

# Housing First Improves Residential Stability in Homeless Adults With Concurrent Substance Dependence and Mental Disorders

Anita Palepu, MD, MPH, Michelle L. Patterson, PhD, Akm Moniruzzaman, PhD, C. James Frankish, PhD, and Julian Somers, PhD

The combination of homelessness, substance use, and mental illness is challenging for affected individuals and society to address. Estimates of the prevalence of substance use disorders among homeless populations vary between 29% and 75%.<sup>1-4</sup> Substance use among persons who are homeless has been associated with lower treatment retention,<sup>5</sup> higher rates of posttreatment relapse,<sup>6</sup> premature mortality,<sup>7</sup> and longer periods of homelessness.<sup>8</sup> Therefore, problematic substance use is a substantial barrier to existing homelessness<sup>9</sup> and contributes to social marginalization.<sup>10-12</sup>

In recent years, Housing First programs have demonstrated increased residential stability among those who are homeless and have a mental illness.<sup>13,14</sup> More recently, Housing First has been shown to be effective among homeless individuals with active substance use disorders.<sup>4,15</sup> However, it is unclear whether Housing First interventions are effective in the context of active and severe polysubstance use.<sup>16</sup> In one of the original Housing First studies,<sup>14</sup> heavy use of drugs was defined as using for 4 days in the previous 6 months and heavy alcohol use as drinking for 28 days in the past 6 months. This level of use does not represent the experience of homeless individuals with substance use and mental disorders in Vancouver, British Columbia, many of whom engage in frequent and severe polysubstance use.<sup>17-19</sup>

Kertesz et al.<sup>16</sup> cautioned that the currently favored policy approach of Housing First might be overreaching the evidence when applied to active substance users and those with severe addictions. Housing First has been successful in improving residential stability among refractory alcoholics,<sup>20,21</sup> but no data have yet been reported among homeless persons with active illicit drug use. A number of studies have found that ongoing substance use was associated with lower residential stability among previously homeless persons who received housing.<sup>22-26</sup>

**Objectives.** We examined the relationship between substance dependence and residential stability in homeless adults with current mental disorders 12 months after randomization to Housing First programs or treatment as usual (no housing or support through the study).

**Methods.** The Vancouver At Home study in Canada included 2 randomized controlled trials of Housing First interventions. Eligible participants met the criteria for homelessness or precarious housing, as well as a current mental disorder. Residential stability was defined as the number of days in stable residences 12 months after randomization. We used negative binomial regression modeling to examine the independent association between residential stability and substance dependence.

**Results.** We recruited 497 participants, and 58% (n = 288) met the criteria for substance dependence. We found no significant association between substance dependence and residential stability (adjusted incidence rate ratio = 0.97; 95% confidence interval = 0.69, 1.35) after adjusting for housing intervention, employment, sociodemographics, chronic health conditions, mental disorder severity, psychiatric symptoms, and lifetime duration of homelessness.

**Conclusions.** People with mental disorders might achieve similar levels of housing stability from Housing First regardless of whether they experience concurrent substance dependence. (*Am J Public Health.* 2013;103:e30–e36. doi: 10.2105/AJPH.2013.301628)

For example, a multisite observational study compared Housing First versus residential treatment or transitional housing before being placed in supported community housing among chronically homeless adults. The authors reported no advantages for participants who received treatment before being assigned supported community housing compared with the Housing First group in terms of days housed and self-reported health status. However, the group that received residential treatment before community housing incurred higher total health service costs.<sup>27</sup> Furthermore, requiring abstinence as a criterion for admission to transitional housing has not been found to be predictive of better housing outcomes post-discharge.<sup>28,29</sup> Interestingly, abstinence-oriented contingency management has been shown in a series of studies to improve housing stability among individuals who are homeless and dependent on crack cocaine.<sup>30</sup> These studies, however, did not include individuals with

psychosis or other forms of substance dependence, and their housing time was limited, making comparisons between their research and Housing First studies difficult.<sup>31</sup>

To date, there have been no randomized controlled trials of Housing First among persons who are homeless with concurrent disorders (co-occurring substance dependence and mental disorders). We hypothesized that these individuals would have lower levels of residential stability than those without substance dependence. We therefore examined the relationship between substance dependence and residential stability in homeless adults with current mental disorders who participated in The Vancouver At Home study.

## METHODS

The Vancouver At Home study comprised 2 randomized controlled trials that investigated Housing First interventions in homeless adults with mental disorders

based on their level of need: high need (ISRCTN57595077; <http://www.controlled-trials.com/ISRCTN57595077/57595077>) and moderate need (ISRCTN66721740; <http://www.controlled-trials.com/ISRCTN66721740/66721740>). The Vancouver study was a collaborating center along with 4 other Canadian cities.<sup>32,33</sup> We report the findings from the recruitment period, using data collected between October 2009 and June 2011, and 12-month follow-up data from the Vancouver site. We pooled the data from the 2 trials to examine the relationship between substance dependence and residential stability.

Participants were eligible if they were 19 years of age or older, met criteria for a current mental disorder (at least 1 other than a substance use disorder) on the Mini International Neuropsychiatric Interview (MINI 6.0),<sup>33</sup> and were homeless or precariously housed.

Written material about the study, eligibility criteria, and the referral process was distributed to community agencies. Most participants were recruited from homeless shelters, drop-in centers, homeless outreach teams, hospitals, community mental health teams, and criminal justice programs. Service providers in the community initiated referrals to the study, and general eligibility criteria were assessed by a brief telephone screening with the referral agent. Self-referrals were also accepted, but collateral clinical information was obtained to confirm eligibility criteria. If appropriate, a face-to-face interview was scheduled with potential participants to formally assess eligibility. Trained interviewers explained procedures, obtained informed written consent, and conducted all interviews.

A total of 800 individuals were screened for eligibility. Approximately 85 (10.6%) individuals did not meet eligibility criteria in the telephone screening with the service providers. Approximately 100 (12.5%) individuals were invited to meet with an interviewer for further eligibility screening or to begin the baseline questionnaire but did not show up for an appointment. Finally, 92 (11.5%) individuals completed the formal eligibility screening process but were deemed ineligible, most often because they did not meet the inclusion criteria for a current mental disorder. When these individuals were compared with participants who were enrolled in the study, there were no significant differences in terms of age or gender.

At baseline, enrolled participants completed a series of detailed interviewer-administered questionnaires that included questions on sociodemographic characteristics, symptoms of current and past mental illness, suicidality, substance use, physical health, service use, and quality of life. The interview time typically ranged from 80 to 120 minutes. After completing the baseline interview, participants received a Can \$35 honorarium. Participants were designated as high need if they scored 62 or lower on the Multnomah Community Ability Scale,<sup>34</sup> met criteria for current manic episodes or psychotic disorders on the MINI, and at least 1 of the following: legal involvement in the past year, substance dependence in the past month, and 2 or more hospitalizations for mental illness in the past 5 years. All other eligible participants were designated as moderate need.<sup>32</sup>

Detailed description of the study intervention arms were previously published.<sup>35</sup> In brief, participants designated as high need were randomly assigned to 1 of 3 study arms: (1) Housing First with assertive community treatment (ACT), in which participants could choose from up to 3 market lease apartments in a variety of neighborhoods with services provided by a transdisciplinary outreach team, including a psychiatrist, nurse, occupational therapist, substance abuse counselor, vocational counselor, and peer specialist; (2) congregate housing with on-site support (CONG), in which participants had their own room and bathroom but shared amenity space with 100 other program participants and received 3 meals per day, as well as activity programming and various health and social services on site; and (3) treatment as usual, which provided no additional housing or support services beyond what was already available in the community. Participants who met the criteria for moderate need were randomly assigned to 1 of 2 study arms: (1) Housing First with intensive case management (ICM), in which participants could choose from up to 3 market lease apartments in a variety of neighborhoods with services provided by a team of case managers who connected participants to existing services, and (2) treatment as usual as previously described. Assignment to intervention arms was conducted using a real-time computerized adaptive randomization procedure. For the Housing

First intervention arms (ACT, CONG, and ICM), support services were available to participants but were not mandatory. The only requirement for housing was compliance with the terms of the rental lease and weekly visits with a case manager to ensure safety and well-being.<sup>36</sup>

A team of field interviewers met with participants at 3-month intervals. A field research office was open daily throughout the study period, and participants were encouraged to drop in regardless of their interview schedule. At each follow-up interval, interviewers updated information regarding participants' routines and typical whereabouts, as well as detailed collateral contact information.

### Variables of Interest

We used the Residential Time-Line Follow Back Inventory<sup>37</sup> to derive our primary outcome variable, residential stability, which we defined as the number of days in stable residences after randomization into the study, up to the participant's 12-month follow-up visit. Stable residence was defined as housing where the individual held tenancy rights for at least 6 months and included living with family or someone else, group homes, independent apartments, and congregate residences. Our primary independent variable, substance dependence (yes or no), was identified using the MINI 6.0.<sup>33</sup> We also captured the self-reported frequency of substance use over the past month using the Maudsley Addiction Profile.<sup>38</sup> We dichotomized the frequency of substance use to capture daily substance use versus less than daily or none; this variable was used to reflect severity of substance use.<sup>39</sup>

Housing First intervention was the combination of the 3 housing intervention arms (ACT, ICM, CONG) compared with the 2 treatment as usual arms. Mental health symptoms and severity were collected through the Colorado Symptom Index (CSI).<sup>40,41</sup> With regard to mental disorders, the Severe Cluster includes at least 1 episode in the past month of psychosis, mood disorder with psychotic features, and manic episode, as identified through the MINI<sup>33</sup> or by current documented physician diagnosis, when available. The Less Severe Cluster includes at least 1 current major depressive episode, panic disorder, and posttraumatic stress disorder, which are also identified through the MINI.<sup>33</sup> Participants were also

asked to report any chronic health conditions that were expected to last or already had lasted 6 months or more. Chronic health conditions listed in the survey tool were adapted from the Canadian Community Health Survey<sup>42</sup> and the National Population Health Survey.<sup>43</sup> Additional study details, such as interviews and measures not included in the present study, were previously published.<sup>32,35</sup>

### Statistical Analysis

Comparisons of variables between groups were conducted using a parametric (Student *t*-test or 1-way analysis of variance for continuous variables) or nonparametric test (Pearson  $\chi^2$  test for categorical variables) as appropriate. To evaluate the effect of the interventions, an intention-to-treat analysis was conducted. Negative binomial regression models were fit to examine the independent association between the residential stability (number of days in stable residences after randomization) and the primary independent variable substance dependence. We also conducted a subanalysis fitting a model for the association of daily substance use and residential stability. We chose negative binomial regression because of its overdispersion of outcome data and better goodness-of-fit statistics compared with Poisson regression. Postrandomization periods that varied across individuals were used as an offset variable in the regression analysis. We included variables that were selected a priori to be potentially associated with residential stability (Housing First intervention, employment, age, gender, ethnicity, education, marital status, length of lifetime homelessness, mental disorders, mental health symptoms, and chronic health conditions). The interaction term between substance dependence and the Housing First intervention was nonsignificant and not included in the final model. Incidence rate ratios (IRRs) obtained from the negative binomial regression model were reported as effect sizes. All reported *P* values were 2-sided. Mean substitution for missing individual items of the CSI scale was used to obtain the combined CSI score. The missing values for other covariates that ranged from 0% to 2% were excluded from the analysis. IBM SPSS Statistics (version 19.0; IBM, Armonk, NY) and STATA 12 (StataCorp., College Station, TX) were used to conduct these analyses.

## RESULTS

We recruited 497 participants between October 2009 and June 2011; 58% (*n* = 288) met the criteria for substance dependence, and

29% (*n* = 143) reported daily substance use (alcohol and illicit drugs). There were 472 participants who had at least 1 follow-up visit at 6 or 12 months (96%). There were no differences in the characteristics of participants

**TABLE 1—Comparisons of Baseline Sociodemographic Characteristics, Mental Disorders, and Physical Illness Between Vancouver Participants, by Current Substance Dependence: The Vancouver At Home Study, Vancouver, British Columbia, 2009–2011**

Variable	Substance Dependence ( <i>n</i> = 288), Mean $\pm$ SD or No. (%)	No Substance Dependence ( <i>n</i> = 209), Mean $\pm$ SD or No. (%)	<i>P</i>
Male gender	203 (71)	156 (74)	.28
Age at enrollment, y	38.4 $\pm$ 9.6	44.3 $\pm$ 11.9	< .001
Ethnicity			.007
Aboriginal	57 (20)	20 (10)	
Caucasian	156 (54)	124 (59)	
Mixed/other	75 (26)	65 (31)	
Lifetime duration of homelessness, mo			< .001
$\leq$ 12	48 (17)	86 (42)	
13–60	133 (47)	70 (34)	
> 60	104 (36)	50 (24)	
Duration of longest single episode of homelessness, mo			< .001
$\leq$ 12	121 (42)	125 (61)	
13–60	121 (42)	61 (30)	
> 60	44 (16)	19 (9)	
Did not finish high school	186 (65)	94 (45)	< .001
Single/never married	197 (69)	146 (71)	.694
Have children younger than 18 y	89 (32)	33 (16)	< .001
Precariously housed	70 (24)	39 (19)	.133
Employed	12 (4)	6 (3)	.377
High need level	183 (65)	114 (55)	.043
Age of first homelessness < 25 y	145 (51)	69 (33)	< .001
Mental disorder			
Less severe cluster	173 (60)	91 (43)	< .001
Severe cluster	196 (68)	167 (80)	.003
$\geq$ 2	156 (54)	84 (40)	.002
Chronic health conditions			.009
None	16 (6)	28 (13)	
1	29 (10)	22 (11)	
2	30 (10)	28 (13)	
$\geq$ 3	213 (74)	131 (63)	
Infectious disease <sup>a</sup>	126 (44)	31 (15)	< .001
Daily substance use in past mo <sup>b</sup>	107 (37)	36 (17)	< .001
Arrested in past 6 mo	115 (41)	58 (29)	.008
CSI total score	39.4 $\pm$ 11.5	34.1 $\pm$ 13.3	< .001
Age of first homelessness, y	27.0 $\pm$ 11.2	34.9 $\pm$ 14.6	< .001

Note. CSI = Colorado Symptom Index. The total sample size was *n* = 497.

<sup>a</sup>HIV, hepatitis B or C.

<sup>b</sup>Including alcohol.

who had at least 1 follow-up visit and those who did not.

There were significant differences between participants who met criteria for substance dependence and those who did not (Table 1). As a group, participants with substance dependence were younger (38.4 vs 44.3 years;  $P < .001$ ), had lifetime durations of homelessness of more than 5 years (36% vs 24%;  $P < .001$ ), did not graduate from high school (65% vs 45%;  $P < .001$ ), first experienced homelessness at younger than 25 years (51% vs 33%;  $P < .001$ ), had a higher prevalence of mental disorders (both less severe and severe clusters), had chronic health conditions and viral infections, and had been arrested in the past 6 months (41% vs 29%;  $P < .001$ ).

Table 2 displays the residential stability by study arm and substance dependence. There was no difference in the proportion of days stably housed at 12 months by substance dependence status (51% vs 52%;  $P = .89$ ) or by daily substance use (49% vs 53%;  $P = .29$ ). In other words, whether participants met the criteria for substance dependence or daily substance use did not influence housing stability. We also observed no difference in residential stability within the Housing First intervention groups by substance dependence (72% vs 71%;  $P = .72$ ) or by daily substance use (70% vs 73%;  $P = .42$ ). The number of days in stable residences did not differ by substance dependence (183.2 days vs 183.9 days), and we found no significant difference in

residential stability when stratified by need level status and substance dependence. The multivariable negative binomial regression models revealed no significant association between substance dependence and residential stability (adjusted IRR = 0.97; 95% confidence interval [CI] 0.69, 1.35) or between daily substance use and residential stability (adjusted IRR = 0.84; 95% CI = 0.59, 1.20) after adjusting for the housing intervention, employment, sociodemographic characteristics, chronic health conditions and mental disorder, mental health symptoms, and lifetime duration of homelessness (Table 3). The intervention (i.e., Housing First vs treatment as usual) was the only variable significantly associated with residential stability (adjusted IRR = 4.05; 95% CI = 2.95, 5.56).

DISCUSSION

Our findings demonstrated that Housing First can achieve residential stability in adults who are homeless and have mental disorders, even if they are substance dependent. Interestingly, this subgroup of individuals with concurrent disorders was less educated, experienced their first episode of homelessness at an earlier age, and had a higher prevalence of mental disorders and chronic health conditions as well as arrests in the previous 6 months compared with those without substance dependence. Despite these disadvantages, they were able to achieve similar levels of residential

stability as those without substance dependence. Furthermore, we found no differences in residential stability among those in the Housing First intervention (scattered-site apartments with outreach support or CONG) by substance dependence or daily substance use. The Vancouver At Home Study was able to provide good quality housing, and the additional supports provided were at considerably higher levels than what was typically available to most other housing programs in the region. The client-to-staff ratios for the ACT and ICM teams were approximately 9:1 and 16:1, which was substantially lower than the typical client-to-staff ratios of case management services in Vancouver that frequently exceed 25:1. It was likely that the level and quality of outreach support available to our study participants contributed to the residential stability of the individuals with substance dependence.

We previously described the pattern of self-reported daily substance use in this cohort, with marijuana being the most frequent substance used on a daily basis (49%), followed by crack cocaine (27%), and heroin (15%).<sup>18</sup> The high prevalence of substance dependence and substance use in Vancouver was also reported in other studies of homeless persons.<sup>17,19,44</sup> Furthermore, British Columbia has the highest provincial lifetime reported use of illicit drugs in Canada (47.9% of the general population),<sup>45</sup> which might, in part, explain the higher prevalence of substance dependence in our sample.

TABLE 2—Residential Stability, by Study Arm and Substance Dependence: The Vancouver At Home Study, Vancouver, British Columbia, 2009–2011

	Substance Dependence—Yes (n = 279)		Substance Dependence—No (n = 199)	
	Days in Stable Residences, Mean (SD)	% in Stable Residences, Mean (SD)	Days in Stable Residences, Mean (SD)	% in Stable Residences, Mean (SD)
All participants	183.2 (139.6)	52 (39)	183.9 (144.1)	51 (39)
HF interventions <sup>a</sup>				
Yes	255.9 (103.8)	72 (28)	254.3 (113.1)	71 (30)
No	68.1 (108.0)	19 (30)	72.3 (114.7)	20 (30)
Need level status				
High	189.3 (134.6)	56 (38)	193.3 (141.5)	54 (38)
Moderate	172.1 (148.3)	46 (39)	166.0 (146.0)	48 (41)

Note. HF = Housing First.

<sup>a</sup>All 3 housing first interventions were collapsed into 1 group (yes), and the 2 treatment as usual groups were collapsed into another group (no).



**TABLE 3—Bivariate and Multivariate Negative Binomial Regression Model for Current Substance Dependence and Other Variables Associated with Residential Stability at 12 Months: The Vancouver At Home Study, Vancouver, British Columbia, 2009–2011**

Variable	Unadjusted IRR (95% CI)	Adjusted IRR (95% CI)
Substance dependence at baseline	1.01 (0.74, 1.38)	0.97 (0.69, 1.35)
HF intervention vs TAU	3.69 (2.75, 4.96)	4.05 (2.95, 5.56)
Age at enrollment, per y	1.00 (0.99, 1.01)	1.00 (0.98, 1.01)
Male gender	1.05 (0.75, 1.47)	0.90 (0.62, 1.28)
Ethnicity		
Aboriginal	1.03 (0.63, 1.67)	0.82 (0.49, 1.38)
Caucasian	1.17 (0.82, 1.66)	0.92 (0.64, 1.32)
Mixed/other (ref)	1.00	1.00
Incomplete high school	1.02 (0.75, 1.40)	0.98 (0.71, 1.34)
Single/never married	0.90 (0.64, 1.26)	0.82 (0.58, 1.17)
Employment		
Unemployed (ref)	1.00	1.00
Employed	1.19 (0.52, 2.73)	1.04 (0.43, 2.50)
Other <sup>a</sup>	1.03 (0.47, 2.26)	1.07 (0.50, 2.26)
Mental disorder		
Less severe cluster	0.98 (0.72, 1.34)	0.91 (0.63, 1.30)
Severe cluster	1.08 (0.77, 1.53)	1.04 (0.72, 1.49)
Chronic health conditions		
None (ref)	1.00	1.00
1	1.20 (0.60, 2.42)	1.39 (0.69, 2.79)
2	0.97 (0.49, 1.91)	0.84 (0.42, 1.65)
≥ 3	0.92 (0.54, 1.58)	0.87 (0.50, 1.52)
Colorado Symptom Index, per point	1.00 (0.99, 1.01)	1.01 (0.99, 1.02)
Lifetime duration of homelessness, per y	1.00 (0.98, 1.03)	1.01 (0.99, 1.02)

Note. CI = confidence interval; HF = Housing First; IRR = incidence risk ratio; TAU = treatment as usual.

<sup>a</sup>Defined as nontraditional employment or employment in the underground economy.

Our findings were consistent with a number of observational studies that found that housing retention among persons with concurrent disorders could be achieved. Tsemberis et al.<sup>46</sup> examined the outcomes of persons who were chronically homeless with alcohol use and psychiatric disorders, and reported a 97% housing retention rate and a reduction in psychiatric symptoms at 12 months. The Collaborative Initiative to Help End Chronic Homelessness also found improved residential stability and reduced substance use among the 734 participants who received housing and comprehensive services intervention at 12 months.<sup>47</sup> One study using the Housing First approach to improve residential stability and treatment retention of mentally ill patients (n = 31) on methadone compared with usual care (n = 30) reported better housing

retention (67.7% vs 13%;  $P < .02$ ) and methadone treatment retention (51.6% vs 20%;  $P < .01$ ) among the Housing First group.<sup>48</sup>

Our results support the integration of housing and intensive support services for persons who are homeless and had substance dependence. Despite the expansion of clinical services in Boston, Massachusetts, there has been no reduction in the all-cause mortality rate among homeless adults since the early 1990s. Drug overdose replaced HIV as the leading cause of death.<sup>49</sup> It appeared that access to clinical services alone for persons who were homeless was insufficient to prevent mortality, given the prevalence of substance dependence. This underscored the challenges of addressing addiction issues in this population, which might be improved by providing case management<sup>50</sup> and housing

services<sup>51</sup> in addition to other supports to reduce this risk. Housing First interventions clearly have an important role in engaging persons with addiction issues who are also homeless.

Limitations of our study included self-reported measures of substance use, which might be underreported, particularly given that the baseline interview was conducted before individuals were randomized to a housing intervention, and participants might have felt hesitant to disclose the amounts and frequencies of illicit substances used. We did, however, use substance dependence as our main independent variable, which was determined by the MINI 6.0 and had high validity. Our study design addressed limitations of previous studies dealing with the issue of Housing First participants with active addictions.<sup>16</sup> We used standardized measures, included persons with active addictions, and achieved a follow-up rate of 96%.

In conclusion, persons who are homeless with mental disorders may achieve similar levels of housing stability from Housing First regardless of whether they experience concurrent substance dependence. By contrast with some interventions, Housing First does not require abstinence from drugs and alcohol among clients. Given the morbidity and mortality associated with homelessness and substance dependence,<sup>49</sup> our findings contribute to the growing evidence that Housing First is a viable and effective strategy for this population. ■

### About the Authors

Anita Palepu is with the Department of Medicine, University of British Columbia, Vancouver, British Columbia. Michelle L. Patterson, Akm Moniruzzaman, and Julian Somers are with the Faculty of Health Sciences, Simon Fraser University, Burnaby, British Columbia. C. James Frankish is with the School of Public and Population Health, University of British Columbia, Vancouver.

Correspondence should be sent to Anita Palepu, Department of Medicine, Centre for Health Evaluation and Outcome Sciences, St. Paul's Hospital, 588B-1081 Burrard Street, Vancouver, BC, V6Z 1Y6, Canada. (e-mail: apalepu@hinet.ubc.ca). Reprints can be ordered at <http://www.ajph.org> by clicking the "Reprints" link.

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### Contributors

A. Palepu, M. L. Patterson, C. J. Frankish, and J. Somers made substantial contributions to conception and design of the article. M. L. Patterson acquired the data. A. Palepu,

M. L. Patterson, A. Moniruzzaman, C. J. Frankish, and J. Somers analyzed and interpreted the data. All of the authors drafted the article or revised it critically for important intellectual content, and approved the final version to be published.

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### Human Participant Protection

Institutional research ethics board approval for the study was received from Simon Fraser University and from the University of British Columbia.

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