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Project Title: Effect of Housing First on Suicidal Behaviour: A Randomized Controlled Trial of Homeless Adults with Mental Disorders

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Summary (250 words max single spaced):

Rates of suicidal ideation and attempts amongst homeless persons are known to be higher than that of the general population, and those with comorbid mental disorders display further compounded risk. The objective was to determine whether Housing First decreased suicidal ideation and attempts compared to Treatment As Usual. This trial was conducted as part of the At Home/Chez Soi project; an unblinded, randomized control trial conducted across five Canadian cities from 2009-2013. Consenting, homeless adults with a diagnosed major mental health disorder were randomized to Housing First (n=1265) and Treatment As Usual (n=990). Housing First participants were provided with private housing units, and had arranged meetings with support services. Treatment As Usual participants retained access to existing community and social supports. Past month suicidal ideation and suicide attempt history were measured at baseline and throughout the trial. Compared to baseline, past month suicidal ideation decreased significantly in both Housing First and Treatment As Usual (B= -.57, SE= .05, p<.001) However, the proportion of people with suicidal ideation over time in the Housing First and Treatment As Usual groups did not differ significantly. Furthermore, there were no significant differences between the two groups on prevalence of suicide attempts during the two year follow-up period (HF=11.9%, TAU =10.5%; p=NS). This study showed that Housing First was not superior to Treatment As Usual in reducing suicidal ideation and attempts. We recommend that Housing First interventions need to consider the addition of psychological treatments that have proven efficacy in reducing suicidal behavior.

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Effect of Housing First on Suicidal Behaviour: A Randomized Controlled Trial of Homeless Adults with Mental Disorders

Introduction

Homelessness is associated with poor mental and physical health outcomes as well as high rates of mortality.[1,2] Individuals who are homeless experience some of the highest rates of suicidal ideation and suicide attempts of any measured cohort.[3] The magnitude of this risk is understood to be a result of a high prevalence of major mental disorders,[4] including drug/alcohol abuse and dependence, trauma, poor medication compliance, high rates of poverty and limited social support networks.[5] Amongst homeless individuals, Eynan et al. (2002) found that those with DSM IV diagnoses of psychotic or mood disorders exhibited disproportionately high rates of suicidal ideation, at 100% and 64%, respectively.[4] Comparing these values to the national lifetime average of 13.4% stresses the concerning level of risk demonstrated by this population.[6]

Although there is substantial literature regarding risk factors for suicidality in the general population, the extant literature on risk factors for homeless individuals is relatively limited. Suicidal behavior is significantly related to comorbidity of mental disorders and addictions, coupled with poverty and social isolation.[7,8] Unfortunately, these exacerbating factors also make treatment challenging. In a large study examining treatment of substance use disorders, it was noted that homeless individuals were significantly more likely to utilize emergency departments, were less likely to utilize outpatient resources, and had a greater likelihood of being arrested for a felony.[9] Traditional community resources are not necessarily designed to address these unique risk factors of homelessness. Identifying and understanding demographic characteristics related to suicidality in this high-risk population may therefore be of notable clinical value.

Housing First (HF) is a treatment approach that is relatively new in practice and research; however, its principles have been used by an increasing number of cities over the past few decades.[10,11,12] The model involves the provision of permanent, private housing units to qualifying individuals with consumer choice on services and housing location being fundamental. This differs from existing, low-income housing strategies in that the units provided are located in community apartments/dwellings. Examination of HF programs in Vienna, Austria identified that this aspect was crucial, presumably to ameliorate the stigma normally associated with living in state-run supportive housing units, and the detriment it may have on long-term outcomes.[13] While this model was originally implemented to improve outcomes and decrease demand on existing medical and social support infrastructure, it has been shown to improve housing stability and quality of life.[10, 14] It has previously been demonstrated that lower quality of life is related to increased suicidal ideation;[15] however, it remains unclear how HF affects suicidal behavior.

Objectives

In this study, we analyzed data from a large unblinded pragmatic randomized controlled trial (At Home/Chez Soi) in Canada.[16–22] Primary outcomes of the study have been previously reported showing that HF is effective at establishing housing stability and in improving an individual's quality of life.[14] Based on high rates of suicidal behavior among homeless individuals and previous work showing improvements in quality of life and mental health among people receiving HF and moving out of poor neighbourhoods,[23] we hypothesized that HF would reduce suicidal ideation and attempts compared to Treatment as Usual (TAU).

Methods

Participants

This study was conducted across 5 Canadian cities (Moncton, Montreal, Toronto, Vancouver, and Winnipeg) as an unblinded, randomized control trial. Research was conducted according to the national At Home/Chez Soi trial protocol.[20] Ethics approval was obtained through Institutional Review Boards for the national At Home/Chez Soi project, as well as at each site and participating university. It was previously determined that a sample size of greater than 100 per group, per site would sufficiently detect a medium effect size.[21] Participants were recruited between 2009 and 2011, through community agencies such as drop-in centres and hospitals. Consent was obtained to undergo eligibility screening. Eligibility criteria included being of legal age of majority, being homeless or precariously housed,[20] and the diagnosis or presence of a serious mental disorder (major depressive, manic or hypomanic episode, post-traumatic stress disorder, mood disorder with psychotic features, psychotic disorder) as identified by the Mini International Neuropsychiatric Interview (MINI).[16] Current substance use or alcohol use disorders did not exclude participants from the study, but participants were required to also meet criteria for one of the aforementioned diagnoses in order to meet eligibility criteria. Participants were excluded if they did not meet eligibility criteria, if they were not legal residents of Canada, or if they were already clients of ACT (Assertive Community Treatment)/ICM (Intensive Case Management) programs.

Intervention

Prior to randomization, participants were individually assessed to determine their level of need using the ACT eligibility criteria.[24] This assessment included the Multnomah Community Ability Score (MCAS), MINI and an eligibility-screening questionnaire. High need individuals were defined as having an MCAS score of 61 or lower and diagnosis of current psychotic or bipolar disorder (as determined by the MINI or eligibility screener). Additionally, they identified as having two or more hospitalizations for mental illness in the past five years, comorbid substance use, or recent arrests/incarceration(s). Those determined to be of high need were assigned to the ACT group after randomization. All others were categorized as moderate need and assigned to ICM after randomization, which involves less-intensive provision of services than the ACT program.[21] Randomization was completed by a computerized algorithm, which adaptively controlled the number of participants in each group to achieve equality. Those randomized into HF were immediately connected with either the ACT or ICM services, depending on their prior needs assessment. Those randomized into TAU were directed to existing community supports, which may include supportive housing and mental health resources.

HF participants were provided housing within the community, with the goal of placement within 6 weeks of entering the program. It was preferred that all housing be ‘permanent’ in the form of individual apartments, as opposed to supportive housing (continuum or congregate housing with built-in mental health supports, often temporary in nature).[25] Rent was subsidized so that participants would not have to pay more than 30% of their income for rent. HF participants were neither required to seek/undergo psychiatric treatment, nor maintain sobriety. Participants were, however, required to meet with support service providers, consistent with the aforementioned ICM or ACT models, at least once a week. Participants who were evicted during the trial were provided with another residence as soon as possible.

Procedure

Data were collected from each group in the form of interviews, during which a member of the At Home/Chez Soi project administered an extensive series of questionnaires addressing the domains of demographics, housing, work, physical/mental health and service use, amongst others. Race/ethnicity and gender were self-reported. Interviews were conducted between June 2009 and October 2013. Interviews were conducted at baseline, 6, 12, 18 and 24-month time points. (In some cases, the comprehensive 24-month interview was combined with the less-intensive 21-month interview for logistical reasons).

Measures

Suicidal Ideation

Suicidal ideation was assessed using a question from the 14-item Modified Colorado Symptom Index (MCSI), which asked "In the past month, how often did you feel like hurting or killing yourself".[26] Participants responded on a 5-point scale from "Not at all" to "At least everyday." Any response greater than "Not at all" was coded as positive for the presence of suicidal ideation. Participants were administered the MCSI at baseline, 6 month, 12 month, 18 month, and 21/24 month time points. Participants were directed to available mental health resources if this or any other question elicited or suggested suicidal ideation/mental deterioration during the interview.

Suicide Attempts

The presence of lifetime suicide attempts was assessed using a question from the Mini-International Neuropsychiatric Interview 6.0.0 (MINI),[27] which was administered at the baseline interview. Participants were asked the yes/no question, "In your lifetime, did you ever make a suicide attempt?" The presence of a suicide attempt during the course of the 2-year study was assessed at the 21/24-month interview with the question "Since you started this study, that is, in the past two years, have you attempted suicide?"

Analytic Strategy

Suicidal Ideation

Latent growth curve modeling (LGCM) was used in Mplus 7.1 to examine the role of sociodemographic, psychiatric diagnoses, and intervention status predictors of both baseline suicidality (i.e., intercept) and changes in suicidality over time.[28] Because LCGM permits participants to differ in both their starting level of suicidality (i.e., intercept) as well as their rate of suicidality change over time (i.e., slope), it is possible to examine the influence of these predictors on individual variation in suicidality.

A basic logistic growth model (with no predictors) was utilized to estimate the presence of suicidality (as a binary outcome variable) over the five time points (Baseline to Month 21/24). In this model, the mean of the intercept was fixed at 0, while the mean of the slope and variances of the intercept and slope factors were allowed to vary. This allowed us to determine if there was significant whole group change in suicidality over time and/or significant between subject variance in suicidality slope or intercept.

We investigated if participation in the HF intervention (vs. control) condition predicted initial presence of suicidality (i.e., intercept) or change in suicidality over time (i.e., slope). In this model we also controlled for (and examined the effects of) sociodemographic (age, gender, race/ethnicity, education, income, lifetime homelessness), baseline psychiatric diagnosis (mood disorder, PTSD, panic disorder, psychotic disorder, substance or alcohol use disorder), and lifetime suicide attempt status (yes vs. no) covariates.

Suicide Attempts

A logistic regression was conducted in Mplus 7.1 to determine the influence of intervention status on suicide attempts during the intervention period. In addition to measuring the influence of HF v. TAU intervention status on suicide attempts during the study period, we also controlled for (and examined the effects of) sociodemographic (age, gender, race/ethnicity, education, income, lifetime homelessness), baseline psychiatric diagnosis (mood disorder, PTSD, panic disorder, psychotic disorder, substance or alcohol use disorder), and lifetime suicide attempt status (yes vs. no) covariates.

Missing data

At baseline, there was minimal missing data across variables (<0.1% - 5.2%). The one exception was race/ethnicity, in which 13.3% of participants had missing data. Longitudinally, 14.3% - 22.2% of suicidal ideation data was missing at a given time point, with 20.2% of suicide attempt (over 2 year study period) data also missing. Intervention status was not related to missing suicidal behavior data at any time point ($p > .05$). Given the nature of the study population, it was anticipated that there would be a potentially large amount of missing data. Therefore, in all models, a full information maximum likelihood estimator allowed us to estimate parameters using all available data from participants due to pairwise deletion, so participants with missing data could be included in analyses.

Results

Sociodemographics

Of the 2866 participants assessed for eligibility, 2255 were included in the trial, and 2221 were included in this analysis (Figure 1). Of those analyzed, 67.9% were male, 49.0% were white and 24.8% were Aboriginal. As per our inclusion criteria, all participants had a diagnosed baseline mental disorder, with the most prevalent being mood disorders (56.5%). In addition, two thirds of the sample (67.4%) met criteria for substance/alcohol abuse. Baseline rates of lifetime suicide attempts were high (55.4%), as was past month suicidal ideation (37.3%). Participants were randomized into HF (n=1236) and TAU (n=985). See Table 1 for additional sociodemographic information.

Suicidal Ideation

The basic growth model indicated a significant overall decline in suicidal ideation over time (significant slope; $B= -.57$, $SE= .05$, $p<.001$), as well as significant variance in both intercept ($B= 2.53$, $SE= .38$, $p<.001$) and slope ($B= .22$, $SE= .05$, $p<.001$). Descriptively, rates of suicidal ideation decreased significantly from 37.3% to 21.3% in the entire study population between baseline and 21/24-month time points. See Table 2 for full suicidality descriptive information.

In the full growth model, treatment condition (HF vs. TAU) did not predict significant variance in suicidal ideation baseline rates (intercept) or changes over time (slope). There were, however, multiple covariate predictors of suicidal ideation intercept and slope (see Table 3 for statistics). Specifically, a higher baseline rate of suicide ideation was predicted by younger age, and presence of various mental disorders including: mood disorder, PTSD, panic disorder, psychotic disorder, and substance use disorder. A positive slope (higher likelihood of suicidal ideation over time) was predicted by aboriginal ethnicity relative to white ethnicity. Figure 2 depicts the rate of suicidal ideation over time for the entire sample and split by HF and TAU conditions.

Suicide Attempts

The logistic regression models predicting suicide attempts from intervention status and covariates also indicated no significant relationship between intervention status and suicide attempts (*B*= .10, *SE*= .16, *p* > .05). There were multiple covariates that predicted higher rates of suicide attempts over the 2-year project period including younger age, lifetime homelessness less than 3 months (versus 3 months to 1 year or greater than 1 year), and a baseline diagnosis of either mood disorder or PTSD. Notably, a lifetime history of suicide attempts at baseline was not predictive of the presence of suicide attempts during the 2-year study period. Full statistics for all predictors included in the model are reported in Table 4.

Discussion

There are three main findings from the current study. First, during the two years of follow-up, HF was not associated with reductions in suicidal ideation or attempts as compared to TAU. Second, both intervention and control groups experienced similarly significant drops in suicidal ideation over the course of the 2-year study. Third, mood disorder, PTSD, panic disorder, psychotic disorder and substance use disorder were more likely to be associated with later suicidal behavior.

Due to the absence of published literature examining the impact of HF on suicidal behavior, we cannot compare our findings to previous literature. There are several potential explanations for the findings in the current study. It is possible that there was regression to the mean with non-specific impact of both TAU and HF arms having reductions in suicidal behavior. Given the intensive, longitudinal nature of our trial, participants from both groups interacted with the At Home/Chez Soi team repeatedly over the course of two years. As a result, the TAU group may have been too "active" a control condition to see a difference between groups. One may consider that engagement in the trial could have provided individuals in both groups with a sense of social connection, apparent concern for their well-being, and a sense of purpose. Research by Okamura et. al. (2014) suggests that, amongst homeless persons in Japan, "perceived emotional social support is a significant protective factor for recent suicidal ideation", more so than instrumental support.[29] It is therefore plausible that outcomes in the control group improved because they experienced the research team as caring about them. Furthermore, participants in the TAU group may have developed a sense of hope that, as the trial concluded, they may be able to take advantage of the resources provided to the HF group.

Another key consideration is that the HF intervention arms did not have any specific evidence-based interventions focused on suicidal behavior (e.g. CBT or DBT). An important meta-analysis by Tarrier et. al (2008) concluded that CBT and DBT are effective treatment modalities for suicidal behaviour.[30] Crucially, these therapies only work if they are directed towards suicidal behaviour and its features, and are not effective if reducing suicidal behaviour is not the primary

intent of the therapy. Our results agree with this restriction, given that HF is not a suicide-focused intervention.

Our investigation also discovered relationships between suicidal behaviour and a variety of mental disorders. In particular, we found that baseline mood disorder and PTSD were significant predictors of both suicidal ideation and suicide attempts. These findings are consistent with previous findings within similar populations, as well as in the general population.[4, 8, 31] These findings underscore the importance of treatment of these disorders in order to reduce risk for suicidal behavior.

Age was found to be inversely related to both suicidal ideation and suicide attempts. An inverse relationship was also discovered between suicide attempts and lifetime homelessness. This is consistent with current literature, describing that homeless persons are more likely to be younger, and become homeless earlier in life.[32–34] Although chronic homelessness (>1 year consecutively homeless) is related to poorer clinical outcomes than those homeless for shorter periods,[2] paradoxically, it seems that individuals with recent onset of homelessness (i.e. < 3 months) are at exaggerated risk for suicidality. Homelessness often results from the coalescing of multiple factors, often culminating in an acute life event/stressor when one first loses stable housing.[35, 36] Taking these factors into account, we suggest that rates of suicidal behaviour may be higher initially, due to the combined impacts of being homeless and unresolved stressors, such as employment difficulties and relationship challenges.[37] Individuals who are older and/or have been homeless for a longer period of time may have either resolved their past life stressors, have better emotional regulation or developed coping skills, which may result in lower rates of suicidal behaviour. This emphasizes the importance of early intervention amongst newly homeless young persons in the prevention and treatment of suicidal behaviour.

A few notable limitations were present within this study. As detailed earlier, there was variation between trial sites in the provision and implementation of the program. This trial was also unblinded, though this was necessary given its nature. Despite having trained interviewers surveying the participants, the trial is still based on questionnaires and may be impacted by response bias and/or errors in recall. The findings are not generalizable to completed suicides. This study's strengths include its large, multi-site sample population, two-year longitudinal data, and comprehensive participant follow-up.

Conclusions

This research has demonstrated that HF is not superior to TAU in reducing suicidal ideation and attempts. Equally significant decreases in suicidal ideation in both groups may in part be due to actively engaging all participants in the trial with comprehensive surveys given by research team members, and increasing perceived social/interpersonal support. While we suggest that HF should not be used solely as a mechanism to decrease suicidal behaviour, its previously demonstrated positive effects on quality of life and housing stability may set the stage for improved long-term follow up and enhanced access to care. HF models may benefit from the addition of proven suicide-focused therapies such as CBT and DBT in order to successfully decrease suicidal behaviour in this high-risk group.

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Disclosures:

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References

1. Hwang SW, Orav EJ, O'Connell JJ, Lebow JM, Brennan T a. Causes of death in homeless adults in Boston. *Ann Intern Med*. 1997;126(8):625-628. doi:10.7326/0003-4819-126-8-199704150-00007.
2. Fazel S, Geddes JR, Kushel M. The health of homeless people in high-income countries: descriptive epidemiology, health consequences, and clinical and policy recommendations. *Lancet*. 2014;384(9953):1529-1540. doi:10.1016/S0140-6736(14)61132-6.
3. Desai R a, Liu-Mares W, Dausey DJ, Rosenheck R a. Suicidal ideation and suicide attempts in a sample of homeless people with mental illness. *J Nerv Ment Dis*. 2003;191(6):365-371. doi:10.1097/00005053-200306000-00003.
4. Eynan R, Langley J, Tolomiczenko G, et al. The association between homelessness and suicidal ideation and behaviors: results of a cross-sectional survey. *Suicide Life Threat Behav*. 2002;32(4):418-427. doi:10.1521/suli.32.4.418.22341.
5. Frederick TJ, Kirst M, Erickson PG. Suicide attempts and suicidal ideation among street-involved youth in Toronto. *Adv Ment Heal*. 2012;11(1):8-17. doi:10.5172/jamh.2012.1851.
6. The Government of Canada. *The Human Face of Mental Health and Mental Illness in Canada 2006*.; 2006. http://www.phac-aspc.gc.ca/publicat/human-humain06/index-eng.php.
7. Gopikumar V, Narasimhan L, Easwaran K, Bunders J, Parasuraman S. Persistent, complex and unresolved issues: Indian discourse on mental ill health and homelessness. *Econ Polit Wkly*. 2015;50(11):42-51. http://www.scopus.com/inward/record.url?eid=2-s2.0-84924813899&partnerID=tZOtx3y1.
8. Goldstein G, Luther JF, Haas GL. Medical, psychiatric and demographic factors associated with suicidal behavior in homeless veterans. *Psychiatry Res*. 2012;199(1):37-43. doi:10.1016/j.psychres.2012.03.029.
9. Krupski A, Graves MC, Bumgardner K, Roy-Byrne P. Comparison of Homeless and Non-Homeless Problem Drug Users Recruited from Primary Care Safety-Net Clinics. *J Subst Abuse Treat*. 2015:1-6. doi:10.1016/j.jsat.2015.06.007.
10. Schiff JW, Rook J. Housing First: Where is the evidence? 2012:1-29.
11. Tsemberis S, Gulcur L, Nakae M. Housing First, Consumer Choice, and Harm Reduction for Homeless Individuals with a Dual Diagnosis. *Am J Public Health*. 2004;94(4):651-656. doi:10.2105/AJPH.94.4.651.
12. Tsemberis S, Kent D, Respress C. Chronically homeless persons With co-occuring disorders in Washington, DC. *Am J Public Health*. 2012;102(1):13-16. doi:10.2105/AJPH.2011.300320.
13. Weinzierl C, Wukovitsch F, Novy A. Housing First in Vienna: a socially innovative initiative to foster social cohesion. *J Hous Built Environ*. 2015. doi:10.1007/s10901-015-9467-0.
14. Stergiopoulos V, Gozdzik A, O'Campo P, Holtby AR, Jeyaratnam J, Tsemberis S. Housing First: exploring participants' early support needs. *BMC Health Serv Res*. 2014;14(167):1-15. doi:10.1186/1472-6963-14-167.
15. Fairweather-Schmidt AK, Batterham PJ, Butterworth P, Nada-Raja S. The impact of suicidality on health-related quality of life: A latent growth curve analysis of community-based data. *J Affect Disord*. 2016;203:14-21. doi:10.1016/j.jad.2016.05.067.

16. Goering P, Veldhuizen S, Watson A, et al. NATIONAL FINAL REPORT Cross-Site At Home/Chez Soi Project. 2014:48. http://www.mentalhealthcommission.ca/English/system/files/private/document/mhcc_at_home_report_national_cross-site_eng_2.pdf.
17. Macnaughton E, Nelson G, Goering P. Bringing politics and evidence together: Policy entrepreneurship and the conception of the At Home/Chez Soi Housing First Initiative for addressing homelessness and mental illness in Canada. *Soc Sci Med*. 2013;82:100-107. doi:10.1016/j.socscimed.2013.01.033.
18. Nelson G, Macnaughton E, Curwood SE, et al. Collaboration and involvement of persons with lived experience in planning Canada's At Home/Chez Soi project. *Health Soc Care Community*. 2015. doi:10.1111/hsc.12197.
19. Nelson G, Macnaughton E, Goering P, et al. Planning a multi-site, complex intervention for homeless people with mental illness: the relationships between the national team and local sites in Canada's At Home/Chez Soi project. *Am J Community Psychol*. 2013;51(3-4):347-358. doi:10.1007/s10464-012-9554-2.
20. Goering PN, Streiner DL, Adair C, 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-e000323. doi:10.1136/bmjopen-2011-000323.
21. Stergiopoulos V, Hwang SW, Gozdzik A, et al. Effect of Scattered-Site Housing Using Rent Supplements and Intensive Case Management on Housing Stability Among Homeless Adults With Mental Illness. *Jama*. 2015;313(9):905. doi:10.1001/jama.2015.1163.
22. Macnaughton E, Stefanic A, Nelson G, et al. Implementing Housing First Across Sites and Over Time. *Am J Community Psychol*. 2015. doi:10.1007/s10464-015-9709-z.
23. Ludwig J, Duncan GJ, Gennetian LA, et al. Neighborhood Effects on the Long-Term Well-Being of Low-Income Adults. *Sci* . 2012;337 (6101):1505-1510. doi:10.1126/science.1224648.
24. Ministry of Health and Long-Term Care. Ontario Program Standards for ACT Teams. *Rehabilitation*. 2005;(October 2004).
25. Macnaughton EL, Goering PN, Nelson GB. Exploring the value of mixed methods within the At Home/Chez Soi housing first project: a strategy to evaluate the implementation of a complex population health intervention for people with mental illness who have been homeless. *Can J public Heal = Rev Can sant?? publique*. 2012;103(7 Suppl 1).
26. Conrad KJ, Yagelka JR, Matters MD, Rich a R, Williams V, Buchanan M. Reliability and validity of a modified Colorado Symptom Index in a national homeless sample. *Ment Health Serv Res*. 2001;3(3):141-153. doi:10.1023/A:1011571531303.
27. Sheehan D V., Lecrubier Y, Sheehan KH, et al. The Mini-International Neuropsychoatric Interview (M.I.N.I.): The Development and Valiation of a Structured Diagnostic Psychiatric Interview for DSM-IV and ICD-10. 1998;59(suppl 20):22-23.
28. Duncan T., Duncan SC, Strycker LA. *An Introduction to Latent Variable Growth Curve Modeling: Concepts, Issues, and Applications*. 2nd Editio. Mahwah, NJ: Lawrence Erlbaum Associates, Inc; 2006.
29. Okamura T, Ito K, Morikawa S, Awata S. Suicidal behavior among homeless people in Japan. *Soc Psychiatry Psychiatr Epidemiol*. 2014;49(4):573-582. doi:10.1007/s00127-013-0791-y.

30. Tarrier N, Taylor K, Gooding P. Cognitive-behavioral interventions to reduce suicide behavior: a systematic review and meta-analysis. *Behav Modif*. 2008;32(1):77-108. doi:10.1177/0145445507304728.

31. Hoertel N, Franco S, Wall MM, et al. Mental disorders and risk of suicide attempt: a national prospective study. *Mol Psychiatry*. 2015;20(6):718-726. doi:10.1038/mp.2015.19.

32. Christensen RC. Commentary on suicide and homelessness: What differentiates homeless persons who died by suicide from other suicides in Australia? A comparative analysis using a unique mortality registry. *Soc Psychiatry Psychiatr Epidemiol*. 2013:1-2. doi:10.1007/s00127-013-0790-z.

33. Ha Y, Narendorf SC, Santa Maria D, Bezette-Flores N. Barriers and facilitators to shelter utilization among homeless young adults. *Eval Program Plann*. 2015;53:25-33. doi:10.1016/j.evalprogplan.2015.07.001.

34. Gaetz S, Donaldson J, Richter T, Gulliver T. *État de L'itinérance Au Canada 2013*.; 2013. http://www.homelesshub.ca/ResourceFiles/Documents/SOHC2013_FR.pdf.

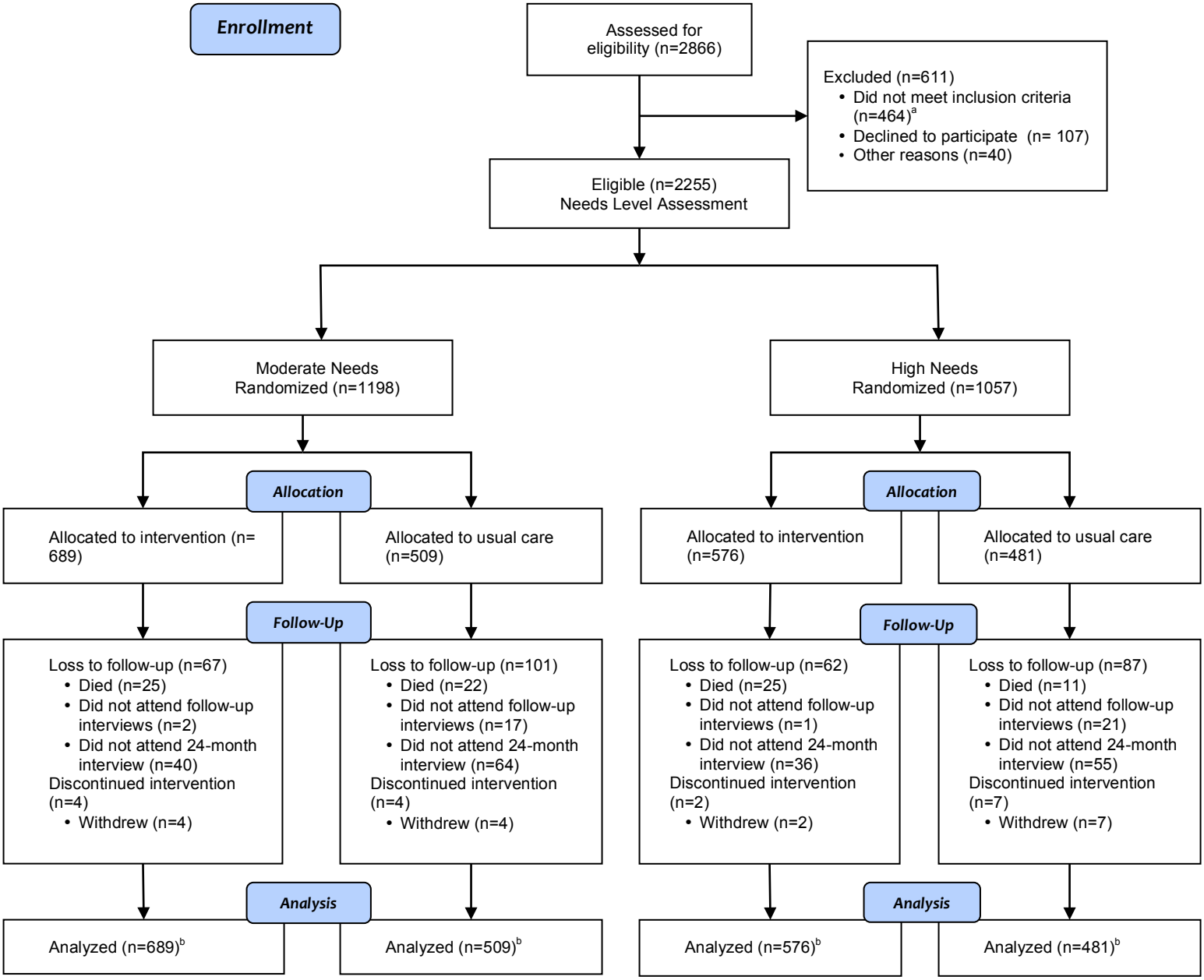
35. McVicar D, Moschion J, van Ours JC. From substance use to homelessness or vice versa? *Soc Sci Med*. 2015;136-137:89-98. doi:10.1016/j.socscimed.2015.05.005.

36. Clark J, Peiperl L, Veitch E, Wong M, Yamey G. Homelessness is not just a housing problem. *PLoS Med*. 2008;5(12):1639-1640. doi:10.1371/journal.pmed.1000003.

37. O'Donnell JK, Gaynes BN, Cole SR, et al. Ongoing life stressors and suicidal ideation among HIV-infected adults with depression. *J Affect Disord*. 2016;190:322-328. doi:10.1016/j.jad.2015.09.054.

FIGURES:

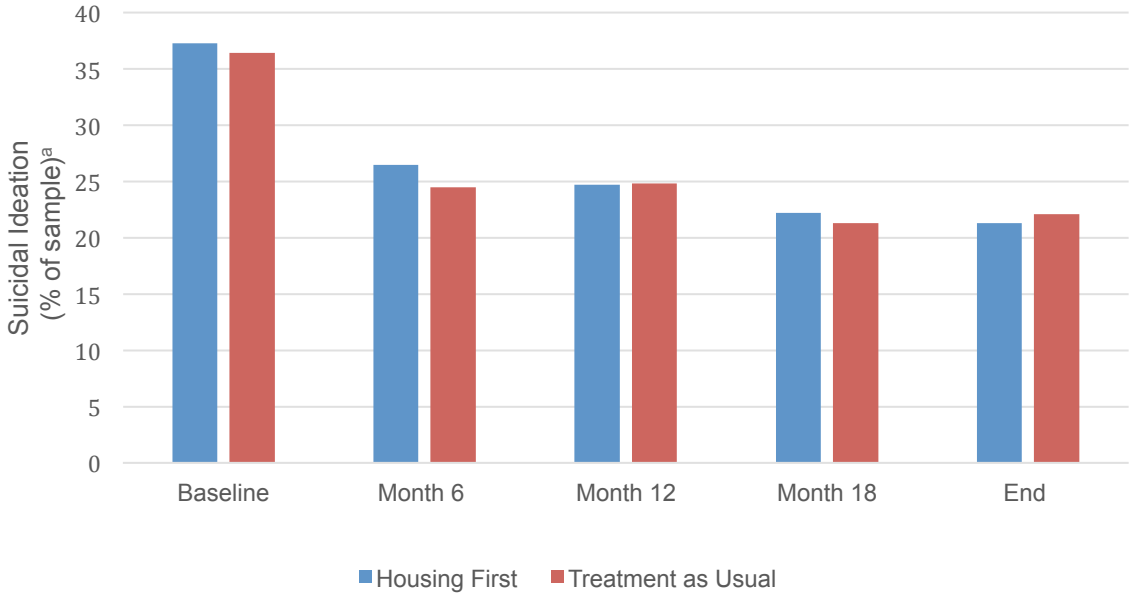
Figure 1: Flow of participants throughout the study. (CONSORT)



[a] Participants were excluded from the study if they did not meet the study inclusion criteria with respect to (1) age, (2) homelessness status, and (3) the presence of a mental disorder based on the Mini International Neuropsychiatric Interview, or (4) if they were currently served by an Assertive Community Treatment (ACT) or Intensive Case Management team or (5) lacked legal status in Canada.

[b] 34 participants (29 in the intervention group, 5 in the usual care group) were excluded from the final analysis as per national trial protocol[20]

Figure 2: Rates of Suicidal Ideation by Intervention Status during the 2-years of the At Home/Chez Soi trial



[a]*Rate of Suicidal Ideation at each time point, assessed as a response greater than "Not at all" to the question: "In the past month, how often did you feel like hurting or killing yourself".*[26]

TABLES:

Table 1. Baseline Sociodemographic Sample Descriptives

Variable	Total Sample N = 2221 (100%)	Housing First N = 1236 (55.7%)	Treatment as Usual N = 985 (44.3%)
Age at enrollment			
Years, *M(SD)*	40.89 (11.23)	40.78 (11.15)	41.02 (11.33)
Gender			
Males	1508 (67.9%)	834 (67.5%)	674 (68.4%)
Females	603 (31.2%)	395 (32.0%)	298 (30.3%)
Other	20 (0.9%)	7 (0.6%)	13 (1.3%)
Race/ Ethnicity			
White	940 (49.0%)	555 (50.5%)	385 (47.0%)
Indigenous	475 (24.8%)	276 (25.1%)	199 (24.3%)
Other	504 (26.3%)	268 (24.4%)	236 (28.8%)
Baseline Psychiatric Diagnoses			
Mood Disorder (MDE & Manic)	1255 (56.5%)	699 (56.6%)	556 (56.4%)
PTSD	645 (29.0%)	360 (29.1%)	285 (28.9%)
Panic Disorder	511 (23.0%)	270 (21.8%)	241 (24.5%)
Psychotic Disorder	1095 (49.3%)	640 (48.2%)	499 (50.7%)
Substance or Alcohol Use Disorder	1498 (67.4%)	823 (66.6%)	675 (68.5%)
Education			
< High School	1241 (56.1%)	704 (57.2%)	537 (54.7%)
≥ High school Diploma	970 (43.7%)	526 (42.8%)	444 (45.3%)
Monthly Income at Baseline			
$0.00 – $399.99	654 (29.4%)	362 (29.3%)	292 (29.6%)
$400.00 - $799.99	740 (33.3%)	403 (32.6%)	337 (34.2%)
$800.00 - highest	827 (37.2%)	471 (38.1%)	356 (36.1%)
Lifetime Homelessness at Baseline			
< 12 Months	640 (28.8%)	357 (28.9%)	283 (28.7%)
12-36 Months	576 (25.9%)	313 (25.3%)	263 (26.7%)
> 36 Months	1005 (45.2%)	566 (45.8%)	439 (44.6%)

*Percentages are valid percent of sample and exclude missing data

Table 2. Descriptives of Outcome Variables

Variable	Total Sample N = 2221 (100%)	Housing First N = 1236 (55.7%)	Treatment as Usual N = 985 (44.3%)
Suicide Attempts (%yes)			
Baseline (past month)	113 (5.6%)	63 (5.6%)	50 (5.6%)
Lifetime	1167 (55.4%)	652 (55.6%)	515 (54.0%)
Prevalence during 2 year study period	200 (11.3%)	124 (11.8%)	76 (10.5%)
Suicide Ideation (past month)			
Prevalence (> Never)			
Baseline *n*(%)	814 (37.3%)	442 (36.4%)	372 (38.4%)
Month 6 *n*(%)	470 (26.5%)	262 (24.5%)	208 (29.5%)
Month 12 *n*(%)	470 (24.7%)	277 (24.8%)	193 (24.6%)
Month 18 *n*(%)	384 (22.2%)	219 (21.3%)	165 (23.5%)
End *n*(%)	378 (21.3%)	232 (22.1%)	146 (20.1%)

Table 3. Predictors of change in Suicidal Ideation during the 2 years of At Home/Chez Soi Housing-First Intervention

Baseline Predictors of Suicidal Ideation Frequency	Growth Model Intercept Beta Estimate (SE)	Growth Model Slope Beta Estimate (SE)
Sex		
Male reference group	.06 (.12)	.11 (.06)
Age		
Continuous, in years	-.01*(.01)	.00 (.00)
Ethnicity		
Aboriginal (vs. White)	-.16 (.17)	.21** (.08)
Other (vs. White)	-.12 (.17)	.06 (.08)
Lifetime Suicide Attempt		
Presence (vs. Absence)	.05 (.12)	.05 (.06)
Baseline Psychiatric Diagnoses		
Mood Disorder (MDE & Manic)	1.42*** (.14)	-.03 (.07)
PTSD	.84*** (.14)	-.11 (.07)
Panic Disorder	.43** (.14)	-.04 (.07)
Psychotic Disorder	.28* (.13)	.06 (.06)
Substance or Alcohol Use Disorder	.51*** (.14)	-.04 (.07)
Income		
$500 – $1000 (vs. < $500)	.17 (.15)	-.00 (.08)
>$1000 (vs. < $500)	-.09 (.17)	-.00 (.08)
Education		
≥ High school equivalent (vs. < High school equivalent)	.05 (.12)	-.01 (.06)
Lifetime Homelessness		
3 months – 12 months (vs. < 3 months)	.09 (.16)	-.06 (.08)
>1 year (vs. < 3 months)	-.14 (.15)	-.04 (.07)
Intervention Status		
Housing First (.vs. TAU)	-.18 (.12)	-.04 (.06)

* p <.05; ** p <. 01; ***p < .001

Table 4. Predictors of Suicide Attempt during the 2 years of At Home/Chez Soi Housing-First Intervention (at 24 month interview)

Predictors of Suicide Attempt during the 2 year study	Beta Estimate (SE)	Logistic Odds Ratio (Confidence Intervals)
Sex		
Male	(ref)	1.00
Female (vs. Male)	.12 (.16)	1.13 (.87-1.46)
Age		
(Continuous)	-.02* (.01)	.98 (.97-.99)
Ethnicity		
White	(ref)	1.00
Indigenous	.40 (.20)	1.49 (1.07 – 2.08)
Other	-.37 (.24)	.69 (.46-1.03)
Lifetime Suicide Attempt		
No Attempt	(ref)	1.00
Attempt	.05 (.16)	1.05 (.80 – 1.37)
Baseline Psychiatric Diagnoses		
(No diagnosis as ref)		
Mood Disorder	.53** (.19)	1.70 (1.25-2.31)
PTSD	.39* (.17)	1.47 (1.12-1.95)
Panic Disorder	.25 (.18)	1.38 (.95-1.72)
Psychotic Disorder	07 (.17)	1.08 (.82 -1.42)
Substance or Alcohol Use Disorder	.34 (.20)	1.40 (1.00-1.95)
Income		
< $500	(ref)	1.00
$500 – $1000	.01 (.20)	1.01 (.73-1.39)
>$1000	.17 (.21)	1.18 (.83-1.67)
Education		
≥ High school equivalent	(ref)	1.00
< High school equivalent	-.14 (.16)	.87 (.67-1.14)
Lifetime Homelessness		
< 3 months	(ref)	1.00
3 months – 12 months	-.49* (.21)	.61 (.44-.86)
>1 year	-.45* (.19)	.64 (.47-.87)
Intervention Status		
Treatment as Usual	(ref)	1.00
Housing First	.10 (.16)	1.11 (.85-1.44)

* p <.05; ** p <. 01; ***p < .001