Daily Substance Use and Mental Health Symptoms among a Cohort of Homeless Adults in Vancouver, British Columbia

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ABSTRACT *Substance use can be a barrier to stable housing for homeless persons with mental disorders. We examined DSM-IV symptoms among homeless adults (N=497), comparing those who reported daily substance use (DSU) with non-daily substance users. Multivariable linear regression modeling was used to test the independent association between DSU and symptoms using the Colorado Symptom Index total score. DSU was independently associated with higher symptoms (beta=3.67, 95 % CI 1.55–5.77) adjusting for homelessness history, age, gender, ethnicity, education, marital status, and mental disorder sub-type (adjusted R^2=0.24). We observed a higher prevalence of DSU in our sample than has been previously reported in a Housing First intervention. DSU was also independently associated with more DSM-IV symptomatology. We have an opportunity to observe this cohort longitudinally and examine if there are changes in substance use based on treatment assignment and commensurate changes in housing stability, community integration, health status, and quality of life.*

KEYWORDS *Substance use, Addiction, Homelessness, Housing first, Mental health, DSM-IV*

INTRODUCTION

The overlapping problems of homelessness, mental illness, and substance use have challenged individuals, communities, and public systems of care. Studies have documented that between 29 and 75 % of homeless populations use alcohol and/or illicit drugs.[1,2] Homeless individuals who use substances are more likely to drop out of treatment programs,[3] have higher rates of post-treatment relapse,[4] premature mortality,[5] chronic physical illness, and longer durations of homelessness.[6]

Recently, Housing First has been shown to be effective among homeless individuals with active substance use disorders.[2,7] However, while substance use per se was prevalent among participants in these studies, the implications of different

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severities and forms of substance use have not been well characterized in this context. For example, Padgett et al.[7] defined heavy use of drugs as using 4 days out of the previous 6 months. This definition does not capture the reality of substance use among people who are homeless and mentally ill in Vancouver, British Columbia,[8] which has the highest provincial lifetime reported use of illicit drugs in Canada (50.8 % of the general population).[9]

The primary objective of this paper is to characterize the pattern of self-reported substance use from the baseline recruitment data collected between October 2009 and June 2011 from participants in the Vancouver At Home study site. We compare mental health symptoms among homeless daily substance users in our sample versus non-daily substance users.

METHODS

The Vancouver At Home study is part of a multi-site pragmatic, randomized controlled trial of a Housing First intervention among homeless individuals with mental illness in five Canadian cities and the detailed methods have been previously described.[10] In brief, participants were eligible if they were 19 years of age or over, met criteria for a current mental disorder on the MINI 6.0 Neuropsychiatric Interview (MINI),[11] and were absolutely homeless or precariously housed. Most participants were recruited from homeless shelters, drop-in centers, homeless outreach teams, hospitals, community mental health teams, and criminal justice programs. Trained interviewers obtained informed written consent and conducted all interviews. Institutional Ethics Board approval was received from Simon Fraser University and from the University of British Columbia.

The surveys included questions on socio-demographic characteristics, symptoms of current and past mental illness, suicidality, substance use, physical health, service use, and quality of life. The interview time ranged from 80 to 120 min and upon completion participants received a $30 honorarium. The current analysis is based on data from the baseline questionnaires of 497 participants.

Self-reported frequency of substance use over the past month was captured using the Maudsley Addiction Profile.[12] Frequency of drug use was dichotomized to compare daily substance use (DSU) versus non-daily use (less than daily or none); this variable was used to reflect severity of substance use and its potential impact on daily functioning. Current mental disorders were identified through the MINI 6.0[11] while mental health symptoms and severity were collected through the 14-item Colorado Symptom Index (CSI).[13] Individual scores on the CSI were summed to obtain a total score with a higher score indicating more severe mental illness symptomatology.

We compared the socio-demographic characteristics and mental disorders of participants who were DSU versus those who were not using the Pearson's chi-square test. We then used a multivariable linear regression model to examine the independent association between DSU and mental health symptoms using the Colorado Symptom Index total score adjusting for variables selected a priori to be potentially associated with mental health symptom severity. All reported p values are two-sided. SPSS-19 was used to conduct these analyses.

RESULTS

There were 497 participants who completed the baseline questionnaires. Most of the participants were male (73 %), single (70 %), and unemployed (92 %). The mean age at enrollment was 40.8 (SD=11.0) years and the mean age when first homeless

TABLE 1 Comparisons of socio-demographic characteristics and mental disorders between Vancouver participants who used substances daily and who did not (n=497)

Variable		Total (N=497)	Less than daily or no use of substances (N=354)	Daily use of substances (N=143)	p value
Gender (%)	Male	73	74	71	0.591
	Female	27	27	29	
Age at enrollment (%)	<25 years	7	7	8	0.029
	25–44 years	57	53	65	
	44 plus years	36	40	27	
Ethnicity (%)	Aboriginals	16	12	23	0.012
	Caucasian	56	58	52	
	Mixed/other	28	29	25	
Education (%)	Incomplete high school or less	57	52	68	0.001
	High school or higher	43	48	32	
Marital status (%)	Single (never married)	70	70	69	0.748
	Other	30	30	32	
Employment status (%)	Unemployed	92	93	92	0.907
	Employed	4	3	4	
	Other—student/housewife	4	4	4	
Have children (under 18) (%)	No	75	81	60	<0.001
	Yes	25	19	40	
Length of homelessness (lifetime) (%)	12 months or less	27	34	11	<0.001
	13–60 months	41	40	44	
	60 months plus	31	26	45	
Time homelessness (longest single period) (%)	12 months or less	50	58	30	<0.001
	Over 12 months	50	42	70	
Age of first homelessness (%)	< 25 years	44	42	48	0.265
	25 or more years	56	58	53	
Housing status (%)	Absolutely homeless	78	80	73	0.112

TABLE 1 *Continued*

Variable		Total (N=497)	Less than daily or no use of substances (N=354)	Daily use of substances (N=143)	p value
Precariously housed	Yes	22	20	27	
Manic or hypomanic episode (%)	Yes	20	16	27	0.006
PTSD (%)	Yes	26	22	35	0.003
Panic disorder (%)	Yes	21	18	29	0.003
Mood disorder with psychotic feature (%)	Yes	17	15	22	0.073
Psychotic disorder (%)	Yes	53	57	43	0.004
Multiple mental disorders (≥2) (%)	Yes	48	44	59	0.003

PTSD post-traumatic stress disorder

was 30.0 (SD=13.4) years. There were 143 participants (29 %) who reported DSU, 232 (47 %) who reported less than daily use, and 122 (24 %) who reported no substance use in the past month. Table 1 presents demographic characteristics of participants by daily drug use status.

Among 143 participants who reported DSU, marijuana was the most common substance used (49 %), followed by crack cocaine (27 %), alcohol (18 %), heroin (15 %), and amphetamines (8 %). Among the DSUs, 112 (78 %) reported using only one substance daily and 31 (22 %) reported using multiple types of substances daily. There were 43 (35 %) DSUs who reported injection drug use while only 47 (13 %) of the less than daily substance users used substances via injection ($p<0.001$).

In the multivariate linear regression model presented in Table 2, we found that DSU was independently associated with higher mental health symptoms (beta=3.67, 95 % CI 1.55–5.77, $p=0.001$, $df=15$) adjusting for homelessness history, age, gender, ethnicity, education, marital status, and mental health disorders (adjusted $R^2=0.24$). Other variables that were also independently associated with higher mental health symptoms included older age, younger age at first homelessness episode, and presence of a current mental disorder with the exception of (hypo)manic episode and psychotic disorder. Interestingly, being single was associated with lower mental health symptoms although its effect was modest relative to other characteristics.

DISCUSSION

Among a sample of homeless adults in Vancouver, BC, daily substance use was independently associated with more symptoms of mental illness. This association was present even after adjusting for a range of potential confounders. The prevalence of

TABLE 2 Bivariate and multiple linear regression for factors associated with mental health symptoms (Colorado Symptom Index)

Variable	Unadjusted β coefficient (SE)	Adjusted β coefficient (SE)	95 % CI for adjusted β
Daily substance use (Y/N)	6.49 (1.20)	3.66 (1.07)	1.55, 5.77
Age at enrollment (years)	−0.11 (0.05)	0.14 (0.06)	0.01, 0.26
Gender (male vs. female)	−0.15 (1.25)	1.29 (1.11)	−0.88, 3.46
Aboriginal ethnicity vs. other	2.57 (1.52)	−0.08 (1.54)	−3.10, 2.95
Caucasian ethnicity vs. other	−0.12 (1.12)	0.30 (1.09)	−1.84, 2.43
High school or higher (Y/N)	2.70 (1.12)	1.52 (1.00)	−0.44, 3.47
Marital status (never married vs. other)	−0.12 (1.22)	−2.52 (1.11)	−4.69, −0.34
Age at first homelessness (years)	−0.18 (0.04)	−0.17 (0.06)	−0.28, −0.07
Length of homelessness in lifetime (months)	0.01 (0.01)	−0.01 (0.01)	−0.03, <0.01
Major depressive episode (Y/N)	11.0 (1.02)	7.55 (1.09)	5.47, 9.69
Manic or hypomanic episode (Y/N)	5.88 (1.38)	2.32 (1.23)	−0.09, 4.73
PTSD (Y/N)	8.84 (1.21)	3.73 (1.20)	1.38, 6.09
Panic disorder (Y/N)	11.3 (1.28)	6.10 (1.25)	3.64, 8.56
Mood disorder with psychotic features (Y/N)	8.88 (1.43)	5.83 (1.31)	3.26, 8.41
Psychotic disorder (Y/N)	−4.48 (1.10)	0.36 (1.03)	−1.66, 2.37

The composite score for Colorado Symptom Index (CSI) Scale was obtained by summing the score of individual item (in total, 14 items). Missing values for any of these items were replaced by the mean value for that specific item

PTSD post-traumatic stress disorder

daily substance use in our study (29 %) is dramatically higher than other Housing First intervention studies of homeless, mentally ill persons.[2,7] In previous studies, drug use was characterized as high frequency when the participant reported using 4 days out of the past 6 months (<25 %) and heavy alcohol use consisted of consuming alcohol on 28 days out of the past 6 months[7] or 15 days in the previous month (16 %).[2] As with the high-frequency substance users in the Collaborative Initiative on Chronic Homelessness study,[2] DSUs in our sample also experienced long durations of homelessness over their lifetime and had more mental health symptoms compared to participants who were abstinent or used substances less than daily.

Most housing and mental health interventions with this population do not address addiction. Neglecting substance use attenuates the potential benefits of longer residential stability of Housing First interventions, particularly when market housing is the basis for the housing stock, and thereby increases the risk of relapse into homelessness.[14] However, there have been a few reports where active substance users achieved residential stability in low-threshold Housing First models, with an accompanying decline in substance use over time.[2,15] Specific policies that address substance use in housing interventions would be a positive development. It is also critical to develop skills in understanding and addressing substance use and associated behaviors among persons who provide support and care to this population. Any intervention that does not address substance use issues, including behaviors that are frequently associated with substance use, creates missed opportunities to improve outcomes for this population.

Limitations of our study include the use of cross-sectional data and, thus, the inability to infer causation. The direction of the relationship could be that mental health symptoms drive daily substance use or vice versa; however, with cross-sectional data, we cannot further elucidate the direction. Substance use was self-reported and may be underreported, particularly given that the baseline interview was conducted prior to being randomized to a housing intervention, and participants may have felt insecure to provide insight into the amount of substances they actually use.

In conclusion, the frequency of substance use and daily substance use in our sample is much higher than most samples previously described in a Housing First intervention. Given that 29 % of the participants in our study endorsed daily substance use at baseline, we have an opportunity to observe this cohort longitudinally and examine if there are changes in substance use frequency based on treatment assignment and commensurate changes in housing stability, mental health symptoms, health status, and quality of life. These data will hopefully provide a robust sense of drug use trajectory associated with various Housing First interventions and help to inform the question: What works best for people with high-frequency substance use?

REFERENCES

1. Velasquez MM, Crouch C, von Sternberg K, Grosdanis I. Motivation for change and psychological distress in homeless substance abusers. *J Subst Abuse Treat.* 2000; 19(4): 395–401.
2. Edens EL, Mares AS, Rosenheck RA. Chronically homeless women report high rates of substance use problems equivalent to chronically homeless men. *Womens Health Issues.* 2011; 21(5): 383–389.

 3. Alterman AI, Erdlen DL, Laporte DJ, Erdlen FR. Effects of illicit drug use in an inpatient psychiatric population. *Addict Behav.* 1982; 7(3): 231–242.
 4. Weisner C, Matzger H, Kaskutas LA. How important is treatment? One-year outcomes of treated and untreated alcohol-dependent individuals. *Addiction.* 2003; 98(7): 901–911.
 5. Beijer U, Andreasson S, Agren G, Fugelstad A. Mortality and causes of death among homeless women and men in Stockholm. *Scand J Public Health.* 2011; 39(2): 121–127.
 6. Patterson M, Somers J, Moniruzzaman A. Prolonged and persistent homelessness: multivariable analyses in a cohort experiencing current homelessness and mental illness in Vancouver, British Columbia. *Mental Health Subst Use.* 2012; 2: 85–101.
 7. Padgett D, Gulcur L, Tsemberis S. Housing First services for people who are homeless with co-occurring serious mental illness and substance abuse. *Res Soc Work Pract.* 2006; 16(1): 74–83.
 8. Palepu A, Marshall BD, Lai C, Wood E, Kerr T. Addiction treatment and stable housing among a cohort of injection drug users. *PLoS One.* 2010; 5(7): e11697.
 9. Canadian Alcohol and Drug Use Monitoring Survey [http://www.hc-sc.gc.ca/hc-ps/drugs-drogues/stat/_2010/tables-tableaux-eng.php#t2]. Accessed 31 August 2012.
10. Goering PN, Streiner DL, Adair C, Aubry T, Barker J, Distasio J, Hwang SW, Komaroff J, Latimer E, Somers J, et al. The At Home/Chez Soi trial protocol: a pragmatic, multi-site, randomised controlled trial of a Housing First intervention for homeless individuals with mental illness in five Canadian cities. *BMJ Open.* 2011; 1(2): e000323.
11. Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, Hergueta T, Baker R, Dunbar GC. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry.* 1998; 59(Suppl 20): 22–33. quiz 34-57.
12. Marsden J, Gossop M, Stewart D, Best D, Farrell M, Lehmann P, Edwards C, Strang J. The Maudsley Addiction Profile (MAP): a brief instrument for assessing treatment outcome. *Addiction.* 1998; 93(12): 1857–1867.
13. Conrad KJ, Yagelka JR, Matters MD, Rich AR, Williams V, Buchanan M. Reliability and validity of a modified Colorado Symptom Index in a national homeless sample. *Ment Heal Serv Res.* 2001; 3(3): 141–153.
14. Kertesz SG, Crouch K, Milby JB, Cusimano RE, Schumacher JE. Housing First for homeless persons with active addiction: are we overreaching? *Milbank Q.* 2009; 87(2): 495–534.
15. Larimer ME, Malone DK, Garner MD, Atkins DC, Burlingham B, Lonczak HS, Tanzer K, Ginzler J, Clifasefi SL, Hobson WG, et al. Health care and public service use and costs before and after provision of housing for chronically homeless persons with severe alcohol problems. *JAMA.* 2009; 301(13): 1349–1357.