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HIGH INTENSITY DRUG USE AND HEALTH SERVICE ACCESS AMONG STREET-INVOLVED YOUTH IN A CANADIAN SETTING

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Abstract

Background/ Objectives—Addiction severity has been associated with numerous social- and health-related harms. This study sought to examine the prevalence and correlates of high intensity drug use among street-involved youth in a Canadian setting with a focus on high-risk drug use practices and health service access.

Methods—Data were derived from the At-Risk Youth Study (ARYS), a Vancouver-based prospective cohort of street-involved youth aged 14-26. We used generalized estimating equations (GEE) to examine variables associated with high intensity drug use, defined as daily use of crack cocaine, cocaine, heroin or crystal methamphetamine.

Results—From September 2005 to November 2012, of 1017 youth included in the analyses, 529 (52%) reported high intensity drug use as defined above at least once during the study period. In a multivariate analysis, older age (Adjusted Odds Ratio [AOR] = 1.47); residing in the Downtown Eastside of Vancouver (AOR=1.46); homelessness (AOR=1.30); recent incarceration (AOR=1.25);

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Declaration of Interest

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

inability to access addiction treatment (AOR=1.42); and crack pipe sharing and/or used syringe injecting (AOR=2.64), were all positively and independently associated with high intensity drug use ($p<0.05$). The most common barrier to accessing addiction treatment reported by these youth was long waiting lists.

Conclusions—High intensity drug use among street-involved youth was prevalent and associated with structural and geographical disadvantages in addition to high-risk drug administration practices. Youth reporting more frequent drug use also reported barriers to accessing addiction treatment, highlighting the need to expand addiction services tailored to youth at greatest risk of harm from illicit drug use and street-involvement.

Keywords

street-involved youth; high-intensity drug use; syringe sharing; health service access barriers; addiction treatment

Introduction

The use of illicit drugs, including crack, cocaine, crystal methamphetamine and heroin, is associated with drug-related harms that include increased risk of overdose and transmission of blood-borne infections (Gleghorn, Marx, Vittinghoff, & Katz, 1998; Miller, Kerr, Fischer, Zhang, & Wood, 2009; Pollini, McCall, Mehta, Vlahov, & Strathdee, 2006; Ti et al., 2011). Frequent or high intensity use of these drugs has been identified as an important catalyst in the rapid and sometimes epidemic spread of blood borne infections, including HIV and Hepatitis C (HCV) (Miller et al., 2006; Tyndall et al., 2003; Wood, Kerr, Lloyd-Smith, et al., 2004). Furthermore, among adult drug users, high frequency or high intensity drug use has been associated with social and structural harms including incarceration and homelessness (Baron, 1999; Milloy et al., 2008; Palepu, Marshall, Lai, Wood, & Kerr, 2010). For street-involved youth, high intensity drug use has been considered characteristic of those most entrenched in street life and illicit drug scenes (Carlson, Sugano, Millstein, & Auerswald, 2006). However, few studies have specifically identified high intensity drug-using groups among youth populations or evaluated the associated risk-factors and service needs faced by these youth.

Accessing health and social resources such as addiction treatment, harm reduction, healthcare and housing services is essential for addressing drug use and related harm among youth engaged in problematic drug use and street-based drug scenes (Carlson et al., 2006; Hadland, Kerr, Li, Montaner, & Wood, 2009; Klein et al., 2000). However, drug use patterns, health conditions, homelessness and socio-demographic marginalization are heterogeneous among street-involved youth populations (Greene, Ennett, & Ringwalt, 1997; Hadland et al., 2009; Kipke, Unger, O'Connor, Palmer, & LaFrance, 1997; Klein et al., 2000). Therefore, developing and providing services that specifically target street-involved populations is difficult given the broad spectrum of service access needs and barriers faced by youth, consequently, many youth report being unable to access such services (Carlson et al., 2006; Gleghorn et al., 1998; Greene et al., 1997; Hadland et al., 2009; Kipke et al., 1997; Klein et al., 2000; Marsh & Fair, 2006).

Given the heterogeneity of street-involved youth, more research is needed to identify the characteristics of youth subpopulations with a view to recognize those youth at greatest risk of drug-related harm and highlight their specific health and social service needs (Carlson et al., 2006; Chami et al., 2013; Feng et al., 2013; Kipke et al., 1997). Yet, the majority of studies involving street-involved youth populations have characterized drug use patterns using general measures such as having recently used illicit drugs, having ever used illicit drugs or having previously injected drugs (Baron, 1999; Gleghorn et al., 1998). To fill this gap in knowledge, this study longitudinally examined the prevalence, and correlated risk factors and service access patterns of street-involved youth reporting high intensity drug use in Vancouver, Canada. Given that high intensity drug users are those positioned to benefit most greatly from addiction treatment, this study also sought to identify specific barriers to addiction treatment reported among youth engaged in high intensity drug use. We hypothesized that high intensity drug use would be positively associated with various social, structural and drug-related risk factors among youth, including homelessness, neighbourhood of residence, high-risk drug administration practices and emergency room utilization.

Methods

Data were collected from the At-Risk Youth Study (ARYS), an ongoing, community-recruited prospective cohort of street-involved youth in Vancouver, Canada that began enrolment in September 2005. Described in detail previously (Wood, Stoltz, Montaner, & Kerr, 2006), youth are eligible for participation in ARYS if they are between the ages of 14 and 26 at baseline, have used illicit drugs other than marijuana in the past 30 days and provide written informed consent. Cohort recruitment strategies include, but are not limited to, community outreach, referral from youth services and peer recruitment from current participants. As in previous studies (Debeck et al., 2013; Gleghorn et al., 1998), “street-involved” was defined as being absolutely or temporarily without stable housing in the past six months or using street-based services for vulnerable youth in the past six months. At baseline and study follow-up interviews every six months thereafter, participants provide blood samples for HIV and HCV serologic testing and complete an interviewer-administered questionnaire. This questionnaire collects data on socio-demographic characteristics; drug use and related risk behaviours including the type and frequency of drugs used; engagement with the criminal justice system; and health and social service utilization. At each study visit, participants receive a \$20 (CAD) honorarium for their time and participation-related expenses. The ARYS cohort has been approved by the Providence Health Care/University of British Columbia research ethics board.

Our primary outcome of interest was high intensity drug use, defined as daily or more frequent use of injection or non-injection crack cocaine, cocaine, crystal methamphetamine or heroin in the six months prior to interview. The periods of follow-up are unique to all participants yet at each study visit participants report on events as either occurring or not occurring in the previous six months, regardless of time between follow-up interviews. Further, due to variability in follow-up rate in this at-risk population, we chose to treat each report of high-intensity drug use as an individual and isolated data point. We selected explanatory variables based on previous literature involving street-involved youth, high-risk

drug use and Vancouver's Downtown Eastside neighbourhood (DTES), home to one of North America's largest open illicit drug scenes (Greene et al., 1997; Klein et al., 2000; Miller et al., 2009; Wood, Kerr, Small, et al., 2004). One explanatory variable of interest used to capture high-risk drug use practices was crack pipe sharing and/or used syringe injecting, defined as having borrowed or lent a crack or crystal meth pipe, and/or having injected with a needle that had already been used by someone else (yes vs. no), due to the implication of these activities in the transmission of infectious disease (Kerr et al., 2010; Ti et al., 2011). Socio-demographic variables included: age (≥ 20 or <20 years); gender (female vs. male); Caucasian ethnicity (yes vs. no); neighbourhood of residence in the previous six months (DTES vs. other); homelessness, defined as having been homeless at some point in the previous six months (yes vs. no); and recent incarceration, defined as being in prison, detention or jail in the previous six months (yes vs. no). Social and health service utilization variables examined referred to activities or exposures in the previous six months and included: alcohol or drug addiction treatment utilization (yes vs. no); social service utilization, defined as having accessed a food bank, meal program, outreach worker, homecare worker or drop in center (yes vs. no); and emergency room utilization (yes vs. no). We also included variables measuring difficulty accessing health and social services in the previous six months including: being in need of a medical service (yes vs. no) or a housing service (yes vs. no) but being unable to obtain the needed service; and having tried to access addiction treatment but being unable to (yes vs. no).

First, we examined descriptive baseline characteristics using Pearson's χ^2 -test for dichotomous variables and the Mann-Whitney test for continuous variables. Baseline characteristics were recorded at first study interview and the sample was stratified by self-report of high intensity drug use at any point during the study period. As the next step, we conducted bivariate analyses using generalized estimating equations (GEE) with exchangeable correlation structure and the logit link function for binary outcomes to determine variables associated with reporting high intensity drug use among street-involved youth throughout the seven-year follow-up period. GEE were selected in part to accommodate participant-specific variation in study follow-up periods. To adjust for potential confounding and identify factors that were associated with the outcome, we first constructed the multivariate GEE regression model using all significant variables in the bivariate analyses in the full model. Using backwards model selection, we then constructed a series of reduced models, iteratively removing variables with the highest *p*-value from each model. The quasiliikelihood under the independence model fit criterion (QIC) statistics were compared between models to identify the final model with the best overall fit as indicated by the lowest QIC value (Pan, 2001).

Finally, we conducted a sub-analysis in order to determine the most common barriers to addiction treatment encountered by youth reporting high intensity drug use. Using data from study interviews that included a report of high intensity drug use as well as encountering a barrier to accessing addiction services, we recorded the percentages of observations reporting different barriers to service access listed as separate response options on the interview questionnaires. Reported barriers were grouped into the following categories: long waiting lists; being turned down by treatment program; individual-level barriers, including behavioural challenges or having failed addiction treatment too many times; structural

barriers, including no treatment programs nearby or no treatment programs that met participant needs; financial barriers; and other.

All statistical analyses were performed using the SAS software version 9.3 (SAS, Cary, NC). All reported p -values are two sided and considered significant at $p < 0.05$.

Results

Between September 2005 and May 2012, 1017 youth completed at least one study interview, 529 (52%) of which reported high intensity drug use at baseline or during at least one follow-up observation. Of these youth, 319 (31%) were female and 691 (68%) were Caucasian. The median number of completed study visits was 3 (Interquartile Range [IQR] = 1 – 5). Of all 3433 observations included in the analyses, a total of 1190 (35%) included a report of high intensity drug use.

Baseline characteristics of the study sample stratified by any report of high intensity drug use over the study period are presented in Table 1. Bivariate and multivariate results from GEE analyses of factors associated with reporting high intensity drug use at any given follow-up interview are presented in Table 2. In the final multivariate GEE model, factors and service access characteristics independently associated with high intensity drug use included: older age (adjusted odds ratio [AOR] = 1.47, 95% confidence interval [CI]: 1.14 – 1.90), DTES residence (AOR = 1.46, 95% CI: 1.21 – 1.77), homelessness (AOR = 1.30, 95% CI: 1.11 – 1.52), recent incarceration (AOR = 1.25, 95% CI: 1.03 – 1.51), unable to access addiction treatment (AOR = 1.42, 95% CI: 1.14 – 1.77) and crack pipe sharing and/or used syringe injecting (AOR = 2.64, 95% CI: 2.25 – 3.10).

Among participant study interviews where youth reported high intensity drug use, 164 (13.7%) contained a report of experiencing at least one barrier to addiction treatment. These barriers included long waiting lists (reported by 70%), being turned down by a treatment program (10%), individual-level barriers (e.g. behavioural challenges or having failed addiction treatment too many times) (6%), structural barriers (e.g. no treatment programs nearby or no treatment programs that met participant needs) (5%), financial barriers (5%) and other (9%).

Discussion

This study found that high intensity drug use was reported by a significant proportion of street-involved youth and was positively associated with older age (≥ 20 years), residing in the Downtown Eastside, homelessness and recent incarceration. In addition, high-risk drug administration practices and being unable to access addiction treatment were positively and independently associated with high intensity drug use. While high levels of illicit drug use have been reported among populations of street-involved youth (Baron, 1999; Gleghorn et al., 1998; Greene et al., 1997; Kral, Molnar, Booth, & Watters, 1997), few studies have specifically characterized the frequency and rates of high intensity drug use. The large proportion of youth in our study that reported high intensity drug use highlights this problem as a significant and prevalent reality among street-involved youth that brings with it the attendant risk of drug-related harms including, the transmission of blood borne infections

such as HIV and HCV (Fuller et al., 2002; Gleghorn et al., 1998; Hadland et al., 2009; Kerr et al., 2009; Miller et al., 2009; Pollini et al., 2006).

The positive and independent associations between high intensity drug use and recent incarceration, homelessness and residence in Vancouver's DTES neighbourhood align with existing literature showing that these risk factors are strongly associated with problematic drug use and involvement in illicit drug use scenes (Chami et al., 2013; Kirst, Erikson, & Strike, 2009; Milloy et al., 2008). While homelessness may be indicative of entrenchment in drug scenes (Werb et al., 2010), it has been suggested that homeless youth may increasingly turn to drug use in order to cope with circumstances of life on the street. For example, homeless youth have reported the use crystal methamphetamine to stay alert, keep warm and enhance social interactions (Bungay et al., 2006), manage the psychological burdens associated with street involvement or self-medicate when contending with untreated mental disorders (Baron, 1999; Greene et al., 1997; Kirst et al., 2009). Additionally, the DTES neighbourhood of Vancouver is often characterized as Canada's largest open illicit drug scene (Chami et al., 2013; Wood, Kerr, Small, et al., 2004). Previous research has demonstrated that street-involved youth living in the DTES are more likely to have recently injected drugs and are more likely to initiate injection drug use (Chami et al., 2013; Werb et al., 2010). Importantly, residing in the DTES is also associated with a higher probability of several health and social harms among adult drug users, including HIV infection (Maas et al., 2007). Last, recent incarceration was significantly associated with high intensity drug use. This finding supports the expansion of community diversion programs in order to reduce drug use and incarceration rates among this population and minimize exposure to social and health related harms associated with continued involvement in illicit drug scenes (Milloy, Kerr, Buxton, Montaner, & Wood, 2009). The results of the current study involving incarceration, homelessness and residence in the DTES identify a highly vulnerable subset of street-involved youth exposed to social and structural disadvantages in addition to high-risk drug use patterns that put marginalized youth at increased risk of health-related harm.

The significant and positive association between high intensity drug use and injecting with used syringes and/or sharing crack cocaine pipes in the current study, while consistent with previous research (Kerr et al., 2010; Ti et al., 2011), is concerning. The sharing of used needles has been closely associated with HIV infection in the current study context and globally (Kerr et al., 2010; Mathers et al., 2008), and recent evidence has shown that among adults, sharing crack cocaine pipes also increases the risk of contracting HIV and HCV (Ti et al., 2011). Reforms to policy, harm reduction and healthcare provision in the current study context have resulted in the widespread availability of harm reduction services for people who use drugs in Vancouver, including low-barrier needle distribution programs and North America's first medically supervised injection facility, Insite (Wood, Kerr, Lloyd-Smith, et al., 2004). In recent years these efforts have resulted in significant declines in reported syringe sharing, and in 2011 only 1.3% of adult injection drug users reported sharing used syringes in Vancouver (Kerr et al., 2010; UHRI, 2013). It is therefore troubling to identify a group of street-involved youth reporting frequent drug use and the sharing of drug use equipment in a setting where harm reduction services are recognized as important measures to prevent HIV and HCV transmission and where significant declines in such high-risk drug use practices have been observed among adults. These findings suggest that current health

and harm reduction services may not be appropriately tailored to meet the needs of high-risk youth. Further investigation in this area is required.

Another concerning finding from the current study is the observation that street-involved youth reporting high intensity drug use in our setting were significantly more likely to be unable to access addiction treatment. When taken alongside the strong positive association between high intensity drug use and the sharing of drug use equipment, barriers to addiction treatment within this group of street-involved youth are especially troubling.

The findings that youth reporting high intensity drug use were more likely to be twenty years of age or older is consistent with previous research demonstrating that older drug using youth are more likely to inject drugs and engage in high-risk drug use (Clatts, Davis, Sotheran, & Atillasoy, 1998; Hadland et al., 2011). The progression to higher intensity drug use practices among older youth may be a reflection of longer duration of illicit drug use and involvement with street-based drug scenes (Hadland et al., 2011).

The outcomes of being unable to access medical services and needle exchange programs were not significantly associated with high intensity drug use in the multivariate model, yet these findings should be interpreted with caution. While it is encouraging to see that these correlations are not significant in this study, youth reporting high intensity drug use may not seek out harm reduction and medical services and would therefore be less likely to report barriers to access. Given this possibility and the association with high-risk drug use practices within this group, access to medical and harm reduction services for this vulnerable youth population should be highlighted as a key public health priority.

The most frequently cited barrier to accessing addiction treatment services by youth reporting high intensity drug use was long waiting lists, followed by being turned down by treatment programs, and individual-level, financial and structural barriers. Previous studies evaluating addiction treatment access have similarly indicated long waiting lists as a common barrier to accessing addiction treatment services. Long wait times may be the result of insufficient institutional capacity and inadequate support for addiction treatment services that accommodate the specific addiction treatment needs of street-involved youth (Appel, 2004; Hadland et al., 2009; Milloy et al., 2010).

The framework of structural and drug-related risk factors, namely homelessness, incarceration and high-risk drug use equipment sharing that were associated with high intensity use of illicit drugs among street-involved youth in the current study calls for addiction treatment, harm reduction and housing services that sufficiently address the complex and heterogeneous needs of this marginalized youth population. Such services may prevent progression into, or continuation of high-risk drug using practices such as injection drug use, or mitigate the harms from such use, thus reducing the risk of blood borne disease transmission, drug overdose and other drug-related harms (Fuller et al., 2002; Hadland et al., 2009; Kerr et al., 2009; Stewart, Gossop, & Marsden, 2002). Specifically, these findings emphasize need for expanding youth addiction treatment and addiction treatment opportunities integrated with low-threshold housing options for homeless youth faced with addiction (Hadland et al., 2009), as well as harm reduction services, such as needle and

crack pipe distribution targeted to youth engaged in high intensity drug use (Kerr et al., 2010; Ti et al., 2011; Tyndall et al., 2003). Finally, high-intensity drug use and exposure to associated harm is less well characterized among youth than among older drug users and should continue to be studied given the results of the current study and recent literature identifying the specific drug use patterns and service needs of street-involved youth (Chami et al., 2013; Hadland et al., 2009; Werb et al., 2010).

This study has a number of limitations. First, the ARYS cohort is a non-random sample of street-involved youth and therefore findings may not be generalizable to other street-involved youth populations. Additionally, data were collected via self report and could be subject to socially desirable or recall response biases which may have resulted in underreporting of stigmatized behaviours. As a result, the prevalence of high intensity drug use and associated risk behaviours may have been underestimated, making the findings of the current study even more alarming. However, self reported risk behaviour has been shown to be largely accurate among youth and adult drug-using populations and we therefore have no reason to anticipate significant response bias in the current study (Brener, Billy, & Grady, 2003; Darke, 1998). Finally, data in this cohort including events, behaviours and risk-factors, are recorded as present or absent within six month follow-up periods. Therefore, we were unable to determine the temporality of events and outcomes measured in this study (e.g. if youth practiced high intensity drug use before or after becoming homeless). Nevertheless, we believe our findings highlight an important group of youth at heightened risk of personal, social and structural harm alongside high intensity drug use.

This study identifies elevated levels of high intensity drug use and associated risks among street-involved youth. Social and structural harms including homelessness, incarceration and residence in Vancouver's DTES neighbourhood, and high-risk drug use practices including the sharing of syringes and other drug administration equipment, were all positively and significantly associated with high intensity use of illicit drugs. Furthermore, youth reporting high intensity drug use were also more likely to report being unable to access addiction treatment, a critical intervention that may reduce drug use and related harms within this group. When taken together these findings identify high-intensity drug use as associated with significant individual, social and structural drug-related harm implicated in the entrenchment in illicit drug scenes and the transmission of blood-borne infections. These findings call for the expansion of healthcare, harm reduction and housing services tailored for and targeted to this highly marginalized population.

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Table 1
Baseline characteristics of street-involved youth in Vancouver stratified by reporting high intensity drug use^a at least once during the study period, 2005 – 2012 (n = 1017)

Characteristic	<u>High intensity drug use</u>		Odds Ratio (95% CI ^b)	p - value
	Yes 529 (52%)	No 488 (48%)		
Age (≥ 20 years)				
yes	426 (81)	320 (66)	2.17 (1.63 – 2.89)	<0.001
Female				
yes	171 (32)	148 (30)	1.10 (0.84 – 1.43)	0.493
Caucasian				
yes	359 (68)	332 (68)	0.99 (0.76 – 1.29)	0.954
DTES residency^{a, c}				
yes	173 (33)	108 (22)	1.71 (1.29 – 2.26)	<0.001
Homelessness^a				
yes	410 (78)	335 (69)	1.57 (1.18 – 2.08)	0.002
Recent incarceration^a				
yes	120 (23)	71 (15)	1.72 (1.24 – 2.38)	0.001
Addiction treatment utilization^a				
yes	169 (32)	101 (21)	1.80 (1.35 – 2.39)	<0.001
Social service utilization^a				
yes	448 (85)	385 (79)	1.48 (1.07 – 2.04)	0.017
Emergency room utilization^a				
yes	221 (42)	162 (33)	1.44 (1.12 – 1.87)	0.005
Unable to access medical service^a				
yes	26 (5)	20 (4)	1.21 (0.67 – 2.20)	0.531
Unable to access addiction treatment^a				
yes	82 (16)	30 (6)	2.80 (1.81 – 4.34)	<0.001
Unable to access housing service^a				
yes	145 (27)	112 (23)	1.27 (0.95 – 1.69)	0.102
Crack pipe sharing and/or used syringe injecting^a				
yes	408 (77)	204 (42)	4.73 (3.61 – 6.22)	<0.001

^a Activities in the previous six months;

^b CI = confidence interval;

^c DTES = Downtown Eastside

Table 2
Factors associated with high intensity drug use^a among street involved youth in Vancouver, 2005 – 2012 (n = 1017)

Characteristic	Unadjusted		Adjusted	
	Odds Ratio (95% CI ^b)	p - value	Odds Ratio (95% CI ^b)	p - value
Age (20 years)				
(yes vs. no)	1.50 (1.18 – 1.91)	0.001	1.47 (1.14 – 1.90)	0.003
Female				
(yes vs. no)	1.18 (0.94 – 1.48)	0.155		
Caucasian				
(yes vs. no)	1.12 (0.90 – 1.40)	0.319		
DTES residency^{a, c}				
(yes vs. no)	1.70 (1.43 – 2.03)	<0.001	1.46 (1.21 – 1.77)	<0.001
Homelessness^a				
(yes vs. no)	1.68 (1.44 – 1.96)	<0.001	1.30 (1.11 – 1.52)	0.001
Recent incarceration^a				
(yes vs. no)	1.47 (1.22 – 1.76)	<0.001	1.25 (1.03 – 1.51)	0.023
Addiction treatment utilization^a				
(yes vs. no)	1.20 (1.01 – 1.43)	0.038	1.10 (0.92 – 1.32)	0.290
Social service utilization^a				
(yes vs. no)	1.27 (1.07 – 1.52)	0.008		
Emergency room utilization^a				
(yes vs. no)	1.23 (1.07 – 1.40)	0.004	1.13 (0.98 – 1.31)	0.094
Unable to access medical service^a				
(yes vs. no)	1.24 (0.89 – 1.71)	0.199		
Unable to access addiction treatment^a				
(yes vs. no)	1.84 (1.48 – 2.29)	<0.001	1.42 (1.14 – 1.77)	0.002
Unable to access housing service^a				
(yes vs. no)	1.23 (1.04 – 1.46)	0.017		
Crack pipe sharing and/or used syringe injecting^a				
(yes vs. no)	2.97 (2.52 – 3.49)	<0.001	2.64 (2.25 – 3.10)	<0.001

^a Activities in the previous six months;

^b CI = confidence interval;

^c DTES = Downtown Eastside