

# Mental disorder, service use, and barriers to care among 500 homeless people in 3 different urban settings

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## Abstract

**Objective** To determine the standardized rates of mental disorder, health service use and barriers to care in a representatively diverse sample of homeless adults in three different sized urban centers in British Columbia, Canada.

**Method** Five hundred homeless adults from Vancouver, Victoria and Prince George were recruited. The MINI-International Neuropsychiatric Interview PLUS was used to determine current and lifetime rates of mental disorder, mental disorder episodes and suicidality. Health service use and barriers to care were recorded.

**Results** Overall, 92.8 % of participants met criteria for a current mental disorder: 82.6 % for alcohol or drug dependence, 57.3 % anxiety disorder, 31.5 % mood disorder. Over half (53.4 %) met criteria for a concurrent disorder. Only 14.9 % had seen a psychiatrist and 12.7 % a mental health team in the year prior to the survey. Most common barriers included being poorly connected to the system of care and issues related to homelessness. Mental

disorder rates across sites were high, however, differences were found that reflected the composition of the samples.

**Conclusion** Improving the mental health state of the homeless will require significant capacity for mental health and concurrent disorder programming that is tailored to the community it intends to serve. Demographic features of the population may help in directing assessments of need.

**Keywords** Homeless persons · Mental disorder · Health services · Substance dependence · British Columbia

## Background

After more than 50 years of public health research on homelessness and health [1], homelessness continues to be a major global public health concern [2–5]. While mental disorder and addiction are among the most persistent and prevalent health concerns affecting the safety and well-being of homeless people, too few are able to access appropriate services given their mental health needs [4]. The traditional purpose of epidemiologic mental health surveys has been the assessment of psychiatric disorders, determining and projecting the amount and nature of treatment needs, and the development of tailored services [34]. Hence, the estimation of prevalence rates of mental disorders is of great importance as underestimating or overestimating may have direct implications to health service planning and delivery.

Underestimating mental disorder rates may lead to under-allocation of care, and the significant potential health burdens and costs associated with untreated mental health disorders [35]. In contrast, overestimating mental disorder rates may also lead to significant costs, including the economic impact of unnecessary services and the

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opportunity costs associated with using resources for mental health that might be better allocated to other types of social programs.

Although several studies have measured mental disorder prevalence rates in specific homeless populations, available data are of limited use to policy makers and public health planners for several reasons: (a) the diversity found in contemporary homeless populations, such as a significant number of women, is not represented in many previous reports on mental disorder; (b) differences in participant characteristics between homeless studies limit the generalizability of results; (c) previous research has focused almost exclusively on large urban centers with little data on smaller centers or comparing different-sized cities; (d) intra-study differences in design, sampling technique and inclusion criteria, has contributed to a wide range of prevalence rates when multiple studies have been combined for analysis. This has led Fazel et al. [5] to state in a 2008 systematic review and meta-regression analysis on mental disorder and homelessness, that ‘service planning should not rely on our summary estimates but commission[ed] local surveys of morbidity to quantify mental health needs’.

Developing an effective mental health strategy to support, stabilize and reconnect the homeless population requires an accurate estimate of the burden of mental illness and a detailed understanding of its distribution. To our knowledge no Canadian studies are available in the peer-reviewed literature that used standardized instruments to report mental disorder in a sizable population of homeless people living on the streets and in homeless shelters, and very few studies have done so across different-sized urban settings. To date, Canadian estimates of mental disorder have been approximated using review articles from the United States, often using non-standardized self-report measures and previous diagnosis data [6–8]. Furthermore, differences between the US and Canada, such as the healthcare system, available support, the law enforcement system, and the composition of the homeless population may have an impact on the specific profile and characteristics of the homeless population. Currently, the academic evidence from which Canadian health agencies can base important public health planning on are at best incomplete and at worst inaccurate.

#### Aims of the study

To report standardized prevalence rates of mental disorder, health service use and barriers to care among a purposefully diverse sample of homeless men and women. To compare demographic features, mental disorders and health services utilization across three different cities in the province of British Columbia, Canada.

## Materials and methods

### Sample

Between May and September 2009, the British Columbia Health of the Homeless Survey (BCHOHS) recruited 500 homeless people in three cities in British Columbia, Canada: the metropolitan city of Vancouver, population 2,116,581 ( $n = 250$ ); the capital island city of Victoria, population 330,088 ( $n = 150$ ); and the fairly remote city of Prince George, population 83,225 ( $n = 100$ ). Participants were to be at least 19 years old, willing and able to give informed consent, able to communicate and be understood in English, and to self-identify as being homeless during the month prior to study entry. Homelessness was defined as living on the streets or in a homeless shelter. Purposeful sampling was used to recruit a significant proportion of women, young people aged 19–24, individuals who identify as Aboriginal, and individuals living on the streets. Targets for sampling these subgroups were set at 50 % of the sample being recruited from the streets, at least 30 % of the participants being women, a minimum of 30 % of the sample identifying as Aboriginal, and at least 10 % of the participants being teenagers and young adults between 19 and 24 years of age.

### Procedure

Inclusion criteria, recruitment, and procedures have been described in detail elsewhere [36]. Briefly, we recruited 500 homeless adults from multiple sites in three cities in British Columbia, Canada. Study participants were recruited through an intensive outreach campaign. A comprehensive list of the existing homeless services for all three cities was created through community consultation, previous knowledge and the Internet. In order to recruit individuals living on the street, research assistants surveyed places where homeless people were known to be and contacted existing street outreach teams and drop-in centers. To recruit individuals living in shelters, research assistants visited all homeless shelters in Victoria and Prince George, and selected homeless shelters in Vancouver. Recruitment was conducted on weekdays and occasionally on weekends.

Individuals approached and interested in participating were informed of the goals and rationale of the study and the requirements for participation. Participants attended a one-session, face-to-face interview with several instruments including a screening for study eligibility, a demographic questionnaire and the MINI-PLUS Neuropsychiatric Interview. Interviews were primarily administered in a research office; however, some interviews took place in a space on site (e.g., at a homeless shelter) where the participant felt

comfortable. Participants received CAD \$30 for their time at the end of the meeting with the research assistant (RA), regardless if the research interview had been completed or not. Interviews were conducted by eight RAs who were supervised and trained for the application of the interview battery by a senior Clinician–Scientist. Each RA had extensive previous experience in working with homeless, substance using, and/or mentally ill individuals. Four RAs have been working with vulnerable populations in both clinical and research settings for several years. Two RAs have been involved in research projects prior to our survey, and two had clinical experience working with these populations. The training of the RAs included one information session on inter-rater reliability. The interview, excluding consent and screening, was designed to last approximately 1 h, but individual needs (e.g., taking breaks) of each participant were considered a priority over finishing the interview in a certain amount of time. Participants received \$30 for their time spent with research at the end of the meeting with the interviewer. Ethical approval for this study was obtained from the Behavioural Research Ethics Board of the University of British Columbia and the Providence Health Care Research Institute. All participants gave informed consent prior to their inclusion in the study.

## Measures

Diagnoses of mental disorders were established by using the MINI-International Neuropsychiatric Interview Plus Version 5.0.0 (MINI-PLUS) [9], a structured clinical interview for research settings based on the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) criteria. The DSM-IV has been used to measure psychopathology in homeless populations in previous studies [10, 11] and has been shown to be reliable and valid in several North-American and European community samples [9]. We administered modules for the following current and lifetime episodes and disorders: major depressive episode, (hypo)manic episode, dysthymia, schizophrenic psychosis, general anxiety disorder (current only), panic disorder, agoraphobia, social phobia, posttraumatic stress disorder (PTSD), alcohol and drug dependence, suicidality (current only), and suicide attempt (lifetime only). Current diagnosis times vary by disorder and are described as follows: major depressive disorder and episode (past 2 weeks), dysthymia (2 years), suicidality, panic disorder, social phobia and PTSD (past month), (hypo) manic episode, psychotic disorders and agoraphobia ('currently'), alcohol and drug dependence (past 12 months). It was our intention to assess the co-occurrence and overlap of substance dependence and mental disorder in this paper. Hence, we do not show prevalence rates for independent mental disorders, but for mental disorders including substance-related mental disorders.

Selected and modified questions of the National Survey of Homeless Assistance Providers and Clients's (NSHAPC), Modules 'Service Needs' and 'Sources of Service Needs' were used to determine health service utilization. The NSHAPC is a comprehensive measure developed specifically for homeless populations and oriented toward assessing chronic health conditions, health service utilization and barriers to accessing care. The complete NSHAPC questionnaire comprises of 14 sections, each section having up to 28 questions.

Four of the questions selected for our research asked about health service using a list (e.g., "*In the past 12 months have you seen...[list]*") and two questions were open ended (e.g., "*What are the reasons you do not have a regular medical doctor/nurse practitioner?*"). Open-ended questions we collected and grouped into themes based on responses all major themes were reported. Responses could have fallen into more than one category.

In addition, a Demographic Questionnaire was used to capture sociodemographic features on the populations such as: age, gender, ethnicity, education, marital status and sleeping location at the time of interview. Based on previous homeless counts and the tendency of marginal subgroups within the homeless to be underrepresented a specific effort was made to include at least 30 % of the participants identifying as Aboriginal. Participants were asked to identify which ethnic group/descent they specifically identify with. The Aboriginal peoples who participated in this study represented nations throughout British Columbia and included: Cree, Carrier, Dene, Gitksan, Sekani, Ojibway, Coast Salish and Metis.

## Analytic approach

The MINI-PLUS diagnostic algorithm was used to summarize mental health disorders and 95 % confidential intervals were estimated from binomial distribution. Demographic characteristics, mental disorder and service utilization rates were stratified by research location and differences across locations were compared using ANOVA for continuous variables and Pearson's Chi-square test for categorical variables. The F-statistics is 0.2 and the degrees of freedom for ANOVA is 2, as we have three study sites. Normal approximation to binomial distribution was used to estimate the confidence intervals.

Site differences were examined by ANOVA for continuous variables and Pearson's Chi-square for categorical variables; the analysis was conducted for the differences itself instead of pair-wise comparisons.

As this study comes with an exploratory data analysis approach, it was not intended to test a global null hypothesis where all individual hypotheses are true simultaneously.

Therefore, multiple test adjustment was not applied in the analysis.

All analyses were performed using Statistical Analysis System SAS, SAS Institute Inc., North Carolina, USA, Version 9.1. All  $p$  values were two-sided and the significant level was set at  $p < 0.05$ .

## Results

### Sociodemographic characteristics

Five hundred participants were recruited into the study and completed the demographic questionnaire. Demographic characteristics stratified by survey location are shown in Table 1. The mean age of participants was  $37.9 \pm 11$  years, 16.4 % were youth/young adults in the age range from 19 to 24 years, 39.2 % were female and 39.8 % of the participants identified as Aboriginal. In bivariate analyses, demographic features did not differ between survey locations except for two variables. When compared to Vancouver and Victoria, more participants from Prince George were currently sleeping in a shelter than on the street ( $p < 0.001$ ), and more identified as Aboriginal ( $p < 0.001$ ). Participants from Victoria were more likely to be sleeping on the street than those in Vancouver and PG ( $p < 0.001$ ).

### Mental disorder

In total, 489 (98 %) MINI-PLUS questionnaires were included for analysis and 11 were discarded due to incompleteness or lack of confidence indicated by the interviewer

[9]. Current and lifetime mental disorder and mental disorder episode rates stratified by survey location are shown in Table 2. We found that 92.8 % of participants met criteria for at least one mental disorder or mental disorder episode and 82.6 % met criteria for current substance dependence disorder (alcohol or drug dependence). Over half of the participants (57.3 %) met criteria for a current anxiety disorder (general anxiety disorder, panic disorder, agoraphobia, and PTSD).

### Mental disorders by location

Participants from Victoria compared to participants from Vancouver and Prince George had higher rates of current depressive episode, social phobia, general anxiety disorder (all  $p < 0.001$ ) and current drug dependence ( $p < 0.05$ ). Participants from Prince George had higher prevalence rates of alcohol dependence ( $p < 0.001$ ) and lifetime suicide attempts ( $p < 0.001$ ) than the other two sites (Table 2). When comparing participants in terms of their ethnicity, those who identified as being Aboriginal had significantly higher rates of alcohol dependence ( $p < 0.0001$ ), while PTSD showed a trend towards significance, but did not meet the criterion for  $p \leq 0.05$ .

### Health service utilization and barriers to care

Health service utilization rates for different categories of health services stratified by survey location are shown in Tables 3 and 4. In total, 63.2 % of participants reported having a regular medical doctor/nurse practitioner and 34.0 % felt that in the 12 months prior to the survey they

**Table 1** Demographic characteristics of participants

Variable	Vancouver, $n = 250$ (%)	Victoria, $n = 150$ (%)	Prince George, $n = 100$ (%)	Total sample, $n = 500$ (%)
Age, mean (SD)	38.0 ( $\pm 10.8$ )	37.4 ( $\pm 11.6$ )	38.3 ( $\pm 10.9$ )	37.9 ( $\pm 11.0$ )
Youth (age $\leq 24$ )	36 (14.4)	29 (19.3)	10 (10.0)	75 (15.0)
Gender				
Female	93 (37.2)	56 (37.3)	47 (47.0)	196 (39.2)
Male	157 (62.8)	94 (62.7)	53 (53.0)	304 (60.8)
Ethnicity				
White	159 (63.6)	98 (65.3)	23 (23.0)	280 (56.0)
Aboriginal	76 (30.4)	48 (32.0)	75 (75.0)**	199 (39.8)
Other <sup>a</sup>	15 (6.0)	4 (2.7)	2 (2.0)	21 (4.2)
Current housing				
Street	125 (50.0)	101 (67.3)**	24 (24.0)	250 (50.0)
Shelter	125 (50.0)	49 (32.7)	76 (76.0)	250 (50.0)
Education				
Less than high school	159 (63.6)	91 (60.7)	68 (68.0)	318 (63.6)
Married/common law	26 (10.4)	16 (10.7)	7 (7.0)	49 (9.8)

\*  $p < 0.05$ , \*\*  $p < 0.001$  from Chi-square test or Fisher's exact test

<sup>a</sup> Black/African (2.2 %); Asian (1.2 %); Hispanic/Latin American (0.8 %)

**Table 2** Prevalence rates for current and lifetime mental disorders and disorder episodes for total sample and stratified by survey location

	Vancouver, ( <i>n</i> = 240)	Victoria, ( <i>n</i> = 149)	Prince George, ( <i>n</i> = 100)	Total Sample, ( <i>n</i> = 489)
<b>Current disorders</b>				
Drug dependence	157 (65.4)	118 (79.2)	68 (68.0)	343 (70.1)
Alcohol dependence	61 (25.4)	56 (37.6)	65 (65.0)**	182 (37.2)
Agoraphobia	70 (29.2)	51 (34.2)	18 (18.0)	139 (28.4)
Major depressive episode	55 (15.4)	37 (36.8)	19 (19.0)	111 (22.7)
Posttraumatic stress disorder	44 (18.3)	38 (25.5)	18 (18.0)	100 (20.5)
General anxiety disorder	46 (19.2)	43 (28.9)**	9 (9.0)	98 (20.0)
Social phobia	24 (10.0)	43 (28.9)**	22 (22.0)	89 (18.2)
Suicide risk <sup>a</sup>	37 (15.4)	28 (18.8)	15 (15.0)	80 (16.4)
Schizophrenic psychosis	28 (11.7)	28 (18.8)	17 (17.0)	73 (14.9)
Panic disorder	27 (11.3)	28 (18.8)	8 (8.0)	63 (12.9)
(Hypo)manic episode	21 (8.8)	21 (14.1)	17(17.0)	59 (12.1)
Dysthymia	7 (2.9)	5 (3.3)	1 (1.0)	13 (2.7)
<b>Lifetime disorders</b>				
Drug dependence	176 (73.3)	123 (82.6)*	75 (75.0)	374 (76.5)
Alcohol dependence	156 (65.0)	103 (69.1)	78 (78.0)*	337 (68.9)
Major depressive episode	92 (38.3)	97 (65.1)**	33 (33.0)	222 (45.4)
(Hypo)manic episode	94 (39.2)	78 (52.3)	45 (45.0)	217 (44.4)
Agoraphobia	87 (36.3)	75 (50.3)**	32 (32.0)	194 (39.7)
Suicide attempt	75 (31.3)	57 (38.3)	51 (51.0)**	183 (37.4)
Schizophrenic psychosis	49 (20.4)	53 (35.6)**	31 (31.0)	133 (27.2)
Panic disorder	40 (16.7)	44 (29.5)**	13 (13.0)	97 (19.8)
Dysthymia	10 (4.2)	5 (3.3)	8 (8.0)	23 (4.7)

Values are given as *n* (%)

\*  $p < 0.05$ , \*\*  $p < 0.001$  from Chi-square test or Fisher's exact test

<sup>a</sup> Moderate to high current suicide risk in MINI-PLUS (30)

had needed care but not received it. Main barriers to care included being poorly connected to the system and issues related to homelessness (Table 4).

## Discussion

Mental disorder estimates from homeless studies in Western countries have found the prevalence rate of having at least one current mental disorder to be approximately 50–70 % [12–16]. In the present study, 92.8 % of participants met criteria for at least one current mental disorder or mental disorder episode, exceeding the high end of the range previously established in the literature. This number was driven primarily by a high prevalence of substance dependence (82.6 %), particularly drug dependence. Substance dependence makes up a substantial portion of the burden of illness carried by this population and will require dedicated efforts from health systems and community agencies to effectively meet the health needs of this underserved population.

Compared to the pooled prevalence rates of mental disorders from a systematic review of 29 homeless studies published between 1966 and 2007 [5] of mostly homeless males, the participants in our study reported much higher

rates of current drug dependence (82.6 vs. 24.4 %), and similar rates of current alcohol dependence and psychotic disorders [5]. In all three settings surveyed, participants reported more drug dependence than alcohol dependence. This contradicts the majority of previous studies that found alcohol dependence to be most common [5, 12], but adds to more recent evidence that shows a trend of increased drug use and dependence in homeless populations and particularly among homeless women [17, 18]. When compared to other studies that used standardized instruments, our participants reported higher rates of both current and lifetime mood disorder episodes, anxiety disorders [4, 13, 15, 18], and comparable rates of posttraumatic stress disorder [19] and dysthymia [18]. Little comparable research is available on (hypo)manic episodes and bipolar disorders, however, the high rates of (hypo)manic symptoms reported by our participants (current, 12.1 %; lifetime, 44.4 %) warrants further research.

These findings describe a population in great need of mental health care and stable housing. Health service utilization rates exposed a discouraging reality. There is agreement in the medical and scientific communities that mental health recovery, aside from housing and physical recovery is essential for overcoming homelessness and reintegration into society, but participants in our study

**Table 3** Prevalence rates of health care service use stratified by survey location

	Vancouver, <i>n</i> = 247 (%)	Victoria, <i>n</i> = 150 (%)	Prince George, <i>n</i> = 100 (%)	Total sample, <i>n</i> = 497 (%)
Health services used in the past 12 months				
Family doctor	141 (57.1)	105 (70.0)**	61 (61.0)	307 (61.8)
Emergency room	127 (51.4)	82 (54.7)	68 (68.0)*	277 (55.7)
Walk-in clinic	105 (42.5)	83 (55.3)*	33 (33.0)	221 (44.2)
Street nurse	44 (17.8)	71 (47.3)**	31 (31.0)	146 (29.4)
Nurse practitioner	37 (14.9)	64 (42.7)	29 (29.0)	130 (26.2)**
Hospital overnight <sup>a</sup>	56 (22.7)	36 (24.0)	22 (22.0)	114 (22.9)
Psychiatrist	35 (14.2)	26 (17.3)	13 (13.0)	74 (14.9)
Mental health team	33 (13.4)	16 (10.7)	14 (14.0)	63 (12.7)
Crisis or suicide prevention services	4 (1.6)	5 (3.3)	3 (3.0)	12 (2.4)
Services used for drug problems in the past 6 months				
Detox treatment	97 (39.3)	37 (24.7)	59 (59.0)**	193 (38.8)
Self-help group	84 (34.1)	30 (20.0)**	41 (41.0)	155 (31.2)
Residential treatment	89 (36.0)	25 (16.7)**	35 (35.0)	149 (30.0)
Counseling	69 (27.9)	19 (12.7)	40 (40.0)**	128 (25.8)
Methadone program	65 (26.3)	47 (31.3)	13 (13.0)*	125 (25.0)
Outpatient/day treatment	54 (21.9)**	16 (10.7)	7 (7.0)	77 (15.5)

\*  $p < 0.05$ , \*\*  $p < 0.001$ <sup>a</sup> Includes at least one night in a hospital, nursing home or convalescent home**Table 4** Health care utilization and perceived barriers to care

	Total sample <i>N</i> = 497 <i>n</i> (%)
Has a regular medical doctor (MD) or nurse practitioner (NP)	314 (63.2)
Reasons for not having an MD/NP <sup>a</sup>	
Person is or feels poorly connected to the system	78 (42.6)
Person feels he/she does not need one	35 (19.1)
Person did not look for one	35 (19.1)
Issues related to homelessness <sup>b</sup>	31 (16.9)
Due to negative past experiences with MDs or NPs	12 (6.6)
Utilized services of clinics instead of a MD or NP	116 (63.4)
Person felt he/she did not receive care when needed	169 (34.0)
Perceived reasons for not receiving care <sup>c</sup>	
Issues related to homelessness <sup>a</sup>	87 (51.5)
Poorly connected to the system	66 (39.1)
Mental health issue or addiction	53 (31.4)
Negative past experiences with health care system	32 (18.9)

<sup>a</sup> Includes only participants who reported not having a regular MD/NP; *n* = 183<sup>b</sup> Issues related to homelessness, i.e., 'do not have a phone/phone number', 'too busy finding food, shelter or other necessities', etc<sup>c</sup> Includes only participants who reported not receiving care when needing it; *n* = 169

reported limited contact with the mental health care system. A total of 92.8 % of participants met diagnostic criteria for one DSM-IV disorder, but only 14.9 % had seen a

psychiatrist and only 12.7 % had seen a mental health team in the past year. While 16.4 % of participants were at moderate to high risk of suicide at the time of interview, only 2.4 % had accessed crisis or suicide prevention services in the previous year. Overall 82.6 % met criteria for substance dependence in the 12 months prior to the survey, but no more than 29.8 % had been in residential substance use treatment, 25.6 % had received outpatient counseling related to their substance use, and 15.4 % had received outpatient substance use treatment in the past year. In light of such findings, local and provincial-based health agencies have begun to acknowledge the need for more comprehensive and effective health care for this population and several initiatives are underway [20, 21]. There are only few services that aim to treat mental health and substance use issues in this population concurrently; however, these services are still the exception and only serve a small fraction of the estimated population needing support [20]. More capacity and more effective programming is urgently needed in the surveyed health authorities.

On a more positive note, close to two-thirds of participants reported having a regular medical doctor (MD) or nurse practitioner (NP). Although this is well below the 85 % estimated in the general population [22], it indicates a significant connection between homeless people and the system of care and adds evidence to claims [23] that augmenting primary care practices for homeless people will positively impact health care access and service use. Important to note, perception of being 'poorly connected to the system of care' was the number one reason that participants gave as to why they did not have an MD/NP and

the second most common reason given for why participants stated they did not receive care when they felt they needed it. These findings indicate the urgent need for health care policies for the homeless that are oriented towards connection and continuity of care.

Demographic results describe a population vastly disadvantaged in terms of education and social and physical resources. Effective long-term planning to improve the health of Canadian communities by improving the health of the homeless will need to address the specific vulnerabilities of homeless individuals. This could be at least in part achieved by addressing underlying issues, such as the high rates of substance dependence and concurrent disorders. Promising research on the biopsychosocial mechanisms underlying adverse childhood and trauma early in life and the highlighting risk of developing severe mental disorders and addiction provide scientific evidence for targeted and general preventive measures, such as supporting disadvantaged families. [24]. Disadvantages in childhood and repetitive experiences of maltreatment and neglect starting at an early age are among the most common experiences shared among this population, and have measurable effects on important areas of brain development implicated in addiction susceptibility, decision-making, impulse control, affect and mood and seem to influence the outcome of treating mental disorders, such as, e.g., cocaine dependence [24, 25]. One-fifth of our sample met diagnostic criteria for a current PTSD, while over half of all of the participants stated that they have experienced a traumatic event in their past, both findings suggesting a common history of impactful trauma.

#### Mental health in three different urban settings

High rates of mental disorder were found in all three cities surveyed indicating widespread need for adequate mental health and addiction services. No studies could be found that compared standardized mental disorder rates in homeless people in different-sized settings; however, results from one 1985 study [26] in the general population of North Carolina found lower rates of mental disorder in a rural setting compared to an urban setting. In contrast, our results showed that homeless people in the different-sized cities surveyed required similarly high levels of comprehensive mental health care but with different foci depending on the composition of the population. Although mental disorder rates were high in all three settings, several significant differences in the mental health and substance use profile could be identified. Participants from Victoria were more likely to be sleeping on the streets than in the other two sites and also had the highest prevalence rate of mental disorders overall. Due to the substance use restrictions and crowded conditions at many shelters,

homeless people living with severe substance dependence, mental disorder or concurrent disorders may be less likely to use shelters and more likely to be sleeping in the street, abandoned buildings, parks, etc. Prince George had a significantly higher proportion of participants who had attempted suicide and who met criteria for alcohol dependence and also a higher proportion of people who identified as Aboriginal. Furthermore, we could confirm in our sample that participants who identified as Aboriginal had higher rates of alcohol dependence compared to participants of other ethnic groups. Research on Aboriginal health in Canada has found that compared to the non-Indigenous population, people of Aboriginal descent suffer from higher rates of suicide attempts and alcohol-related disorders as a result of historical and modern causes including cultural trauma, colonial oppression, displacement and poverty [27, 28]. Our results suggest that this disparity may persist even among the homeless where many health challenges are shared across ethnic boundaries. While the level of mental health disorders and addiction overall were similar there were differences in the levels of use of specific substances and of specific disorders. Further analysis will be needed to verify if these differences can be attributed to ethnicity or can be explained by confounding factors.

Health service utilization findings highlight the different needs of the three groups surveyed. For those in Victoria, the majority of who were sleeping on the street, the prevalence of receiving health care from a street nurse far exceeded that from the other two sites. Similarly, participants from Prince George, who met criteria for a higher prevalence of alcohol dependence, were more likely to have received health care from detox or had used detox treatment as a resource for drug problems. Unfortunately, although more participants from PG were at moderate to high risk of suicide at the time of interview and had attempted suicide in the past, no significant difference was found between sites in the use of crisis or suicide prevention. Results may also indicate service availability, for example, despite similar rates of substance dependence participants from Victoria were less likely to have been involved in a self-help group or to have received residential or outpatient treatment than participants in Vancouver. These results demonstrate, to some extent, the relationship between service need, service use and service availability, which can be used for more effective service planning and resourcing. For example, knowing that homeless people on the street have high rates of mental disorder and commonly access street nurses, suggests the need to properly train and resource that form of care as a gateway to more specific and appropriate services.

In sum, our results describe three BC homeless populations with high prevalence rates of mental disorders. These rates are exceeding those of the general population

by far, where 1-month prevalence rates are generally low [37]. While there are differences in Vancouver, Victoria and Prince George concerning individual diagnoses, the rate of mental disorder in all three cities was extremely high. Resourcing adequate mental health and concurrent disorder care for homeless people is needed not only in major urban centers, but also in more remote communities. Special attention to harm reduction and health care support for those who are substance dependent should be seen as a public health necessity, particularly in light of the relationship between street substance use, infectious disease transmission and mortality [29–31].

#### Limitations

First, no instruments that measure DSM-IV psychiatric disorders have been designed for the homeless population and although the MINI-PLUS has been used in previous homeless studies, it has not been validated specifically for the homeless population. We did not collect specific data on inter-rater reliability and interviews were neither sound nor camera recorded, so data were based on the handwritten records of the RAs and the completed questionnaires. In order to allow completion of the interview, we restricted the assessment to the more common mental disorders and did not assess mental disorders such as eating disorders or personality disorders. Thus, the overall estimated rates might underestimate the level of mental disorders and their co-morbidities. High rates of substance use disorders, as found in our participants, can make disentangling substance disorder-related symptoms from symptoms that are related to primary/independent mental disorders difficult especially in a one-time research. Furthermore, information regarding the connection between substance use and symptoms is subject to recall bias in participants, especially for those who had long-standing and interweaving experiences with mental disorder symptoms and substance use. We did not focus our assessments on further disentangling concurrent disorders from substance-related disorders, therefore we refrain from discussing this methodological and specific issue in more detail. As less than 5 % of the participants reported the respective mental disorder to be substance-related, we refrained from an attempt to disentangle substance-related disorder from the endogen/independent disorder, as it would have only minimal impact on the estimates overall.

Finally, the different characteristics of the samples restrict generalizations about the burden of mental illness in different-sized settings. Although these differences (i.e., higher proportion of Aboriginal homeless in Prince George, higher proportion of homeless people sleeping on the streets Victoria) were a natural reflection of local populations, consistent with recent local homeless counts

[32, 33], it may not be considered a precise representations of the respective populations.

#### Conclusions

Homeless individuals are an extremely vulnerable and an underserved population. To address the health of this population more effectively health care capacity for treating mental health and addiction needs to be built and adapted to their specific needs. As the determinants and distributions of health in the homeless population vary depending on the demographic features shown by our study and others [34, 35], this process must include a sophisticated understanding of the diversity within the population. Future work needs to further address a number of issues, including: (1) co-occurring disorders; (2) the relationships between gender, ethnicity, age and mental health; (3) the differences in health-related vulnerabilities among key demographic groups and (4) the relationship between health care utilization and burden of illness.

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#### References

- Hartston W, MacGregor JF (1953) Tuberculosis hostels, a contribution to the welfare of the homeless phthisic. *Tubercle* 34(7):180–184
- Plumb JD (2000) Homelessness: reducing health disparities. *CMAJ* 163(2):172
- Turnbull J, Muckle W, Masters C (2007) Homelessness and health. *CMAJ* 177(9):1065–1066
- Fichter MM, Quadflieg N (2001) Prevalence of mental illness in homeless men in Munich, Germany: results from a representative sample. *Acta Psychiatr Scand* 103:94–104
- Fazel S, Khosla V, Doll H, Geddes J (2008) The prevalence of mental disorders among the homeless in Western countries: systematic review and meta-regression analysis. *PLoS Med* 5(12):e225
- Hwang SW (2001) Homelessness and health. *CMAJ* 164(2):229–233
- Goering P, Tolomiczenko G, Sheldon T, Boydell K, Wasylenki D (2002) Characteristics of persons who are homeless for the first time. *Psychiatr Serv* 53(11):1472–1474
- Canadian Institute for Health Information (2007) Improving the health of Canadians: mental health and homelessness. CIHI, Ottawa
- Sheehan D, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, Hergueta T, Baker R, Dunbar GC (1998) The mini-international neuropsychiatry interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry* 59(Suppl 20):34–57

10. Thompson SJ, Barczyk AN, Gomez R, Dreyer L, Popham A (2010) Homeless, street-involved emerging adults: attitudes toward substance use. *J Adolesc Res* 25(2):231–257
11. Weinreb LF, Buckner JC, Williams V, Nicholson J (2006) A comparison of the health and mental health status of homeless mothers in Worcester, Mass: 1993 and 2003. *Am J Public Health* 96(8):1444–1448
12. Fischer PJ, Breakey WR (1991) The epidemiology of alcohol, drug, and mental disorders among homeless persons. *Am Psychol* 46(11):1115–1128
13. Koegel P, Burnam MA, Farr RK (1988) The prevalence of specific psychiatric disorders among homeless individuals in the inner city of Los Angeles. *Arch Gen Psychiatry* 45:1085–1092
14. Lehman AF, Cordray DS (1993) Prevalence of alcohol, drug, and mental disorders among the homeless: one more time. *Contemp Drug Probl* 20(3):355–386
15. Vazquez C, Munoz M, Sanz J (1997) Lifetime and 12-month prevalence of DSM-III-R mental disorders among the homeless in Madrid: a European study using the CIDI. *Acta Psychiatr Scand* 95:523–530
16. North CS, Smith EM (1993) A systematic study of mental health services utilization by homeless men and women. *Soc Psychiatry Psychiatr Epidemiol* 28:77–83
17. North CS, Eyrich KM, Pollio DE, Spitznagel EL (2004) Are rates of psychiatric disorders in the homeless population changing? *Am J Public Health* 94:103–108
18. Teesson M, Hodder T, Buhrich N (2004) Psychiatric disorders in homeless men and women in inner Sydney. *Aust NZ J Psychiatry* 38(3):162–168
19. North CS, Smith EM (1992) Posttraumatic stress disorder among homeless men and women. *Hosp Community Psychiatry* 43(10):1010–1016
20. Patterson M, Somers J, McIntosh K, Shiell A, Frankish CJ (2007) Housing and supports for adults with severe addictions and/or mental illness in BC. Centre for Applied Research in Mental Health and Addiction, Vancouver
21. Ministry of Health Services, Ministry of Children and Family Development (2010) Healthy minds, healthy people: a ten-year plan to address mental health and substance use in British Columbia
22. Statistics Canada (2009) Health fact sheet: having a regular doctor, 2009. Canadian Community Health Survey
23. Koon AD, Kantayya VS, Choucair B (2010) Homelessness and health care: considerations for evaluation, management, and support within the primary care domain. *Dis Mon* 56(12):719–733
24. Mate G (2008) In the realm of hungry ghosts: close encounters with addiction. Knopf, Canada
25. Burns MN, Lehman KA, Milby JB, Wallace D, Schumacher JE (2010) Do PTSD symptoms and course predict continued substance use for homeless individuals in contingency management for cocaine dependence? *Behav Res Ther* 48(7):588–598
26. Blazer D, George LK, Landerman R, Pennybacker M, Melville ML, Woodbury M, Manton KG, Jordan K, Locke B (1985) Psychiatric disorders. A rural/urban comparison. *Arch Gen Psychiatry* 42(7):651–656
27. Kirmayer LJ, Brass GM, Holton T, Paul K, Simpson C, Tait CL (2007) Suicide among Aboriginal people in Canada. Aboriginal Healing Foundation, Foundation, Aboriginal Healing
28. Kirmayer LJ, Brass GM, Tait CL (2000) The mental health of Aboriginal peoples: transformations of identity and community. *Can J Psychiatry* 45(7):607–616
29. Tyndall MW, Craib KJP, Currie S, Li K, O’Shaughnessy MV, Schechter MT (2001) Impact of HIV infection on mortality in a cohort of injection drug users. *JAIDS J Acquir Immun Defic Syndr* 28(4):351–357
30. Marshall BDL, Kerr T, Qi J, Montaner JSG, Wood E (2010) Public injecting and HIV risk behaviour among street-involved youth. *Drug Alcohol Depend* 110(3):254–258
31. Hwang SW (2000) Mortality among men using homeless shelters in Toronto, Ontario. *JAMA* 283(16):2152–2157
32. Victoria Cool Aid Society (2007) Homeless needs survey 2007. A pathway to home. Victoria
33. Kutzner D, Ameyaw S, Prince George Community Partners Addressing Homelessness (2010) Prince George homeless count report 2010. UNBC Computer-Assisted Survey Research Laboratory, Prince George
34. Breakey WR, Fisher PJ, Kramer M, Nestadt G, Romanoski AJ, Ross A, Royall RM, Stine OC (1989) Health and mental health problems of homeless men and women in Baltimore. *JAMA* 262(10):1352–1357
35. Lin E, Goering PN, Lesage A, Streiner DL (1997) Epidemiologic assessment of overmet need in mental health care. *Soc Psychiatry Psychiatr Epidemiol* 32(6):355–362
36. Torchalla I, Strehlau V, Okoli CTC, Li K, Schuetz C, Krausz M (2011) Smoking and predictors of nicotine dependence in a homeless population. *Nicotine Tob Res* 13(10):934–942
37. Andrade L, Walters EE, Gentil V, Laurenti R (2002) Prevalence of ICD-10 mental disorders in a catchment area in the city of Sao Paulo, Brazil. *Soc Psychiatry Psychiatr Epidemiol* 37(7):316–325