Published in final edited form as:

Drug Alcohol Depend. 2013 October 1; 132(3): 486–490. doi:10.1016/j.drugalcdep.2013.03.011.

Neighborhood of residence and risk of initiation into injection drug use among street-involved youth in a Canadian setting

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Abstract

Background—While research has suggested that exposure to environments where drug use is prevalent may be a key determinant of drug-related risk, little is known regarding the impact of such exposure on the initiation of illicit injection drug use. We assessed whether neighborhood of residence predicted rates of injecting initiation among a cohort of street-involved youth in Vancouver, British Columbia.

Methods—We followed street-involved injecting naïve youth aged 14–26 and compared rates of injecting initiation between youth residing in Vancouver’s Downtown Eastside (DTES) neighborhood (the site of a large street-based illicit drug market) to those living in other parts of the city. Univariate and multivariate Cox regression analyses were employed to determine whether residence in the DTES was independently associated with increased risk of initiation of injection drug use.

Results—Between September, 2005 and November, 2011, 422 injection-naïve individuals were followed, among whom 77 initiated injecting for an incidence density of injecting of 10.3 (95% Confidence Interval [CI] 5.0–18.8) per 100 person years. In a multivariate model, residence in the DTES was independently associated with initiating injection drug use (Adjusted Hazard Ratio [AHR] = 2.16, 95% CI: 1.33 – 3.52, $p = 0.002$).

Conclusions—These results suggest neighborhood of residence affects the risk of initiation into injection drug use among street-involved youth. The development of prevention interventions should target high-risk neighborhoods where risk of initiating into injecting drug use may be greatest.

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CONTRIBUTORS

GC, DW and EW drafted the initial manuscript. CF performed the statistical analyses. KD, TK, and EW performed significant revisions to the manuscript. All authors made significant contributions to the conception and design of the analyses, interpretation of the data, and approved the final version of the manuscript.

CONFLICT OF INTEREST

No conflict declared.

Keywords

initiation; injection drug use; HIV; street-involved youth; At Risk Youth Study; ARYS; Vancouver; Downtown Eastside

1. INTRODUCTION

Injection drug use is associated with heightened overdose risk (Coffin et al., 2003; Garfield and Drucker, 2001), and risk of contracting blood-borne infectious diseases such as human immunodeficiency virus (HIV) and hepatitis C (HCV; Garfein et al., 1996; Tyndall et al., 2001), as well as a host of negative social and personal outcomes such as sex trade involvement, drug overdose, and subjective feelings of marginalization (Kerr et al., 2009; Ochoa et al., 2005; Rhodes et al., 2007). Street-involved youth, defined as adolescents and young adults who spend extensive time on the street, are a population at particularly high risk of initiating injection drug use (Clements et al., 1997; Kral et al., 1997; Fuller et al., 2001; Lifson and Halcon 2001), and preventing this transition to injecting has recently been identified as a critical public health priority (Robertson et al., 2003; Beyrer et al., 2010).

Vancouver's Downtown Eastside (DTES) neighborhood is the poorest urban neighborhood in Canada and the site of a well described open, street-based illicit drug market (Wood et al., 2004) where powder cocaine injection, crack cocaine smoking, and heroin injection are common (Fast et al., 2010). Previous work has identified residence in the DTES as an independent predictor of HIV infection among a cohort of adult injection drug users (IDU; Maas et al., 2007). However, there is a dearth of quantitative research examining the impact of exposure to specific drug use environments on the initiation of injection drug use. Existing research suggests that exposure to people who inject drugs and environments where injecting is common increases the risk of transition to injecting (Roy et al., 2003; Abelson et al., 2006; Neaigus et al., 2006; Koram et al., 2011; Roy et al., 2011). Research has also found that current IDU who move out of urban areas report less frequent cocaine and heroin injection compared to those who remain in such areas (Rachlis et al., 2010). This study therefore sought to determine whether neighborhood of residence is an independent predictor of initiation of injection drug use among a cohort of street-involved youth living in Vancouver, British Columbia.

2. METHODS

The present study employed data from the At-Risk Youth Study (ARYS), an open prospective cohort study of street-involved youth aged between 14 and 26 years from Vancouver, Canada (Wood et al., 2006). Street-involved youth were defined as those who spend a large proportion of their time on the street. ARYS participants were recruited through extensive street-based outreach and self-referral, using a combination of snowball and convenience sampling methods. While many of the youth in our sample are homeless, others report living in single room occupancy hotels, hostels, and apartments. To be eligible for inclusion, participants have to be between 14 and 26 years old at the time of enrolment and report using an illicit drug other than or in addition to marijuana in the 30 days prior to recruitment. All study participants provide written consent prior to enrolment.

At baseline and semi-annual follow-up visits participants complete an interviewer-administered questionnaire that solicits detailed demographic data as well as data on housing situations and drug use behaviors. All interviews were conducted by ARYS staff trained in survey administration. Interviewers all receive background training to ensure trust and rapport are developed with participants as well as to ensure confidentiality. At each study visit participants receive a \$20 CAD honorarium. A number of strategies were put in effect

to address the health and social needs of youth identified during study visits, including referrals to local health programs, social services, and housing programs. The study has been approved by the University of British Columbia/Providence Health Care Ethics Review Board.

Data were collected from participant interviews conducted between September, 2005 and November, 2011. The sample was restricted to all ARYS participants who reported not ever injecting drugs at baseline and who completed at least one follow-up questionnaire. The outcome of interest was defined as the first report of injection drug use. The primary independent variable of interest was neighborhood of residence (DTES vs. Other). The DTES is a concentrated lower income neighborhood which borders Vancouver's business district and busy tourist areas (Wood et al. 2006). It is characterized by low-income housing, including single room occupancy hotels, and a large subpopulation of highly dependent drug users engaging in both non-injection and injection drug use. The measure of neighborhood of residence for this study was based on self-reported area of residence in the past six months. For participants who were homeless or unstably housed, residence was defined as the area where they reported spending the majority of their time. A time-updated report of residence was used in the survival analysis.

Potential confounders identified in previous research were included in the analysis (Fuller et al., 2001; Roy et al., 2003; Fuller et al., 2005; Roy et al., 2011). These included: age, gender, ethnicity (Caucasian vs. others), alcohol use, marijuana use, non-injection powder cocaine use, non-injection crack cocaine use, non-injection crystal methamphetamine use, and non-injection heroin use. Further, we included a variable measuring drug use frequency, defined as daily non-injection use of any cocaine, crack, crystal methamphetamine, or heroin. All behavioral variables refer to behaviors in the previous 6 months, with all time-updated behavioral variables lagged to previously completed questionnaires in order to protect against reverse causality. Incidence of injection drug use was calculated as the total number of subjects who initiated injecting during the study period divided by the total time at risk per 100 person-years.

We investigated the differences in baseline characteristics of street-involved youth in the sample using Pearson's Chi-square test for dichotomous variables and the Wilcoxon rank sum test for continuous variables. Next, Kaplan-Meier methods were used to calculate the cumulative incidence of injection initiation. Univariate Cox regression analyses were then conducted to determine the association between neighborhood of residence and the initiation of injection, along with potential confounders. Subsequently, a multivariate Cox regression model was constructed to explore the independent effect of neighborhood of residence on injection while adjusting for potential confounders.

In determining whether neighborhood of residence was independently associated with injection initiation, we accounted for potential confounding by various sociodemographic and drug use variables, and then fit a series of confounding models based *a priori* on an approach described by Greenland and colleagues (Maldonado and Greenland, 1993; Rothman and Greenland, 1998). First, univariate Cox regression analyses were constructed to determine whether the independent variable of interest (DTES residence) and potential confounders were significant predictors of initiation of injection drug use at the univariate level ($p < 0.05$). Second, a multivariate confounding model was constructed that included all potential confounding variables. Then, in a stepwise manner we removed potential confounders individually to construct a series of reduced models. The relative coefficient change for initiation of injection drug use was calculated among these reduced models, and those variables that changed the model coefficient by more than 5% relative to the full

model were included in a final multivariate confounding model. Age, gender and ethnicity were forced into the final model.

All tests of significance were two-sided, with a p value of <0.05 . All statistical analyses were performed using SAS software version 9.2 (SAS Institute Inc., Cary, North Carolina, USA).

3. RESULTS

In total, between September, 2005 and November, 2011, 991 street-involved youth were recruited, among whom 390 (39.3%) reported injecting at baseline. Those who had injected at baseline were more likely to reside in the DTES (odds ratio 1.73; 95% CI 1.31 – 2.30). Among the 601 individuals who were injecting naïve at baseline, 179 did not have a follow-up visit, and therefore the study sample included 422 street-involved youth who were eligible for the present study. Among this sample, the median age was 22 (Interquartile Range [IQR] = 20 – 23) and the median follow-up time was 20.6 months (IQR = 12.6 – 26.1). Those participants lost to follow-up were found to be significantly younger (20.7 vs. 21.6 years old, $p = 0.003$), more likely to be Caucasian (70.9% vs. 61.1%, $p = 0.022$), and less likely to use non-injection crack cocaine (40.8% vs. 55.9%, $p = 0.001$) compared with those included in the analysis. No significant differences were detected with respect to gender or neighborhood of residence.

Baseline characteristics of the study population stratified by neighborhood of residence are presented in Table 1. The median age of street-involved youth living in the DTES was 22.7 years (IQR = 21.1 – 24.1), compared with 21.1 years (IQR = 19.0 – 22.8) among youth living in other areas of Vancouver ($p < 0.001$). At baseline, 48.0% of street-involved youth living in the DTES were of Caucasian background, compared with 65.1% of youth living in other areas of Vancouver ($p = 0.002$). 84.7% of participants living in the DTES reported marijuana use in the past 6 months, compared to 91.7% of those living in other areas ($p = 0.043$). Additionally, 68.4% of youth living in the DTES reported using non-injection crack cocaine in the past 6 months compared with 52.2% of youth living in other areas ($p = 0.005$). Finally, 28.6% of those youth living in the DTES reported frequent (i.e., daily) use of non-injection heroin, crack, cocaine or crystal methamphetamine, compared to 13.3% of those living in other areas of Vancouver ($p < 0.001$).

With respect to neighborhood of residence at baseline, 98 (23.2%) study participants reported living in the DTES, while 324 (76.8%) in other areas of Vancouver. By the end of the study period, 77 (18.2%) participants initiated injection drug use for an incidence density of 10.3 (95% 5.0 – 18.8) per 100 person years. Figure 1 shows the Kaplan-Meier survival curves 36 months after enrollment, and indicates a cumulative incidence of injection initiation of 43.8% for participants living in the DTES compared to 19.7% for those living elsewhere (log rank $p = 0.03$).

Table 2 presents results from the univariate and multivariate Cox regression analyses. As shown, residence in the DTES was significantly associated with an increased risk of injecting initiation (Hazard Ratio [HR] = 1.80, 95% Confidence Interval [CI]: 1.13 – 2.88, $p = 0.014$) in univariate analysis. This association remained significant after adjustment for potential confounders in a multivariate model (Adjusted Hazard Ratio [AHR] = 2.16, 95% CI: 1.33 – 3.52, $p = 0.002$).

4. DISCUSSION

Among street-involved youth, residing in a neighborhood with a high prevalence of injection drug use and a large open, street-based illicit drug market was associated with injection drug

use upon recruitment into the cohort. Further, residence in this neighborhood was independently associated with elevated rates of injection initiation.

A large body of research supports the notion that a range of social and environmental factors can influence high-risk behavior (Rhodes et al., 2002, 2003; Small et al., 2007; Werb et al., 2008; Ramos et al., 2009). For youth, particularly those who are street-involved or exposed to other risk factors, neighborhood of residence may reflect one of many complex environmental factors that lead to increased risk of injection drug use. For example, Thai drug users living in rural areas have been found to have half the risk of initiation of injection drug use compared to those living in urban areas, even after controlling for confounders such as level of education (Cheng et al., 2006). These effects may also drive risk behavior after drug injecting has been initiated. For instance, among current injection drug users living in Canadian inner cities, those from socioeconomically disadvantaged neighborhoods are more likely than their counterparts to practice high-risk injection behavior such as needle sharing (Genereux et al., 2010).

Previous research suggests that being exposed to IDU increases the likelihood of initiation of injection drug use (Roy et al., 2003; Abelson et al., 2006; Neaigus et al., 2006; Koram et al., 2011; Roy et al., 2011). It is possible that the relationship between neighborhood of residence and injection initiation is therefore modified by exposure to other individuals who inject. For example, youth residing in the DTES have previously reported that the social networks they encounter in the neighborhood are an important factor in changing what they view as ‘acceptable’ drugs to use, especially with respect to problematic substances such as smoked heroin or crack cocaine (Fast et al., 2010). To that end, our findings suggest that programs and social services aimed at preventing injection initiation should be targeted towards youth living in urban neighborhoods identified as potential areas of transition into injection drug use. However, previous research has highlighted the importance of achieving a balance between distributing services across urban settings and clustering them in neighborhoods with increased need, such as the DTES (Hyshka et al., 2012). This is important given the potential that clustering these services may increase youth exposure to injecting and injecting environments.

This study has limitations typical of observational studies of drug-using populations. First, similar to other prospective cohort studies involving street-involved youth, ARYS is not a random sample, although significant efforts have been undertaken to derive a representative sample (Wood et al., 2006). Second, behavioral data is based on self-report, and as a result it is possible that risk behaviors among study participants may have been underreported, as has been observed in past studies (Macalino et al., 2002). However, we know of no reasons why participants residing in different neighborhoods would differentially report on drug-using behaviors such as injecting initiation; further, participants are physically examined by a research nurse at each visit to examine for stigmata of drug injecting. Finally, the primary goal of this study was to determine the impact of neighborhood of residence on initiation of injecting, with confounders that included sociodemographic factors and variables measuring levels of non-injection drug use. However, it is likely that other factors not considered in this study may impact the risk of injection initiation among street-involved youth including social network characteristics. Future research is necessary to explore these issues further.

In summary, among street-involved youth, residing in a neighborhood with a high prevalence of injection drug use and a large open-air illicit drug market was associated with injection drug use upon recruitment and was independently associated with elevated rates of injecting initiation during follow-up. These findings may be useful for the development of interventions aimed at reducing the risk of initiation of injecting drug use (Beyrer et al., 2010).

Acknowledgments

ROLE OF FUNDING SOURCE

This study was supported by the US National Institutes of Health (R01DA028532) and the Canadian Institutes of Health Research (MOP-102742).

The authors thank the study participants for their contribution to the research, as well as current and past researchers and staff. We would specifically like to thank Deborah Graham, Peter Vann, Caitlin Johnston, Steve Kain, and Calvin Lai for their research and administrative assistance. Dan Werb is supported by the Canadian Institutes of Health Research and the Trudeau Foundation. Evan Wood is supported through a Canadian Institutes of Health Research Tier 1 Canada Research Chair in Inner City Health. Thomas Kerr is supported by the Michael Smith Foundation for Health Research.

References

- Abelson J, Treloar C, Crawford J, Kippax S, van Beek I, Howard J. Some characteristics of early-onset injection drug users prior to and at the time of their first injection. *Addiction*. 2006; 101:548–555. [PubMed: 16548934]
- Beyrer C, Malinowska-Sempruch K, Kamarulzaman A, Kazatchkine M, Sidibe M, Strathdee SA. Time to act: a call for comprehensive responses to HIV in people who use drugs. *Lancet*. 2010; 376:551–563. [PubMed: 20650515]
- Cheng Y, Sherman SG, Srirat N, Vongchak T, Kawichai S, Jittiwutikarn J, Suriyanon V, Razak MH, Sripaipan T, Celentano DD. Risk factors associated with injection initiation among drug users in Northern Thailand. *Harm Reduct J*. 2006; 3:10. [PubMed: 16536869]
- Clements K, Gleghorn A, Garcia D, Katz M, Marx R. A risk profile of street youth in northern California: implications for gender-specific human immunodeficiency virus prevention. *J Adolesc Health*. 1997; 20:343–353. [PubMed: 9168381]
- Coffin PO, Galea S, Ahern J, Leon AC, Vlahov D, Tardiff K. Opiates, cocaine and alcohol combinations in accidental drug overdose deaths in New York City, 1990–98. *Addiction*. 2003; 98:739–747. [PubMed: 12780362]
- Fast D, Shoveller J, Shannon K, Kerr T. Safety and danger in downtown Vancouver: understandings of place among young people entrenched in an urban drug scene. *Health Place*. 2010; 16:51–60. [PubMed: 19733496]
- Fuller CM, Borrell LN, Latkin CA, Galea S, Ompad DC, Strathdee SA, Vlahov D. Effects of race, neighbourhood and social network on age at initiation of injection drug use. *Am J Public Health*. 2005; 95:689–695. [PubMed: 15798131]
- Fuller CM, Vlahov D, Arria AM, Ompad DC, Garfein R, Strathdee SA. Factors associated with adolescent initiation of injection drug use. *Public Health Rep*. 2001; 116:136–145. [PubMed: 11889281]
- Garfein RS, Vlahov D, Galai N, Doherty MC, Nelson KE. Viral infections in short-term injection drug users: The prevalence of the hepatitis C, hepatitis B, human immunodeficiency, and human T-lymphotropic viruses. *Am J Public Health*. 1996; 86:655–661. [PubMed: 8629715]
- Garfield J, Drucker E. Fatal overdose trends in major US cities: 1990–1997. *Addiction Res Theory*. 2001; 9:425–436.
- Généreux M, Bruneau J, Daniel M. Association between neighbourhood socioeconomic characteristics and high-risk injection behaviour amongst injection drug users living in inner and other city areas in Montréal, Canada. *Int J Drug Policy*. 2010; 21:49–55. [PubMed: 19250813]
- Hyshka E, Strathdee S, Wood E, Kerr T. Needle exchange and the HIV epidemic in Vancouver: Lessons learned from 15 years of research. *Int J Drug Policy*. 2012; 23:261–270. [PubMed: 22579215]
- Kerr T, Marshall BDL, Miller C, Shannon K, Zhang R, Montaner JSG, Wood E. Injection drug use among street-involved youth in a Canadian setting. *BMC Public Health*. 2009; 9:171. [PubMed: 19493353]

- Koram N, Liu H, Li J, Li J, Luo J, Nield J. Role of social network dimensions in the transition to injection drug use: actions speak louder than words. *AIDS Behav.* 2011; 15:1579–1588. [PubMed: 21431412]
- Kral AH, Molnar BE, Booth RE, Watters JK. Prevalence of sexual risk behavior and substance use among runaway and homeless adolescents in San Francisco, Denver and New York City. *Int J STD AIDS.* 1997; 8:109–117. [PubMed: 9061410]
- Lifson AR, Halcon LL. Substance abuse and high-risk needle-related behaviors among homeless youth in Minneapolis: implications for prevention. *J Urban Health.* 2001; 78:690–698. [PubMed: 11796815]
- Maas B, Fairbairn N, Kerr T, Li K, Montaner JSG, Wood E. Neighborhood and HIV infection among IDU: Place of residence independently predicts HIV infection among a cohort of injection drug users. *Health Place.* 2007; 13:432–439. [PubMed: 16798055]
- Macalino GE, Celentano DD, Latkin C, Strathdee SA, Vlahov D. Risk behaviors by audio computer-assisted self-interviews among HIV-seropositive and HIV-seronegative injection drug users. *AIDS Educ Prev.* 2002; 14:367. [PubMed: 12413183]
- Maldonado G, Greenland S. Simulation study of confounder-selection strategies. *Am J Epidemiol.* 1993; 138:923–936. [PubMed: 8256780]
- Neaigus A, Gyarmathy A, Miller M, Frajzyngier VM, Friedman SR, Des Jarlais DC. Transitions to injecting drug use among noninjecting heroin users: social network influence and individual susceptibility. *J Acquir Immune Defic Syndr.* 2006; 41:493–503. [PubMed: 16652059]
- Ochoa KC, Davidson PJ, Evans JL, Hahn JA, Page-Shafer K, Moss AR. Heroin overdose among young injection drug users in San Francisco. *Drug Alcohol Depend.* 2005; 80:297–302. [PubMed: 15961257]
- Rachlis BS, Wood E, Li K, Hogg RS, Kerr T. Drug and HIV-related risk behaviors after geographic migration among a cohort of injection drug users. *AIDS Behav.* 2010; 14:854–861. [PubMed: 18427970]
- Ramos R, Ferreira-Pinto JB, Brouwer KC, Ramos ME, Lozada RM, Firestone-Cruz M, Strathdee SA. A tale of two cities: social and environmental influences shaping risk factors and protective behaviors in two Mexico-US border cities. *Health Place.* 2009; 15:999–1005. [PubMed: 19464228]
- Rhodes T. The ‘risk environment’: a framework for understanding and reducing drug-related harm. *Int J Drug Policy.* 2002; 13:85–94.
- Rhodes T, Mikhailova L, Sarang A, Lowndes CM, Rylkov A, Khutorskoy M, Renton A. Situational factors influencing drug injecting, risk reduction and syringe exchange in Togliatti City, Russian Federation: a qualitative study of micro risk environment. *Soc Sci Med.* 2003; 57:39–54. [PubMed: 12753815]
- Rhodes T, Watts L, Davies S, Martin A, Smith J, Clark D, Craine N, Lyons M. Risk, shame and the public injector: a qualitative study of drug injecting in South Wales. *Soc Sci Med.* 2007; 65:572–585. [PubMed: 17475383]
- Robertson, EB.; David, SL.; Rao, SA. Preventing Drug Use Among Children and Adolescents: A Research-Based Guide for Parents, Educators, and Community Leaders. 2. National Institute on Drug Abuse; US Department of Health and Human Services; Bethesda, MD: 2003. NIH Publication No. 04-4212A
- Rothman, KJ.; Greenland, S. Modern Epidemiology. Lippincott Williams & Wilkins; New York: 1998.
- Roy É, Godin G, Boudreau JF, Cote PB, Denis V, Haley N, Leclerc P, Boivin J. Modeling initiation into drug injection among street youth. *J Drug Educ.* 2011; 41:119–134. [PubMed: 21887997]
- Roy É, Haley N, Leclerc P, Cedras L, Blais L, Boivin JF. Drug injection among street youths in Montreal: predictors of initiation. *J Urban Health.* 2003; 80:92–105. [PubMed: 12612099]
- Small W, Rhodes T, Wood E, Kerr T. Public injection settings in Vancouver: physical environment, social context and risk. *Int J Drug Policy.* 2007; 18:27–36. [PubMed: 17689341]
- Tyndall MW, Craib KJ, Currie S, Li K, O’Shaughnessy MV, Schechter MT. Impact of HIV infection on mortality in a cohort of injection drug users. *J Acquir Immune Defic Syndr.* 2001; 28:351–357. [PubMed: 11707672]

- Werb D, Kerr T, Lai C, Montaner JSG, Wood E. Nonfatal overdose among a cohort of street-involved youth. *J Adolesc Health*. 2008; 42:303–306. [PubMed: 18295139]
- Wood E, Kerr T, Small W, Li K, Marsh DC, Montaner JS, Tyndall MW. Changes in public order after the opening of a medically supervised safer injecting facility for illicit injection drug users. *CMAJ*. 2004; 171:731–734. [PubMed: 15451834]
- Wood E, Stoltz JA, Montaner JS, Kerr T. Evaluating methamphetamine use and risks of injection initiation among street youth: the ARYS study. *Harm Reduct J*. 2006; 3:18. [PubMed: 16723029]

Figure 1.
Cumulative hazard of injection initiation among street-involved youth residing in two neighborhoods in Vancouver, Canada September 2005 – November 2011 (n = 422).

TABLE 1

Baseline characteristics of injection-naïve street-involved youth according to neighborhood of residence in past 6 months Vancouver, Canada, September 2005 – November 2011 (n=422).

Characteristic	Neighborhood of residence			p value
	Total (%) (n = 422)	DTES (%) (n=98)	Other (%) (n=324)	
Sociodemographic factors				
Median age (IQR)*	21.6 (19.6, 23.2)	22.7 (21.1 – 24.1)	21.1 (19.0 – 22.8)	< 0.001
Male gender	289 (68.5%)	64 (65.3%)	225 (69.4%)	0.440
Caucasian	258 (61.1%)	47 (48.0%)	211 (65.1%)	0.002
Drug use-related behaviors				
Alcohol	73 (17.3%)	12 (12.2%)	61 (18.8%)	0.131
Marijuana	380 (90.0%)	83 (84.7%)	297 (91.7%)	0.043
Non-injection powder cocaine	206 (48.8%)	40 (40.8%)	166 (51.2%)	0.071
Non-injection crack cocaine	236 (55.9%)	67 (68.4%)	169 (52.2%)	0.005
Non-injection CM**	148 (35.0%)	35 (35.7%)	113 (34.9%)	0.879
Non-injection smoked heroin	66 (15.6%)	19 (19.4%)	47 (14.5%)	0.244
Frequent non-injection drug use***	71 (16.8%)	28 (28.6%)	43 (13.3%)	< 0.001

Note: All drug use variables refer to any non-injection use in the preceding six months

* IQR = Interquartile Range

** CM = Crystal methamphetamine

*** Defined as daily use of any of powder cocaine, crack cocaine, smoked heroin or crystal methamphetamine

TABLE 2

Unadjusted and adjusted hazard ratios for factors related to initiation of injection drug use among street-involved youth in Vancouver, Canada, September 2005 – November 2011 ($n = 422$).

Characteristic	Unadjusted HR (95% CI)	Adjusted HR (95% CI)	<i>p</i> value*
Age (per year older)	0.96 (0.88 – 1.04)	0.94 (0.86 – 1.03)	0.168
Male gender	1.03 (0.63 – 1.67)	1.13 (0.68 – 1.87)	0.650
Caucasian	1.50 (0.92 – 2.44)	1.64 (1.00 – 2.71)	0.052
DTES residence	1.80 (1.13 – 2.88)	2.16 (1.33 – 3.52)	0.002
Alcohol	0.99 (0.55 – 1.80)	--	--
Marijuana	0.87 (0.47 – 1.61)	--	--
Non-injection cocaine	0.99 (0.62 – 1.57)	--	--
Non-injection crack cocaine	1.38 (0.88 – 2.18)	--	--
Non-injection CM	1.83 (1.16 – 2.87)	--	--
Non-injection heroin	1.83 (1.06 – 3.14)	--	--
Frequent non-injection drug use*	1.50 (0.89 – 2.55)	--	--

Note: All drug use variables refer to non-injection use in the preceding six months

Note: HR = hazard ratio; CI = confidence interval

*
p value for adjusted hazard ratio

**
Defined as daily use of any of powder cocaine, crack cocaine, smoked heroin or crystal methamphetamine