

High rates of homelessness among a cohort of street-involved youth

Beth S. Rachlis^{a,b}, Evan Wood^{a,c}, Ruth Zhang^a, Julio S.G. Montaner^{a,c}, Thomas Kerr^{a,c,*}

^aBritish Columbia Centre for Excellence in HIV/AIDS, St. Paul's Hospital, 608-1081 Burrard Street, Vancouver, BC, Canada V6Z 1Y6

^bDepartment of Health Care and Epidemiology, University of British Columbia, Vancouver, BC, Canada V6T 1Z3

^cDepartment of Medicine, University of British Columbia, Vancouver, BC, Canada V6T 1Z3

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Abstract

Using multivariate logistic regression, we examined the prevalence and correlates of homelessness among youth enrolled in a community-recruited prospective cohort known as the At-Risk Youth Study (ARYS), between September 2005 and October 2006. Of 478 individuals included in this analysis, 132 (27.6%) were female and 120 (25.1%) self-identified as Aboriginal. The median age was 22 (IQR: 20–24). In total, 284 (56.9%) participants reported baseline homelessness, with most living either at no fixed address, on the street, or in a hostel or shelter. Factors associated with homelessness included public injecting, frequent crack use, experienced violence, having less than a high-school education, and not having been in any addiction treatment. Homeless individuals were at-risk for various adverse health outcomes. These findings indicate the need for additional interventions, including residential addiction treatment, to address homelessness and drug use among youth.

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Introduction

Homelessness is associated with an array of health and social harms throughout North America (Hwang et al., 1997; Culhane et al., 2001; Feldman and Middleman, 2003; Frankish et al., 2005; Nwakeze et al., 2003). It is estimated that as many as 260,000 Canadians are living in absolute homelessness either living on the street, in temporary shelters, or in settings “not meant for human habitation” (Canadian Centre for Policy Alternatives, 1998). Moreover, of the 33,000 individuals estimated to be homeless on any given night in Canada, young people represent one of the fastest growing sub-populations. Youth now make up to one-third of Canada's homeless population, with approximately 8000–11,000 youth homeless each night (Canada Mortgage and Housing Corporation, 2001). In the United States, the number of homeless youth

ranges anywhere from 500,000 (National Coalition for the Homeless, 2006) up to 2 million (Ringwalt et al., 1998).

Interestingly, a new geography of ‘homeless places’, that is places of higher than usual levels of rough sleeping and single homelessness, has emerged (May, 2003). While it has been previously suggested that place matters in the distribution of health (Rhodes et al., 2006; Macintyre et al., 2002; Diez Roux, 2002), there has been little investigation of the causal pathways by which the local community or physical environment translates into health outcomes. However, it is probable that certain features and characteristics of a particular setting, neighborhood, or location are more important than others (Pickett and Pearl, 2001; Macintyre et al., 2002). Therefore, to understand how the health and well-being of “street youth” may be compromised, it is necessary to consider both the physical and social spaces where individuals live their everyday lives. For example, exposure to physical and/or sexual violence, poverty and neglect, staying in crowded shelters and a lack of access to adequate hygiene (Feldman and Middleman, 2003; Roy et al., 2003; Fuller et al., 2003; De Rosa et al., 1999) often increase the likelihood of negative

*Corresponding author at: British Columbia Centre for Excellence in HIV/AIDS, St. Paul's Hospital, 608-1081 Burrard Street, Vancouver, BC, Canada V6Z 1Y6. Tel.: +1 604 806 9116; fax: +1 604 806 9044.

E-mail address: uhri@cfenet.ubc.ca (T. Kerr).

health-related outcomes among individuals who lack stable housing. Not surprisingly, substance abuse has become a growing problem in this population, commonly used as a way of coping with stress, depression, or as a way to escape the harsh realities of being on the streets (Crofts et al., 1996). Moreover, homeless youth more commonly experience a whole host of difficulties rather than a single problem (Martijn and Sharpe, 2006), and generally face multiple barriers to service utilization making the treatment of various health concerns increasingly challenging (Nwakeze et al., 2003; Aidala et al., 2005; Carlson et al., 2006).

Recent reports of rising injection drug use and high-risk behaviors among North American street youth highlight the growing risk of HIV transmission among younger age groups (Feldman and Middleman, 2003; Health Canada, 2003; Wood et al., 2006; Bousman et al., 2005). Furthermore, the literature consistently demonstrates that in excess of 50% of homeless youth have some drug- and alcohol-related problems (Goering et al., 2002; Klein et al., 2000), which often arise following the onset of homelessness (Martijn and Sharpe, 2006). In Canada, injection drug use is reported among approximately 38% and 54% of street youth in Vancouver (Ochnio et al., 2001) and Montreal (Roy et al., 2002), respectively. Interestingly, there remains an absence of data on public injection drug use among street-involved youth, even though public injecting has been associated with extensive harms (e.g., HIV) among more experienced populations of homeless injectors both in our setting (Small et al., 2005) and others (Rhodes et al., 2006; Klein and Levy, 2003; Navarro and Leonard, 2004; Green et al., 2003). Further, given that homeless youth are a “hidden population” often not connected to any traditional health-related system (Feldman and Middleman, 2003; Martijn and Sharpe, 2006), little is known about rates of homelessness and the associated risks among street-involved youth. Therefore, in an exploratory study, we sought to determine the prevalence of homelessness in a new prospective community-recruited cohort of street-involved youth living in Vancouver, Canada. As a secondary objective, we sought to identify a unique set of risk factors, including drug-related risk behaviors, associated with reporting homelessness in our cohort.

Methods

The ‘At-risk Youth Study’ (ARYS, pronounced ‘arise’) is a prospective cohort of Vancouver street-involved youth that has been described in detail previously (Wood et al., 2006). In brief, snowball sampling and extensive street-based outreach were undertaken in an effort to develop a representative sample of the city’s street youth who are using illicit drugs. Eligibility for the study included age 14–26 years at baseline and use of illicit drugs other than marijuana in the past 30 days. At baseline and semi-annually, subjects provide blood samples for measurement of HIV and hepatitis C (HCV) antibodies and complete

and interviewer-administered questionnaire. The ARYS study has been ethically approved by the University of British Columbia’s Research Ethics Board.

This present study was conducted to examine the prevalence of homelessness among street-involved youth, as well as the associations between homelessness and socio-demographic characteristics, drug use and risk behaviors. Homelessness, the primary endpoint in this analysis, was defined as having no-fixed address (NFA), or living on the street, in a shelter or hostel or couch surfing at baseline. In our cohort, homeless youth differ from other street-involved youth, with the latter being defined as those who spend a significant amount of time on the streets everyday but who are, at the very least, marginally housed (e.g., living in single room occupancy (SRO) hotels). Here we compare those youth who reported current homelessness at baseline to those who did not using univariate and logistic regression analyses. Variables considered included gender, age, Aboriginal ethnicity (yes vs. no), Downtown Eastside (DTES) residence (yes vs. no), education (<high school vs. ≥high school), HCV status (yes vs. no), HIV status (yes vs. no), sex trade involvement (yes vs. no), drug dealing (yes vs. no), frequent crack cocaine smoking (yes vs. no), frequent heroin injection (yes vs. no), frequent crystal methamphetamine use (yes vs. no), public injection drug use (yes vs. no), shooting gallery attendance (yes vs. no), syringe borrowing (yes vs. no), syringe lending (yes vs. no), requiring help injecting (yes vs. no), recent incarceration (yes vs. no), received any addiction treatment in the past six months (yes vs. no), recent non-fatal overdose (OD) experience (yes vs. no), having been victim of street violence (yes vs. no), history of sexual abuse (yes vs. no) and history of physical abuse (yes vs. no). Frequent crack, heroin and crystal methamphetamine use were defined as use of greater than once daily. Unless otherwise noted, all behavioral variables refer to the six-month period prior to the interview, whereas “history of” refers to any time in the past. All variable definitions have been used extensively and were identical to earlier reports (Wood et al., 2006).

For univariate analyses, those who did and did not report being homeless at baseline were compared using Pearson’s Chi-square test (dichotomous variables) and the Wilcoxon rank sum test (continuous variables). To determine independent predictors of homelessness at baseline, we fit a multivariate logistic regression model using an *a priori* defined model building protocol that involved backward model selection, adjusting for all variables that were found to be statistically significant at $p < 0.05$ in univariate analyses. All p -values are two sided. All statistical analyses were performed using SAS software version 8.0 (SAS, Cary, NC).

Results

Between September 2005 and October 2006, 478 street-involved youth were recruited into the ARYS cohort.

Among these individuals, 132 (27.6%) were female and 120 (25.1%) self-identified as Aboriginal. The median age was 22 (Interquartile range [IQR]: 20–24). In total, 284 (59.4%) participants reported being homeless at baseline. Of these, 182 (38.1%) were living either at NFA or on the street. One hundred and one (21.1%) reported staying in a shelter or hostel while one participant reported current ‘couch surfing’. Of the remaining 194 (40.6%) participants not reporting homelessness at baseline, most were living either in an apartment (35%), a room in a hotel (32%) or in a house (28%). Further, 89 (46.7%) of these participants and a total of 365 (76%) of the entire cohort reported being homeless at least once in the 6 months prior to baseline.

Table 1 shows the socio-demographic characteristics associated with homelessness. Participants reporting homelessness at baseline were more likely to report having less than a high-school education (Odds ratio [OR] = 1.59;

[95% CI: 1.08–2.35]; $p = 0.019$) as well as having a history of physical abuse (OR = 1.49; [95% CI: 1.03–2.16]; $p = 0.035$).

Table 2 shows the behavioral variables associated with homelessness. Participants reporting current homelessness were more likely to report public injection drug use (OR = 2.31; [95% CI: 1.44–3.70]; $p < 0.001$), having had a non-fatal OD (OR = 1.90; [95% CI: 1.02–3.55]; $p = 0.042$), frequent crack use (OR = 1.80; [95% CI: 1.09–2.98]; $p = 0.019$), drug dealing (OR = 1.69; [95% CI: 1.17–2.45]; $p = 0.005$), having been a victim of violence (OR = 1.54; [95% CI: 1.07–2.22]; $p = 0.021$), and having not been in any drug or alcohol treatment in the past six months (OR = 0.65; [95% CI: 0.42–0.99]; $p = 0.048$).

When all variables that were associated with homelessness at $p < 0.05$ in univariate analyses were considered in a multivariate logistic model (Table 3), public injection

Table 1
Socio-demographic characteristics associated with homelessness among youth

| Characteristics | Homeless | | Odds ratio (95% CI ^a) | <i>p</i> -Value |
|-----------------------------|------------|------------|-----------------------------------|-----------------|
| | No (%) | Yes (%) | | |
| Gender | | | | |
| Male | 136 (70.1) | 210 (73.9) | | |
| Female | 58 (29.9) | 74 (26.1) | 0.83 (0.55–1.24) | 0.356 |
| Age | | | | |
| Median (IQR ^b) | 22 (20–24) | 22 (20–24) | 0.96 (0.90–1.03) | 0.213 |
| Ethnicity | | | | |
| Other | 138 (71.1) | 220 (77.5) | | |
| Aboriginal | 56 (28.9) | 64 (22.5) | 0.72 (0.47–1.09) | 0.117 |
| Highest education | | | | |
| ≥High-school | 73 (37.6) | 78 (27.5) | | |
| <High-school | 121 (62.4) | 206 (72.5) | 1.59 (1.08–2.35) | 0.019 |
| Hepatitis C positive | | | | |
| No | 171 (89.5) | 237 (85.0) | | |
| Yes | 20 (10.5) | 42 (15.0) | 1.52 (0.86–2.67) | 0.149 |
| HIV positive | | | | |
| No | 185 (95.9) | 273 (97.5) | | |
| Yes | 8 (4.1) | 7 (2.5) | 0.59 (0.21–1.66) | 0.316 |
| DTES residence ^c | | | | |
| No | 135 (69.6) | 219 (77.1) | | |
| Yes | 59 (30.4) | 65 (22.9) | 0.68 (0.45–1.03) | 0.065 |
| Incarceration ^c | | | | |
| No | 161 (83.0) | 238 (83.8) | | |
| Yes | 33 (17.0) | 46 (16.2) | 0.94 (0.58–1.54) | 0.814 |
| History of sexual abuse | | | | |
| No | 139 (71.1) | 216 (79.1) | | |
| Yes | 55 (28.3) | 68 (23.9) | 0.80 (0.53–1.20) | 0.279 |
| History of physical abuse | | | | |
| No | 120 (61.9) | 148 (52.1) | | |
| Yes | 74 (38.1) | 136 (47.9) | 1.49 (1.03–2.16) | 0.035 |

Note: 5 and 8 individuals did not have data on HIV and HCV status, respectively.

^aCI—confidence interval.

^bIQR—interquartile range.

^cWhere noted variables refer to activities in the prior six months.

Table 2
Behavioral characteristics associated with homelessness among youth

| Characteristic ^a | Homeless | | Odds ratio (95% CI) ^b | <i>p</i> -Value |
|-----------------------------|------------|------------|----------------------------------|-----------------|
| | No (%) | Yes (%) | | |
| Sex trade involved | | | | |
| No | 172 (88.7) | 253 (89.1) | | |
| Yes | 22 (11.3) | 31 (10.9) | 0.96 (0.54–1.71) | 0.884 |
| Drug dealing | | | | |
| No | 118 (60.8) | 136 (47.9) | | |
| Yes | 76 (39.2) | 148 (52.1) | 1.69 (1.17–2.45) | 0.005 |
| Frequent crack | | | | |
| No | 168 (86.6) | 222 (78.2) | | |
| Yes | 26 (13.4) | 62 (21.8) | 1.80 (1.09–2.98) | 0.019 |
| Frequent heroin | | | | |
| No | 174 (89.7) | 253 (89.1) | | |
| Yes | 20 (10.3) | 31 (10.9) | 1.07 (0.59–1.93) | 0.833 |
| Frequent crystal meth | | | | |
| No | 182 (93.8) | 262 (92.2) | | |
| Yes | 12 (6.2) | 22 (7.8) | 1.27 (0.61–2.64) | 0.514 |
| Public injection | | | | |
| No | 165 (85.1) | 202 (71.1) | | |
| Yes | 29 (14.9) | 82 (28.9) | 2.31 (1.44–3.70) | <0.001 |
| Gallery attendance | | | | |
| No | 162 (83.5) | 222 (78.2) | | |
| Yes | 32 (16.5) | 62 (21.8) | 1.41 (0.88–2.27) | 0.150 |
| Non-fatal OD | | | | |
| No | 179 (92.3) | 245 (86.3) | | |
| Yes | 15 (7.7) | 39 (13.7) | 1.90 (1.02–3.55) | 0.042 |
| Borrow syringes | | | | |
| No | 185 (95.4) | 265 (93.3) | | |
| Yes | 9 (4.6) | 19 (6.7) | 1.47 (0.65–3.33) | 0.348 |
| Lent syringes | | | | |
| No | 187 (96.4) | 264 (93.0) | | |
| Yes | 7 (3.6) | 20 (7.0) | 2.02 (0.84–4.88) | 0.110 |
| Require help injecting | | | | |
| No | 183 (94.3) | 262 (92.2) | | |
| Yes | 11 (5.7) | 22 (7.8) | 1.40 (0.66–2.95) | 0.379 |
| Any treatment | | | | |
| No | 140 (72.2) | 227 (79.9) | | |
| Yes | 54 (27.8) | 57 (20.1) | 0.65 (0.42–0.99) | 0.048 |
| Victim of violence | | | | |
| No | 113 (58.2) | 135 (47.5) | | |
| Yes | 81 (41.8) | 149 (52.5) | 1.54 (1.07–2.22) | 0.021 |

^aAll variables refer to activities in the prior six months unless otherwise indicated.

^bCI—confidence interval.

drug use (adjusted Odds ratio [AOR] = 2.32; [95% CI: 1.43–3.78]; $p < 0.001$), frequent crack use (AOR = 1.84; [95% CI: 1.09–3.09]; $p = 0.023$), having had experienced violence (AOR = 1.57; [95% CI: 1.07–2.30]; $p = 0.020$) and having less than a high-school education (AOR = 1.15; [95% CI: 1.01–2.27]; $p = 0.045$) were independently and positively associated with reporting baseline homelessness. Having been in any drug and alcohol treatment in the last six months was negatively

associated with reporting current homelessness at baseline (AOR = 0.52; [95% CI: 0.33–0.81]; $p = 0.004$).

Discussion

In the present analysis we found a high rate of homelessness among a community-recruited cohort of at-risk youth in Vancouver, with most living on the street or in shelters and hostels. Being homeless was associated with

Table 3
Multivariate logistic regression analysis of characteristics associated with homelessness among youth

| Characteristics | Adjusted Odds ratio | 95% CI ^a | p-Value |
|---|---------------------|---------------------|---------|
| Crack use* (frequent vs. not frequent) | 1.84 | 1.09–3.09 | 0.023 |
| Education (< high-school vs. ≥ high-school) | 1.51 | 1.01–2.27 | 0.045 |
| Public injection* (yes vs. no) | 2.32 | 1.43–3.78 | <0.001 |
| Any treatment* (yes vs. no) | 0.52 | 0.33–0.81 | 0.004 |
| Victim of violence* (yes vs. no) | 1.57 | 1.07–2.30 | 0.020 |

^aConfidence interval.

various risks including frequent crack cocaine smoking, public injection drug use, and having been a victim of violence. Additionally, those reporting homelessness at baseline were less likely to have completed a high-school education and to have been in any drug or alcohol treatment in the preceding six months.

The high rate of homelessness observed among youth participating in this study is worrisome for several reasons. Street-youth commonly have worse health outcomes than other adolescents living in stable conditions. For example, a Montreal study that followed the city's street-youth between 1995 and 2000 demonstrated that the homeless youth mortality rate was 11 times higher than the rate for youth in the general population in the Province of Quebec (Roy et al., 2004). While HIV was not associated with homelessness in this study, homeless participants possessed many characteristics that put them at heightened risk for HIV infection.

In this analysis, frequent crack cocaine use was positively associated with being homeless at baseline. While this finding is similar to a US study which reported that homeless male and female youth have a 1.75–2.27 greater odds of substance use than their respective non-homeless counterparts (Hoyt et al., 1999), it is a significant finding in this setting given that non-injecting drug use, particularly crack smoking has been associated with adolescent initiation into injection drug use (Taylor-Seehafer, 2004; Friedman et al., 1998; Sherman and Latkin, 2002). Moreover, recent literature has shown that homelessness among youth, in itself, can be an important predictor leading to the initiation of injection drug use (Roy et al., 2003). Further, it is concerning that homeless youth in this study were less likely to have a high-school education given the evidence which suggests that having less than a high-school education can often promote initiation into injecting behavior (Crofts et al., 1996; Aidala et al., 2005).

Participants reporting homelessness in this analysis were more likely to be public injectors. This new finding is of particular concern given that public injection drug use tends to be associated with elevated injecting risk behaviors and risk of HIV and HCV transmission (Latkin et al., 1994; Rhodes et al., 2006; Klein and Levy, 2003) as has been demonstrated in an older cohort of IDU in our setting (Small et al., 2005). Importantly, a fear of interruption (e.g., due to police presence) has been linked with rushed

injecting and may also prompt accidental syringe sharing and unsafe disposal of injecting equipment (Miller et al., 2006). Reduced safety and hygienic routines (e.g., using puddle water to mix drugs into a solution) can further lead to vascular damage and bacterial infection (Rhodes et al., 2006) in addition to blood-borne diseases.

Findings from this study also indicate that homelessness was associated with having recently experienced violence. Given the public spaces which homeless youth often spend most of their lives, particularly in urban settings such as downtown Vancouver, this finding is not surprising. Homeless youth, including those in our study, are at-risk for and likely to be subjected to violence, whether they are themselves victimized or are a witness to a violent event (Huba and Melchior, 2000). In one study, for example, it was demonstrated that the odds of experiencing a violent act, including being beaten, witnessing a shooting or stabbing or thinking of hurting someone else, are 2–3 higher for street-based youth than other youth (Irwin et al., 1996). Furthermore, the probability that street-youth will experience violence likely increases in accordance with the amount of time spent on the street (Huba and Melchior, 2000; Fuller et al., 2001), further demonstrating the incredible need for interventions that prevent at-risk youth from either becoming or remaining homeless.

Finally, in this analysis, youth reporting baseline homelessness were less likely to have been in addiction treatment in the past 6 months. Interestingly, while some literature suggests that only a small proportion of youth who use drugs, seek treatment (Carlson et al., 2006; Klein et al., 2000; Irwin et al., 1996; Sherman, 1992; Sherman and Latkin, 2002), other research indicates that when services are available, youth access them (Carlson et al., 2006; De Rosa et al., 1999). However, some geographers have pointed to the varying and unequal spatial location of support services (Cloke et al., 2000; May, 2003) which undoubtedly presents barriers for youth seeking treatment. In this study, we acknowledge, however, that not being in any treatment may also be a predisposing factor for becoming homeless and not just a consequence. Competing needs such as finding safe shelter and food also renders accessing health care difficult or may make it a low priority (Carlson et al., 2006). Regardless, our findings are troublesome given that the longer individuals are homeless,

the more likely they are to become involved in substance abuse (Feldman and Middleman, 2003). The emotional distress and mental health concerns homeless youth often face may be further exacerbated by constant victimization and violence commonly experienced on the streets, and in turn may increase susceptibility to addiction (Fuller et al., 2001; Sherman, 1992) as described above. However, because homeless young people are often not connected to a traditional health care system, improving health outcomes among this population can be challenging (Sherman, 1992).

While homelessness itself is widely considered to be marginal and risky, for some young people it is a considerably safer choice than remaining at home (Daiki, 2007). Interestingly, some research has suggested that the spaces often meant to provide a safe and secure place for homeless youth (e.g., shelters,) are not, in reality, viewed as safe in comparison to public spaces where youth can remain connected within their peer networks and 'street families' (Pain and Francis, 2004; De Rosa et al., 1999). A lack of privacy, restrictive rules (e.g., curfews, hours of operation), and a fear of violence, assault and theft in shelters often dissuades individuals from actively seeking out and using such services (Frankish et al., 2005; Daiki, 2007; De Rosa et al., 1999). For youth, specifically those under the age of 18, having to provide personal identification to use shelter services may be a particularly important barrier especially for those who do wish to keep their whereabouts from their parents/guardians a secret (De Rosa et al., 1999). Trusting professionals including health care providers is often difficult for homeless youth, as many have had numerous real or perceived negative experiences with adults throughout their lives (Feldman and Middleman, 2003; Carlson et al., 2006). As a result, the social networks among street-youth are of particular importance. In Vancouver, for example, street-youth have reported they often turn to their friends rather than professionals for help and medical advice (Smith et al., 2007). For those youth who use illicit drugs, there may be additional concerns regarding the involvement of police and/or social services when seeking health care (Feldman and Middleman, 2003). Homeless youth often perceive their housing status to be one reason why police hassle them and in this sense, a lack of support from police may reinforce or in some cases actually create the housing difficulties they experience (Daiki, 2007; De Rosa et al., 1999). Importantly, individuals involved in the drug economy are significantly more likely to share syringes, inject with a greater number of contacts, spend more time on the street, and have larger social networks of active drug users (Buhrich et al., 2000; Ensign and Santelli, 1998). Taking into consideration the nature of their social networks, one approach to address the needs of this highly vulnerable population may be to include youth in the process as peer educators. More specifically, street-experienced individuals could be trained to promote safer practices among youth, particularly for those heavily

involved in drug use, and could also work to place individuals in contact with support services.

The present study has several limitations. First, although extensive street-based outreach efforts and snowball sampling methods were used to derive a representative sample of street-involved youth, there are no registries from which to draw a random sample. With respect to this concern, it should be noted that the ARYS cohort demographics are similar to other local studies of street-involved youth (Ochnio et al., 2001; Miller et al., 2006). Homelessness among youth is often described as a transient or episodic rather than fixed grouping, in that young people often move into and out of it at different times (Pain and Francis, 2004; May, 2003) and given that we only measured homelessness at one time point, it is likely that our estimate of homelessness in this setting may be underestimated. Further, given that almost half of the street-involved youth in our study reported being homeless at least once in the 6 months prior to baseline, it is likely therefore, that participants in ARYS represent youth on a continuum of homelessness rather than youth who can be divided into one of two distinct groups: those whom are homeless versus those whom are not. Since we relied on self-report data regarding drug- and sexual-related practices, our analysis could be subject to socially desirable responding. Although confidentiality is reassured as part of the interview, and interviewers make every effort to build trust with the participants, it is possible that we underestimated some behaviors in the present study.

In summary, we found a high rate of homelessness among a community-recruited cohort of drug using street youth, with approximately 57% of youth reporting homelessness at baseline. Further, we identified a unique set of risk factors associated with homelessness in our cohort which included frequent crack use, public injecting, experiencing violence and having not been in any addiction treatment in the six-month period prior to being interviewed. The findings of this analysis paint a bleak picture for street-involved youth in Vancouver, Canada. Our observations are particularly worrisome given previous literature which suggests that if violence, psychological disorders and substance use remain untreated and if homelessness and public injecting behaviors persists, additional challenges are likely to develop (Martijn and Sharpe, 2006), including heightened risk for premature death and HIV infection (Hwang et al., 1997; Clatts et al., 1998; Klinkenberg et al., 2003). To ensure support and care for this vulnerable population, improved access to appropriate health care is vital, whether it be by providing transportation to available services, increasing their number and location, or applying an integrated approach to address multiple needs (e.g., mental health issues, drug treatment) in one place. Based on the findings of this study, low-barrier supportive housing, that is housing where a minimal number of expectations are placed on tenants (e.g., drug use tolerated) and increased availability of residential treatment programs, may be appropriate first

steps to create spaces where youth feel comfortable. Further, the barriers impacting access to care need to be fully evaluated and managed. Given the importance of social networks and street families, training youth to act as peer educators may be a particularly effective program to promote safer practices and improve awareness of available services. Finally, more participatory research should be conducted with street youth, particularly where the focus is on the development and evaluation of programs/policies specifically intended to address the health and social issues of street youth and/or other homeless populations.

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References

- Aidala, A., Cross, J.E., Harre, D., Sumartojo, E., 2005. Housing status and HIV risk behaviors: implications for prevention and policy. *AIDS Behavior* 9, 251–265.
- Bousman, C., Blumberg, E.J., Shillington, A.M., Hovell, M.F., Ji, M., Lehman, S., Clapp, J., 2005. Predictors of substance use among homeless youth in San Diego. *Addictive Behavior* 30, 1100–1110.
- Buhrich, N., Hodder, T., Teeson, M., 2000. Lifetime prevalence of trauma among homeless people in Sydney. *Australia and New Zealand Journal of Psychiatry* 34, 863–866.
- Canada Mortgage and Housing Corporation, 2001. Research Report. Environmental Scan on Youth Homelessness: 1-71 Canada Mortgage and Housing Corporation Ottawa, Canada.
- Canadian Centre for Policy alternatives, 1998. Alternative federal budget papers 1998. Canadian Centre for Policy Alternatives Ottawa, Canada.
- Carlson, J., Sugano, E., Millstein, S.G., Auerswald, C.L., 2006. Service utilization and the life cycle of youth homelessness. *Journal of Adolescent Health* 38, 624–627.
- Clatts, M.C., Davis, W.R., Sothoran, J.L., Atillasoy, A.R., 1998. Correlates and distribution of HIV risk behaviors among homeless youth in NYC: implications of prevention and policy. *Child Welfare* 77, 195–207.
- Cloke, P., Milbourne, P., Widdowfield, R., 2000. The hidden and emerging spaces of rural homelessness. *Environment and Planning A* 32, 77–90.
- Crofts, N., Louie, R., Rosenthal, D., Jolley, D., 1996. The first hit: circumstances surrounding initiation into injecting. *Addiction* 91, 1187–1196.
- Culhane, D.P., Gullub, E., Kuhn, R., Shpaner, M., 2001. The co-occurrence of AIDS and homelessness: results from the integration of administrative databases for AIDS surveillance and public shelter utilization in Philadelphia. *Journal of Epidemiology and Community Health* 55, 5–20.
- Daiski, I., 2007. Perspectives of homeless people on their health and health needs priorities. *Journal of Advanced Nursing* 58, 273–281.
- De Rosa, C., Montgomery, S.B., Kipke, M.D., Iverson, E., Ma, J.L., Unger, J.B., 1999. Service utilization among homeless and runaway youth in Los Angeles, California: rates and reasons. *Journal of Adolescent Health* 24, 449–458.
- Diez Roux, A.V., 2002. Invited commentary: places, people, and health. *American Journal of Epidemiology* 155, 516–519.
- Ensign, J., Santelli, K., 1998. Shelter-based homeless youth. Health and access to care. *Archives of Pediatrics and Adolescent Medicine* 152, 20–24.
- Feldman, J., Middleman, A.B., 2003. Homeless adolescents: common clinical concerns. *Seminars in Pediatric Infectious Diseases* 14, 6–11.
- Frankish, C.J., Hwang, S.W., Quantz, D., 2005. Homelessness and health in Canada. *Canadian Journal of Public Health* 96, S23–S29.
- Friedman, S.R., Furst, R.T., Jose, B., Curtis, R., Neagius, A., Des Jarlais, D.C., Goldstein, M.F., Ildefonso, G., 1998. Drug scene roles and HIV risk. *Addiction* 93, 1403–1416.
- Fuller, C., Vlahov, D., Arria, A.M., Ompad, D.C., Garfein, R., Strathdee, S.A., 2001. Factors associated with adolescent initiation of injection drug use. *Public Health Reports* 116 (Suppl. 1), 136–145.
- Fuller, C., Vlahov, D., Latkin, C.A., Ompad, D.C., Celentano, D.D., Strathdee, S.A., 2003. Social circumstances of initiation of injection drug use and early shooting gallery attendance: implications for HIV intervention among adolescent and young adult injection drug users. *Journal of the Acquired Immune Deficiency Syndromes* 32, 86–93.
- Goering, P., Tolomiczenko, G., Sheldon, T., Sheldon, T., Boydell, K., Wasylenki, D., 2002. Characteristics of persons who are homeless for the first time. *Psychiatric Services* 53, 1472–1474.
- Green, T., Hankins, C., Palmer, D., Boivin, J.F., Platt, R., 2003. Ascertaining the need for a supervised injecting facility (SIF). The burden of public injecting in Montreal, Canada. *Journal on Drug Issues* 33, 713–732.
- Health Canada, 2003. HIV and AIDS among youth in Canada. In HIV/AIDS epi update centre for infectious disease prevention and control. Available at <http://www.phac-aspc.gc.ca/publicat/epiu-aeipi/hiv-vih/youth_e.html>. Accessed on November 5, 2006.
- Hoyt, D.R., Ryan, K.D., Cauce, A.M., 1999. Personal victimization in a high-risk environment: homeless and runaway adolescents. *Journal of Research in Crime and Delinquency* 36, 371–392.
- Huba, G.J., Melchior, L.A., 2000. Predicting substance abuse among youth with, or at high risk for HIV. *Psychology of Addictive Behaviors* 14, 197–205.
- Hwang, S.W., Oray, E.J., O'Connell, J.J., Lebow, M., Brennan, T.A., 1997. Causes of death in homeless adults in Boston. *Annals of Internal Medicine* 126, 625–628.
- Irwin, K., Edlina, B.R., Faruque, S., McCoy, M.V., Word, C., Serrano, Y., Inciardi, J., Bowser, B., Holmberg, S.D., 1996. Crack cocaine smokers who turn to drug injection: characteristics, factors associated with injection, and implications for HIV transmission. *Drug and Alcohol Dependence* 42, 85–92.
- Klein, H., Levy, J., 2003. Shooting gallery users and HIV risk. *Journal of Drug Issues* 33, 751–767.
- Klein, J.D., Woods, A.H., Wilson, K.M., Prospero, M., Greene, J., Ringwalt, C., 2000. Homeless and runaway youths access to health care. *Journal of Adolescent Health* 27, 43–48.
- Klinkenberg, W.D., Casyln, R.J., Morse, G.A., Yonker, R.D., McCudden, S., Ketema, F., Constantine, N.T., 2003. Prevalence of human immunodeficiency virus, hepatitis b and hepatitis C among homeless persons with co-occurring severe mental illness and substance use disorders. *Comprehensive Psychiatry* 44, 293–302.
- Latkin, C., Mandell, W., Vlahov, D., Oziemkowska, M., Knowlton, A., Celentano, D., 1994. My place, your place and no place: behavior settings as a risk factor for HIV-related injection practices of drug users in Baltimore, Maryland. *American Journal of Community Psychology* 22, 415–430.

- Macintyre, S., Ellaway, E., Cummins, S., 2002. Place effects on health: how can we conceptualise, operationalise and measure them? *Social Science & Medicine* 55, 125–139.
- Martijn, C., Sharpe, L., 2006. Pathways to youth homelessness. *Social Science & Medicine* 62, 1–12.
- May, J., 2003. Local connection criteria and single homeless people's geographical mobility: evidence from Brighton and Hove. *Housing Studies* 18, 29–46.
- Miller, C., Strathdee, S.A., Kerr, T., Li, K., Wood, E., 2006. Factors associated with early adolescent initiation into injection drug use: implications for intervention programs. *Journal of Adolescent Health* 38, 462–464.
- National Coalition for the Homeless, Homeless youth fact sheet #13. Available at <<http://www.nationalhomeless.org/publications/fact/youth/pdfwww.nationalhomeless.org/publications/fact/youth/pdf>>. Accessed on December 1, 2006.
- Navarro, C., Leonard, L., 2004. Prevalence and factors related to public injecting in Ottawa, Canada: implications for the development of a trial safer injecting facility. *International Journal on Drug Policy* 15, 275–284.
- Nwakeze, P.C., Magura, S., Rosenblum, A., Joseph, H., 2003. Homelessness, substance misuse, and access to public entitlements in a soup kitchen population. *Substance Use and Misuse* 38, 64–68.
- Ochnio, J., Patrick, D., Ho, M., Talling, D.N., Dobson, S.R., 2001. Past infection with hepatitis A virus among Vancouver street youth, injection drug users and men who have sex with men: implications for vaccination programs. *Canadian Medical Association Journal* 165, 293–297.
- Pain, R., Francis, P., 2004. Living with crime: spaces of risk for homeless young people. *Children's Geographies* 2, 95–110.
- Pickett, K.E., Pearl, M., 2001. Multilevel analyses of neighborhood socioeconomic context and health outcomes: a critical review. *Journal of Epidemiology and Community Health* 55, 111–122.
- Rhodes, T., Kimber, J., Small, W., Fitzgerald, J., Kerr, T., Hickman, M., Holloway, G., 2006. Public injecting and the need for 'safer environment interventions' in the reduction of drug-related harm. *Addiction* 101, 1384–1393.
- Ringwalt, C., Greene, J.M., Robertson, M., 1998. The prevalence of homelessness among adolescents in the US. *American Journal of Public Health* 88, 1325–1329.
- Roy, E., Haley, N., Leclerc, P., Cedras, L., Boivin, J.F., 2002. Drug injection among street youth: the first time. *Addiction* 97, 1003–1009.
- Roy, E., Haley, N., Leclerc, P., Cedras, L., Blais, L., Boivin, J.F., 2003. Drug injection among street youths in Montreal: predictors of initiation. *Journal of Urban Health* 80, 92–105.
- Roy, E., Haley, N., Leclerc, P., Sochanski, B., Boudreau, J.F., Boivin, J.F., 2004. Mortality in a cohort of street youth in Montreal. *Journal of the American Medical Association* 292, 569–574.
- Sherman, D., 1992. The neglected health care needs of street youth. *Public Health Reports* 107, 433–440.
- Sherman, S.G., Latkin, C.A., 2002. Drug users' involvement in the drug economy: implications for harm reduction and HIV prevention programs. *Journal of Urban Health* 79, 266–277.
- Small, W., Kerr, T., Charette, J., Wood, E., Spittal, P., 2005. HIV risks related to public injecting in Vancouver's Downtown Eastside. *Canadian Journal of Infectious Diseases* 16, 16A.
- Smith, A., Saewyc, E., Albert, M., MacKay, L., Northcott, M., The McCreary Centre Society, 2007. *Against the Odds: A Profile of Marginalized and Street-involved Youth in BC*. The McCreary Centre Society, Vancouver, BC.
- Taylor-Seehafer, M.A., 2004. Positive youth development: reducing the health risks of homeless youth. *MCN The American Journal of Maternal Child Nursing* 29, 36–40.
- Wood, E., Stolz, J., Montaner, J.S.G., Kerr, T., 2006. Evaluating methamphetamine use and risks of injection initiation among street youth: the ARYS study. *Harm Reduction Journal* 3, 18–24.