Physical health status of homeless Veterans in Canada: a cross-sectional study

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ABSTRACT

Introduction: Veteran homelessness is an issue gaining in visibility. Both Veterans and the homeless seem to be more susceptible to an array of physical health issues than the general population. However, very little is known about the health status of homeless Veterans in Canada. A more thorough knowledge of the physical health status of homeless Veterans could help better target services. This study has two objectives: (1) to estimate the prevalence of physical health conditions in a Canadian sample of homeless Veterans with mental illness and (2) to compare the prevalence observed in Veterans with a matched sample of homeless non-Veterans. **Methods:** The data come from a Canadian multi-site randomized trial, At Home/Chez Soi, that studies the effectiveness and efficiency of a Housing First program combined with a recovery-oriented approach to care. The present article is a cross-sectional analysis of baseline data. The participants are a volunteer sample of 99 homeless or precariously housed Veterans suffering from severe and persistent mental health problems and a matched sample of 99 non-Veterans. The data come from self-reported measures administered at baseline that describe chronic health conditions. **Results:** Veterans presented with five physical health conditions on average, the more common being dental problems, head injuries, musculoskeletal injuries, and foot problems. Both the number of conditions and the prevalence of each condition were similar to that of a matched comparison group of non-Veterans. **Discussion:** The number and severity of physical health conditions observed in our sample of homeless Veterans and non-Veterans suggest similar needs for physical health services in addition to housing services. Interventions targeting this population should therefore include a wide array of expertise and interdisciplinary collaboration to fit the various profiles of Veterans and non-Veterans in terms of housing, mental health, and physical health needs.

Key words: Canada, diseases, homeless persons, Veterans

RÉSUMÉ

Introduction : L'itinérance chez les vétérans est un enjeu dont la visibilité s'accroît. Les vétérans et les personnes itinérantes semblent plus vulnérables à un ensemble de problèmes de santé physique que la population générale. Néanmoins, l'état de santé des vétérans itinérants au Canada demeure peu connu. Une connaissance plus approfondie de l'état de santé physique des vétérans itinérants pourrait contribuer à mieux cibler l'offre de services. Cette étude comporte deux objectifs: (1) estimer la prévalence de problèmes de santé physique dans un échantillon canadien de vétérans itinérants vivant avec une maladie mentale et (2) comparer la prévalence observée chez les vétérans avec un échantillon apparié de personnes itinérantes qui ne sont pas des vétérans. **Méthodes :** Les données proviennent d'un essai randomisé multisite canadien, *At Home/Chez Soi*, qui étudie l'efficacité et l'efficience d'un programme *Logement d'abord* combiné avec une approche de soin basée sur le rétablissement. Cet article présente une analyse transversale des données recueillies au début de l'étude. Les participants, qui se sont portés volontaires, sont 99 vétérans itinérants ou précairement logés vivant avec des troubles mentaux sévères et chroniques et un échantillon apparié de 99 non-vétérans. Les données proviennent de mesures auto-rapportées administrées au début de l'étude qui décrivent les problèmes chroniques de santé physique. **Résultats :** Les vétérans rapportent en moyenne cinq problèmes de santé physique, dont les plus communs sont les problèmes dentaires, les blessures à la

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tête, les blessures musculo-squelettiques et les problèmes aux pieds. Le nombre et la prévalence de problèmes de santé physique sont semblables à ceux d'un échantillon apparié de non-vétérans. **Discussion :** Le nombre et la sévérité des problèmes de santé physique observés dans cet échantillon de vétérans et de non-vétérans itinérants suggèrent des besoins similaires en matière de services de santé en plus des services d'aide au logement. Les interventions visant cette population devraient donc inclure une vaste gamme d'expertises ajustées aux divers profils des personnes itinérantes, vétérans comme non-vétérans, en matière de logement et de santé physique et mentale.

Mots clés : Canada, maladies, personnes itinérantes, Vétérans.

INTRODUCTION

Background

Veterans' physical health

Several studies have established that Veterans in Canada and the United States present with more physical health conditions than non-Veterans and that these conditions have an important impact both on their military and civilian lives.[1,2] Canadian Veterans have a higher prevalence of chronic health conditions than the general Canadian population.[1] Hébert looked only at musculoskeletal (MSK) injuries and concluded that in the Canadian military they were the most common medical cause of restricted duties and days off as well as for not deploying.[3] Also, MSK injuries accounted for between 43% and 66% of all 3b medical releases – that is, when the individual is considered disabled and unfit to perform the duties of his or her present trade or specialty and cannot be otherwise gainfully employed in the Canadian Armed Forces (CAF). Medical release from the military is associated with having a harder time adjusting to civilian life.[1]

The situation is similar in other countries. For example, an American longitudinal study reveals that although Veteran and non-Veteran men have approximately the same number of physical health conditions at the mean age of all study participants (66 years old), Veterans' physical health declines more rapidly thereafter.[3] This study included only men since less than 1% of the women surveyed had served in the military. In another study, Hébert concluded that MSK injuries, such as back pain or arthritis, were the main cause of discharge from the military in the United Kingdom from 2008 to 2013.[3] In the United States, MSK injuries in the military are the most common reason for seeking medical care and medical evacuations.

El-Gabalawy and colleagues[4] and Hopman and colleagues[5] have reported on the prevalence of various chronic health conditions in Canadian Veterans based on the data in the Survey on Transition to Civilian Life. Their results show that 49% of Canadian Veterans lived with MSK injuries, 28% had hearing problems, 21% reported cardiovascular conditions, 11% were affected by gastrointestinal problems, 8% were affected by respiratory issues, 6% suffered from diabetes, and 1% lived with cancer. More than half experienced chronic pain. The risk factors for chronic physical health conditions include smoking (former or current), obesity, older age, having completed less than a high-school diploma, low income, deployment, serving in the Army, being released as a non-officer, and being a woman.[6]

Homeless Veterans' physical health

While there are an increasing number of studies on the health status of Veterans and military personnel, much less is known about the physical health of Veterans who experience homelessness. A recent American study suggests that in a sample of homeless Veterans, over 86% present with a chronic medical condition such as hypertension (21% to 33%), diabetes (10% to 13%), chronic obstructive pulmonary disease or asthma (8% to 14%), liver disease or hepatitis (21% to 26%), or heart disease (4% to 12%).[7] In the United States, Dunne and colleagues reported that 10% of homeless Veterans and 6% of non-Veterans identified physical or medical problems as the main cause for their being homeless.[8] In the same study, Veterans were twice as likely as non-Veterans to report current physical health problems. However, in an American study of three samples of homeless men, Rosenheck and Koegel concluded that there were no significant differences in physical health between Veterans and non-Veterans.[9] Also, in the United States, Barnes and colleagues have studied the prevalence of traumatic brain injuries (TBI) and related symptoms in Veterans seeking services for the homeless.[10] They recorded a 90% prevalence of TBIs in a sample of 229 male Veterans, with a median of three incidents of TBI per person having experienced TBI. In 77% of cases, TBI resulted in symptoms, such as headaches (57%), dizziness or balance problems (48%), blurred vision (39%), tinnitus (37%), tiredness, fatigue, or sleep problems (35%), memory or

cognitive troubles (30%), difficulties managing stress or emotions (19%), impulsivity or irritability (19%), and seizures (3%). The health status of Canadian homeless Veterans is still largely unknown, but in one recent study, Bourque and colleagues reported that 89% of a sample of 99 Canadian homeless Veterans with severe and persistent mental illness presented with more than one physical health condition (only 5% didn't report any).[11] The number of health conditions reported did not differ significantly between homeless Veterans and non-Veterans.

Research objectives

In this article, we wish to provide more detailed information on the physical health of homeless Veterans in Canada. This study has two objectives: (1) to estimate the prevalence of physical health conditions in a Canadian sample of homeless Veterans with mental illness and (2) to compare the prevalence observed in Veterans with a matched sample of homeless non-Veterans to determine whether Rosenheck and Koegel's results can be corroborated in Canada, almost 25 years after their study.[9]

METHODS

The At Home/Chez Soi study

This article uses baseline data from the At Home/Chez Soi study, a multi-site controlled trial held in five Canadian cities: Vancouver, Winnipeg, Toronto, Montreal, and Moncton. The goal of At Home/Chez Soi was to test the effectiveness of a Housing First intervention on housing and quality of life outcomes in a population of people living with homelessness and severe and chronic mental illness.[12] Participants were either referred by community agencies, service providers, or they self-referred to the study. They were then assessed for eligibility, for which they had to meet three criteria: (1) be of legal adult age for their jurisdiction (19 in Vancouver, 18 in the other sites), (2) be absolutely homeless or precariously housed (see Goering et al. for definitions),[12] and (3) present with current mental illness (as determined using the Mini International Neuropsychiatric Interview).[13]

Eligible participants were then asked for free and informed consent, and consenting participants completed the baseline measures. Once the baseline interview was completed, they were randomized using an electronic adaptive randomization technique to either the intervention group (INT) (Housing First with either assertive community treatment or intensive case management) or treatment as usual (TAU).[14] Treatment as usual varied from city to city and could include any available service addressing homelessness or mental health provided by community or government agencies, with the exclusion of other Housing First, assertive community treatment, and intensive case management services, as these constituted exclusion criteria for the study. The total sample at baseline included 2,298 participants (1,289 INT, 1,009 TAU), who were enrolled from October 2009 to August 2011. Baseline data included demographic and clinical characteristics, service utilization, quality of life, housing, and community integration. The follow-up lasted for up to 24 months, during which data was collected every three months. At Home/Chez Soi was registered with the International Standard Randomized Control Trial Number Register (ISRCTN42520374). It received ethics approval from universities and health care institutions in each of the five study sites and from the university-affiliated teaching hospital where the coordinating centre of the study was based.

Study design

This article uses only baseline data and a descriptive/correlational design to document the prevalence of various chronic physical ailments in homeless Veterans and compares the Veteran sample with a matched sample of non-Veterans.

Matching procedure

One item of the baseline questionnaire asked about Veteran status: "Have you ever had any wartime service in the military forces of Canada or its allies?" Out of the 2,298 participants recruited for At Home/Chez Soi, 99 (4.3%) identified as Veterans. A matched sample of 99 non-Veterans was drawn from the 2,182 participants who had answered negatively to the Veteran status item. Veterans and non-Veterans were matched on study site (Vancouver, Winnipeg, Toronto, Montreal, or Moncton), sex, and age (± 3 years). We first identified non-Veteran participants who matched a Veteran perfectly on site and sex and then selected the participant whose age was the closest to the Veteran participant. When more than one non-Veteran matched the Veteran participant equally well, a random number generator was used to pick one (http://www.random.org).

Sample

The sample analyzed for this study is composed of 99 Veterans and 99 non-Veterans. Because these variables were used as matching criteria, the groups are equivalent

Table 1. Sample characteristics

Variable	Veterans ($n = 99$)	Non-Veterans ($n = 99$)
Gender (%)		
Male	79	79
Female	20	20
Transgender/Transsexual	1	1
Age at enrolment: $\overline{X}$ (s)	44 (12)	45 (11)
Study site (%)		
Moncton	11	11
Montreal	13	13
Toronto	22	22
Vancouver	27	27
Winnipeg	26	26
Language (%)		
English	66	61
French	13	18
Other	21	21
Ethnicity (%)		
White	53	48
Aboriginal	20	25
Other	27	27
Mental Illness (%)		
Major depressive episode	55	54
Manic or hypomanic episode	16	11
post-traumatic stress disorder	40	29
Panic disorder	27	22
Mood disorder/psychotic features	17	23
Psychotic disorder	34	39
Alcohol dependence	41	39
Substance dependence	39	46
Suicidality (moderate/high)	38	25
Highest level of education (%)		
Did not complete high school	33	60
Completed high school	24	16
Some post-secondary education	43	24

for gender, age, and study site (Table 1). The groups are also statistically equivalent for language ($L^2(2) = 1.01$, $p = 0.60$), ethnicity ($L^2(2) = 0.81$, $p = 0.67$), and mental health conditions (see Bourque et al., 2014, for detailed results).[11] Note that we used the likelihood ratio Chi-square test to account for the non-quadricity of the contingency table. However, the Veteran group presents with significantly higher levels of education than the non-Veterans ($\chi_{MH}^2(1) = 13.22$, $p < 0.001$), which is to be expected since one benefit of joining the CAF is paid education. More precisely, adjusted standardized residuals reveal that Veterans are significantly more likely than non-Veterans to have attended some post-secondary education and less likely to have ended their education before completing high school. We used the Mantel-Haenszel Chi-square test for this last comparison to account for the ordered nature of the education variable.

Measures

Socio-demographic information

We obtained socio-demographic information using the Demographics, Service and Housing History questionnaire, which was created by the At Home/Chez Soi team to gather factual information from participants at baseline (for example, gender, ethnicity, Veteran status, and language).[12] Items come from the 2006 Canada Census, the 2006 Toronto Board of Education Student Census, and the Community Mental Health Evaluation Initiative.

Physical health

To assess physical health, we used the Comorbid Conditions (CMC) questionnaire, an inventory of physical health conditions developed by the At Home/Chez Soi team.[12] The CMC lists 30 health conditions (for example, back problems, arthritis, and diabetes), and participants indicate the presence or absence of each. The list of conditions was inspired by several pre-existing instruments, such as the Canadian Community Health Survey and the National Population Health Survey (Statistics Canada). One item was added to assess the presence of traumatic brain injuries.

Data analysis

The prevalence of each condition for both Veterans and non-Veterans was expressed by raw frequencies and percentages, with 95% confidence intervals for percentages. Differences in prevalence between Veterans and non-Veterans were tested using Pearson's Chi-square test of independence. Effect sizes were estimated using odds ratios with 95% confidence intervals. The significance criterion (α) was adjusted to control for inflation of the probability of type I error due to multiple testing by using Benjamini and Hochberg's approach to reducing false discovery rates.[15]

RESULTS

This study investigates two questions: (1) the physical health conditions affecting homeless Veterans and (2) how homeless Veterans compare to homeless non-Veterans in terms of physical health.

Prevalence of physical health conditions in Veterans

On average, after correcting for one outlier, Veterans ($\overline{X} = 5.01$, $s = 3.08$) and non-Veterans ($\overline{X} = 5.13$, $s = 3.93$) reported five physical conditions. Descriptive statistics presented in Table 2 reveal that among home-

Table 2. Prevalence of physical health conditions in homeless Veterans and non-Veterans

		Non-Veterans				Veterans			
Condition	N	*n*	%	*Lower*	*Upper*	*n*	%	*Lower*	*Upper*
Dental problems	198	58	59	49	69	66	67	58	76
Head injury	198	65	66	57	75	65	66	57	75
Back problems	198	54	55	45	65	59	60	50	70
Arthritis	198	40	40	30	50	44	44	34	54
Foot problems	198	43	43	33	53	38	38	28	48
Bronchitis/Emphysema	198	20	20	12	28	31	31	22	40
Migraine	198	40	40	30	50	31	31	22	40
High blood pressure	198	23	23	15	31	29	29	20	38
Asthma	198	23	23	15	31	26	26	17	35
Gynaecological problem	40	2	10	0	23	5	25	6	44
Ulcer (stomach/bowel)	198	15	15	8	22	17	17	10	24
Skin problems	198	24	24	16	32	16	16	9	23
Hepatitis C	198	20	20	12	28	15	15	8	22
Lice/Scabies/Other	198	13	13	6	20	15	15	8	22
Anemia	198	15	15	8	22	14	14	7	21
Epilepsy/Seizures	198	10	10	4	16	13	13	6	20
Crohn's/Colitis	198	9	9	3	15	13	13	6	20
Urinary Incontinence	198	27	27	18	36	11	11	5	17
Kidney/Bladder issue	198	16	16	9	23	10	10	4	16
Diabetes	198	11	11	5	17	8	8	3	13
Stroke	198	3	3	0	6	6	6	1	11
Heart disease	198	13	13	6	20	5	5	1	9
Cancer	198	4	4	0	8	5	5	1	9
HIV/AIDS	198	3	3	0	6	4	4	0	8
Other STD	198	5	5	1	9	4	4	0	8
Other liver disease	198	9	9	3	15	4	4	0	8
Thyroid condition	198	7	7	2	12	3	3	0	6
Alzheimer/Dementia	198	0	0	—	—	2	2	0	5
Tuberculosis	198	4	4	0	8	1	1	0	3
Hepatitis B	198	1	1	0	3	1	1	0	3

less Veterans, the most common conditions are dental problems (67%), head injuries (66%), and back problems (60%). These conditions affect up to two-thirds of the Veteran sample. Other conditions affect between a quarter and a half of homeless Veterans in our sample: arthritis (44%), foot problems (38%), bronchitis/emphysema (31%), migraine headaches (31%), high blood pressure (29%), and asthma (26%). Gynaecological problems affect 25% percent of women in the Veteran sample. At the opposite end of the spectrum, some conditions are present in less than 10% of the Veteran sample: diabetes, stroke, heart disease, cancer, HIV/AIDS and other sexually transmitted diseases (STDs), liver diseases (other than hepatitis B or C), thyroid conditions, Alzheimer's disease or dementia, tuberculosis, and hepatitis B.

Both groups reported a similar mean number of physical conditions, roughly five. An independent sample *t*-test, with Welch correction to account for heteroscedasticity, confirmed that there was no statistically significant difference between groups ($t(196) = 0.24$, $p = 0.81$). The effect size, estimated with Cohen's *d*, is negligible ($d = 0.03$). The same observation applies to each individual condition: after correcting the significance criterion to control for multiple testing, there are no differences in prevalence between homeless Veterans and non-Veterans (Table 3). At first glance, orders of magnitude seem close for prevalence in both groups. However, wide variability in odds ratios suggests low precision. Two factors can explain this situation: small sample size and low base rates for some of the observed conditions.

DISCUSSION

The objectives of our study were to estimate the prevalence of various physical health conditions in a sample of homeless Veterans with severe and persistent mental illness and to compare the prevalence of these conditions with a matched sample of non-Veterans. Following a study by Wilmoth, London, and Parker with US Veterans,

Table 3. Statistical comparison between homeless Veterans and non-Veterans

Condition	N	$\chi^2(1)$	*p*	Odds ratio	95% CI Lower	95% CI Upper
Asthma	197	0.29	0.592	1.19	0.63	2.28
Bronchitis/Emphysema	197	3.05	0.081	1.78	0.93	3.40
Tuberculosis	188	1.66	0.198	0.26	0.03	2.36
Hepatitis C	193	0.81	0.368	0.71	0.34	1.49
Hepatitis B	193	0.00	0.982	0.97	0.06	15.72
HIV/AIDS	191	0.14	0.711	1.33	0.29	6.12
Other STD	196	0.10	0.757	0.81	0.21	3.11
Migraine	195	1.94	0.163	0.66	0.37	1.19
Epilepsy/Seizures	195	0.56	0.456	1.39	0.58	3.35
Stroke	191	1.15	0.283	2.14	0.52	8.80
Alzheimer/Dementia	192	1.94	0.164	—	—	—
Back problems	198	0.52	0.473	1.23	0.70	2.16
Dental problems	198	1.38	0.240	1.41	0.79	2.52
Foot problems	198	0.52	0.470	0.81	0.46	1.43
Skin problems	197	1.91	0.167	0.61	0.30	1.24
Lice/Scabies/Other	196	0.17	0.683	1.18	0.53	2.64
Arthritis	193	0.42	0.520	1.21	0.68	2.13
Ulcer (Stomach/Bowel)	190	0.21	0.651	1.19	0.56	2.55
Crohn's/Colitis	198	0.82	0.366	1.51	0.62	3.72
Kidney/Bladder issue	194	1.75	0.186	0.57	0.24	1.32
Urinary incontinence	198	8.34	0.004	0.33	0.16	0.72
High blood pressure	185	0.88	0.350	1.36	0.71	2.59
Thyroid condition	190	1.78	0.182	0.40	0.10	1.60
Heart disease	191	3.83	0.050	0.36	0.12	1.04
Diabetes	188	0.53	0.468	0.70	0.27	1.83
Other liver disease	190	2.06	0.151	0.42	0.13	1.41
Cancer	187	0.18	0.672	1.34	0.35	5.14
Anemia	183	0.03	0.865	0.93	0.42	2.07
Gynecological problem	40	1.69	0.194	3.09	0.53	17.95
Head injury	196	0.00	1.000	1.00	0.55	1.81

Note: $\alpha = 0.002$ for first test after controlling for false discovery rate.[15]

we expected Veterans to present with more physical health conditions than non-Veterans in our sample of homeless individuals with mental illness.[2] However, the average number of conditions was the same in both groups, and the prevalence was similar for each condition, which is in line with the results observed almost 25 years ago in the United States.[9] It is worth mentioning that physical health in both groups was typically poor.

Canadian studies of Veterans reported a high prevalence of MSK injuries (for example, back problems and arthritis), which is not only consistent with our results but also extends to homeless non-Veterans.[2,4,5] Prevalence-point estimates suggest that the homeless Veterans and non-Veterans in our sample are more affected (>60%) by MSK injuries than Veterans who are not homeless (49%). To our knowledge, this high prevalence of MSK injuries in a homeless population (Veterans and non-Veterans alike) has not been documented before and warrants further research. Also consistent with the existing literature is the high prevalence of head injuries.[10] The observation that the physical health of homeless Veterans is worse than that of Veterans who are not homeless is not particularly surprising given the typically poor health of homeless populations.

The number and severity of physical health conditions observed in our sample of homeless Veterans and non-Veterans suggest high needs for physical health services in addition to housing services. Interventions targeting this population should therefore include a wide array of expertise and interdisciplinary collaboration to account for various housing, mental health, and physical health profiles. Bourque and colleague's[16] study suggests that a Housing First intervention paired with interdisciplinary, intensive health support can successfully reduce the prevalence of homelessness in a Veteran sample with severe and chronic mental illness and provide more favourable conditions to address health challenges.[17] However, in addition to housing support,

Housing First provides a rather intensive model of care suited for people with moderate to high mental health needs. What our results suggest is that there is also a need for physical health services targeting homeless Veterans that do not necessarily include the type of wrap-around support provided by assertive community treatment or even intensive case management and that may not need to differ much from services offered to homeless non-Veterans. Given what is known about homeless populations, however, an intervention model based on community outreach might be required to reach homeless Veterans.

CONCLUSION

This article examined the prevalence of various health conditions in a Canadian sample of homeless Veterans with severe and persistent mental illness. We concluded that Veterans presented with five physical health conditions on average, the more common being dental problems, head injuries, MSK injuries, and foot problems. Both the number of conditions and prevalence of each condition were similar to that of a matched comparison group of non-Veterans. To our knowledge, this is the first study exploring the physical health status of homeless Canadian Veterans. These findings suggest that as far as physical health is concerned, the needs of homeless Veterans and non-Veterans do not seem to differ much. Our study suffers from two main limitations. First, our relatively small sample of 99 Veterans and 99 non-Veterans, combined with the low base rate of certain health conditions, limited the statistical power to detect small to moderate differences between Veterans and non-Veterans. Second, with few to no data on the homeless Veteran population in Canada, it is not currently possible to assess the representativeness of our volunteer sample. Further studies will be needed to clarify the picture of the health status and the service needs of this underprivileged population.

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Jimmy Bourque supervised research at the Moncton site and was part of the National Research Team, analyzed the data, and wrote the first draft of the manuscript. Linda VanTil, Josée Nadeau, Jennifer Ebner Daigle, Caroline Gibbons, and Kathy Darte revised the manuscript for important intellectual content and approved the final version submitted for publication. Stefanie LeBlanc coordinated data collection for the Moncton site and revised the manuscript for important intellectual content and approved the final version submitted for publication.

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