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## Eviction and Loss of Income Assistance Among Street-Involved Youth in Canada

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### Abstract

Loss of housing and income assistance among vulnerable youth has not been well described in the literature, yet it is a crucial issue for public health. This study examines the prevalence and correlates of loss of income assistance as well as eviction among street-involved youth. We collected data from a prospective cohort of street-involved youth aged 14–26. Among 770 participants, 64.3% reported having housing and 77.1% reported receiving income assistance at some point during the study period. Further, 28.6% and 20.0% of youth reported having been evicted and losing income assistance, respectively. In multivariable generalized estimating equations (GEE) analysis, heavy alcohol use, unprotected sex, being a victim of violence, and homelessness were all independently associated with eviction. Separately, homelessness, recent incarceration, and drug dealing were independently associated with loss of income assistance. Eviction and loss of income assistance are common experiences among street-involved youth with multiple vulnerabilities. Our findings highlight the importance of improving continued engagement with critical social services.

### Keywords

street-involved youth; access to services; homelessness; drug use; prospective cohort

### Background

Annual use of emergency shelters by Canadians for 2005 to 2009 was estimated to be close to 150,000 individuals, approximately 20% of whom (roughly 30,000) were youth between the ages of 16 to 24 years.<sup>1</sup> These figures do not capture homeless individuals sleeping on the street, or those with unstable provisional accommodation, such as 'couch surfing'.<sup>2</sup> In metropolitan Vancouver's 2015 homeless count, 28% of homeless people sampled reported

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sleeping on the street or in someone else's home where they did not pay rent (i.e., couch surfing). Among this group, 13% were youth between the ages of 19 to 24, suggesting that the number of homeless youth in Canada considerably exceeds 30,000.<sup>3</sup> Youth who are street-involved are known to engage more frequently in risky practices such as substance use, drug dealing, survival sex work, and unprotected sex.<sup>4–6</sup> As a result, street-involved youth are at risk of long-term health consequences including transmission of human immunodeficiency virus (HIV), hepatitis C virus (HCV), and other sexually transmitted infections (STIs).<sup>7, 8</sup>

Despite efforts to provide critical social services to vulnerable youth, many street-involved youth find it challenging to get assistance to meet basic needs.<sup>9–11</sup> Specifically, these youth find it difficult to obtain housing and income assistance.<sup>11</sup> Although the barriers that youth encounter in their efforts to use social services have been documented,<sup>12, 13</sup> less attention has been given to examining whether youth who are able to overcome barriers and use key social services remain engaged with these services.

Eviction and loss of income assistance are two threats to service engagement confronting street-involved youth. Both housing and income assistance have been shown to increase overall health and longevity.<sup>14–16</sup> Studies have linked economic instability to risky behaviors and negative outcomes, including drug dealing, and injection initiation.<sup>5, 17</sup> Homelessness has been associated with increased mortality in populations of street-involved youth.<sup>18</sup> Similarly, unstable housing is a well-documented independent risk factor for mortality in adult populations.<sup>16, 19–21</sup> Some of us found unstable housing to be an independent risk factor for initiation into injection drug use among street-involved youth in Vancouver.<sup>22</sup> This highlights the importance of ensuring youth have economic security and stable housing.

Given the established benefits of housing stability and economic security, we sought to assess retention in key social services by examining the prevalence and correlates of experiencing eviction and loss of income assistance respectively, among a prospective cohort of street-involved youth.

## Methods

We used data from the At-Risk Youth Study (ARYS), a prospective cohort of street-involved youth in Vancouver, Canada. Study details have been described elsewhere.<sup>23</sup> Eligible youth were aged 14–26 at enrolment and gave written informed consent. They used illicit drugs (e.g., crack, cocaine, heroin, or crystal methamphetamine) in the last 30 days, were street involved—presently without stable housing.

We initiated recruitment to ARYS in September 2005, using self-referral, word of mouth, street outreach, and youth agencies/services in a concerted effort to reach hidden populations.<sup>24–26</sup> At enrolment, and subsequent semi-annual follow-up visits participants completed an interviewer-administered questionnaire that elicited many data, including demographic characteristics, income generation, housing status, drug use patterns, and health and social services engagement. Participants were given a \$20 stipend for their time at

each study visit. The University of British Columbia's Research Ethics Board approved the study.

For the analysis presented here, we used data collected between June 2007 and May 2012, as the measures for our outcomes of interest were only available for this time period. We were interested in two independent primary outcomes—eviction and loss of income assistance. We defined these outcomes based on responses to the questions: “Have you been evicted in the last six months?” (yes. vs. no) and “Have you been cut off or denied Welfare in the last six months?” (yes vs. no). For those who answered “yes” to these questions, we asked a follow up “why?” and again categorized the responses into predetermined categories, or listed them in their entirety under the “other” category. Participants were permitted to provide none or numerous reasons for their eviction or loss of income assistance.

We grouped the reasons for loss of income assistance in categories including:

- “not eligible or application denied” included demographic ineligibilities, work related barriers, and any reports of being denied;
- “logistical problem/failure to comply” included issues such as not having ID, banking problems, and administrative problems;
- “illegal activity” which included being accused of crimes or owing money;
- “incarceration”, and
- “unknown”.

We used predetermined categories for reported reasons for eviction, including:

- “disruptive behaviour” that included being noisy, partying, fighting, having many visitors, and having unauthorized pets;
- “financial instability” that captured those unable to pay rent;
- “interpersonal conflict” that included conflict with roommates, landlords/managers, and social contacts;
- “substance use” that included illicit drug and heavy alcohol use;
- “building availability/suitability” that accounted for buildings being sold/closed, improper zoning, and unsanitary conditions;
- “drug dealing”;
- “health reasons”;
- “incarceration”, and
- “unknown”.

To learn of initial engagement with housing and income security services, at each study visit we examined reports of those “being housed” and “receiving income assistance” in the previous six months. We defined being housed as answering “no” to the question: “Have you been homeless in the last six months?” We defined receiving income assistance as receipt of monthly payments in the last six months from welfare or disability assistance (the latter

specifically, persons with persistent multiple barriers (PPMB) or persons with disabilities (PWD) payments).

To characterize factors associated with eviction and loss of income assistance, we *a priori* selected a range of socio-demographic and behavioural variables that we hypothesized might be associated with our outcomes of interest. With the exception of age, gender, and race, all variables were in reference to the prior six months and measured at each semiannual follow up visit and were treated as time-updated. These included the following demographic variables: age (per year older); gender (female vs. male); race (Caucasian vs. non-Caucasian); “homelessness”, defined as self reporting being homeless, a category that could include absolute homelessness, such as sleeping on the street, sheltered homeless, such as living in an emergency shelter, and having provisional accommodation such as ‘couch surfing’ (yes vs. no); and living in the Downtown Eastside, a well defined neighbourhood in Vancouver with an established open drug market scene (yes vs. no).

We examined behavioral variables, including participation in unprotected sex, defined as engaging in vaginal or anal sex without a condom (yes vs. no); incarceration, defined as being in detention, prison, or jail (yes vs. no); engaging in sex work, defined as exchanging sex for money, shelter, drugs or other commodities (yes vs. no); being a victim of violence, defined as being attacked, assaulted, or suffering violence (yes vs. no); and drug dealing, defined as any drug trade involvement (yes vs. no).

Drug and alcohol-use related behaviours, in the past six months, included: any injection drug use (yes vs. no); heavy alcohol consumption, defined, based on the US National Institute on Alcohol Abuse and Alcoholism guidelines for heavy alcohol use, (for females as four drinks in one day in the last week or seven drinks containing alcohol per week and for males as five drinks in one day in the last week or fourteen drinks containing alcohol per week (yes vs. no)); frequent heroin use, defined as at least daily use (yes vs. no); frequent cocaine use defined as at least daily use (yes vs. no); frequent crack smoking defined as at least daily use (yes vs. no); frequent crystal methamphetamine use, defined as at least daily use (yes vs. no); drug/alcohol treatment, defined as having been in any drug or alcohol treatment program, including a methadone program (yes vs. no); and non-fatal drug overdose (yes vs. no).

Because analysis of factors potentially associated with our outcomes of interest included serial measures for each subject, we used generalized estimating equations (GEE) for binary outcomes with logit link for the analysis of correlated data to determine factors associated with eviction and loss of income assistance. These methods provided standard errors adjusted by multiple observations per person using an exchangeable correlation structure. Data from every participant’s follow-up visit was considered in these analyses and we were able to accommodate changes in categories over time. We addressed missing data through the GEE estimating mechanism, that uses the all available pairs method for missing data from dropouts or intermittent missing. All non-missing pairs of data were used in the estimators of the working correlation parameters. GEE logistic regression is commonly used to analyze longitudinal and other correlated response data.<sup>27</sup>

We used bivariable GEE to obtain unadjusted odds ratios and 95% confidence intervals for factors associated with eviction and loss of income assistance in the previous six months, respectively.<sup>27</sup> To adjust for potential confounding and to establish factors that were independently associated with our independent outcomes of interest, eviction and loss of income assistance, all variables with  $p < 0.10$  in the bivariable analyses were considered in two separate multivariable analyses.

Consistent with prior longitudinal GEE analyses, Quasilikelihood under the Independence model Criterion (QIC) statistic with a backward model selection procedure was used to screen possible combinations of candidate variables and identify the model with the best overall fit, as indicated by the lowest QIC value.<sup>28–31</sup> We performed all statistical analyses using SAS software, version 9.3 (SAS Institute, Cary, NC). All  $p$ -values were two-sided.

## Results

Seven hundred and seventy youth completed a study interview during the study period, among whom 249 (32.3%) were female and 508 (66.0%) reported Caucasian race. The median age at baseline was 22 years (interquartile range [IQR]: 20–24). The median number of study visits during the study period was 2 (IQR = 1–5) and the median follow-up time was 26.7 months (IQR: 8.0–35.3).

At some point during the study period, 495 (64.3%) and 594 (77.1%) youth reported being housed and receiving income assistance, respectively. Over the same period 220 (28.6%) youth in the study reported eviction and 154 (20.0%) loss of income assistance in the previous six months. The characteristics of study participants stratified by eviction and loss of income assistance are presented in Table 1.

Table 2 summarizes the reported reasons for eviction and loss of income assistance. The most commonly reported reason for eviction was disruptive behaviour (35%). Other reasons for eviction included financial instability (23%), interpersonal conflict (16%), and substance use (9%). The most commonly reported reason for loss of income assistance was a logistical problem or failure to comply (25%). Respondents provided other common reasons as being deemed to have resources (23%), ineligibility (20%) and incarceration (17%).

Table 3 presents bivariable and multivariable GEE analyses of variables associated with eviction. In a multivariable GEE analysis, heavy alcohol use (adjusted odds ratio [AOR]=1.34, 95% confidence interval [CI]: 1.02 – 1.76), engaging in unprotected sex (AOR=1.37, 95% CI: 1.04 – 1.79), being a victim of violence (AOR=1.53, 95% CI: 1.16 – 2.03) and homelessness (AOR=3.72, 95% CI: 2.77 – 4.99) were independently associated with eviction.

Table 4 presents the bivariable and multivariable GEE analyses for factors associated with loss of income assistance, demonstrating that homelessness (AOR=1.48, 95% CI: 1.04 – 2.09), incarceration (AOR=1.83, 95% CI: 1.25 – 2.67) and drug dealing (AOR=1.59, 95% CI: 1.15 – 2.21) were independently associated with loss of income assistance.

## Discussion

Eviction and loss of income assistance were relatively common occurrences among our sample of street-involved youth. These and other vulnerability factors appear to cluster to affect street-involved youth. Homelessness, heavy alcohol use, unprotected sex, and being a victim of violence were independently associated with eviction, while homelessness, incarceration, and drug dealing were independently associated with loss of income assistance. In addition to the stress and hardship of being evicted or losing financial stability in the form of loss of income assistance, our findings highlight that street-involved youth in these situations face multiple challenges. Reported reasons for eviction further echo this interpretation. It is particularly troubling that logistical problems or failure to comply were the most commonly reported reasons for loss of income assistance, as so much effort is made to engage individuals in this supportive service.

In Canada, income assistance is regulated or provided by the provinces. Our study participants would have accessed income assistance services through the British Columbia Ministry of Social Development and Social Innovation. Eligibility for income assistance begins upon becoming an “adult” at age 18. At younger ages, a youth’s parents, guardians, or the Ministry of Children and Family Development are financially responsible. The Ministry ends its care at age 19. During this one-year overlap, caseworkers generally try to assist the youth to apply for income assistance and to find housing within the funding allowance. The process of applying for income assistance requires an internet connection, literacy, and access to identification, as well as to many supporting documents.<sup>32</sup>

Among our cohort of youth who were all street-involved at the time of enrolment, we expected that participants’ housing status would fluctuate over time. Previous studies have shown that homeless or street-involved youth differ from adult populations. They tend to alternate more rapidly than older populations between different states of being housed.<sup>12, 33</sup> We relied on participants to define “homelessness” for themselves and it might mean something different to different participants. Even with this limitation in mind, it is notable that experiencing eviction and loss of income assistance were both independently associated with reporting homelessness.

Homelessness has been shown to be an independent risk factor for all cause mortality, as well as for initiation into injection drug use.<sup>16, 20, 21, 34</sup> Although we are unable to prove a temporal relationship between eviction or loss of income assistance and subsequent homelessness, our data underscore that loss of an important social service (income assistance) and being evicted are both closely linked with homelessness. This warrants attention, as homelessness has been temporally linked with serious risks and harms including, injection initiation, unprotected sex, and mortality.<sup>18, 22, 35</sup>

Inconsistent condom use is associated with structural factors—including homelessness, being searched and detained by police, and having a warrant or area restriction (placed by the judicial system) that affects access to services.<sup>7</sup> Homeless youth have also been previously found to experience higher rates of pregnancy compared to their housed counterparts.<sup>36</sup> We also found that being evicted was associated with increased risk of engaging in unprotected

sex. Unprotected sex puts a person at risk of further emotional and physical turmoil by way of real or threatened infection and/or unexpected pregnancy. Violence, too, has the potential to lead to these emotional and physical repercussions. Worldwide, violence disproportionately affects those with lower socioeconomic status. Poor economic conditions are cited as both the cause and effect of increased interpersonal violence.<sup>37</sup> Disruptive behaviour, interpersonal conflict, and incarceration can all be related to violence and they make up a significant proportion of our recorded reasons for eviction.

Alcohol use and abuse are risk factors for many health conditions including cancer, heart disease, liver disease, and mental illness, as well as social harm.<sup>38</sup> The negative effects of alcohol start at low doses and are generally dose dependent.<sup>38</sup> In addition, irregular, heavy drinking, as is common in youth, increases the risk of suicide and violence.<sup>38</sup> Our definition of heavy alcohol use may have resulted in an under estimation of heavy alcohol use and yielded a conservative estimate of the association between eviction and alcohol consumption based on our choice of definitions. We based “heavy alcohol consumption” on the US National Institute on Alcohol Abuse and Alcoholism guidelines for heavy alcohol use rather than on the Canadian low-risk drinking guidelines. The latter recommend that alcohol use be delayed until late teens and upon initiation in youth use should not exceed two drinks on a single day in a week.<sup>39</sup> Because our study population spanned ages 14–26, what constitutes “heavy drinking” may vary by age group.

That drug dealing in our study is independently associated with loss of income assistance further illustrates the vulnerabilities of this sub-population. Drug dealing is commonly performed by youth to support their drug use.<sup>5</sup> Loss of other income may encourage this risky and illegal activity. Similarly, incarceration was associated with loss of income assistance, possibly the result of increased reliance on illegal activities in the absence of stable social assistance. Five percent of youth reported illegal activity as the reason for their loss of income assistance. Income assistance is turned off or lost when one enters the judicial system. Our finding that 17% of youth attribute loss of income assistance to incarceration suggests that this explanation was perhaps more common among our sample.

Low socioeconomic status and poor housing conditions are associated with a wide range of health conditions. Our study highlights the number of youth exposed to these negative social determinants of health. What role should public health play in prevention and mitigation? Based on this study, in addition to providing evidence-based interventions in the areas of substance use, sexual health, and violence prevention, the public health community should also continue to emphasize the importance of housing and income security as key determinants of health and wellness. Public health might advocate and support low-threshold, youth focused housing in addition to low threshold employment programs to improve youths’ economic security.<sup>14, 41, 42</sup>

How can society address the logistical challenges that exist around accessing and maintaining income assistance? Systematic analysis of systems and pressure on government bodies for changes to eliminate barriers remains needed. For more targeted interventions, research might identify early risk factors that can be used to screen vulnerable youth and identify those at greatest risk of becoming disconnected from key social services.

## Limitations

We did not choose the study sample at random and our findings may not be generalizable to all street-involved youth, particularly populations in low-income countries or areas with different social support services. Self-reported data may have been affected by a reporting bias, but self-reported data have been used and found to be valid in studies involving similarly at risk populations of persons who inject drugs.<sup>40</sup> As with all observational studies, the independent associations that we found could have been influenced by unobserved confounding.

## Conclusions

Our study's findings indicate that youth who lose income assistance and those who experience eviction have markers of multiple vulnerabilities, including homelessness, recent incarceration, unprotected sex, and having been a victim of violence. These findings highlight the importance of maintaining engagement of street-involved youth with supportive social services such as income assistance and housing to prevent unnecessary ill health and promote their well being.

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## References

1. Segaert, A. [accessed 26 Jan 2016] The National Shelter Study: Emergency Shelter Use in Canada 2005–2009: Homelessness Partnering Strategy. 2012. [http://homelesshub.ca/sites/default/files/Homelessness%20Partnering%20Secretariat%202013%20Segaert\\_0.pdf](http://homelesshub.ca/sites/default/files/Homelessness%20Partnering%20Secretariat%202013%20Segaert_0.pdf)
2. Canadian Observatory on Homelessness. Canadian Definition of Homelessness. Homeless Hub; 2012. [www.homelesshub.ca/homelessdefinition/](http://www.homelesshub.ca/homelessdefinition/) [accessed 26 Jan 2016]
3. Thomson, M. [accessed 26 Jan 2016] Vancouver Homeless Count. 2015. <http://vancouver.ca/files/cov/vancouver-homeless-count-2015.pdf>
4. Werb D, Kerr T, Fast D, Qi J, Montaner JS, Wood E. Drug-related risks among street youth in two neighborhoods in a Canadian setting. *Health Place*. 2010; 16(5):1061–7. [PubMed: 20621542]
5. Werb D, Kerr T, Li K, Montaner J, Wood E. Risks surrounding drug trade involvement among street-involved youth. *American Journal of Drug and Alcohol Abuse*. 2008; 34(6):810–20. [PubMed: 19016187]
6. Adlaf EM, Zdanowicz YM. A cluster-analytic study of substance problems and mental health among street youths. *American Journal of Drug and Alcohol Abuse*. 1999; 25(4):639–60. [PubMed: 10548440]
7. Marshall BD, Kerr T, Shoveller JA, Montaner JS, Wood E. Structural factors associated with an increased risk of HIV and sexually transmitted infection transmission among street-involved youth. *BMC Public Health*. 2009; 9:7. [PubMed: 19134203]
8. Marshall BD, Kerr T, Shoveller JA, Patterson TL, Buxton JA, Wood E. Homelessness and unstable housing associated with an increased risk of HIV and STI transmission among street-involved youth. *Health Place*. 2009; 15(3):753–60. [PubMed: 19201642]
9. Darbyshire P, Muir-Cochrane E, Fereday J, Jureidini J, Drummond A. Engagement with health and social care services: perceptions of homeless young people with mental health problems. *Health & Social Care in the Community*. 2006; 4(6):553–62. [PubMed: 17059497]



10. Reid P, Klee H. Young homeless people and service provision. *Health & Social Care in the Community*. 1999; 7(1):17–24. [PubMed: 11560618]
11. Barker B, Kerr T, Nguyen P, Wood E, DeBeck K. Barriers to health and social services for street-involved youth in a Canadian setting. *Journal of Public Health Policy*. 2015; 36(3):350–63. [PubMed: 25811385]
12. Krusi A, Fast D, Small W, Wood E, Kerr T. Social and structural barriers to housing among street-involved youth who use illicit drugs. *Health & Social Care in the Community*. 2010; 18(3):282–8. [PubMed: 20102394]
13. Hadland SE, Kerr T, Li K, Montaner JS, Wood E. Access to drug and alcohol treatment among a cohort of street-involved youth. *Drug and Alcohol Dependence*. 2009; 101(1–2):1–7. [PubMed: 19081203]
14. Pauly BB, Reist D, Belle-Isle L, Schactman C. Housing and harm reduction: what is the role of harm reduction in addressing homelessness? *International Journal of Drug Policy*. 2013; 24(4): 284–90. [PubMed: 23623720]
15. Tompsett CJ, Domoff SE, Toro PA. Peer substance use and homelessness predicting substance abuse from adolescence through early adulthood. *American Journal of Community Psychology*. 2013; 51(3–4):520–9. [PubMed: 23381568]
16. Morrison DS. Homelessness as an independent risk factor for mortality: results from a retrospective cohort study. *International Journal of Epidemiology*. 2009; 38(3):877–83. [PubMed: 19304988]
17. Richardson L, DeBeck K, Feng C, Kerr T, Wood E. Employment and risk of injection drug use initiation among street involved youth in Canadian setting. *Preventative Medicine*. 2014; 66:56–9.
18. Roy E, Haley N, Leclerc P, Sochanski B, Boudreau JF, Boivin JF. Mortality in a cohort of street youth in Montreal. *The Journal of the American Medical Association*. 2004; 292(5):569–74. [PubMed: 15292082]
19. Zivanovic R, Milloy MJ, Hayashi K, Dong H, Sutherland C, Kerr T, et al. Impact of unstable housing on all-cause mortality among persons who inject drugs. *BMC Public Health*. 2015; 15:106. [PubMed: 25884182]
20. Hibbs JR, Benner L, Klugman L, Spencer R, Macchia I, Mellinger A, et al. Mortality in a cohort of homeless adults in Philadelphia. *New England Journal of Medicine*. 331(5):304–9. [PubMed: 8022442]
21. Baggett TP, Hwang SW, O’Connell JJ, Porneala BC, Stringfellow EJ, Orav EJ, et al. Mortality among homeless adults in Boston: shifts in causes of death over a 15-year period. *The Journal of the American Medical Association Internal Medicine*. 173(3):189–95. [PubMed: 23318302]
22. Feng C, DeBeck K, Kerr T, Mathias S, Montaner J, Wood E. Homelessness independently predicts injection drug use initiation among street-involved youth in a Canadian setting. *Journal of Adolescent Health*. 2013; 52(4):499–501. [PubMed: 23299006]
23. Wood E, Stoltz JA, Montaner JS, Kerr T. Evaluating methamphetamine use and risks of injection initiation among street youth: the ARYS study. *Harm Reduction Journal*. 2006; 2006(3):18. [PubMed: 16723029]
24. Thompson SK, Collins LM. Adaptive sampling in research on risk-related behaviors. *Drug and Alcohol Dependence*. 2002; 68(Suppl 1):S57–67. [PubMed: 12324175]
25. Heckathorn, D.; Broadhead, R. Respondent-driven sampling: a new approach to sampling hidden populations. *International Conference AIDS*; 1998; p. 928
26. Douglas, D.; Broadhead, R. A new approach to sampling hidden populations: respondent-driven sampling. *International Conference AIDS*; 1996; p. 231
27. Hanley JA, Negassa A, Edwardes MD, Forrester JE. Statistical analysis of correlated data using generalized estimating equations: an orientation. *American Journal of Epidemiology*. 2003; 157(4):364–75. [PubMed: 12578807]
28. Pan W. Akaike’s information criterion in Generalized Estimating Equations. *Biometrics*. 2001; 57:120–5. [PubMed: 11252586]
29. Omura JD, Wood E, Nguyen P, Kerr T, DeBeck K. Incarceration among street-involved youth in a Canadian study: implications for health and policy interventions. *International Journal of Drug Policy*. 2014; 25(2):291–6. [PubMed: 24405564]

30. Phillips M, Richardson L, Wood E, Nguyen P, Kerr T, DeBeck K. High-Intensity Drug Use and Health Service Access Among Street-Involved Youth in a Canadian Setting. *Substance Use Misuse*. 2015; 50(14):1805–13. [PubMed: 26642870]
31. Cheng T, Wood E, Nguyen P, Montaner J, Kerr T, DeBeck K. Crack pipe sharing among street-involved youth in a Canadian setting. *Drug and Alcohol Review*. 2015; 34(3):259–66. [PubMed: 25066509]
32. Ministry of Social Development and Social Innovation. [accessed 6 Jan 2016] BC Employment & Assistance Application Document List. 2015. <http://www.eia.gov.bc.ca/bcea/checklist.htm>
33. Kelly K, Caputo T. Health and street/homeless youth. *Journal of Health Psychology*. 2007; 12(5): 726–36. [PubMed: 17855458]
34. Cheung AM, Hwang SW. Risk of death among homeless women: a cohort study and review of the literature. *Canadian Medical Association Journal*. 2004; 170(8):1243–7. [PubMed: 15078846]
35. Cheng T, Johnston C, Kerr T, Nguyen P, Wood E, DeBeck K. Substance use patterns and unprotected sex among street-involved youth in a Canadian setting: a prospective cohort study. *BMC Public Health*. 2016; 16(1):4. [PubMed: 26728877]
36. Boivin JF, Roy E, Haley N, Galbaud du Fort G. The health of street youth: a Canadian perspective. *Canadian Journal of Public Health*. 2005; 96(6):432–7. [PubMed: 16350867]
37. Krug EG, Mercy JA, Dahlberg LL, Zwi AB. The world report on violence and health. *Lancet*. 2002; 360(9339):1083–8. [PubMed: 12384003]
38. Kaptein S, Wan T, Amorium E. Alcohol impacts health: a rapid review of the evidence. *Peer Public Health*. 2013
39. Butt, P.; Beirness, D.; Stockwell, T.; Gliksmann, L.; Paradis, C. [accessed 6 Jan 2016] Alcohol and health in Canada: A summary of evidence and guidelines for low-risk drinking. 2011. <http://www.ccsa.ca/Resource%20Library/2011-Summary-of-Evidence-and-Guidelinesfor-Low-Risk%20Drinking-en.pdf>
40. Darke S. Self-report among injecting drug users: a review. *Drug and Alcohol Dependence*. 1998; 51(3):253–63. discussion 67–8. [PubMed: 9787998]
41. Richardson L, Wood E, Li K, Kerr T. Factors associated with employment among a cohort of injection drug users. *Drug and Alcohol Review*. 2010; 29(3):293–300. [PubMed: 20565522]
42. DeBeck K, Wood E, Qi J, Fu E, McArthur D, Montaner J, et al. Interest in low-threshold employment among people who inject illicit drugs: implications for street disorder. *International Journal of Drug Policy*. 2011 Sep; 22(5):376–84. [PubMed: 21684142]

**Table 1**

Characteristics of street-involved youth (n = 770).

| Characteristic                          | Eviction <sup>a</sup> |                  | p - value | Loss of income assistance <sup>a</sup> |                  | p - value |
|---|-----------------------|------------------|-----------|--|------------------|-----------|
|   | Yes (%) (n = 220)     | No (%) (n = 550) |           | Yes (%) (n = 154)                      | No (%) (n = 616) |           |
| Age (median, IQR)                       | 22 (20–24)            | 22 (20–24)       | 0.632     | 22 (20–24)                             | 22 (20–24)       | 0.225     |
| Female gender                           | 71 (32.3)             | 178 (32.4)       | 0.981     | 37 (24.0)                              | 212 (34.4)       | 0.014     |
| Caucasian ethnicity                     | 151 (68.6)            | 357 (64.9)       | 0.324     | 101 (65.6)                             | 407 (66.1)       | 0.909     |
| Homeless <sup>a</sup>                   | 171 (77.7)            | 329 (59.8)       | <0.001    | 100 (64.9)                             | 373 (60.6)       | 0.318     |
| Living in DTES <sup>a</sup>             | 64 (29.1)             | 151 (27.5)       | 0.648     | 46 (29.9)                              | 180 (29.2)       | 0.874     |
| Injection drug use <sup>a</sup>         | 67 (30.5)             | 156 (28.4)       | 0.563     | 36 (23.4)                              | 186 (30.2)       | 0.095     |
| Heavy alcohol use <sup>b</sup>          | 99 (45.0)             | 230 (41.8)       | 0.420     | 77 (50.0)                              | 254 (41.2)       | 0.049     |
| Daily heroin use <sup>a, c</sup>        | 20 (9.1)              | 73 (13.3)        | 0.108     | 13 (8.4)                               | 78 (12.7)        | 0.147     |
| Daily cocaine use <sup>a, c</sup>       | 7 (3.2)               | 13 (2.4)         | 0.519     | 6 (3.9)                                | 16 (2.6)         | 0.387     |
| Daily crack smoking <sup>a</sup>        | 36 (16.4)             | 73 (13.3)        | 0.266     | 18 (11.7)                              | 94 (15.3)        | 0.261     |
| Daily crystal meth use <sup>a, c</sup>  | 32 (14.6)             | 56 (10.2)        | 0.086     | 19 (12.3)                              | 70 (11.4)        | 0.735     |
| Drug and alcohol treatment <sup>a</sup> | 65 (29.6)             | 160 (29.1)       | 0.900     | 52 (33.8)                              | 176 (28.6)       | 0.207     |
| Non-fatal overdose <sup>a</sup>         | 25 (11.4)             | 46 (8.4)         | 0.194     | 17 (11.0)                              | 53 (8.6)         | 0.347     |
| Unprotected sex <sup>a</sup>            | 134 (60.9)            | 283 (51.5)       | 0.017     | 86 (55.8)                              | 335 (54.4)       | 0.745     |
| Victim of violence <sup>a</sup>         | 98 (44.6)             | 184 (33.5)       | 0.004     | 66 (42.9)                              | 208 (33.8)       | 0.035     |
| Incarceration <sup>a</sup>              | 50 (22.7)             | 123 (22.4)       | 0.913     | 48 (31.2)                              | 132 (21.4)       | 0.011     |
| Sex work <sup>a</sup>                   | 14 (6.4)              | 49 (8.9)         | 0.244     | 7 (4.6)                                | 56 (9.1)         | 0.066     |
| Drug dealing <sup>a</sup>               | 88 (40.0)             | 200 (36.4)       | 0.346     | 69 (44.8)                              | 227 (36.9)       | 0.070     |
| Loss of income assistance <sup>a</sup>  | 21 (9.6)              | 50 (9.1)         | 0.844     |  |                  |           |

<sup>a</sup> Characteristics for those who reported either eviction or loss of income assistance in the last six months were measured at their first visit (during the study period: June 2007 to May 2012), which involved a report of either eviction or loss of income assistance in the last six months. Characteristics for all other participants were measured from the first study visit. P-values were calculated using the Wilcoxon rank-sum test for continuous characteristics and Pearson's  $\chi^2$  test for categorical characteristics.

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

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

Refers to any route of consumption (i.e., sniffing, snorting, smoking or injecting)

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**Table 2**

Reported reasons<sup>o</sup> for eviction and loss of income assistance among street-involved youth.

| <b>Reason for eviction</b>        | <b>N (%) (n = 220)</b> | <b>Reason for loss of income assistance</b> | <b>N (%) (n = 154)</b> |
|-----------------------------------|------------------------|---|------------------------|
| Disruptive behaviour              | 76 (35)                | Logistical problem or failure to comply     | 39 (25)                |
| Financial instability             | 50 (23)                | Deemed to have resources                    | 36 (23)                |
| Interpersonal conflict            | 36 (16)                | Not eligible or application denied          | 31 (20)                |
| Substance use                     | 20 (9)                 | Incarceration                               | 26 (17)                |
| Building availability/suitability | 18 (8)                 | Illegal activity                            | 7 (5)                  |
| Unknown                           | 14 (6)                 | Unknown                                     | 5 (3)                  |
| Incarceration                     | 8 (4)                  |   |                        |
| Drug dealing                      | 8 (4)                  |   |                        |
| Health reasons                    | 1 (1)                  |   |                        |

<sup>o</sup> Reasons were measured at their most recent study visit (during the study period: June 2007 to May 2012), which involved a report of eviction or loss of income assistance in the last six months, respectively.

**Table 3**

Bivariable and multivariable GEE analyses of factors associated with eviction among street-involved youth in Vancouver (n=770).

| Characteristic                          | Unadjusted         |                 | Adjusted           |                 |
|---|--------------------|-----------------|--------------------|-----------------|
|   | OR (95% CI)        | <i>p</i> -value | AOR (95% CI)       | <i>p</i> -value |
| Age Per year older                      | 1.02 (0.97 – 1.07) | 0.471           |                    |                 |
| Female gender                           | 0.91 (0.68 – 1.22) | 0.539           |                    |                 |
| Caucasian ethnicity                     | 1.26 (0.94 – 1.70) | 0.123           |                    |                 |
| Homeless <sup>a</sup>                   | 4.14 (3.11 – 5.52) | <0.001          | 3.72 (2.77 – 4.99) | <0.001          |
| Living in DTES <sup>a</sup>             | 1.10 (0.84 – 1.44) | 0.491           |                    |                 |
| Injection drug use <sup>a</sup>         | 1.11 (0.83 – 1.47) | 0.483           |                    |                 |
| Heavy alcohol use <sup>b</sup>          | 1.58 (1.21 – 2.05) | 0.001           | 1.34 (1.02 – 1.76) | 0.035           |
| Daily heroin use <sup>a, c</sup>        | 0.79 (0.53 – 1.20) | 0.270           |                    |                 |
| Daily cocaine use <sup>a, c</sup>       | 1.31 (0.60 – 2.86) | 0.493           |                    |                 |
| Daily crack smoking <sup>a</sup>        | 1.28 (0.91 – 1.81) | 0.154           |                    |                 |
| Daily crystal meth use <sup>a, c</sup>  | 1.24 (0.85 – 1.81) | 0.271           |                    |                 |
| Drug and alcohol treatment <sup>a</sup> | 1.02 (0.78 – 1.35) | 0.864           |                    |                 |
| Non-fatal overdose <sup>a</sup>         | 1.60 (1.02 – 2.50) | 0.039           |                    |                 |
| Unprotected sex <sup>a</sup>            | 1.54 (1.19 – 2.00) | 0.001           | 1.37 (1.04 – 1.79) | 0.024           |
| Victim of violence <sup>a</sup>         | 1.91 (1.46 – 2.50) | <0.001          | 1.53 (1.16 – 2.03) | 0.003           |
| Incarceration <sup>a</sup>              | 1.22 (0.91 – 1.64) | 0.177           |                    |                 |
| Sex work <sup>a</sup>                   | 0.86 (0.49 – 1.52) | 0.602           |                    |                 |
| Drug dealing <sup>a</sup>               | 1.56 (1.20 – 2.02) | 0.001           | 1.22 (0.93 – 1.61) | 0.153           |
| Loss of income assistance <sup>a</sup>  | 1.34 (0.89 – 2.03) | 0.167           |                    |                 |

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

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

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

**Table 4**

Bivariable and multivariable GEE analyses of factors associated with loss of income assistance among street-involved youth in Vancouver (n=770).

| Characteristic                          | Unadjusted         |                 | Adjusted           |                 |
|---|--------------------|-----------------|--------------------|-----------------|
|   | OR (95% CI)        | <i>p</i> -value | AOR (95% CI)       | <i>p</i> -value |
| Age                                     | 0.98 (0.93 – 1.04) | 0.536           |                    |                 |
| Female gender                           | 0.66 (0.45 – 0.96) | 0.032           |                    |                 |
| Caucasian ethnicity                     | 1.13 (0.80 – 1.59) | 0.479           |                    |                 |
| Homeless <sup>a</sup>                   | 1.78 (1.27 – 2.49) | 0.001           | 1.48 (1.04 – 2.09) | 0.029           |
| Living in DTES <sup>a</sup>             | 1.16 (0.84 – 1.60) | 0.378           |                    |                 |
| Injection drug use <sup>a</sup>         | 0.79 (0.54 – 1.16) | 0.227           |                    |                 |
| Heavy alcohol use <sup>b</sup>          | 1.50 (1.09 – 2.05) | 0.012           | 1.36 (0.98 – 1.89) | 0.064           |
| Daily heroin use <sup>a, c</sup>        | 0.65 (0.38 – 1.12) | 0.123           |                    |                 |
| Daily cocaine use <sup>a, c</sup>       | 1.85 (0.81 – 4.22) | 0.143           |                    |                 |
| Daily crack smoking <sup>a</sup>        | 0.91 (0.54 – 1.50) | 0.701           |                    |                 |
| Daily crystal meth use <sup>a, c</sup>  | 1.20 (0.76 – 1.87) | 0.433           |                    |                 |
| Drug and alcohol treatment <sup>a</sup> | 1.16 (0.85 – 1.59) | 0.357           |                    |                 |
| Non-fatal overdose <sup>a</sup>         | 1.58 (0.97 – 2.58) | 0.068           |                    |                 |
| Unprotected sex <sup>a</sup>            | 0.97 (0.72 – 1.31) | 0.826           |                    |                 |
| Victim of violence <sup>a</sup>         | 1.60 (1.17 – 2.20) | 0.003           | 1.30 (0.93 – 1.82) | 0.126           |
| Incarceration <sup>a</sup>              | 2.28 (1.62 – 3.21) | <0.001          | 1.83 (1.25 – 2.67) | 0.002           |
| Sex work <sup>a</sup>                   | 0.52 (0.25 – 1.07) | 0.077           | 0.51 (0.25 – 1.07) | 0.074           |
| Drug dealing <sup>a</sup>               | 1.90 (1.39 – 2.58) | <0.001          | 1.59 (1.15 – 2.21) | 0.006           |

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

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

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