

## Research Article

# Are Substance Use and Mental Illness Associated to an Earlier Onset of Homelessness?

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## ABSTRACT

**Purpose:** Substance use and complex concurrent mental disorders are highly common among the homeless, contributing to a higher burden of disease and mortality. Are they associated to an earlier loss of housing?

**Methods:** Participants of the Vancouver arm of the At Home/Chez Soi study suffering from at least one psychiatric illness (n=490) were included in this cross-sectional analysis. Alcohol and substance use patterns were assessed at baseline using the highly validated Mini questionnaire. Age of first homelessness was a self-reported measure. To investigate the independent association between these variables, a linear regression model was created.

**Results:** Sixty percent of the participants had a diagnosis of psychoactive substance use disorder. Thirty-two percent an alcohol abuse and dependence disorder at baseline. While all

participants had one mental disorder, over ninety percent had from two to eight diagnoses. According to our model, each additional psychiatric diagnosis was associated to an earlier onset of homelessness by 0.86 years and each category of drug used by 0.51 years.

**Conclusions:** The number of psychiatric comorbidities and abused substances were found to be associated to earlier onset of homelessness. These findings provide information on the path into homelessness, general health conditions and social marginalization, helping the researchers understand how to better face this challenge. The data suggest an increased need for proactive integration of homeless individuals suffering from psychiatric disorders.

**MeSh Headings/Keywords:** Homelessness onset; Substance use; Mental disorder; At Home/Chez Soi

## Introduction

Homelessness has significant health implications, both physical and mental, that lead to a high burden of disease and premature mortality [1-3]. The high proportion of physical

illness is well documented in the literature [4-6], ranging from infectious diseases, for instance HIV [4,7] and tuberculosis [4,8], to conditions such as cardiovascular disease [9] and chronic obstructive pulmonary disease [10].

A general consensus exists that these conditions are related to the lack of housing and its consequences: harsh living conditions, insufficient hygiene and inadequate health services [9]. Mental illness rates also tend to be significantly higher in the homeless than in the general population [11-14]. Deinstitutionalization has been named as a possible cause [15], and the inverse association of mental disorders with socioeconomic status has been widely debated [16]. In fact, some scholars consider mental illness to be a risk factor for housing loss [17,18], while others believe housing loss to be the consequence of adverse events and stress [19-22]. In both cases, a wide range of evidence has been offered, but no definitive answer has been able to conclude this discussion.

Within this field of research, a great deal of attention has been paid to illegal substance use, as its prevalence is rising steeply in this population [23-25]. Some studies point out that substance abuse puts individuals at greater risk of homelessness [26] the "social adaptation" model on the other hand posits that people could be genetically predisposed to drift down into homelessness, and in this perspective, drugs could be a consequence of homelessness, not a cause [16,27]. In addition, studies on non-homeless populations have, in the past, reinforced this theory, associating increased substance abuse to stressors, including job loss [28] and other factors, undoubtedly part of the homeless experience [29].

Homeless individuals who are concurrent substance users were found to be more likely to die prematurely [30] and to experience post-treatment relapses [31].

Multiple substance abuse and multiple mental conditions have thus a high impact and bring the health of the homeless to a new complexity level, but their effect on the onset of homelessness remains unclear. From using the data from a large Canadian longitudinal research trial, the At Home/Chez Soi Project, possible associations will be evaluated in this study. The At Home/Chez Soi Project (2009-2013) was conceived to investigate the efficacy of the Housing First model in five Canadian urban settings [32,33]. To date, Housing First is considered (confirmed by the At Home/Chez Soi results [34], to be the best available approach to homelessness [35]. It is important to note that the inclusion criterion for the At Home study was that all participants had a mental disorder, diagnosed with an appropriate instrument. The design of the At Home study has been described in depth in other papers [32,33].

In Vancouver (one of the five cities involved in the At Home study 497 participants completed the baseline questionnaires; 143 reported daily substance use, 232 reported less than daily substance use, and 122 reported no substance use in the last month before the study. One out of five (22%) of the daily substance users abused more than one substance daily. After creating a multivariate linear regression model, a Vancouver study group found that daily substance use was independently associated with higher mental health symptoms, measured through the Colorado Symptom Index scale [24]. In our opinion, higher symptomatology corresponds to lower functioning and therefore having both multiple mental illnesses and using multiple substances may possibly lead to an earlier housing loss.

The goal of this paper is to ascertain if multiple psychiatric comorbidities and poly-substance abuse are associated with an earlier loss of housing.

After considering the implications of multiple psychiatric diagnoses, in terms of the burden of disease, we hypothesized that a larger number of mental disorders, and thus a heavier burden of disease, may be linked to an earlier onset of homelessness.

At the same time, we hypothesized that multiple abused substances, including alcohol, may also have contributed to anticipate the drift down to homelessness [36] the more substances abused, the earlier the housing loss.

## Materials and Methods

### Design

The At Home/Chez Soi Study was a four-year national randomized clinical trial investigating interventions designed to test the effectiveness of Housing First with different psychosocial stabilization methods for the homelessness with mental disorders over a two year follow-up period across five cities in Canada: Vancouver, Winnipeg, Montreal, Moncton and Toronto [32,33]. In this analysis, only data from the Vancouver site was considered.

### Sample

Participants were selected to be representative of the adult homeless population with mental disorder. Vancouver participants were recruited through service providers and agencies serving individuals who are homeless and mentally ill, such as shelters, drop-in centers, street outreach workers, hospitals, police, and courts. In order to reduce to a minimum the homogeneity of the sample, and thus be able to draw conclusions applicable to virtually any general adult homeless population, an effort was made to locate individuals throughout the city, while recognizing that the majority of visible homelessness and related services were concentrated in one area, the Downtown Eastside. Potential participants had to go through a screening interview and received compensation of \$5 for it. All individuals who completed it and satisfied all inclusion criteria were included in the study [33]. To be included, participants had to be of legal age (19 years old in Vancouver), be absolutely homeless or precariously housed, and have a mental disorder as determined by DSM-IV criteria. Exclusion criteria were being the client of another Intensive Case Management (ICM) or Assertive Community Treatment (ACT) program, and not being a Canadian citizen.

Participants were followed for 24 months through face-to-face and telephone interviews, and received financial compensation: twenty Canadian Dollars per interview [32].

The entire Vancouver sample (n=497) was initially deemed fit for this analysis. It is of note that seven participants who could not be interviewed with the MINI due to evident mental impairment were included in the study despite lacking a validated mental disorder diagnosis. Since it was not possible for us to validate whether or not these seven participants' impairment were indeed due to psychiatric disorder, they were excluded from our analysis. Additionally, eight participants were included in the study despite not fulfilling the criteria for the psychiatric disorders in the MINI. For the purposes of this analysis, these participants will be considered non-psychotic and are included in the analysis.

As a result, this study considered 490 homeless adults, with 98.4% of the sample having at least one mental illness. Their average age at baseline was  $40 \pm 10.9$  years, the youngest being 19 year old and the oldest 74. As for gender, 350 were male (71.43%), 134 were female (27.35%) and 6 (1.22%) identified themselves as transsexual, transgender or "other". The majority ( $n=426$ , or 86.9%) was born in Canada and had never married ( $n=336$ , or 68.6%). Forty-three percent ( $n=215$ ) of the sample had completed high school or higher education. A physical examination was not required to be included in the study, but participants were given the opportunity to report already known medical conditions. Twenty-eight percent of them ( $n=137$ ) reported having hepatitis C, eight percent ( $n=42$ ) suffered from HIV, showing as high a prevalence as already described in the literature [4,7].

### Instruments

All data used in this analysis were collected during baseline interviews. Age and gender at baseline were obtained from the Demographics, Service and Housing History (DSHH) questionnaire, as was the onset of homelessness. This questionnaire gathered information about participants' age, marital status, ethnicity, housing situation, education, source of income, criminal history and social contacts.

Mental illness was evaluated administering the Mini International Neuropsychiatric Interview 6.0 (MINI), a short, reliable, validated, structured interview format [37-40] based on the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) [41] and the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10) [42]. At Home/Chez Soi's interviewers assessed 8 main psychiatric diagnoses: major depressive episode (Section A), suicidality (B), manic and hypomanic episodes (C), panic disorder (D), posttraumatic stress disorder (H), alcohol dependence/abuse (I), non-alcohol psychoactive substance use disorders (J), psychotic disorders and mood disorder with psychotic features (K). In an attempt, in our model, to be even more accurate in defining the mental illnesses, psychosis and mood disorder with psychotic features were also considered separately, leaving us with nine lifetime psychiatric diagnoses.

Information on substance use over the preceding 12 months of interview was retrieved from the MINI as well. The question asked was: "In the past 12 months, did you take any of these substances more than once, to get high, to feel elated, to get a "buzz" or to change your mood? Please circle each drug taken."

The MINI divides drugs into 9 categories:

1. Stimulants (i.e. amphetamines, speed, crystal meth, Dexedrine, Ritalin, diet pills, "crank", "rush")
2. Cocaine (snorting, IV, freebase, smoking crack, "speedball")
3. Narcotics (heroin, morphine, Dilaudid, opium, Demerol, methadone, Darvon, codeine, Percodan, Vicoden, OxyContin)
4. Hallucinogens (LSD, mescaline, peyote, psilocybin, STP, MDA, MDMA, "mushrooms", "ecstasy")
5. Phencyclidine (PCP, ketamine)

6. Inhalants ("glue", ethyl chloride, "rush", nitrous oxide, amyl or butyl nitrate)
7. Cannabis (marijuana, hashish, THC, "pot", "grass", "weed", "reefer")
8. Tranquilizers (Quaalude, Seconal, Valium, Xanax, Librium, Ativan, Dalmane, Halcion, barbiturates, Miltown, GHB, Roofinol)
9. Miscellaneous, such as steroids, cough medicine, nonprescription pills.

The last group was considered too vague and heterogeneous and was not considered further in our work. Heroin, being the most used opioid and being often treated as a separate subject in literature, is considered separately from the other narcotics.

Alcohol abuse and dependence, also present in the MINI, were considered separately from drug abuse and dependence, and were also included in our regression.

### Analysis

In order to explore the reciprocal interactions of psychiatric diagnoses, substance abuse and onset of homelessness, a linear regression model was created, with controls for age and gender. All data were analyzed with IBM© SPSS Statistics 20. Significance was set at 0.05.

### Statement of human and animal rights

The At Home/Chez Soi study was reviewed and approved by a Research Ethics Board at the national level (The Centre for Addiction and Mental Health REB) and by 11 other REBs in universities in the five participating provinces. Participants gave informed consent for collection of all the data for the primary research purpose, including administrative data [32].

### Results

#### Substance use patterns

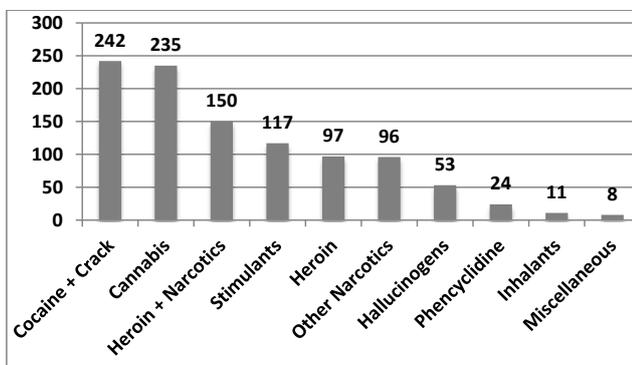
When being asked the number of substances taken more than once in the past year, the prevalent answer was "zero"; the second most prevalent trend was the use of only one drug, followed by two substances, three, and four substances in decreasing order of frequency. Hence, 70.1% of the At Home participants had taken at least one drug during the previous 12 months, even though not all were diagnosed with substance abuse or dependence. Roughly one third of the participants (34.9%) showed a poly-substance use - i.e. the use of three or more substances - pattern (Table 1).

The most commonly reported drug used in the past 12 months was cocaine in all forms including crack (49.6%), followed by cannabis (48%), stimulants (23.9%) and heroin (19.8%). Narcotics (morphine, Dilaudid, opium, Demerol, methadone, Darvon, codeine, Percodan, Vicoden, OxyContin) were reportedly consumed by 19.6% of the participants. However, the MINI considered heroin and the other opiates together and a total of 150 (30.6%) participants were categorized in this group. Lastly, 10.8% of the participants reported the use of hallucinogens, 9% tranquilizers, 4.9% used phencyclidine and 2.2% inhaled glue and other inhalants (Figure 1).

Altogether a substance abuse or dependence diagnosis was attributed to 60% ( $n= 294$ ) of the participants.

**Table 1:** Reported substance use pattern in the 12 months prior to being recruited in the At Home/Chez Soi study- 2009-2013, N= 490

Number of drug categories	Frequency	Percent
0	144	29.4
1	103	21
2	72	14.7
3	49	10.0
4	45	9.2
5	44	9.0
6	12	2.4
7	12	2.4
8	5	1.0
9	4	0.8
Total	490	100.0



**Figure 1:** The reported substances used in the 12 months preceding the At Home/Chez Soi study- 2009-2013, N= 490.

### Complex concurrent mental illnesses

75.9% of the Vancouver At Home sample was affected by three or more psychiatric illnesses. While the inclusion criteria maintained that each participant have at least one mental disorder, 91.6% of the participants had two or more; 352 (71.8%) participants had a current risk of suicidality, which was the most prevalent diagnosis, 334 (68.2%) had a current, or had had a past or recurrent major depressive episode, and 253 (51.6%) had a current or lifetime diagnosis of psychosis. Less prevalent illnesses identified were bipolar disorders (37.6%), panic disorder (32%), PTSD (25.9%), mood disorder with psychotic features (20.4%). One hundred and sixty out of 490 (32.7%) of the participants currently abused or depended on alcohol, while 294 (60%) currently abused or depended on other illegal substances (Table 2).

### Did concurrent mental illnesses and polysubstance use interact with the onset of homelessness?

In our first regression, with alcohol included among the substances of abuse, the only significant association found with the onset of homelessness was the number of psychiatric diagnoses, with a significance of 0.005. Each additional psychiatric diagnosis was linearly associated with an earlier age of first homelessness, by 0.839 years. Drugs and alcohol altogether did not reach statistical significance (0.053). Use of each additional substance was associated with an earlier age of first homelessness, by 0.449 years (Table 3).

Interestingly, when excluding alcohol from the “number of drugs used” composite variable, leaving just the illegal substances, the association of this variable with age of first homelessness became significant ( $p = 0.029$ ) (Table 4).

### Discussion

What has been learnt from the Vancouver At Home Study? In 2012, Patterson et al. ran a multivariate analysis on the yet to be completed At Home sample looking for associations and predictors of persistent or prolonged homelessness. Persistent homelessness, defined as three or more years, was significantly associated with male gender, younger age when first homeless, aboriginal ethnicity, having more than one current mental disorder as well as any infectious diseases or a current substance dependence, injection drug use in the past month, needing health care but not receiving it, not having seen a psychiatrist and not having seen a family doctor. It was also independently predicted by male gender, older age at enrollment, younger age when first homeless, incomplete high school education, past month alcohol use, daily illicit drug use.

Prolonged homelessness, a longest single episode of one year

**Table 2:** Number of concurrent mental disorders in (Mini 6.0.0) in the At Home/Chez Soi study- 2009-2013, N= 490.

Number of mental disorders for each participant	Frequency	Percent
0	8	1.6
1	33	6.7
2	77	15.7
3	84	17.1
4	98	20.0
5	75	15.3
6	62	12.7
7	42	8.6
8	10	2.0
9	1	0.2
Total	490	100.0

**Table 3:** Linear Regression Model for prediction of onset of homelessness by mental disorders and substance use inclusive of alcohol in the At Home/Chez Soi study, N= 490. Confidence interval: 95%.

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
(Constant)	1.034	2.303		0.449	0.654
N° of psychiatric diagnoses	-0.839	0.295	-0.108	-2.843	0.005
Number of drugs	-0.449	0.232	-0.075	-1.940	0.053
Age at baseline	0.779	0.041	0.645	19.197	0.001
Gender	1.610	0.861	0.062	1.871	0.062

a. Dependent Variable: Age of first homelessness (age at baseline and gender are control variables)

**Table 4:** Linear Regression Model for prediction of onset of homelessness by substance use exclusive of alcohol and mental disorders, in the At Home/Chez Soi study, N= 490. Confidence interval: 95%.

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
(Constant)	1.051	2.294		0.458	0.647
N° of psychiatric diagnoses	-0.863	0.282	-0.112	-3.061	0.002
Number of drugs	-0.508	0.232	-0.081	-2.193	0.029
Age at baseline	0.778	0.040	0.644	19.256	0.001
Gender	1.674	0.856	0.064	1.955	0.051

#### a. Dependent

or more, was significantly associated with younger age when first homeless, incomplete high school education, having children under the age of eighteen years, having more than one current mental disorder or a current substance dependence, infectious disease positivity, history of head injury, needing health care but not receiving it, not having seen a psychiatrist, contact with the police that did not result in arrest. Prolonged homelessness was independently predicted by older age at enrollment in the study, younger age when first becoming homeless, a current substance dependence, daily illicit drug use, not having seen a psychiatrist in the past month [43].

Another team investigated the substance use at the At Home baseline, and found that daily substance use was independently associated with higher mental health symptoms, as well as with the presence of a current mental disorder with the notable exceptions of manic episodes and psychotic disorder [24]. In 2013 the quality of life within Housing First, congregate housing and treatment as usual was investigated, finding that both Housing First and congregate housing lead to a higher quality of life [44]. Interestingly, no association was found in Vancouver between substance dependence and housing stability after providing housing [24], confirming that sobriety does not significantly affect one's chances of maintaining stable housing.

Due to the cross-sectional design of the study, it is not possible for us to determine whether the onset of mental illness preceded or followed the onset of substance use. In our regression analysis the number of drug categories used in the twelve months previous to the interviews was associated to earlier onset of homelessness, 0.508 years earlier per additional drug category when excluding alcohol and 0.449 years when including it. It was debated among the authors whether or not alcohol should be excluded, being a substance of abuse but at the same time being legal and more socially accepted than any of the other substances considered. Social marginalization plays a role in the drift to homelessness [36] and for this reason it is possible that because of the ubiquity of alcohol use it had a more moderate or less direct effect on the drift than other substances. This article includes both models, inclusive and exclusive for alcohol as a substance reported to be used by participants.

At baseline, one participant out of three (n=160) was diagnosed with alcohol abuse or dependence. Surprisingly the prevalence of alcohol use or dependence was relatively low in comparison with the prevalence of substance use disorders.

Whether a more disabling mental illness caused heavier drug abuse and thus predicted an anticipated onset of homelessness,

or whether the drugs caused a worsening of the existing mental conditions cannot be determined with the available data. However this study highlights the higher level of vulnerability of the homeless with multiple concurrent mental disorders and poly-substance use, and provides grounds for further research, valuable for better understanding the drift into homelessness. Also, this study's findings point to an urgent need for stabilization and continuous comprehensive healthcare provision to such patients. The fact that three quarters of our sample had at least three, but more often four or more psychiatric illnesses well represents the complexity of the homeless and mentally ill, and the extreme difficulty of providing effective treatment or services to such a heterogeneous population. Psychosis was one of the most common non-substance-related mental illnesses in this sample. Having reviewed the literature, this did not come as a surprise. Other studies had already described it as the most common non-substance-related illness within the homeless [45].

One important limitation is that both the drug use and the age of first homelessness variables were self-reported. Unfortunately the drug use history in the years prior to the study and to the very onset of homelessness was not acquired in the At Home/Chez Soi study. Hence, there was no way for the authors to investigate the impact of early substance use on onset of homelessness. The present findings enable us to speculate that higher drug use at baseline may reflect a lower functioning in the past and a possible association to anticipation of homelessness; on the other hand, we are not able to exclude that life on the street itself acted as an incentive to drug use, being not a consequence but possibly a cause.

Three quarters of the sample had three or more psychiatric diagnoses, in line with the literature showing that the homeless have a high burden of mental disease [13,45,46]. This represents well the complexity of the homeless and mentally ill, and the extreme difficulty of providing effective treatment or services to such a heterogeneous population. The At Home study's inclusion criteria required having at least one mental disorder; in a "general" homeless population, lower prevalence of psychiatric diagnoses would have been expected. Housing First strategies work promisingly towards the reduction of mental health and substance use conditions, promoting and supporting the autonomy of homeless with concurrent disorders [47].

The total number of psychiatric diagnoses was associated to earlier onset of homelessness, as hypothesized. In a future study, it would be interesting to assess and characterize the burden of psychiatric illness in more detail.

This study focused on one of several areas that could be investigated in the At Home/Chez Soi study. We expect the results of this work to be replicable, for instance using data from any of the other At Home cities. This is particularly true acknowledging that only data collected before or at baseline were used to draw our conclusions, before the site-specific intervention arms came into play. In the summer of 2014 the full At Home/Chez Soi dataset became publicly available, and anybody willing to explore further or verify if any of the conclusions drawn from a single city's data applies to the rest of the sample may do so.

### Strengths and limitations

The main strengths of this study are the large sample size, a diverse recruitment strategy and the use of the MINI, an instrument that can lead to reliable conclusions [37-40]. Some limitations must be considered, especially regarding the onset of homelessness. One is the fact that some key measures, such as the age of first homelessness itself, were self-reported. Considering the inclusion criteria of having at least one mental disorder, and the high levels of psychosis present in our sample, accuracy of recall may have been compromised. This has to be considered carefully, since many of the measures included in our analysis were self-reported. Further, as it was previously described in the literature, individuals with more time between their first onset of homelessness and study enrollment were more likely to have experienced a longer duration of homelessness [48]. Therefore we controlled for age at baseline. Another limitation was that we were not able to retrieve information associated with early trauma or family dysfunction variables, while North has associated these with earlier onset of homelessness [48].

Finally, the use of cross-sectional data did not allow us to draw any causal inferences from our analyses. Therefore, it must be noted that the associations described in this study do not indicate a causal relationship.

### Conclusions

The number of psychiatric comorbidities and substances used were associated to an earlier onset of homelessness in the Vancouver At Home sample. This reminds us that fighting marginalization and appropriate care are critical, together with Housing First strategies, especially in the most complex patients. Causal relationship among these variables and housing loss could not and has yet to be demonstrated.

### Trial Registration and Acknowledgements

The Vancouver At Home/Chez Soi study: Housing First plus Assertive Community Treatment versus congregate housing plus supports versus treatment as usual was registered with the International Standard Randomized Control Trial Number Register and assigned ISRCTN57595077. Also, the Vancouver At Home/Chez Soi study consisted of: Housing First plus Intensive Case Management versus treatment as usual was registered with the International Standard Randomized Control Trial Number Register and assigned ISRCTN66721740.

Thanks to Jayne Barker (2008-11), Cameron Keller (2011-12), and Catharine Hume (2012-present), the Mental Health Commission of Canada At Home/Chez Soi National Project Leads, as well as the At Home National Research Team, led by Paula Goering, the five site research teams, the site coordinators,

the numerous service and housing providers, and the people with lived experience who contributed to the original At Home/Chez Soi Research Demonstration Project. We would most especially like to acknowledge the contributions of the At Home/Chez Soi participants, whose willingness to share their lives, experiences, and stories were central and essential to the original project. The original research was made possible through a financial contribution from Health Canada. The views expressed herein are solely those of the authors.

### Conflict of Interest

The authors declare that they have no conflict of interest.

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*Submitted April 11, 2016*

*Accepted May 24, 2016*