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Publisher: Routledge

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Mental Health and Substance Use

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/rmhs20>

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Available online: 05 Oct 2011

To cite this article: Michelle L. Patterson, Julian M. Somers & Akm Moniruzzaman (2011): Prolonged and persistent homelessness: multivariable analyses in a cohort experiencing current homelessness and mental illness in Vancouver, British Columbia, *Mental Health and Substance Use*, DOI:10.1080/17523281.2011.618143

To link to this article: <http://dx.doi.org/10.1080/17523281.2011.618143>



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Prolonged and persistent homelessness: multivariable analyses in a cohort experiencing current homelessness and mental illness in Vancouver, British Columbia

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(Accepted 27 June 2011)

Recent research and policy making concerning homelessness has focused on the particular challenges associated with ending chronic homelessness. It is generally assumed that individuals who have been homeless for longer durations have a greater impact on the public system of care and are in need of the most assistance. The aim of this study was to examine key sample characteristics by duration of homelessness (total lifetime duration and longest single episode) using bivariate and multivariable regression analysis. Participants ($n = 425$) were adults recruited in Vancouver, BC on the basis of absolute homelessness or precarious housing and a current mental disorder. Interviewer-administered questionnaires elicited details concerning demographics, mental illness, substance use, service use, and duration of homelessness. In multivariable models, “persistent” homelessness (lifetime duration of three or more years) was independently predicted by male gender, older age, younger age when first homeless, incomplete high school, past month alcohol use, and daily illicit drug use. “Prolonged” homelessness, a single episode of one year or more, was independently predicted by older age, younger age when first homeless, current substance dependence, daily illicit drug use, and not seeing a psychiatrist in the past month. Substance use is strongly associated with prolonged and persistent homelessness among people with mental disorders, as is the early experience of first becoming homeless. Our findings replicate and extend those of previous studies, and are discussed in terms of their implications for service delivery and the broader construct of social inclusion.

Keywords: homelessness; chronicity; mental illness; substance use; concurrent disorders

Introduction

Homelessness is a social problem that has significant public health, economic, and social consequences. As such, it has become an issue of national concern among the media, researchers, and policy makers. Municipal counts report that the size of the homeless population has significantly increased in recent decades, and hundreds of cities across North America and Europe have developed strategies to “end homelessness” (Busch-Geertsema, Edgar, O’Sullivan, & Pleace, 2010; Laird, 2007; United States Interagency Council on Homelessness – USICH, 2003, 2010).

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Recent research and policy have focused on adults who are “chronically” homeless, an estimated 10% to 20% of the overall homeless population (Caton et al., 2005; Kuhn & Culhane, 1998), as it is argued that those who have been homeless for longer durations (usually defined as one year or more) have a greater impact on the public system of care and are in need of the most assistance (Kuhn & Culhane, 1998; USICH, 2003). Individuals who are homeless for longer durations are more likely to have concurrent substance use and mental disorders (Fischer et al., 1986; Kuhn & Culhane, 1998) which, in turn, complicate the housing and the recovery needs of individuals (Edens, Mares, Tsai, & Rosenheck, 2011; Kertesz, Crouch, Milby, Cusimano, & Schumacher, 2009).

Research into the causes of homelessness suggests complex interactions between individual and structural factors (Cronley, 2010; Shinn, 2007). Individual factors associated with homelessness include physical health problems, substance abuse and poor coping skills, while structural factors include the availability of affordable housing as well as educational and employment opportunities. Despite evidence linking homelessness to broader social determinants of health (Raphael, 2008), policy makers often attribute the causes of homelessness to individual factors and interventions tend to focus narrowly on individuals who display “high risk” characteristics (Shinn, 2007; Wright, Rubin, & Devine, 1998). Several categories of risk factors have been associated with vulnerability to repeated homelessness, including criminal justice contact, mental illness, substance dependence, ethnicity, and social networks (Caton et al., 2000, 2005; McBride, Calsyn, Morse, Klinkenberg, & Allen, 1998; North, Pollio, Smith, & Spitznagel, 1998; Sosin & Bruni, 1997). These factors are themselves a function of poor access to the social determinants of health (Raphael, 2008), illustrating an interaction that cannot be fully understood by studying individual or structural variables independently.

The delineation of sub-groups within the homeless population is important for the identification of specific needs, and the delivery of indicated forms of intervention. Kuhn and Culhane (1998) described a typology derived from their work with shelter users, distinguishing between chronic, episodic, and transitional users of these facilities (see McAllister, Lennon, & Kuang, 2011 for a refinement of this typology). This typology has had an important influence on subsequent research and has stimulated policy makers to focus particular attention on the sub-population that conforms to the expected profile of “chronic” homelessness (e.g. USICH, 2003). It is important to distinguish those who are chronically homeless (one year or more), given the cost burden on the public system of care and the health and social consequences of prolonged homelessness to individuals, families, and communities (Culhane & Metraux, 1999; Gulcur, Stefancic, Shinn, Tsemberis, & Fischer, 2003). The identification of individual-level risk factors for chronic homelessness has practical implications for service delivery in that it can highlight opportunities for targeting preventive interventions.

Cross-sectional studies on the *occurrence* of homelessness have identified factors that distinguish homeless people from their housed counterparts (Caton et al., 2005; North et al., 1998). However, it is not clear whether these same factors also play a role in determining the *course* of homelessness. Among 377 first time homeless adults admitted to shelters, Caton et al. (2005) found that older age and arrest history were the strongest predictors of duration of homelessness over 18 months. Twenty-nine percent of their sample met criteria for a current mental disorder and 22% met criteria for a current substance use disorder, however, neither of these

variables was associated with duration of homelessness. Using survival analysis with a prospective design, McBride et al. (1998) included age, gender, race, income, psychiatric diagnosis, and severity of symptoms at intake to predict duration of homelessness within a sample of 215 participants. They found no effect of age or race; males were homeless for longer durations than females; and those with more severe psychiatric symptoms were more likely to be homeless for longer durations, regardless of specific diagnosis. Notably, no substance use variables were included in their analyses.

In a cross-sectional study of 900 homeless people, North et al. (1998) found that chronicity of homelessness was associated with the number of symptoms (but not presence) of alcohol use disorder, earlier age of onset of drug use disorder, presence and number of symptoms of both schizophrenia and antisocial personality disorder, and earlier onset of both major depression and conduct disorder. In multiple regression models, these authors found that more education was associated with shorter lifetime duration of homelessness. Thus, it remains unclear how mental health and substance use, among other variables, influence the duration of homelessness.

Individuals with comorbid mental and substance use disorders may be at particular risk for prolonged episodes of homelessness as they have poor rates of treatment completion and higher rates of post-treatment relapse and re-hospitalization (Weisner, Matzger, & Kaskutas, 2003). Johnson and Chamberlain (2008) used three temporal classifications of homelessness (less than three months, three to 11 months, one year or more) to demonstrate that homeless people with substance abuse were more likely to be chronically homeless. Eighty-two percent of participants with substance abuse had been homeless for one year or more, compared to only 50% of those who had no substance abuse. In addition, two-thirds of those with substance use developed their problem after becoming homeless (Johnson & Chamberlain, 2008).

Given the recent focus on chronic homelessness and the mixed results in the literature, it is important to further clarify the characteristics associated with duration of homelessness. Further, given the well-documented use of alcohol and other drugs among homeless populations (Caton, et al., 2000; Leal, Galanter, Dermatis, & Westreich, 1999; Snow & Anderson, 1993), it is critical that both substance use and other mental disorders be included in future analyses.

This study investigates factors associated with prolonged (single longest episode of one year or more) and persistent (cumulative lifetime duration of three years or more) homelessness among a sample of adults who were recruited on the basis of current homelessness and mental illness in Vancouver, BC. Our objectives were to:

- (1) identify the characteristics of participants who had prolonged and/or persistent homelessness
- (2) examine the association between mental disorders, substance use, and co-occurring disorders in relation to prolonged and persistent homelessness within the sample.

Methods

The Vancouver At Home Project is a prospective cohort study of adults who are homeless and have a mental illness in Vancouver, BC. Eligibility criteria included

legal adult status (19 years of age or over), presence of a current mental disorder on the MINI Neuropsychiatric Interview (MINI; Sheehan et al., 1998), and being absolutely homeless or precariously housed. Absolute homelessness was defined as living on the streets or in a shelter for at least two weeks during the past year. Precariously housed was defined as living in a rooming house, hotel or other form of transitional housing with at least one episode of absolute homelessness in the past year.

Participants were recruited through referral from over 40 agencies representing approximately 13 different types of services available to homeless adults in Vancouver. The majority of participants were recruited from:

- homeless shelters,
- drop-in centers,
- homeless outreach teams,
- hospitals,
- community mental health teams,
- criminal justice programs.

Written material about the study, eligibility criteria, and the referral process was distributed to community agencies. We specifically targeted organizations that serve women, youth, aboriginal peoples, and gay/lesbian/transgender individuals in order to obtain as diverse and representative a sample as possible. Referral was initiated by service providers in the community, and general eligibility criteria were assessed using a brief telephone screen with the referral agent. If the potential participant appeared to meet the study criteria, a face-to-face interview was scheduled with the individual to more formally assess eligibility (mental illness, homelessness). All interviews were conducted by trained research interviewers who explained procedures and obtained informed consent. The project was approved by the Research Ethics Boards at Simon Fraser University and the University of British Columbia.

If the individual met all study criteria, they were enrolled as a participant and the baseline questionnaire commenced. As illustrated in Figure 1, approximately 85 individuals were turned away on the phone because they clearly did not meet eligibility criteria. In addition, approximately 100 individuals were invited to meet with an interviewer for further eligibility screening and/or to begin the baseline questionnaire but did not show up for an appointment. Whenever possible, appointments were rescheduled and interviewers tried to locate individuals in the community. Finally, 92 recruits completed the formal eligibility screening process but were deemed ineligible. When these individuals were compared with participants who were enrolled in the study, no significant differences were found in terms of current age or gender.

At baseline, enrolled participants completed a series of detailed interviewer-administered questionnaires that included questions on:

- socio-demographic characteristics,
- symptoms of mental illness,
- substance use,
- physical health,
- service use,
- quality of life.

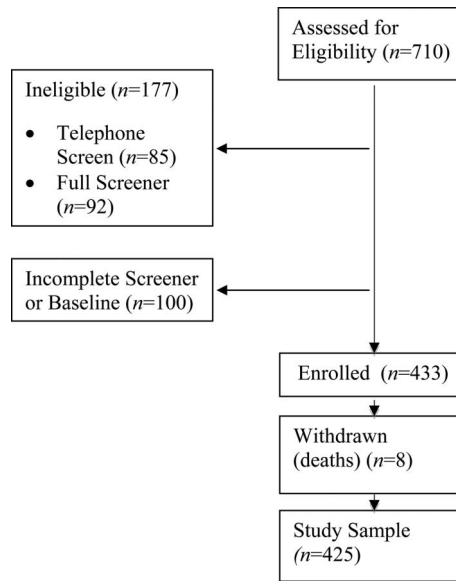


Figure 1. Partial consort diagram of screening and enrollment process.

All participants received a cash honorarium upon completion of the baseline interview. This analysis is based upon data from the baseline questionnaires of 425 participants recruited from the study's inception in October 2009 to January 2011. Eight participants died during this time period and were withdrawn from the sample.

Variables of interest

Aboriginal ethnicity was self-reported and does not include participants who are part-Aboriginal and who self-identified as "Mixed/Other." With regard to mental disorders, severe cluster includes at least one of current (i.e. past month) psychosis, mood disorder with psychotic features, and hypomanic or manic episode, as identified through the MINI or documented physician diagnosis. Less severe cluster includes at least one of current major depressive episode, panic disorder, and post-traumatic stress disorder (PTSD). Substance dependence was also identified using the MINI; however, use of various drugs and frequency of use were recorded over the past month using the Maudsley Addiction Profile (MAP; Marsden et al., 1998). Frequency of use included all illicit drugs (i.e. not alcohol). Infectious disease was assessed based on a positive self-report diagnosis of HIV, Hepatitis B, or Hepatitis C. Head injury status was determined based on the question "Did you ever receive a head injury that left you unconscious?"

Self-reported involvement with health services was collected for the past six months including visiting a:

- family doctor
- psychiatrist
- emergency room (ER)
- being transported by ambulance to an ER.

Access to health care was elicited by the questions “Is there a place that you usually go to when you’re sick or in need of advice about your health?” and “In the past 6 months, was there ever a time when you needed health care but you did not receive it?” Criminal justice services included:

- contact with the police that did not result in arrest
- contacts that resulted in arrest
- being held in a police cell for less than 24 h.

Statistical analyses of categorical data were conducted using Pearson’s chi-square test. Comparisons of numeric variables (e.g. age at enrolment, age at first homelessness) between groups were conducted using the Student *t* test and Wilcoxon’s rank-sum test. Single variable and multivariable logistic regression analyses were used to model independent risk factors for duration of homelessness. We defined “prolonged” homelessness as a single longest episode of one year or more in duration and “persistent” homelessness as three or more years of cumulative homelessness in one’s lifetime. Variables entered into multivariable regression were chosen based on statistical significance in univariate analysis. However, given its influence on the duration of homelessness, age at enrollment was included in the multivariable model despite not being significant in the univariate analysis. Backward stepwise logistic regression was used to derive the final model. Odds ratios and 95% confidence intervals (CI) were obtained using logistic regression. All reported *p*-values are two-sided. SPSS-19 was used to conduct these analyses.

Results

In total, 425 participants completed the baseline questionnaire. Data on the duration of homelessness were missing for nine participants, resulting in a final sample size of 416. The mean age at enrollment was 40.8 (SD = 11.0) years and the mean age when first homeless was 30.0 (SD = 13.4) years. Seventy-four percent of the sample were males. Tables 1 and 2 present demographic characteristics and current mental disorder status of participants by duration of homelessness (cumulative lifetime and longest episode). A median split was used to separate the sample into two groups on the dimensions of prolonged and persistent homelessness. Out of 416 participants, 214 had been homeless for a total of less than three years and 202 for three or more years during their lifetime. The longest single episode of homelessness was less than one year for 209 participants, and one year or greater for another 208 participants.

Table 3 presents current substance use (past month) and service use (past six months) characteristics by duration of homelessness.

All bivariate comparisons between participants by duration of homelessness are summarized in Tables 1–3. The results indicate that *persistent homelessness* (three years or more vs. less than three years) was significantly associated with:

- male gender (80% vs. 68%),
- younger age when first homeless (mean = 25.5 years vs. 34.2 years),
- Aboriginal ethnicity (21% vs. 11%),
- more than one current mental disorder on the MINI (59% vs. 46%),
- infectious disease positivity (44% vs. 23%),

Table 1. Demographic characteristics by duration homeless (cumulative lifetime and longest episode) ($n = 425$)*.

	Total ⁺ , n (%)	Cumulative lifetime		p value	Longest single episode		p value
		Less than three years, n (%)	Three years or more, n (%)		Less than one year, n (%)	One year or more, n (%)	
<i>Gender</i>							
Male	306 (74)	145 (68)	161 (80)	0.006	150 (72)	157 (75)	0.390
Female	110 (26)	69 (32)	41 (20)		59 (28)	51 (24)	
<i>Age at enrollment</i>							
Mean years (SD)	40.8 (11.0)	40.8 (11.5)	40.9 (10.5)	0.907	40.3 (11.9)	41.3 (10.0)	0.335
<i>Age first homeless</i>							
Mean years (SD)	30.0 (13.4)	34.2 (14.0)	25.5 (11.2)	<0.001	31.5 (13.9)	28.4 (12.6)	0.018
<i>Ethnicity</i>							
Aboriginal	65 (16)	23 (11)	42 (21)	0.017	24 (11)	41 (19)	0.063
Caucasian	236 (56)	127 (59)	109 (54)		123 (58)	113 (54)	
Mixed/Other	118 (28)	66 (31)	52 (26)		64 (30)	55 (26)	
<i>Education</i>							
Grade 8 or less	63 (15)	27 (13)	36 (18)	<0.001	24 (11)	39 (19)	0.015
Incomplete high school	176 (42)	76 (35)	100 (50)		82 (39)	94 (45)	
Graduated high school	178 (43)	112 (52)	66 (33)		103 (49)	76 (36)	
<i>Marital status</i>							
Single/never	293	147	146	0.505	146 (70)	147	0.906
Married	(70)	(68)	(73)			(71)	
Married/partnered	23 (6)	14 (7)	9 (5)		11 (5)	12 (6)	
Separated/divorced	99 (24)	54 (25)	45 (23)		52 (25)	48 (23)	
<i>Children under 18 years</i>							
99 (24)	44 (21)	55 (28)		0.103	38 (18)	62 (30)	0.006
<i>Housing status</i>							
Absolutely homeless	334 (80)	171 (79)	163 (81)	0.697	162 (77)	172 (83)	0.132
Precariously housed	84 (20)	45 (21)	39 (19)		49 (23)	36 (17)	
<i>Infectious disease</i>							
137 (33)	49 (23)	88 (44)		<0.001	51 (24)	86 (42)	<0.001
<i>Head injury</i>							
229 (56)	120 (56)	109 (56)		0.971	106 (51)	124 (61)	0.044

Notes: *Denominator fluctuates due to missing observations; ⁺ total is based on cumulative lifetime and may differ slightly between cumulative lifetime and longest single episode due to slightly different case mixes.

Table 2. Mental illness characteristics by duration homeless (cumulative lifetime and longest episode) ($n = 425$)*.

	Total [†] , n (%)	Cumulative lifetime		Longest single episode		p value
		Less than three years, n (%)	Three years or more, n (%)	Less than one year, n (%)	One year or more, n (%)	
Major depression	169 (40)	77 (36)	92 (46)	74 (35)	95 (46)	0.039
Manic/hypomanic	87 (21)	44 (20)	43 (21)	41 (19)	47 (23)	0.818
PTSD	111 (27)	50 (23)	61 (30)	46 (22)	65 (31)	0.109
Panic disorder	87 (21)	35 (16)	52 (26)	35 (17)	53 (25)	0.016
Psychotic disorder	218 (52)	116 (54)	102 (50)	117 (55)	101 (49)	0.512
Mood disorder with psychotic features	73 (18)	39 (18)	34 (17)	37 (18)	37 (18)	0.725
Alcohol dependence	105 (25)	50 (23)	55 (27)	47 (22)	58 (28)	0.337
Substance dependence	243 (58)	108 (50)	135 (67)	104 (49)	140 (67)	<0.001
<i>Number of mental disorders</i>						0.013
One	186 (48)	109 (54)	77 (41)	105 (54)	81 (42)	
Two or more	202 (52)	93 (46)	109 (59)	89 (46)	114 (58)	
<i>Suicide risk</i>						0.762
Moderate/high	148 (35)	75 (35)	73 (36)	67 (32)	81 (39)	
None/low	270 (65)	141 (65)	129 (64)	144 (68)	127 (61)	
<i>Severity</i>						
Severe cluster	304 (73)	163 (75)	141 (70)	157 (74)	148 (71)	0.194
Less severe cluster	225 (54)	103 (48)	122 (60)	100 (47)	126 (61)	0.009
<i>Psychiatric hospital (past five years)</i>						
Longer than six months	41 (10)	22 (10)	19 (10)	28 (13)	14 (7)	0.778
More than two times	203 (50)	106 (50)	97 (50)	115 (56)	89 (45)	0.996

Notes: *Denominator fluctuates due to missing observations; [†]total is based on cumulative lifetime and may differ slightly between cumulative lifetime and longest single episode due to slightly different case mixes.

Table 3. Substance use and service use characteristics by duration homeless (cumulative lifetime and longest episode) ($n = 425$)*.

	Cumulative lifetime			Longest single episode			
	Total ⁺ , n (%)	Less than three years, n (%)	Three years or more, n (%)	p value	Less than one year, n (%)	One year or more, n (%)	p value
<i>Substance use (past month)</i>							
Alcohol	196 (47)	102 (47)	94 (47)	0.928	100 (47)	96 (47)	0.908
Cannabis	178 (47)	85 (44)	93 (51)	0.188	82 (42)	96 (53)	0.030
Heroin	84 (20)	31 (14)	53 (26)	0.002	30 (14)	55 (27)	0.002
Cocaine	75 (18)	29 (13)	46 (23)	0.013	32 (15)	44 (21)	0.101
Crack	141 (34)	54 (25)	87 (44)	0.013	54 (26)	87 (42)	<0.001
Amphetamines	49 (12)	21 (10)	28 (14)	<0.001	21 (10)	28 (14)	0.248
Injection drug use	77 (19)	22 (10)	55 (28)	0.188	24 (11)	53 (26)	0.027
<i>Frequency of illicit drug use[†]</i>							
Never	144 (34)	94 (44)	50 (25)	<0.001	88 (42)	56 (27)	<0.001
Less than daily	167 (40)	89 (41)	78 (38)		89 (42)	78 (37)	
Daily	108 (26)	33 (15)	75 (37)		34 (16)	75 (36)	
<i>Service use (past six months)</i>							
Access to health care	325 (79)	166 (78)	159 (78)	0.770	162 (78)	164 (80)	0.736
Needed health care but not available	182 (44)	83 (39)	99 (50)	0.022	76 (37)	107 (52)	0.001
Family doctor	269 (65)	149 (69)	120 (60)	0.048	140 (66)	130 (63)	0.448
Psychiatrist	107 (26)	68 (31)	39 (19)	0.004	71 (34)	36 (17)	<0.001
Emergency room	239 (58)	130 (61)	109 (54)	0.198	122 (59)	117 (58)	0.834
Ambulance	164 (39)	89 (42)	75 (37)	0.332	88 (42)	76 (38)	0.296
Held in police cell	98 (24)	44 (21)	54 (28)	0.120	50 (24)	48 (24)	0.984
Police contact (no arrest)	232 (56)	110 (52)	122 (61)	0.080	104 (50)	128 (63)	0.008
Arrested	144 (35)	66 (31)	78 (40)	0.085	79 (38)	66 (33)	0.231

Notes: *Denominator fluctuates due to missing observations; [†] total is based on cumulative lifetime and may differ slightly between cumulative lifetime and longest single episode due to slightly different case mixes; does not include alcohol.

- current substance dependence (67% vs. 50%),
- injection drug use in the past month (28% vs. 10%),
- needing health care but not receiving it (50% vs. 39%),
- not having seen a psychiatrist (19% vs. 31%),
- not having seen a family doctor (60% vs. 69%).

Being arrested and having contact with the police that did not result in arrest were both marginally significant.

Prolonged homelessness, a longest single episode of one year or more vs. less than one year, was significantly associated with:

- younger age when first homeless (mean = 28.4 years vs. 31.5 years),
- incomplete high school (45% vs. 39%),
- having children under the age of 18 years (30% vs. 18%),
- more than one current mental disorder on the MINI (58% vs. 46%),
- current substance dependence (67% vs. 49%),
- infectious disease positivity (42% vs. 24%),
- history of head injury (61% vs. 51%),
- needing health care but not receiving it (52% vs. 37%),
- not having seen a psychiatrist (17% vs. 34%, $p < 0.001$),
- contact with the police that did not result in arrest (63% vs. 50%).

Unadjusted (UAO) and adjusted odds ratios (AOR) and CI for variables included in the univariate and multivariable analyses are presented in Tables 4 and 5, respectively. The results indicate that *persistent* homelessness was independently predicted by:

- male gender (AOR: 2.39, 95% CI: 1.33, 4.30),
- older age at enrollment (AOR: 1.10, 95% CI: 1.07, 1.14),
- younger age when first homeless (AOR: 0.90, 95% CI: 0.88, 0.93),
- incomplete high school (AOR: 1.96, 95% CI: 1.15, 3.32),
- past month alcohol use (AOR: 2.34, 95% CI: 1.20, 4.58),
- daily illicit drug use (AOR: 2.88, 95% CI: 1.44, 5.76).

No mental health or service use variables were significant in this analysis.

The following variables were predictive of *prolonged* homelessness:

- older age at enrollment (AOR: 1.05, 95% CI: 1.02, 1.08),
- younger age when first homeless (AOR: 0.97, 95% CI: 0.94, 0.99),
- current substance dependence (AOR: 1.85, 95% CI: 1.08, 3.15),
- daily illicit drug use (AOR: 2.93, 95% CI: 1.48, 5.78),
- not seeing a psychiatrist in the past month (AOR: 0.48, 95% CI: 0.28, 0.82).

Male gender was a marginally significant predictor (AOR: 1.74, 95% CI: 0.99, 3.06). No mental health variables were significant in this analysis.

Discussion

Our multivariable models identified several factors that were associated with persistent homelessness (three years or greater in one's lifetime) and prolonged

Table 4. Univariate logistic regression analysis for homeless adults by duration homeless (cumulative lifetime and longest episode) ($n = 425$).

	Cumulative lifetime			Longest single episode		
	UOR	95% CI		UOR	95% CI	
		Lower	Upper		Lower	Upper
Demographics						
Age at enrollment	1.00	0.98	1.02	1.01	0.99	1.03
Age first homeless	0.95**	0.93	0.96	0.98*	0.97	0.99
Male gender	1.87*	1.2	2.92	1.21	0.78	1.87
Aboriginal ethnicity	2.13*	1.2	3.76	1.86*	1.06	3.27
Education						
Less than Grade 8	2.26	1.26	4.06	2.2*	1.02	2.36
Incomplete high school	2.23	1.46	3.42	1.55*	1.02	2.36
Children under 18	1.46	0.93	2.3	1.9*	1.2	3.02
Infectious disease	2.69**	1.76	4.12	2.29**	1.51	3.49
Head injury	1.3	0.86	1.95	2.03**	1.34	3.08
Mental disorder						
Major depression	1.51*	1.02	2.24	1.56*	1.05	2.31
PTSD	1.43	0.92	2.21	1.64*	1.06	2.55
Panic disorder	1.79*	1.11	2.9	1.72*	1.07	2.77
Psychotic disorder	0.88	0.6	1.3	0.76	0.52	1.11
Substance dependence	2.02**	1.36	2.99	2.12*	1.43	3.15
Suicide risk	1.06	0.71	1.59	1.37	0.92	2.05
Type of disorder						
Severe cluster	0.75	0.49	1.16	0.85	0.55	1.31
Less severe cluster	1.67*	1.14	2.47	1.71*	1.16	2.51
Psychiatric hospitalization (past five years)						
Longer than six months	0.91	0.48	1.74	0.47*	0.24	0.92
More than two times	1.00	0.68	1.48	0.64*	0.43	0.95
Substance use (past month)						
Alcohol	0.98	0.67	1.45	0.98	0.67	1.44
Cannabis	1.31	0.88	1.91	1.57*	1.05	2.36
Heroin	2.13*	1.3	3.48	2.2*	1.34	3.6
Cocaine	1.9*	1.14	3.17	1.52	9.2	2.51
Crack	2.3**	1.51	3.48	2.11**	1.4	3.2
Amphetamine	1.5	0.82	2.73	1.42	0.78	2.6
Injection drug use	3.36**	1.96	5.76	2.74**	1.62	4.64
Frequency (illicit drugs)						
Less than daily	1.65*	1.04	2.61	1.38	0.88	2.17
Daily	4.27**	2.51	7.29	3.46**	2.05	5.86
Service use (past six months)						
Access to health care	1.08	0.67	1.73	1.09	0.68	1.74
Need care but none	1.58*	1.07	2.34	1.9**	1.28	2.82
Family doctor	0.67*	0.45	0.99	0.86	0.57	1.28
Psychiatrist	0.52*	0.33	0.81	0.41**	0.26	0.65
Emergency room	0.77	0.52	1.15	0.96	0.65	1.42
Ambulance	0.82	0.56	1.22	0.81	0.55	1.2
Police cell	1.44	0.91	2.27	1.01	0.64	1.58
Police contact (no arrest)	1.42	0.96	2.1	1.7*	1.15	2.52
Arrest	1.58*	1.05	2.38	0.78	0.52	1.17

Notes: * $p \leq 0.05$; ** $p \leq 0.001$.

Table 5. Multivariable step-wise logistic regression analysis by duration homeless (cumulative lifetime and longest episode) ($n = 425$).

	Cumulative lifetime			Longest episode		
	AOR	95% CI		AOR	95% CI	
		Lower	Upper		Lower	Upper
Age at enrollment	1.10**	1.07	1.14	1.05**	1.02	1.08
Age first homeless	0.90**	0.88	0.93	0.97*	0.94	0.99
Male gender	2.39*	1.33	4.30	1.74*	0.99	3.06
Incomplete high school	1.96*	1.15	3.32			
Major depression	1.55 ⁺	0.94	2.53			
Substance dependence				1.85*	1.08	3.15
Alcohol use (past month)	2.34*	1.20	4.58			
Daily illicit drug use	2.88*	1.44	5.76	2.93*	1.48	5.78
Psychiatrist (past six months)				0.48*	0.28	0.82

Notes: * $p \leq 0.05$; ** $p \leq 0.001$; ⁺ $p = 0.085$.

homelessness (one year continuously or greater) in a cohort of individuals who were recruited on the basis of current homelessness and a current mental disorder. Notably, none of our measures of psychiatric conditions (e.g. specific diagnoses, single versus multiple disorders) were significant in our models. Instead, current daily use of illicit drugs, younger age of first homelessness, older current age, and male gender were significant predictors of both prolonged and persistent homelessness.

These findings support a growing body of literature suggesting that problematic substance use is one of the most persistent barriers to exiting homelessness, and a contributor to social exclusion (Johnson & Chamberlain, 2008; Kertesz et al., 2009; Kuhn & Culhane, 1998). Moreover, substance misuse has been strongly linked to premature mortality among the homeless, including homeless persons with mental disorders (Beijer, Andréasson, Agren, & Fugelstad, 2011) and homeless youth (Dibben, Atherton, Doherty, & Baldacchino, 2011). The very worrisome implication of these findings is that substance misuse places homeless individuals at risk of exclusion from services and significantly reduces life expectancy. Our results extend previous research by indicating a specific and increased risk of chronic homelessness for those individuals with concurrent mental disorders and substance use, particularly involving illicit drugs.

Forty-nine percent of our sample had been homeless for a total of three years or more, and 50% had a single episode of at least one year, figures that are higher than previous estimates of chronic homelessness (e.g. Caton, et al., 2005; McBride et al., 1998). The mental health and substance-related characteristics of our sample also differ from those reported previously, due to our use of psychiatric illness as an inclusion criterion. Fazel, Kholsa, Doll and Geddes (2008) identified 29 studies that used sound operational definitions of substance use and mental illness among homeless samples between 1966 and 2007, spanning Western Europe and North America. Prevalence rates for substance dependence ranged from 5% to 54% and for psychotic disorder from 3% to 42%. In our sample, the prevalence rates for substance dependence (58%) and psychosis (52%) exceeded the upper end of the corresponding figures reported by Fazel et al. (2008).

In addition to the influence of sampling, the high prevalence of substance dependence in our sample may be a function of local systemic factors such as drug availability, tolerance for drug use, and the limited availability of treatment and relevant supports. As noted, no measure of mental illness, including psychosis, was related to either prolonged or persistent homelessness in our sample, which suggests greater access to care and shelter among persons with mental disorders compared to those with concurrent disorders.

Our findings underscore that the needs and characteristics of people who are chronically homeless may vary considerably by geographic location. They also suggest that systemic factors, such as community norms and service availability, may also mediate the probability of prolonged or persistent homelessness. Other implications of our results include the continued need for integrated concurrent disorders treatment services for the homeless. Although all members of our study cohort had mental disorders, only those with particular drug problems, such as daily illicit drug use, were at risk of prolonged or persistent homelessness, with attendant risks related to infectious disease transmission (Badiaga, Raoult, & Brouqui, 2008), physical illness (Frankish, Hwang, & Quantz, 2005), and mortality (Beijer et al., 2011; Dibben et al., 2011). The absence in our models of risk associated with mental illness suggests that services may be in place that could be built upon and expanded in order to achieve greater effectiveness among those with concurrent disorders. In addition, there may be barriers to housing that differentially affect individuals who use illicit drugs.

The integration of substance use and mental health services is a decades-old movement with abundant challenges (see Davidson & White, 2007). Nevertheless, our results provide clear evidence of the public health importance of intervening more effectively with those who are homeless and who experience co-occurring substance use and mental disorders.

Studies of pathways into homelessness typically point to a series of ruptures involving important social bonds, often compounded by substance use (Johnson & Chamberlain, 2008; Keys, Mallett, & Rosenthal, 2006). Johnson and Chamberlain (2008) identified three stages leading to homelessness:

- (1) separation from the mainstream labor market
- (2) erosion of support from family and friends
- (3) acquisition of new social networks in the context of homelessness.

They also observed that substance-related problems more commonly followed, rather than preceded, the onset of homelessness (Johnson & Chamberlain, 2008). This finding emphasizes the importance of early intervention for substance use among individuals who are newly homeless. Such intervention should be provided in many forms but should include housing and intensive support services particularly around trauma, daily living skills, and harm reduction.

This interpretation is consistent with the Risk Amplification Model (Paradise et al., 2001; Whitbeck, Hoyt, & Yoder, 1999), which conceptualizes homelessness as the result of successive environmental disruptions, each of which places individuals at greater risk for homelessness and associated risk factors. According to this model, in addition to the cumulative effects of progressive risk, risk may be multiplied at each stage because the environmental risks associated with later phases present increasingly greater challenges to development and adaptation (see Hser, Longshore,

& Anglin, 2007). Therefore, the first experience of homelessness may be a critical point in the process because duration of homelessness may predict the extent to which early risks are amplified.

Limitations

Despite the strengths of our sample (e.g. large sample size, diverse recruitment strategy, structured diagnostic interviews), several limitations bear on the interpretation of our results. First, all variables were based on participant self-report. Given that the sample was selected based on current mental illness and the high levels of psychosis in our sample, accuracy of recall may have been compromised. Furthermore, participants were interviewed before being randomized to a housing intervention, therefore, some may have modified their responses in an attempt to influence the outcome of randomization. It should also be noted that we based severity of mental illness on diagnostic category and number of concurrent diagnoses; level of functional impairment was not included.

Another limitation specifically involves the duration of homelessness variable. This variable describes the amount of homelessness an individual has experienced, but not all individuals have had equal opportunity to be homeless for the same amount of time. For example, individuals with more time between first onset of homelessness and study enrollment are more likely to have a longer duration of homelessness (North et al., 1998). Therefore, in our multivariable model, we controlled for both age at enrollment and age of first homelessness.

A limitation of cross-sectional studies is that causal inferences cannot be drawn from the analyses. Therefore, it must be noted that the associations described in this study do not necessarily indicate a causal relationship. Finally, in the current study, we did not have access to early trauma or family dysfunction variables. These variables have been associated with early onset of homelessness (North et al., 1998) and should be further explored as correlates of prolonged and persistent homelessness in future studies.

Future directions

Researchers are beginning to understand the developmental significance of extended time frames and how early life experiences relate to later functional outcomes (Hser et al., 2007; Halfon & Hochstein, 2002). Future research could examine how different variables operate to “push” individuals’ trajectories toward or away from adverse outcomes such as prolonged homelessness. A better understanding of health and social trajectories should enable us to manipulate early risk and protective factors and shift our emphasis on treatment in the later stages of illness and social exclusion to the promotion of earlier, more effective preventive strategies and interventions.

In conclusion, we have found evidence that current daily use of illicit drugs, younger age of first homelessness, older current age, and male gender were significant predictors of both prolonged and persistent homelessness. Notably, none of our measures of psychiatric conditions (e.g. specific diagnoses, single versus multiple disorders) were significant in our models. Interventions focusing on those who are already chronically homeless are necessary but not sufficient to reduce homelessness. Prevention efforts, such as assisting people at-risk for prolonged and

persistent homelessness to retain adequate housing and to access appropriate services must be part of a comprehensive strategy to address homelessness.

Acknowledgments

The authors thank the At Home/Chez Soi Project collaborative at both national and local levels; National project team: J. Barker, PhD (2008–2011) and C. Keller, MHCC National Project Leads; P. Goering, RN, PhD, Research Lead; approximately 40 investigators from across Canada and the US; 5 site coordinators; numerous service and housing providers; and persons with lived experience. This research has been made possible through a financial contribution from Health Canada. The views expressed herein solely represent the authors.

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