere (Fergusson et al., 2008). A prior study in our setting found that childhood physical abuse was the only form of childhood maltreatment independently associated with prevalent injection drug use (Kerr et al., 2009). Building on this previous finding, the current study indicates that physical abuse is not only associated with experimenting with risky drug use practices, but is also an independent predictor of becoming a regular injection drug user.

Although specific drug types have previously been associated with injection initiation (Wood et al., 2008), our analysis suggests that the properties and characteristics of a particular drug do not appear to be associated with transitions to sustained injection drug use. While drug use patterns, such as prior frequent use of the drug first injected and younger age at injection initiation, predicted subsequent regular injection, no single drug type resulted in more

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