June, 2017

Gender Differences in Factors Associated with Unsheltered Status and Increased Risk of Premature Mortality among Individuals Experiencing Homelessness

Ann Elizabeth Montgomery, *University of Alabama, Birmingham*
Dorota Szymkowiak, *United States Department of Veterans Affairs*
Dennis P Culhane

Women's Health Issues xxx-xx (2017) 1–8

ELSEVIER

WOMEN'S HEALTH ISSUES

www.whijournal.com

Original article

Gender Differences in Factors Associated with Unsheltered Status and Increased Risk of Premature Mortality among Individuals Experiencing Homelessness

Ann Elizabeth Montgomery, PhD [a,b,*], Dorota Szymkowiak, PhD [b], Dennis Culhane, PhD [b,c]

[a] *Department of Health Behavior, University of Alabama at Birmingham, School of Public Health, Birmingham, Alabama*
[b] *U.S. Department of Veterans Affairs, National Center on Homelessness Among Veterans, Philadelphia, Pennsylvania*
[c] *University of Pennsylvania, School of Social Policy & Practice, Philadelphia, Pennsylvania*

Article history: Received 1 December 2016; Accepted 24 March 2017

A B S T R A C T

Background: Among individuals experiencing homelessness, unsheltered status is associated with poor health and access to care and an increased risk for premature death. Insufficient research has explored gender differences in these outcomes; the objective of this study was to address this gap in the research.
Methods: This study used survey data collected during the 100,000 Homes Campaign. Chi-square tests identified differences in the characteristics of women, men, and transgender individuals. Generalized linear mixed models fit with demographic, homelessness, mental/behavioral health, institutional, and income characteristics were run separately for women and men to assess correlates of unsheltered status and increased risk of premature mortality.
Results: Men reported more frequently experiencing unsheltered homelessness while women and transgender participants more frequently met the criteria for risk of premature mortality. Women reported less frequently than men a history of or current substance use, but it significantly increased their likelihood of unsheltered homelessness; reports of mental health issues were rarer among men but significantly increased their odds of unsheltered homelessness. The experience of a violent attack while homeless was most strongly related to increased risk of premature mortality for both women and men.
Conclusions: Interventions to reduce unsheltered homelessness among men should be particularly sensitive to mental health issues while for women there may need to be increased attention to substance use. A focus on experience of trauma and the provision of trauma-informed care is essential to address the increased risk of premature mortality among both men and women experiencing homelessness.
Published by Elsevier Inc. on behalf of Jacobs Institute of Women's Health.

The most recent annual estimates of homelessness identify a profile of the "typical" adult individual accessing emergency shelter or transitional housing in the United States: a 31- to 50-year-old White man who experienced homelessness before entering shelter and reported no disability. Although this profile may describe the majority of homeless individuals, during 2015 almost 30% of all adult individuals accessing emergency shelter or transitional housing were women and 0.33% were transgender (U.S. Department of Housing and Urban Development, 2016b). In addition, on one day in January 2016, women constituted about one-quarter, and transgender individuals 0.60%, of adult individuals experiencing unsheltered homelessness (U.S. Department of Housing and Urban Development, 2016a).

Although much of the research related to homeless adults has focused on men, studies that have assessed gender differences in homeless experiences have found that pathways to homelessness may vary considerably by gender (Tessler, Rosenheck, & Gamache, 2001). These studies have consistently identified an association between serious mental illness and homelessness among women (Fischer & Breakey, 1991; Roll, Toro, & Ortola,

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

* Correspondence to: Ann Elizabeth Montgomery, PhD, Department of Health Behavior, University of Alabama at Birmingham, School of Public Health, RPHB 227M, 1720 2nd Avenue South, Birmingham, AL 35294-0022. Phone: +1-205-934-9325, fax: +1-205-933-8101.
E-mail addresses: aemontgo@uab.edu, ann.montgomery2@va.gov (A.E. Montgomery).

1049-3867/$ - see front matter Published by Elsevier Inc. on behalf of Jacobs Institute of Women's Health.
http://dx.doi.org/10.1016/j.whi.2017.03.014

1999; Tsai, Kasprow, Kane, & Rosenheck, 2014), compared with a strong relationship between homelessness and substance use disorders among men (Opler et al., 2001; Roll et al., 1999; Stein & Gelberg, 1995; Tsai, Kasprow, et al., 2014; Zugazaga, 2004). Work exploring the high rate of housing instability among the transgender population (Fletcher, Kisler, & Reback, 2014; Grant, Mottet, Tanis, Harrison, Herman, & Keisling, 2011; Mizuno, Frazier, Huang, & Skarbinski, 2015) has attributed it to, in part, family rejection (Fletcher et al., 2014), systemic discrimination (Barboza, Dominguez, & Chance, 2016; Grant et al., 2011), and structural barriers such as lack of transportation or employment (Raiford, Hall, Taylor, Bimbi, & Parsons, 2016).

Research has also found that, among adults experiencing homelessness, men have a higher likelihood of a history of incarceration (Roll et al., 1999; Tsai, Rosenheck, & Kane, 2014b; Tsai, Kasprow, et al., 2014; Zugazaga, 2004), although women are at greater risk for homelessness post-incarceration (Fries, Fedock, & Kubiak, 2014), and women more frequently report experiences of childhood physical and sexual abuse and foster care (Zugazaga, 2004). In addition to these issues, among the transgender population, participation in sex work and higher rates of human immunodeficiency virus (HIV) infection and suicide are associated with homeless status (Grant et al., 2011).

Insufficient research has explored how gender differences may impact specific health and housing outcomes among adults experiencing homelessness, specifically the experience of unsheltered homelessness and increased risk of premature mortality. These outcomes are particularly important to understand given that unsheltered status is associated with poor health and access to care (Byrne, Montgomery, & Fargo, 2016; Gelberg & Siecke, 1997; Nyamathi, Leake, & Gelberg, 2000; O'Toole, Gibbon, Hanusa, & Fine, 1999) and an increased risk for premature death (O'Connell, 2005). Recent studies, as well as annual counts of homelessness, have found that women are less likely than men to experience unsheltered homelessness (Byrne et al., 2016; Montgomery, Byrne, Treglia, & Culhane, 2016; Montgomery, Szymkowiak, Marcus, Howard, & Culhane, 2016; Tsai, Kasprow, et al., 2014; U.S. Department of Housing and Urban Development, 2016b), but more likely to experience an increased risk of premature mortality (Cheung & Hwang, 2004; Montgomery, Szymkowiak et al., 2016). Little is known about the transgender homeless population and these specific outcomes.

The objective of this study was to extend previous work that identified gender differences in rates of unsheltered status and increased risk of premature mortality (Montgomery, Szymkowiak et al., 2016) by further exploring correlates of these outcomes separately by gender.

Material and Methods

Data were primarily collected during the 100,000 Homes Campaign, which sought to house 100,000 vulnerable or chronically homeless individuals in communities across the United States between July 2010 and July 2014. During "Registry Weeks," volunteers in 96 communities used a standard instrument, the Vulnerability Index, to collect personal, health, and housing information from every person living on the streets and in shelters (Leopold & Ho, 2015). A small number of communities had used this instrument before the launch of the campaign; the pre-campaign respondents were also included in this study. Data used for this study were collected between May 2008 and December 2014.

Measures

The Vulnerability Index collected information on demographic characteristics (education, race, gender, age, veteran status); homelessness characteristics including respondents' current living situation, duration and frequency of homelessness, and whether respondents had experienced a violent attack while homeless; and history of incarceration and foster care. The survey assessed three types of sources of income: "active" income included on- and off-the-books employment; "passive" income was from pensions, the U.S. Department of Veterans Affairs, Supplemental Security Income, Social Security Disability Insurance, Social Security, Supplemental Nutrition Assistance Program, and public assistance; and other informal income came from recycling, panhandling, and the drug and sex trades. Finally, the Vulnerability Index assessed whether respondents had a history of mental health treatment, current alcohol abuse and history of other substance use and related treatment, past and present medical conditions, and the use of acute and emergency health services.

This study focused on gender differences among individuals experiencing homelessness; gender was described as female, male, transgender, or other. Of particular emphasis for this study was sheltered status and the presence of factors related to increased risk of premature mortality. Sheltered status was based on respondents' answers to a question about where they slept most frequently. Respondents sleeping in vehicles, vacant buildings, streets, parks, beaches, riverbeds, and other areas not intended for human habitation were considered "unsheltered," whereas those staying in shelters, hotels and motels, and in the homes of family or friends were considered sheltered. Respondents who only listed "other"—or listed "other" along with sheltered locations—were excluded from the analyses because they may have been staying in unsheltered situations at least some of the time.

Guided by studies that identified conditions that increased the risk of premature death among individuals living in unsheltered situations (Hwang, Lebow, Bierer, O'Connell, Orav, & Brennan, 1998; Hwang, O'Connell, Lebow, Bierer, Orav, & Brennan, 2001; Hwang, Orav, O'Connell, Lebow, & Brennan, 1997; O'Connell, Mattison, Judge, Allen, & Koh, 2005), we operationalized increased risk of mortality as respondents meeting at least one of the following criteria:

1. Trimorbidity of substance use (past or present), serious mental illness (past involuntary hospitalization for psychiatric treatment), and chronic medical illness (past or present diagnosis of 2 or more of the following: heart disease, diabetes, asthma, emphysema, cancer, hepatitis C, tuberculosis);
2. Intensive service use (hospitalization during the past year or 3 or more emergency department visits in past 3 months);
3. Older than 60 years of age;
4. Diagnosis of HIV or AIDS;
5. Liver or kidney disease; and
6. History of frostbite, hypothermia, or immersion foot.

To account for regional variation in unsheltered homelessness, which is largely a function of climate (U.S. Department of Housing and Urban Development, 2016a), we also assessed average January temperature for the state in which each community was located (Weatherbase, 2016).

Sample

Because missing data were an issue in many of the 96 communities that collected data, those that met any of the following

criteria were excluded from this study: 50% or more missing or unusable (e.g., "other") data related to sheltered status or two or more other variables or 75% or more missing data on one or more other variables. These criteria applied to 34 of the 96 communities included in the original dataset, reducing the sample size from 50,607 to 36,540. Of these, respondents with missing data on sheltered status or any key predictor variable were excluded from the study, as were eight respondents with complete data who identified as other gender. The final analytic sample comprised 25,481 respondents.

Analyses

We used χ^2 tests to assess differences in the characteristics of female, male, and transgender respondents. To assess differences in the correlates of unsheltered status for men and women (we were unable to run parallel analyses for the transgender group owing to insufficient sample size), we fit a generalized linear mixed model with demographic, homelessness, mental/behavioral health, institutional, and income characteristics as fixed effects and community as a random effect. This analysis also

Table 1
Characteristics of Study Sample, by Gender ($n = 25,481$)

Characteristic	Women ($n = 6,740$), %	Men ($n = 18,647$), %	Transgender ($n = 94$), %	p Value
Average state temperature in January				.003
<25°F	14.7	14.4	12.8	
25–34°F	27.9	29.3	17.0	
35–44°F	14.6	14.8	10.6	
≥45°F	42.9	41.5	59.6	
Demographic characteristics				
Education				<.001
Less than high school	33.2	32.0	29.8	
HS/GED/trade school	36.3	43.2	40.4	
Some college	22.4	18.0	21.3	
College graduate	8.1	6.8	8.5	
Race				<.001
Black	37.7	44.3	52.1	
White	36.8	34.4	22.3	
Hispanic	10.5	11.2	6.4	
Other/mixed	15.0	10.1	19.2	
Age (y)				<.001
18–29	16.8	9.2	33.0	
30–39	19.4	14.0	24.5	
40–49	29.7	29.4	25.5	
50–59	27.0	36.8	13.8	
≥60	7.0	10.6	3.2	
Served in U.S. military	3.4	20.4	9.6	<.001
Homelessness characteristics				
Unsheltered	48.9	55.8	48.9	<.001
Years spent homeless				<.001
<1	30.7	22.0	24.5	
1–5	47.9	46.8	52.1	
>5	21.5	31.1	23.4	
Frequently homeless (>4 times in 3 years)	11.7	9.3	16.0	<.001
Experience of violent attack while homeless	39.5	35.0	56.4	<.001
Institutional history				
Ever incarcerated	63.9	83.3	81.9	<.001
Ever in foster care	21.1	14.1	29.8	<.001
Income				
Active/employment	14.4	26.2	17.0	<.001
Passive/entitlements	70.6	61.5	71.3	<.001
Other informal income	16.7	20.8	22.3	<.001
Mental health				
Ever treated for mental health problems	66.3	49.2	71.3	<.001
Ever hospitalized against will	28.1	19.5	38.3	<.001
Substance use				
Drank alcohol every day for past month	10.8	19.4	13.8	<.001
Ever abused drugs/alcohol	56.7	68.7	60.6	<.001
Ever used IV drugs	16.2	19.6	16.0	<.001
Ever treated for drug/alcohol abuse	41.1	48.1	38.3	<.001
Increased mortality risk	61.0	56.6	64.9	<.001
Trimorbidity	8.7	5.1	12.8	<.001
Substance abuse	60.4	73.8	66.0	<.001
Severe mental illness	28.1	19.5	38.3	<.001
Chronic medical illness	28.4	20.8	26.6	<.001
Service use	50.7	43.5	48.9	<.001
Hospitalization	43.9	39.5	44.7	<.001
Frequent emergency room visits	23.2	15.9	23.4	<.001
Over age 60	5.6	8.4	3.2	<.001
Human immunodeficiency virus/AIDS	2.9	3.6	30.9	<.001
Liver and/or kidney disease	12.9	13.6	12.8	.395
Frostbite/hypothermia/immersion foot	7.1	9.2	6.4	<.001

controlled for average state temperature in January as a fixed effect, but did not include experience of a violent attack while homeless, because that seems to be a consequence of literal homelessness (i.e., literally homeless individuals are more likely than their marginally housed counterparts to experience victimization; Kushel, Evans, Perry, Robertson, & Moss, 2003). To assess differences in the correlates of increased risk of premature mortality for men and women, we fit a generalized linear mixed model modeling the likelihood of meeting one or more of the six criteria outlined with unsheltered status and demographic, homelessness (including experience of a violent attack while homeless), institutional, and income characteristics as fixed effects and community as a random effect. Because average state temperatures in January correlated too closely with the incidence of frostbite, hypothermia, and immersion foot, one of the six indicators of increased mortality risk, it was excluded from this model. This study was approved by the University of Pennsylvania Institutional Review Board.

Results

Characteristics of Study Sample

Women comprised 26.5% of the sample, men 73.2%, and transgender participants 0.37%. Women and transgender participants reported higher levels of education than men (30.4% of women and 29.8% of transgender respondents attended at least some college vs. 24.8% of men; Table 1). Each of the three groups identified most frequently as Black; transgender respondents were the least likely to identify as White. The transgender group was significantly younger than the groups of women and men (57.5% of transgender respondents were younger than 40 vs. 36.2% of women and 23.2% of men). One in five men reported service in the U.S. military compared with 3.4% of women and 9.6% of transgender respondents.

As identified in a previous study (Montgomery, Szymkowiak et al., 2016), men most frequently reported staying in an unsheltered situation (55.8% vs. 48.9% of women and transgender respondents) and had longer durations of homelessness—one-third of men were homeless for more than 5 years compared with one-fifth of women and almost one-quarter of transgender respondents—however, the transgender group reported more often experiencing frequent episodes of homelessness. More than one-half of transgender respondents reported experience of a violent attack while homeless compared with 39.5% of women and 35.0% of men.

More than 80% of men and transgender respondents reported a history of incarceration compared with less than two-thirds of women. A history of foster care was reported more frequently among transgender respondents (29.8% vs. 21.1% of women and 14.1% of men). A greater proportion of women and transgender respondents reported accessing entitlement-based income (70.6% and 71.3%, respectively) compared with men, and men were more likely to secure income from employment (26.2% vs. 14.4% of women and 17.0% of transgender respondents); however, the transgender group was slightly more likely than the other groups to access informal sources of income such as the drug and sex trades, recycling, and panhandling (22.3% vs. 16.7% of women and 20.8% of men).

Overall, transgender participants reported most frequently receiving treatment for mental health problems followed by women and then men. Men had higher rates of both drug and alcohol abuse and related treatment followed by transgender participants then women, with the exception of drug/alcohol treatment, which was slightly higher among women.

A slightly greater proportion of transgender respondents met the criteria for increased risk of premature mortality (64.9% vs. 61.0% of women and 56.6% of men). The rates of premature mortality among transgender respondents and women seem to be driven largely by mental health and chronic medical conditions—most strikingly, report of HIV/AIDS among transgender respondents (30.9% vs. 2.9% of women and 3.6% of men)—and use of acute and emergency care. Increased risk of premature mortality among men was driven by substance abuse, older age, and—likely owing to higher rates of unshelteredness—a history of frostbite, hypothermia, or immersion foot.

Correlates of Unsheltered Status and Increased Risk of Premature Mortality among Women

The mixed-effect logistic regression assessing correlates of unsheltered status among women showed that respondents with less than a high school education had greater odds of being unsheltered (adjusted odds ratio [AOR], 1.17; 95% confidence interval [CI], 1.02–1.34; Table 2). There was a negative relationship between identifying as Black and being unsheltered (AOR, 0.73; 95% CI, 0.63–0.84). There seemed to be no relationship between age and unsheltered status among women. Duration of homelessness was significantly related to being unsheltered, with AORs of 1.45 (95% CI, 1.27–1.66) for women who had been homeless for 1 to 5 years and 1.81 (95% CI, 1.53–2.15) for women who had been homeless for more than 5 years. Women with a history of incarceration also had greater odds of being unsheltered (AOR, 1.38; 95% CI, 1.21–1.58), as did those accessing informal sources of income (AOR, 2.30; 95% CI, 1.95–2.72). Women with access to entitlement-based income, in contrast, had lower odds of being unsheltered (AOR, 0.72; 95% CI, 0.63–0.82). Finally, respondents reporting a history of substance abuse (AOR, 1.28; 95% CI, 1.09–1.49) or recent alcohol abuse (AOR, 2.47; 95% CI, 2.02–3.01) had higher odds of sleeping in unsheltered situations. Substance use treatment, however, seemed to be protective (AOR, 0.84; 95% CI, 0.72–0.98).

Results of the mixed-effect logistic regression model assessing correlates of increased risk of premature mortality did not identify a significant association between unsheltered status and risk for premature mortality among women. Compared with high school graduates, women who finished college (AOR, 1.33; 95% CI, 1.09–1.64; Table 3) and those who did not finish high school (AOR, 1.22; 95% CI, 1.08–1.38) had higher odds of meeting one or more of the criteria that indicate increased risk of premature mortality. Black (AOR, 0.80; 95% CI, 0.71–0.91) and Hispanic (AOR, 0.70; 95% CI, 0.58–0.84) self-identification seemed to have a protective effect. Risk of premature mortality was higher among women experiencing long-term homelessness (1–5 years: AOR, 1.15 [95% CI, 1.01–1.30]; >5 years: AOR, 1.49 [95% CI, 1.27–1.75]) and those who experienced a violent attack while homeless (AOR, 1.81; 95% CI, 1.62–2.03). Women who reported a history of incarceration (AOR, 1.25; 95% CI, 1.12–1.40) or receipt of entitlement income (AOR, 1.34; 95% 1.20–1.51) had greater odds of meeting the criteria for increased risk of mortality; active employment was, in contrast, associated with lower risk (AOR, 0.68; 95% CI, 0.59–0.79).

Table 2
Results of Mixed-Effects Logistic Regression Model Assessing Correlates of Unsheltered Status, by Gender ($n = 25,387$)

Variable	Women			Men		
	AOR	95% CI	*p* Value	AOR	95% CI	*p* Value
Demographic characteristics (reference: HS/GED/trade school)						
Education						
Less than high school	1.17	(1.02–1.34)	.021	1.07	(0.99–1.16)	.094
Some college	0.99	(0.85–1.15)	.898	0.82	(0.74–0.90)	<.001
College graduate	0.84	(0.67–1.05)	.124	0.81	(0.70–0.93)	.003
Race (reference: White)						
Black	0.73	(0.63–0.84)	<.001	0.63	(0.57–0.68)	<.001
Hispanic	1.02	(0.83–1.25)	.846	0.79	(0.70–0.90)	<.001
Other/mixed	1.20	(1.00–1.44)	.047	0.93	(0.81–1.06)	.250
Age, y (reference: 18–29)						
30–39	0.97	(0.81–1.18)	.778	1.01	(0.87–1.17)	.880
40–49	1.01	(0.85–1.21)	.873	0.92	(0.81–1.05)	.225
50–59	1.00	(0.84–1.20)	.976	0.88	(0.77–1.00)	.053
≥60	0.91	(0.70–1.18)	.477	0.85	(0.72–1.00)	.043
Served in US military	1.02	(0.74–1.39)	.907	1.11	(1.02–1.21)	.018
Homelessness characteristics						
Years spent homeless (reference: <1)						
1–5	1.45	(1.27–1.66)	<.001	1.34	(1.23–1.46)	<.001
>5	1.81	(1.53–2.15)	<.001	2.00	(1.81–2.21)	<.001
Institutional history						
Ever incarcerated	1.38	(1.21–1.58)	<.001	1.25	(1.14–1.38)	<.001
Ever in foster care	1.11	(0.96–1.28)	.158	1.16	(1.05–1.28)	.005
Income						
Active/employment	0.88	(0.75–1.04)	.139	0.96	(0.89–1.04)	.348
Passive/entitlement	0.72	(0.63–0.82)	<.001	0.80	(0.74–0.86)	<.001
Other informal income	2.30	(1.95–2.72)	<.001	2.42	(2.20–2.66)	<.001
Mental health						
Ever treated for mental health problems	0.99	(0.86–1.13)	.855	0.97	(0.89–1.04)	.374
Ever hospitalized against will	1.15	(1.01–1.31)	.039	1.24	(1.13–1.36)	<.001
Substance use						
Drank alcohol every day for past month	2.47	(2.02–3.01)	<.001	1.90	(1.73–2.08)	<.001
Ever abused drugs/alcohol	1.28	(1.09–1.49)	.002	1.06	(0.97–1.15)	.229
Ever used IV drugs	1.04	(0.88–1.23)	.647	1.15	(1.05–1.26)	.003
Ever treated for drug/alcohol abuse	0.84	(0.72–0.98)	.025	0.83	(0.76–0.90)	<.001

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; HS, high school.
Note: Model controls for average state temperature in January as a fixed effect and community where survey was conducted as a random effect.

Correlates of Unsheltered Status and Increased Risk of Premature Mortality among Men

According to the mixed-effects logistic regression model assessing the correlates of unsheltered status among men, those who identified as Black or Hispanic, reported more than a high school education, or were 60 years or older had greater odds of sleeping in a sheltered situation; military veterans had greater odds of being unsheltered. Unshelteredness was strongly related to the duration of homelessness: men who were homeless for 1 to 5 years had greater odds of being unsheltered compared with men who were homeless for less than 1 year (AOR, 1.34; 95% CI, 1.23–1.46), and men who were homeless for longer than 5 years had twice the odds of being unsheltered (AOR, 2.00; 95% CI, 1.81–2.21). Among men, there was a positive relationship between a history of incarceration (AOR, 1.25; 95% CI, 1.14–1.38) or foster care (AOR, 1.16; 95% CI, 1.05–1.28) and unsheltered status. Men who relied on informal sources of income had higher odds of unshelteredness (AOR, 2.42; 95% CI, 2.20–2.66), whereas those receiving entitlement income were less likely to be unsheltered (AOR, 0.80; 95% CI, 0.74–0.86). Histories of involuntary hospitalization related to a serious mental illness (AOR, 1.24; 95% CI, 1.13–1.36), IV drug use (AOR, 1.15; 95% CI, 1.05–1.26), or recent alcohol abuse (AOR, 1.90; 95% CI, 1.73–2.08) were also predictive of sleeping in unsheltered situations. Men reporting a history of substance abuse treatment, however, were less likely to be unsheltered (AOR, 0.83; 95% CI, 0.76–0.90).

According to the mixed-effects logistic regression predicting increased risk of premature mortality, both men with more than a high school education (some college: AOR, 1.10 [95% CI, 1.00–1.19]; college graduate: AOR, 1.22 [95% CI, 1.07–1.39]) and men with less than a high school education (AOR, 1.10; 95% CI, 1.02–1.18) seemed to be at greater risk for premature mortality. Identifying as Black (AOR, 0.77; 95% CI, 0.71–0.83) and being employed (AOR, 0.59; 95% CI, 0.55–0.64) seemed to be protective. Increased risk was also associated with histories of U.S. military service (AOR, 1.26; 95% CI, 1.16–1.36) and incarceration (AOR, 1.29; 95% CI, 1.19–1.41). Unsheltered status did not contribute to increased risk of premature mortality; however, long-term homelessness (1–5 years: AOR, 1.25 [95% CI, 1.16–1.36]; >5 years: AOR, 1.44 [95% CI, 1.31–1.57]) and a history of violent attack while homeless did (AOR, 1.88; 95% CI, 1.76–2.02). Finally, men accessing informal income sources (AOR, 1.13; 95% CI, 1.04–1.23) or entitlement-based income (AOR, 1.71; 95% CI, 1.60–1.82) seemed to be at greater risk for premature mortality.

Discussion

This study corroborates previous studies that compared women and men experiencing homelessness and reports novel findings regarding the transgender population. Compared with women, men were older (Jainchill, Hawke, & Yagelka, 2000; Tsai, Kasprow, et al., 2014; Tsai, Rosenheck, et al., 2014), more frequently identified as a veteran, were more likely to be

Table 3
Results of Mixed-Effects Logistic Regression Model Assessing Correlates for Increased Risk of Premature Mortality, by Gender ($n = 25,387$)

Variable	Women			Men		
	AOR	95% CI	*p* Value	AOR	95% CI	*p* Value
Demographic characteristics						
Education (reference: HS/GED/trade school)						
Less than high school	1.22	(1.08–1.38)	.002	1.10	(1.02–1.18)	.010
Some college	1.05	(0.92–1.21)	.459	1.10	(1.00–1.19)	.039
College graduate	1.33	(1.09–1.64)	.006	1.22	(1.07–1.39)	.003
Race (reference: White)						
Black	0.80	(0.71–0.91)	<.001	0.77	(0.71–0.83)	<.001
Hispanic	0.70	(0.58–0.84)	<.001	1.02	(0.91–1.14)	.705
Other/mixed	0.88	(0.75–1.04)	.144	0.96	(0.86–1.08)	.508
Served in US military	1.25	(0.94–1.68)	.129	1.26	(1.16–1.36)	<.001
Homelessness characteristics						
Unsheltered	1.00	(0.90–1.13)	.942	1.06	(0.99–1.14)	.082
Years spent homeless, y (reference: <1)						
1–5	1.15	(1.01–1.30)	.028	1.25	(1.16–1.36)	<.001
>5	1.49	(1.27–1.75)	<.001	1.44	(1.31–1.57)	<.001
Experience of violent attack while homeless	1.81	(1.62–2.03)	<.001	1.88	(1.76–2.02)	<.001
Institutional history						
Ever incarcerated	1.25	(1.12–1.40)	<.001	1.29	(1.19–1.41)	<.001
Ever in foster care	1.11	(0.98–1.27)	.107	0.97	(0.89–1.07)	.578
Income						
Active/employment	0.68	(0.59–0.79)	<.001	0.59	(0.55–0.64)	<.001
Passive/entitlements	1.34	(1.20–1.51)	<.001	1.71	(1.60–1.82)	<.001
Other informal income	1.08	(0.93–1.25)	.329	1.13	(1.04–1.23)	.003

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; HS, high school.
Note: Model controls for community where survey was conducted as a random effect.

currently employed, and more often reported a history of incarceration (Roll et al., 1999; Tsai, Rosenheck, Decker, Desai, & Harpaz-Rotem, 2012; Tsai, Kasprow, et al., 2014; Tsai, Rosenheck, et al., 2014; Zugazaga, 2004). Men more frequently endorsed indicators of substance use while women significantly more frequently endorsed indicators of mental illness (Fischer & Breakey, 1991; Roll et al., 1999; Tsai, Kasprow, et al., 2014). Women also had higher levels of education and more frequently reported a history of foster care (Zugazaga, 2004) and receipt of entitlement income (Roll et al., 1999).

The descriptive results for transgender respondents indicate that, compared with women and men experiencing homelessness, they more frequently identify as Black and are significantly younger. Transgender respondents also more frequently reported a history of foster care and experience of serious mental illness. A larger proportion of transgender individuals were at increased risk for premature mortality, as found elsewhere (Montgomery, Szymkowiak et al., 2016). Consistent with literature describing the transgender homeless population, this group frequently reported experience of a violent attack while homeless (Barboza et al., 2016; Grant et al., 2011) and had particularly high rates of HIV/AIDS (Fletcher et al., 2014; Grant et al., 2011).

The multivariate results—available only for women and men—also concur with previous research in that men were more likely to experience unsheltered homelessness while women were more likely to have an increased risk of premature mortality (Montgomery, Szymkowiak et al., 2016); however, the present study provides additional information about how the correlates of these outcomes vary by gender. For both men and women, chronic homelessness, a history of incarceration, receipt of informal income, and drinking alcohol daily for the past month were positively associated with unsheltered status; receipt of entitlements and previous treatment for substance use issues seemed to be protective. Although women less frequently endorsed any of the four measures that served as a proxy for substance use disorder, they had 2.5 the odds of experiencing unsheltered homelessness if they reported drinking alcohol daily and about 1.3 the odds if they had a history of substance abuse. Similarly, although histories of involuntary psychiatric hospitalization and foster care were rarer among men than women, they seemed to have a greater impact on men, increasing their odds of unsheltered homelessness by 24% and 16%, respectively. Although somewhat surprising, these results do not necessarily conflict with the literature describing the relationship between serious mental illness and homelessness for women and substance use disorders and homelessness for men. The outcome of interest is specifically unsheltered homelessness, about which minimal research has been conducted and none, to our knowledge, has stratified the multivariate analyses by gender. This result implies that the pathways to and experience of ongoing homelessness are complex and have implications for both outreach and housing interventions.

In terms of health, women seemed to fare worse than men: they were at greater risk of premature mortality, had higher prevalence of chronic medical conditions, and more frequently reported recent use of acute health care. The multivariate models indicated that, for both men and women, lower educational attainment, experience of chronic homelessness, receipt of entitlements or other benefits, and a history of incarceration were associated with an increased risk of premature mortality. Most strikingly, the experience of a violent attack while homeless had the greatest effect size for both men and women; although significantly more women reported a violent attack, men who did so had 1.89 the odds of meeting the criteria for increased risk of premature mortality, on par with 1.83 for women.

Several studies have found that rates of victimization and assault are much higher among women experiencing homelessness compared with men (Kim, Ford, Howard, & Bradford, 2010; Kushel et al., 2003; Roll et al., 1999; Stermac & Paradis, 2001; Tsai et al., 2012), and violence and abuse are well-known precursors to incident and ongoing housing instability among women (Baker, Cook, & Norris, 2003; Browne & Bassuk, 1997;

Goodman, 1991; Hamilton, Poza, & Washington, 2011; Pavao, Alvarez, Baumrind, Induni, & Kimerling, 2007; Rollins, Saris, & Johnston-Robledo, 2001; Tsai et al., 2012; Washington, Yano, McGuire, Hines, Lee, & Gelberg, 2010). In addition, there may be a relationship between victimization and post-incarceration homelessness (Fries et al., 2014). However, one study found that there was not a gender-based difference in the rate of experience of traumatic events (Torchalla, Streglau, Li, Linden, Noel, & Krausz, 2014)—consistent with the findings presented herein—but that victimization among men is often specifically associated with drug and alcohol use while homeless (Stein & Gelberg, 1995). Female gender may be associated with higher rates of post-traumatic stress disorder in response to these experiences (Jainchill et al., 2000; Torchalla et al., 2014), which may account, to some extent, for women's increased use of acute care, because they are more likely than men to experience long-term effects of trauma (Nyamathi et al., 2000; Roll et al., 1999; Stein & Gelberg, 1995). The finding that there was a similarly strong association between experience of a violent attack and increased risk of premature mortality among men as among women indicates that trauma-informed approaches to care must be extended to men experiencing homelessness. Although we do not have multivariable results for transgender respondents, this group has also been found to have high rates of physical victimization (Barboza et al., 2016; Grant et al., 2011), even in comparison with women and men (Kushel et al., 2003), which must be similarly addressed.

Although this study used a novel set of data to investigate the gender differences in two important outcomes related to homelessness—unsheltered status and increased risk of premature mortality—the results must be viewed in light of a number of limitations. First, the multivariate models could not control for a number of factors that would be particularly important given the stratification of analyses by gender, including information about household composition, respondents' previous trauma history, and the nature of unsheltered status (i.e., history, duration, and frequency). Further, we were unable to present multivariate results for the transgender group. Second, several aspects of the study design limit the utility of these results; this was a cross-sectional study that relied on self-report data, which may or may be not be accurate. There was a high degree of missing data leading to the exclusion of a large portion of the sample, which may limit the generalizability of the findings. Much of the missing data was likely a function of inconsistent survey administration, collected by volunteers, and sometimes in suboptimal settings; however, the size of the sample, even after excluding many communities and respondents, provides an important opportunity to study this vulnerable population. Finally, we were not able to assess or control for geographic characteristics—other than statewide temperature—or rurality/urbanness owing to lack of information about specific communities where the data were collected.

Implications for Practice and/or Policy

The results of this study have a number of implications for practice and policy related to homelessness among individual adults. First, the positive correlation between a history of serious mental illness—and its large effect size relative to several indicators of substance abuse—and unsheltered homelessness among men indicates a need for both outreach and the availability of housing interventions that are sensitive to this need. And, among women, low-barrier housing options that do not require abstinence from substances—particularly from alcohol—may decrease the frequency with which women experiencing homelessness stay in an unsheltered situation. The particularly high rates of serious mental illness, physical victimization, and diagnosis of HIV/AIDS among the transgender homeless population warrant particular attention. Existing interventions to address these specific needs include the Housing First approach to permanent supportive housing, which ensures housing stability without the precondition of treatment for serious mental illness or substance use disorders (Tsemberis, 2010). A specific variant of this approach that may be particularly effective for individuals with substance use disorders is single-site permanent supportive housing in which units are located in one facility, often with on-site services that may be used at the participants' discretion. This type of housing has been found to be particularly effective among participants with severe alcohol problems (Collins, Malone, & Clifasefi, 2013).

Second, interventions that are intended to address the correlates of increased risk of premature mortality should pay particular attention to individuals who have experienced long-term or chronic homelessness, the health-related outcomes of which, including mortality, are well-documented (O'Connell, 2005). In addition, the results of this study call for an increased focus on trauma—one's history of trauma, recent victimization, and the traumatic experience of homelessness—and the provision of trauma-informed care, which has been found to positively impact outcomes related to mental health, substance use, use of acute care services, and housing stability (Hopper, Bassuk, & Olivet, 2009).

References

Baker, C. K., Cook, S. L., & Norris, F. H. (2003). Domestic violence and housing problems: A contextual analysis of women's helpseeking, received informal support, and formal system response. *Violence Against Women*, 9(7), 754–783.

Barboza, G. E., Dominguez, S., & Chance, E. (2016). Physical victimization, gender identity and suicide risk among transgender men and women. *Preventive Medicine Reports*, 4, 385–390.

Browne, A., & Bassuk, S. S. (1997). Intimate violence in the lives of homeless and poor housed women: Prevalence and patterns in an ethnically diverse sample. *American Journal of Orthopsychiatry*, 67, 261–278.

Byrne, T. H., Montgomery, A. E., & Fargo, J. D. (2016). Unsheltered homelessness among veterans: Correlates and profiles. *Community Mental Health Journal*, 52(2), 148–157.

Cheung, A. M., & Hwang, S. W. (2004). Risk of death among homeless women: A cohort study and review of the literature. *Canadian Medical Association Journal*, 170(8), 1243–1247.

Collins, S. E., Malone, D. K., & Clifasefi, S. L. (2013). Housing retention in single-site housing first for chronically homeless individuals with severe alcohol problems. *American Journal of Public Health*, 103(S2), S269–S274.

Fischer, P. J., & Breakey, W. R. (1991). The epidemiology of alcohol, drug, and mental disorders among homeless persons. *American Psychologist*, 46(11), 1115–1128.

Fletcher, J. B., Kisler, K. A., & Reback, C. J. (2014). Housing status and HIV risk behaviors among transgender women in Los Angeles. *Archives of Sexual Behavior*, 43, 1651–1661.

Fries, L., Fedock, G., & Kubiak, S. P. (2014). Role of gender, substance use, and serious mental illness in anticipated postjail homelessness. *Social Work Research*, 38(2), 107–116.

Gelberg, L., & Siecke, N. (1997). Accuracy of homeless adults' self-reports. *Medical Care*, 35(3), 287–290.

Goodman, L. (1991). The prevalence of abuse in the lives of homeless and housed poor mothers: A comparison study. *American Journal of Orthopsychiatry*, 61, 489–500.

Grant, J. M., Mottet, L. A., Tanis, J., Harrison, J., Herman, J. L., & Keisling, M. (2011). *Injustice at every turn: A report of the National Transgender Discrimination Survey*. Washington, DC: National Center for Transgender Equality and National Gay and Lesbian Task Force. Available: http://www.transequality.org/sites/default/files/docs/resources/NTDS_Report.pdf. Accessed: February 6, 2017.

Hamilton, A. B., Poza, I., & Washington, D. L. (2011). "Homelessness and trauma go hand-in-hand": Pathways to homelessness among women veterans. *Women's Health Issues*, 21(4S), S203–S209.

Hopper, E. K., Bassuk, E. L., & Olivet, J. (2009). Shelter from the storm: Trauma-informed care in homelessness service settings. *Open Health Services and Policy Journal*, 2, 131–151.

Hwang, S. W., Lebow, J. M., Bierer, M. F., O'Connell, J. J., Orav, E. J., & Brennan, T. A. (1998). Risk factors for death in homeless adults in Boston. *Archives of Internal Medicine*, 158, 1454–1460.

Hwang, S. W., O'Connell, J. J., Lebow, J. M., Bierer, M. F., Orav, E. J., & Brennan, T. A. (2001). Health care utilization among homeless adults prior to death. *Journal of Health Care for the Poor and Underserved*, 12(1), 50–58.

Hwang, S. W., Orav, E. J., O'Connell, J. J., Lebow, J. M., & Brennan, T. A. (1997). Causes of death in homeless adults in Boston. *Annals of Internal Medicine*, 126(8), 625–628.

Jainchill, N., Hawke, J., & Yagelka, J. (2000). Gender, psychopathology, and patterns of homelessness among clients in shelter-based TCs. *American Journal of Drug and Alcohol Abuse*, 26(4), 553–567.

Kim, M. M., Ford, J. D., Howard, D. L., & Bradford, D. W. (2010). Assessing trauma, substance abuse, and mental health in a sample of homeless men. *Health and Social Work*, 35, 39–48.

Kushel, M. B., Evans, J. L., Perry, S., Robertson, M. J., & Moss, A. R. (2003). No door to lock: Victimization among homeless and marginally housed persons. *Archives of Internal Medicine*, 163, 2492–2499.

Leopold, J., & Ho, J. (2015). *Evaluation of the 100,000 Homes Campaign*. Washington, DC: Urban Institute.

Mizuno, Y., Frazier, E. L., Huang, P., & Skarbinski, J. (2015). Characteristics of transgender women living with HIV receiving medical care in the United States. *LGBT Health*, 2(3), 228–234.

Montgomery, A. E., Byrne, T. H., Treglia, D., & Culhane, D. P. (2016). Characteristics and likelihood of ongoing homelessness among unsheltered Veterans. *Journal of Health Care for the Poor and Underserved*, 27, 911–922.

Montgomery, A. E., Szymkowiak, D., Marcus, J., Howard, P., & Culhane, D. P. (2016). Homelessness, unsheltered status, and risk factors for mortality: Findings from the 100,000 Homes Campaign. *Public Health Reports*, 131(6), 765–772.

Nyamathi, A. M., Leake, B., & Gelberg, L. (2000). Sheltered versus nonsheltered homeless women: Differences in health, behavior, victimization, and utilization of care. *Journal of General Internal Medicine*, 15, 565–572.

O'Connell, J. J. (2005). *Premature mortality in homeless populations: A review of the literature*. Nashville, TN: Health Care for the Homeless Council.

O'Connell, J. J., Mattison, S., Judge, C. M., Allen, J. S., & Koh, H. K. (2005). A public health approach to reducing morbidity and mortality among homeless people in Boston. *Journal of Public Health Management Practice*, 11(4), 311–316.

O'Toole, T. P., Gibbon, J. L., Hanusa, B. H., & Fine, M. J. (1999). Utilization of health care services among subgroups of urban homeless and housed poor. *Journal of Health Politics, Policy and Law*, 24(1), 91–114.

Opler, L. A., White, L., Caton, C. L., Dominguez, B., Hirshfield, S., & Shrout, P. E. (2001). Gender differences in the relationship of homelessness to symptom severity, substance abuse, and neuroleptic noncompliance in schizophrenia. *Journal of Nervous and Mental Disease*, 189(7), 449–456.

Pavao, J., Alvarez, J., Baumrind, N., Induni, M., & Kimerling, R. (2007). Intimate partner violence and housing instability. *American Journal of Preventive Medicine*, 32(2), 143–146.

Raiford, J. L., Hall, G. J., Taylor, R. D., Bimbi, D. S., & Parsons, J. T. (2016). The role of structural barriers in risky sexual behavior, victimization and readiness to change HIV/STI-related risk behavior among transgender women. *AIDS and Behavior*, 20(10), 2212–2221.

Roll, C. N., Toro, P. A., & Ortola, G. L. (1999). Characteristics and experiences of homeless adults: Single men, single women, and women with children. *Journal of Community Psychology*, 27(2), 189–198.

Rollins, J. H., Saris, R. N., & Johnston-Robledo, I. (2001). Low-income women speak about housing: A high-stakes game of musical chairs. *Journal of Social Issues*, 57, 277–298.

Stein, J. A., & Gelberg, L. (1995). Homeless men and women: Differential associations among substance abuse, psychosocial factors, and severity of homelessness. *Experimental and Clinical Psychopharmacology*, 3(1), 75–86.

Stermac, L., & Paradis, E. (2001). Homeless women and victimization: Abuse and mental health history among homeless rape survivors. *Resources for Feminist Research*, 28, 65–81.

Tsemberis, S. (2010). *Housing First: The Pathways model to end homelessness for people with mental illness and addiction*. Center City, MN: Hazelden.

Tessler, R., Rosenheck, R., & Gamache, G. (2001). Gender differences in self-reported reasons for homelessness. *Journal of Social Distress and the Homeless*, 10(3), 243–254.

Torchalla, I., Strehlau, V., Li, K., Linden, I. A., Noel, F., & Krausz, M. (2014). Post-traumatic stress disorder and substance use disorder comorbidity in homeless adults: Prevalence, correlates, and sex differences. *Psychology of Addictive Behaviors*, 28(2), 443–452.

Tsai, J., Kasprow, W. J., Kane, V., & Rosenheck, R. A. (2014a). National comparison of literally homeless male and female VA service users: Entry characteristics, clinical needs, and service patterns. *Women's Health Issues*, 24(1), e29–e35.

Tsai, J., Rosenheck, R. A., Decker, S. E., Desai, R. A., & Harpaz-Rotem, I. (2012). Trauma experience among homeless female veterans: Correlates and impact on housing, clinical, and psychosocial outcomes. *Journal of Traumatic Stress*, 25, 624–632.

Tsai, J., Rosenheck, R. A., & Kane, V. R. (2014b). Homeless female U.S. veterans in a national supported housing program: Comparison of individual characteristics and outcomes with male Veterans. *Psychological Services*, 11(3), 309–316.

U.S. Department of Housing and Urban Development. (2016a). *The 2016 Annual Homeless Assessment Report (AHAR) to Congress: Part 1, point-in-time estimates of homelessness*. Washington, DC: Author. Available: https://www.hudexchange.info/resources/documents/2016-AHAR-Part-1.pdf. Accessed: January 24, 2017.

U.S. Department of Housing and Urban Development. (2016b). *The 2015 Annual Homeless Assessment Report (AHAR) to Congress: Part 2, estimates of homelessness in the United States*. Washington, DC: Author. Available: https://www.hudexchange.info/onecpd/assets/File/2015-AHAR-Part-2.pdf. Accessed: January 24, 2017.

Washington, D. L., Yano, E. M., McGuire, J., Hines, V., Lee, M., & Gelberg, L. (2010). Risk factors for homelessness among women Veterans. *Journal of Health Care for the Poor and Underserved*, 21, 82–91.

Weatherbase. (2016). *United States of America – weather averages*. Available: http://www.weatherbase.com/weather/state.php3?c=US&s=&countryname=United-States. Accessed: September 27, 2016.

Zugazaga, C. (2004). Stressful life event experiences of homeless adults: A comparison of single men, single women, and women with children. *Journal of Community Psychology*, 32(6), 643–654.

Author Descriptions

Ann Elizabeth Montgomery, PhD, is an investigator with the National Center on Homelessness Among Veterans and an Assistant Professor at the University of Alabama at Birmingham School of Public Health. Her work focuses on homelessness generally and among veterans specifically.

Dorota Szymkowiak, PhD, is a statistician with the National Center on Homelessness Among Veterans, where her work identifies correlates of adverse outcomes related to housing and homelessness to support timely intervention by providers in the field.

Dennis Culhane, PhD, is Dana and Andrew Stone Professor of Social Policy, University of Pennsylvania School of Social Policy & Practice, and Director of Research, National Center on Homelessness Among Veterans. His research concerns homelessness and assisted housing policy.