



## Short communication

## Differences in methods of suicide among veterans experiencing housing instability, 2013–2016



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## ABSTRACT

Although housing instability moderates suicide risk among military veterans, it is unknown whether suicide methods differ between stably and unstably housed veterans. The Veterans Health Administration screened 5,849,870 veterans for housing instability between October 1, 2012 and September 30, 2016. Death data were from the National Death Index. Unstably housed veterans had greater hazards of suicide mortality by jumping from a height (aHR = 3.07, 95%CI = 1.20–7.98) and unspecified means (aHR = 2.80, 95%CI = 1.63–4.80) than stably housed veterans. Translating these findings into optimal suicide prevention programming tailored to unstably housed veterans is essential.

## 1. Introduction

Approximately 9% of adults experiencing homelessness in the U.S. are military veterans (U.S. Interagency Council on Homelessness, June 2019). Compared to stably housed veterans, unstably housed veterans (i.e., experiencing or at risk of homelessness) are more likely to experience suicidal ideation (0.8% vs. 9.6%, respectively), suicide attempts (0.7% vs. 8.5%), and suicide death (Blosnich et al., 2020; Hoffberg et al., 2018; U.S. Department of Veterans Affairs and Office of Mental Health and Suicide Prevention, 2019). Understanding methods of suicide can inform prevention and intervention efforts. For instance, because suicide by firearm is higher among veterans than non-veterans (U.S. Department of Veterans Affairs and Office of Mental Health and Suicide Prevention, 2019), firearm safety has become a widespread component of veteran suicide prevention (The Assessment and Management of Suicide Risk Work Group, 2019). However, it is unknown whether methods of suicide differ between stably and unstably housed veterans. This is essential for understanding how suicide prevention strategies should differ for unstably housed veterans. Indeed, theories of suicide, such as the ideation-to-action frameworks, now

integrate access to lethal means as a key moderator for suicide (O'Connor and Kirtley, 2018). This exploratory study examined whether veterans' methods of suicide varied by housing status. We refrained from positing hypotheses.

## 2. Methods

The Veterans Health Administration (VHA) implemented universal clinical screening administered by providers during outpatient VHA visits to assess housing instability ("In the past 2 months, have you been living in stable housing that you own, rent, or stay in as part of a household?" and "Are you worried or concerned that in the next 2 months you may NOT have stable housing that you own, rent, or stay in as part of a household?") (Montgomery et al., 2013). We used existing data from 5,849,870 veterans who were (1) screened between October 1, 2012 and September 30, 2016 (fiscal years 2013–2016) and (2) searched in the National Death Index for date and cause of death during the study period.

Veterans who screened positive for housing instability, at least once during the study period, were considered unstably housed, and veterans

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without a positive screen during the study period were considered stably housed. Mortality data were gathered from the National Death Index and categorized from International Classification of Diseases (ICD-10) codes in accordance with the National Center for Health Statistics (National Center for Health Statistics, 2002). The study outcome was whether veterans died by suicide. Cox regression models estimated suicide risk. We report all hazard ratios (HR) with 95% confidence intervals (CI). We conducted models unadjusted and then adjusted for age, sex, and ever being diagnosed with depression, alcohol use disorder, or drug use disorders in the 18 months prior to the first screen; these covariates were gathered from VHA administrative and electronic health record data. For unstably housed veterans, survival time began on the date of the first positive screen for housing instability. For stably housed veterans, survival time began on the date of the first screen for housing instability. For both unstably and stably housed veterans, survival time ended either at death or end of the study period. The institutional review board of the VA Pittsburgh Healthcare System approved this study.

### 3. Results

The population mean age was 60.9 years, 92.8% were male, and prevalence of diagnoses of depression, alcohol use disorder, and drug use disorders were 8.4%, 3.9%, and 2.5%, respectively. Across the study period, 169,221 (2.9%) veterans were unstably housed. Among the 7005 veterans who died by suicide, 4.2% (n = 297) were unstably housed (Table 1). The unadjusted suicide rate for stably and unstably housed veterans was approximately 118/100,000 and 175/100,000 veterans, respectively.

Among stably housed veterans, nearly 3 of 4 suicides involved firearms; for unstably housed veterans, less than half of suicides involved firearms. Significant hazards in suicide methods in unadjusted models remained in adjusted models, though with lessened magnitudes of association. In adjusted models, unstably housed veterans had 86% increased hazard of suicide from self-poisoning from exposure to drugs and other biological substances compared to stably housed veterans. Unstably housed veterans were over 3 times more likely to die by jumping from a height (aHR = 3.07, 95%CI=1.20–7.98) and over 2.5 times more likely to die by suicide from unspecified means (aHR = 2.80, 95%CI = 1.63–4.80) than stably housed veterans.

### 4. Discussion

Mortality studies of unstably housed populations remain limited. The high risk of suicide among veterans in the present study aligns with findings from, to our knowledge, the only other study of causes of death among a sample of homeless individuals (Baggett et al., 2013). Findings

corroborate that unstably housed veterans have a higher risk of suicide than stably housed veterans (Hoffberg et al., 2018). This study is the first to show significant differences in means of suicide by housing status.

For unstably housed veterans, greater hazards of dying by methods of suicide other than firearms suggest potentially unmet suicide prevention needs. Further research regarding setting of suicide deaths (e.g., VHA domiciliary programs, non-VHA shelters, public spaces) is warranted for adapting interventions to the needs of unstably housed veterans. For example, future research on modifications to the environment (e.g., ligature resistant-products, bridge nets) may be key to preventing suicide among unstably housed individuals (Beautrais, 2007). The greater hazard of suicide deaths by unspecified means among unstably-relative to stably-housed veterans illuminates issues around death documentation for unstably housed individuals. Because unstably housed individuals may live in transient circumstances or have fragmented social ties, there may be limited information during a death investigation, resulting in suicide deaths indicated as “unspecified means.” Better understanding the death documentation process for unstably housed individuals is needed, such as fatality case reviews to enhance epidemiologic efforts that, in turn, inform public health prevention efforts (Hipple et al., 2016).

Aligning with previous research, firearms were the most common suicide method among all veterans, irrespective of housing status (U.S. Department of Veterans Affairs and Office of Mental Health and Suicide Prevention, 2019). Firearm safety remains critical for suicide prevention in veterans generally, but lethal means safety counseling focused on firearms raises several questions for unstably housed veterans. Further research is needed to understand how recommended safe firearm storage practices (e.g., store ammunition separately from firearms, keep firearms in lockboxes or safes) translate to unstably housed veterans who may be unsheltered or living in shelters.

We note several limitations. Derived from a VHA-engaged population, results may not generalize to non-veterans or veterans not engaged in VHA care. Misclassification of suicide is a perennial concern (Rockett, 2010), and may be amplified among unstably housed individuals, whose deaths may be more isolated and without witnesses or may have limited next-of-kin contacts. The timing of housing instability was limited to veterans' responses to a clinical screen conducted upon presenting for VHA care, which may not necessarily have been when veterans actively experienced housing instability.

The different methods of suicide among unstably housed veterans suggests augmenting public health messaging and intervention surrounding access to specific lethal means (e.g., substances). Additional research is warranted to translate these findings into optimal suicide prevention programming tailored to unstably housed veterans.

**Table 1**

Unadjusted prevalence and adjusted hazards of suicide methods among veterans who died by suicide, by housing status, FY2013–2016.

	Suicides		Hazard of suicide for unstably housed veterans	
	Stably housed veterans (n = 6708)	Unstably housed veterans (n = 297)	Unadjusted <sup>a</sup> (n = 5849,847)	Adjusted <sup>a,b</sup> (n = 5849,847)
<i>Methods of suicide</i>	N (%)	N (%)	HR(95%CI)	aHR(95%CI)
Self-poisoning by/exposure to drugs and other biological substances (X60-X64)	567 (8.4)	51 (17.2)	3.79 (2.58–5.58)*	1.86 (1.25–2.76)*
Self-poisoning by/exposure to other and un-specified solid or liquid substances and their vapors (X65-X66, X68-X69) or other gasses/vapors (X67)	179 (2.7)	11 (3.7)	1.80 (0.67–4.86)	1.26 (0.46–3.45)
Hanging, strangulation, suffocation (X70)	864 (12.9)	64 (21.6)	3.34 (2.39–4.66)*	1.89 (1.34–2.65)*
Discharge of firearms (X72-X74)	4787 (71.4)	142 (47.8)	1.04 (0.81–1.34)	0.92 (0.72–1.20)
Jumping from height (X80)	63 (0.9)	8 (2.7)	6.30 (2.53–15.64)*	3.07 (1.20–7.98)*
Self-harm by all other and unspecified means and their sequelae (X71, X75-X79, X81-X84, Y87.0)	248 (3.7)	21 (7.1)	4.89 (2.91–8.24)*	2.80 (1.63–4.80)*

<sup>a</sup> reference is stably housed veterans.

<sup>b</sup> adjusted for age, sex, and diagnoses of depression, alcohol use disorder, or drug use disorder in the 18 months prior to housing screen.

\* p < .05.

### CRediT authorship contribution statement

**John R. Blossnich:** Conceptualization, Methodology, Writing - original draft, Formal analysis. **Lindsey L. Monteith:** Writing - original draft. **Ryan Holliday:** Writing - original draft. **Lisa A. Brenner:** Writing - original draft. **Ann Elizabeth Montgomery:** Investigation, Data curation, Writing - original draft.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.psychres.2020.112947](https://doi.org/10.1016/j.psychres.2020.112947).

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