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Housing and food stress among transgender adults in the United States

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ABSTRACT

Purpose: The purpose of the study was to assess housing and food-related stress in transgender and cisgender adults in the United States.
Methods: Data from the 2014 and 2015 Behavioral Risk Factor Surveillance System were analyzed for 53,060 adults who responded to the Sexual Orientation and Gender Identity module and the Social Context module. We used multiple logistic regression to assess the association of gender identity with housing and food-related stress.
Results: There were no significant differences by gender identity in the odds of experiencing housing or food-related stress. A sensitivity analysis revealed that with a broader definition of food-related stress, transgender individuals had higher odds of experiencing food-related stress compared with cisgender individuals. The sample of transgender individuals who experienced food-related stress were young, single, racially diverse, sexual minorities, and the majority had a high school degree or less. Similarly, most transgender individuals who experienced housing-related stress were single, sexual minorities, and had a high school degree or less.
Conclusions: More precise assessments of housing and food insecurity among probability-based samples of transgender individuals are needed to fully understand housing and food-related instability and the stress associated with these experiences.

Introduction

Transgender individuals—people whose sex assigned at birth is different from their current gender identity—experience pervasive stigma and discrimination [1], leaving this population vulnerable to negative social determinants of health such as homelessness and housing instability [2], and food insecurity [2]. The U.S. Transgender Survey estimated that among a sample of over 27,000 transgender respondents, the rate of homelessness was, at the time of the survey, three times higher than the general U.S. population [3]. Similarly, among veterans using Veterans Health Administration (VHA) services, nearly twice as many transgender veterans experienced housing instability compared with cisgender (i.e. nontransgender) veterans [4,5].

The higher rate of housing instability and homelessness in the transgender population may be attributed to several factors including discrimination in housing and in the workforce [3,6,7], limited legal protections against employment discrimination [8], barriers to obtaining accurate identity documents [9], and family rejection [10]. The consequences of housing instability and homelessness for transgender individuals are also different and more complex than their cisgender counterparts. For example, many homeless shelters are segregated by sex, which creates potentially unsafe environments for transgender individuals [11]. Transgender individuals are also at increased risk of premature mortality when experiencing homelessness [12], likely due to violence [2,3], HIV/AIDS [10], or increased barriers to health care [13].

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Food insecurity and hunger are also risk factors for poor health outcomes [13]. To our knowledge, there is no literature on food insecurity in the transgender population. A report by the Williams Institute showed that lesbian, gay, bisexual, and transgender (LGBT) people are more likely to be food insecure compared with heterosexual people; however, this report did not distinguish between gender and sexual minorities [14]. It is likely that transgender individuals experience increased food insecurity, given the extensive economic stress they experience [3].

Assessing the prevalence of housing instability and food insecurity in the transgender population is challenging for several reasons. First, there is no standard definition or validated measure used to assess housing instability [15]. Housing instability has been used to refer to a broad set of challenges including trouble paying rent, moving frequently, staying with relatives or friends, or spending most of one's income on housing [13,16]. Food insecurity has been defined on a continuum of severity by the U.S. Department of Agriculture (USDA) [17]; however, the USDA definition is rarely used by other population-based surveys. Last, there are limited nationally representative, probability-based surveys that assess transgender-inclusive gender identity in addition to housing instability and food insecurity. Most, if not all, of the current research on housing instability in the transgender population has used convenience-based samples [2,4,5].

Food insecurity and housing insecurity are difficult to measure because few nationally representative surveys assess food and housing insecurity according to USDA guidelines and none include data to identify transgender respondents. However, it may be possible to use probability-based samples to understand the associations between transgender-inclusive gender identity and food- and housing security–related stress associated with these phenomena. In 2014, the Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System (BRFSS) began filling this gap by adding questions asking about respondents' gender identity and items gauging worry or stress related to housing and food security. Thus, the aim of this study was to examine the association of transgender identity with housing and food-related stress using a probability sample of seven states in the United States. We hypothesized that (1) in comparison with cisgender individuals, transgender individuals would have higher odds of housing-related stress and (2) in comparison with cisgender individuals, transgender persons would have higher odds of food-related stress.

Methods

Data are from the CDC's 2014 and 2015 BRFSS surveys, which were compiled from probability-based samples of landline and cellular telephone interviews with noninstitutionalized adults aged 18 years or older [18]. The BRFSS includes a standardized core survey administered to all respondents, and states and territories can also elect to administer one of several CDC-approved optional modules, which include a Sexual Orientation and Gender Identity (SOGI) module and a Social Context module. In the 2014 and 2015 surveys, seven states administered both of these optional modules: Virginia, Ohio, Delaware, Georgia, Kansas, Minnesota, and Missouri. Across these seven states, the average response rate was 49.8% (range: 43.9–56.7), producing a sample of 53,060 respondents. Detailed information about the sampling design and survey characteristics is available through the CDC [19,20].

The key independent variable of interest was self-reported gender identity. Interviewers asked respondents "Do you consider yourself to be transgender?" Persons who answered "no" were categorized as cisgender, whereas those who answered affirmatively were asked a follow-up question of: "Do you consider yourself to be (1) male-to-female, (2) female-to-male, or (3) gender nonconforming?" Persons who answered "yes, male-to-female," "yes, female-to-male," or "yes, gender nonconforming" were categorized as transgender. Persons who responded "don't know/not sure" or refused to answer were excluded from analysis. We selected several demographic characteristics that have been associated with housing instability or food insecurity [12,21–27]. Demographic information included in this study were sex (male/female), race and ethnicity (white, black/African American, other/multiracial, and Hispanic), age (in years), current marital status (partnered/married, formerly married [i.e., widowed, divorced, separated], never married), education (a high school diploma or less vs. some college or greater), employment status (employed, unemployed, out of the workforce [i.e., homemaker, student, unable to work], retired), veteran status, sexual orientation (sexual minority [i.e., lesbian/gay, bisexual], other or unknown sexual orientation, and heterosexual), and annual household income (less than $25,000, $25,000 to less than $50,000, more than $50,000). Due to the high prevalence of missing income data among both cisgender (14.9%) and transgender (15.3%) groups, missing values were treated as a separate category in the analyses.

The key outcomes of interest were two items from the Social Context module. Interviewers asked respondents, "How often in the past 12 months would you say you were worried or stressed about having enough money to pay your rent/mortgage?" and "How often in the past 12 months would you say you were worried or stressed about having enough money to buy nutritious meals?" Response options for both items were always, usually, sometimes, rarely, or never. Responses for both items were dichotomized into stress (always or usually) or no stress (sometimes, rarely, or never).

Survey-adjusted Wald tests were used to compare differences between transgender and cisgender respondents across all categorical variables. Because our dependent variables were dichotomous, we used multiple logistic regression to assess the association of transgender identity with stress associated with housing and with food. Although previous research with these BRFSS items has dichotomized responses into always, usually, or sometimes versus rarely or never [28,29], we elected for a more conservative definition of always or usually versus sometimes, rarely, or never [30]. In model 1, we assessed the association of transgender identity and housing- and food-related stress while controlling for sociodemographic variables. We also conducted a sensitivity analysis to determine potential differences in outcomes using the alternate categorization of always, usually, or sometimes versus rarely or never.

In model 2, we estimated the additive interaction between race and gender identity on the prevalence of housing and food stress while adjusting for the effects of sociodemographic variables. Additive-scale interaction compared with multiplicative-scale interaction is considered the more relevant public health measure [31,32]. Given the well-documented disparities in health outcomes found among transgender people of color [3], we hypothesized that we would find a significant positive additive interaction between race and gender identity. A positive additive interaction would indicate that the prevalence of housing and food stress for gender and racial/ethnic minorities differs from what would be expected by adding together the individual effects of gender minority identity and race/ethnicity [33]. To estimate additive interaction using a dichotomous outcome variable, we calculated the relative excess odds due to interaction (REOI). REOI represents the excess odds due to interaction of multiple marginalized identities relative to the odds without marginalized identities. Positive additive interaction is present if the REOI is greater than zero, whereas negative additive interaction is present if the REOI is less than zero [33]. While some consider all REOI greater or less than zero as evidence of

additive interaction,[34] we obtained standard errors for the REOI and the associated 95% confidence intervals using the delta method [35].

Likewise, in model 3, we estimated the additive interaction between employment status and gender identity using REOI on the prevalence of housing and food stress while adjusting for the effects of sociodemographic variables. Finally, we described the sociodemographic and health-related characteristics of transgender individuals who endorsed housing or food stress.

In addition, there may be differences in the lived experiences and risks experienced by different subgroups of individuals who identify as transgender and gender nonconforming; however, due to the relatively small sample of transgender respondents, we could not analyze transgender men, transgender women, and gender nonconforming groups as independent groups. Although we used a single transgender category for the main analyses, we also include narrative results about prevalence estimates for individual transgender groups.

Analyses were conducted using Stata/SE Version 13. In 2011, CDC implemented iterative proportional fitting (i.e. raking) in the BRFSS to having data weighting that was able to integrate more demographic information, including telephone type, which was integral because of the advent of BRFSS incorporating cellular phone–based interviews in addition to household landline telephone interviews. Greater detail of the weighting procedures is available from the CDC [36]. Consequently, we weighted the data, using Taylor series linearized variance estimation for standard errors and using both cluster and stratification variables to account for the complex survey design. The study was approved by the institutional review board of (name masked for review).

Table 1
Sociodemographic characteristics of transgender and cisgender adults: Behavioral Risk Factor Surveillance System, 2014–2015

Sociodemographic variable	Transgender ($n = 261$) n (weighted %) or mean ± SD	Cisgender ($n = 52,799$) n (weighted %) or mean ± SD	*P*-value
Age	45.19 ± 1.92	47.92 ± 0.15	.094
Sex*			
Female	127 (46.7)	30,603 (52.3)	.315
Male	134 (53.4)	22,196 (47.7)	
Race and ethnicity			
White	196 (68.1)	44,152 (73.9)	.283
Black	28 (14.4)	4335 (15.7)	
Other/multiracial	17 (8.9)	2009 (5.0)	
Latino/a	14 (8.6)	1630 (5.4)	
Sexual orientation			
Sexual minority	33 (23.0)	1384 (3.4)	<.001
Other/unknown	14 (3.9)	492 (0.8)	
Heterosexual	212 (73.1)	50,502 (95.8)	
Education			
Some college or higher	144 (47.5)	34,545 (58.0)	.056
High school or lower	116 (52.5)	18,144 (42.0)	
Annual household income			
< $25,000	80 (30.7)	10,846 (20.5)	<.001
$25,000 to < $50,000	58 (22.2)	11,634 (22.0)	
$50,000 or more	83 (31.8)	22,418 (42.5)	
Missing	40 (15.3)	7901 (14.9)	
Partnership status			
Partnered/married	132 (46.9)	30,358 (57.2)	.075
Formerly married	73 (20.8)	14,679 (20.9)	
Never married	54 (32.3)	7504 (21.9)	
Employment status			
Employed	121 (51.7)	26,915 (57.8)	.023
Unemployed	17 (5.9)	1999 (5.4)	
Out of workforce	58 (29.1)	7577 (18.0)	
Retired	62 (13.3)	16,077 (18.8)	
Housing stress			
No	213 (85.3)	44,363 (85.8)	.906
Yes	34 (14.7)	5670 (14.2)	
Food stress			
No	227 (84.8)	48,632 (90.5)	.125
Yes	33 (15.2)	3969 (9.5)	
Housing and food stress			
No	228 (91.5)	47,116 (92.8)	.899
Yes	18 (8.5)	2817 (7.2)	

* Respondents may have been assigned sex by the interviewer based on vocal timbre.

Results

In 2014 and 2015, 53,060 individuals completed the Sexual Orientation and Gender Identity Module and the Social Context Module. Of the respondents, 52,799 (99.5%) did not identify as transgender, whereas 261 (0.5%) identified as transgender.

Table 1 illustrates the weighted prevalence of sociodemographic characteristics by transgender status. Overall, there were no significant differences between transgender and cisgender individuals with regard to age, sex, race, education, and partnership status. However, transgender individuals had a significantly different pattern of employment and income than their cisgender peers. Transgender and cisgender individuals also did not significantly differ in the prevalence of housing or food-related stress.

As shown in Table 2, after adjustment for sociodemographic characteristics, there were no significant differences between transgender and cisgender individuals in the odds of experiencing housing or food-related stress. The sensitivity analysis yielded no significant effect changes for housing-related stress. However, we found significant differences in food-related stress for transgender versus cisgender individuals in both the crude bivariate model and in the adjusted multivariable model when using the more liberal classification of food-related stress. In the multivariable model, transgender individuals had higher odds of experiencing food-related stress compared with cisgender individuals (adjusted odds ratio: 1.97, 95% confidence interval: 1.20, 3.23).

There were no significant additive interactions between race/ethnicity and gender identity on either housing or food-related stress. Likewise, there were no significant additive interactions between employment and gender identity for either housing or food-related stress.

Table 3 describes the sociodemographic and health-related characteristics among the transgender adults with housing-related stress. Of the 261 transgender respondents, 34 reported housing-related stress. In addition, 73.1% of the transgender population overall identified as heterosexual and 46.9% were partnered; however, a majority of those with housing-related stress (59.1%) identified as sexual minorities and 38.9% were partnered. Of those individuals with housing-related stress, 55.3% were employed, 6.8% were unemployed, 21.4% were out of the workforce, and 16.6% were retired. Regarding measures of socioeconomic status, 82.8% of transgender individuals with housing-related stress had a high school diploma or less, and 68.0% had an annual household income of less than $25,000. When rating general health, 85.3% of transgender individuals with housing-related stress reported their health as excellent, very good, or good. On average, transgender individuals with housing-related stress reported 4.23 comorbid medical conditions, 6.16 days of poor physical health, 6.15 days of poor mental health, and 7.96 days of activity limitation per month.

Table 3 also describes the sociodemographic and health-related characteristics among the 33 transgender adults with food-related stress. The mean age of transgender individuals with food-related stress was 38.08 years. Notably, the transgender population overall was 68% white, but transgender individuals with food-related stress were 25.2% white, 14.3% black, 33.9% multiracial or other race, and 26.6% Latino/a. Similar to those with housing stress, a

majority of transgender individuals with food-related stress identified as sexual minorities (58.6%) had a high school diploma or less (72.8%), were never married (48.8%), and had an annual household income of less than $25,000 (58.2%). Of those with food-related stress, 39.5% were employed, 5.7% were unemployed, 47.3% were out of the workforce, and 7.5% were retired, and 62.0% reported their health as excellent, very good, or good. Finally, those with food-related stress reported 4.18 comorbid conditions, 7.06 days of poor physical health, 8.46 days of poor mental health, and 12.84 days of activity limitation per month.

Table 2
Results of weighted multivariable logistic regression of housing and food stress on gender identity: Behavioral Risk Factor Surveillance System, 2014–2015

Model 1: main effects only	Housing stress (n = 49,004)	Food stress (n = 51,408)
	adjusted odds ratio (95% CI)	adjusted odds ratio (95% CI)
Gender identity		
Transgender	0.86 (0.45, 1.66)	1.25 (0.63, 2.50)
Cisgender	Reference	Reference
Age	**0.99 (0.98, 0.99)**	**0.99 (0.98, 0.99)**
Sex*		
Female	Reference	Reference
Male	**0.88 (0.78, 0.99)**	**0.82 (0.71, 0.93)**
Race and ethnicity		
White	Reference	Reference
Black	0.94 (0.79, 1.12)	0.86 (0.72, 1.04)
Other/multiracial	1.08 (0.85, 1.38)	**1.45 (1.13, 1.86)**
Latino/a	0.90 (0.68, 1.18)	0.79 (0.57, 1.08)
Sexual orientation		
Sexual minority	**1.51 (1.13, 2.00)**	**1.49 (1.08, 2.07)**
Other/unknown	0.93 (0.56, 1.63)	1.07 (0.60, 1.92)
Heterosexual	Reference	Reference
Education		
Some college or more	Reference	Reference
High school or less	**1.33 (1.18, 1.50)**	**1.29 (1.12, 1.47)**
Annual household income		
< $25,000	Reference	Reference
$25,000 to < $50,000	**0.47 (0.41, 0.55)**	**0.46 (0.39, 0.55)**
$50,000 or more	1.08 (0.85, 1.38)	**0.13 (0.10, 0.16)**
Missing	0.90 (0.67, 1.18)	**0.35 (0.29, 0.43)**
Partnership status		
Partnered/married	Reference	Reference
Formerly married	**1.48 (1.29, 1.69)**	**1.66 (1.40, 1.96)**
Never married	**0.82 (0.69, 0.96)**	0.95 (0.79, 1.14)
Employment status		
Employed	Reference	Reference
Unemployed	**2.49 (2.01, 3.08)**	**2.06 (1.66, 2.57)**
Out of workforce	**1.46 (1.26, 1.69)**	**1.74 (1.50, 2.03)**
Retired	**0.46 (0.39, 0.55)**	**0.44 (0.36, 0.54)**
Model 2: Relative excess risk due to interaction between transgender identity and race/ethnicity		
	REOI (95% CI)	REOI (95% CI)
Transgender × white	Reference	Reference
Transgender × black	−0.76 (−1.61, 0.10)	0.65 (−0.99, 2.29)
Transgender × other/multiracial	−0.38 (−1.92, 1.16)	8.97 (−5.31, 23.26)
Transgender × Latino/a	2.14 (−2.96, 7.23)	3.59 (−3.58, 10.76)
Model 3: Relative excess risk due to interaction between transgender identity and employment status		
	REOI (95% CI)	REOI (95% CI)
Transgender × employed	Reference	Reference
Transgender × unemployed	−2.56 (−5.14, 0.03)	−1.30 (−4.57, 1.97)
Transgender × out of workforce	−1.50 (−3.09, 0.10)	0.51 (−3.33, 4.34)
Transgender × retired	1.11 (−2.68, 4.92)	0.98 (−4.07, 6.03)

All variables are entered simultaneously for Model 1. Model 2 is adjusted for age, sex, sexual orientation, education, partnership status, and employment. Model 3 is adjusted for age, sex, race and ethnicity, sexual orientation, and partnership status. Bold indicates significance at $P < .05$.

* Respondents may have been assigned sex by the interviewer based on vocal timbre.

Discussion

To our knowledge, this study is the first to use population data to examine stress related to money for housing and food among transgender adults in the United States. Surprisingly, there were no significant differences between transgender and cisgender individuals in the prevalence of worry or stress about not having enough money to pay rent/mortgage or to buy food. Similarly, in multivariable models, we found no significant differences in the odds of housing or food-related stress in transgender compared with cisgender individuals.

An appraisal of the sociodemographic differences between transgender and cisgender respondents in this sample reveals slight inconsistencies with prior studies using data from BRFSS [37,38]. We found that compared with cisgender respondents, transgender respondents were more likely to be unemployed or out of the workforce and were more likely to identify as sexual minorities. Downing and Przedworski (2018) and Meyer et al (2017) also found disparities in employment between transgender and cisgender respondents, while Downing and Przedworski (2018) also found that transgender respondents were more likely to identify as sexual minorities. We found no significant differences between transgender and cisgender individuals in age or partnership status, consistent with Meyer et al. (2017). Notably, we also found no significant differences in race or education, whereas both Meyer et al. (2017) and Downing and Przedworski (2018) found that transgender respondents were more racially diverse and less educated than their cisgender counterparts. There may be several reasons for the observed inconsistencies with prior studies. Given that the P-value for education was approaching statistical significance ($P = .056$), the null findings in our study may reflect inadequate sample size to detect that difference. Our sample drew 261 transgender respondents from seven states while Meyer et al. (2017) and Downing and Przedworski (2018) drew 691 transgender respondents from 19 states and 2221 transgender respondents from 31 states, respectively. The seven states represented in our sample were exclusively from the East coast or Midwest, which may have contributed to the lack of racial differences between transgender and cisgender individuals in our sample.

We found no evidence that individuals with intersecting marginalized identities were at greater risk for experiencing stress related to costs of food and housing beyond the effect already accounted for by race/ethnicity, employment status, and gender identity. The term intersectionality was introduced to the public lexicon by black feminist scholar Kimberlé Crenshaw in 1989 and was quickly adopted by several fields including women's studies and feminist legal studies [39,40]. Recently, Bowleg (2012) called attention to the infrequent use of intersectionality theory in public health and underscored the utility of this theoretical framework in helping public health researchers describe and understand the complexity of health disparities and social inequality in health [41]. The Institute of Medicine has also recognized the importance of an intersectional approach to studying transgender health and included intersectionality as one of the main tenants that shaped the Committee on LGBT Health's 2011 report [1]. This analysis was an attempt to further explore intersectionality in the context of transgender health disparities. Although no interactions were present in this sample, within-group diversity among transgender individuals remains an important and understudied area of inquiry.

In our sample, a majority of transgender individuals who worried about not having enough money to pay rent were employed and over one-third of those who worried about not having enough money to buy food were employed. The high rates of employment found among transgender individuals who have housing or food-related stress suggest that this stress may be

Table 3
Sociodemographic characteristics and health-related characteristics of transgender adults with housing and food stress: Behavioral Risk Factor Surveillance System, 2014–2015

	Housing stress ($n = 34$) weighted % or mean ± SD	Food stress ($n = 33$) weighted % or mean ± SD
Age	46.70 ± 7.90	38.08 ± 5.23
Sex*		
Female	27.9	49.4
Male	72.1	50.6
Race and ethnicity		
White	57.2	25.2
Black	4.7	14.3
Other/multiracial	5.2	33.9
Latino/a	3.3	26.6
Sexual orientation		
Sexual minority	59.1	58.6
Other/unknown	38.3	32.5
Heterosexual	2.5	8.9
Education		
Some college or higher	17.2	27.2
High school or lower	82.8	72.8
Annual household income		
< $25,000	68.0	58.2
$25,000 to < $50,000	18.8	19.4
$50,000 or more	2.3	1.1
Missing	10.9	21.3
Partnership status		
Partnered/married	38.9	10.4
Formerly married	42.2	40.8
Never married	18.9	48.8
Employment status		
Employed	55.3	39.5
Unemployed	6.8	5.7
Out of workforce	21.4	47.3
Retired	16.6	7.5
General health		
Excellent, very good, good	85.3	62.0
Fair or poor	14.7	38.1
Diagnosed with depressive disorder	28.3	42.1
Obese	16.9	25.3
Days of poor physical health	6.16 ± 2.02	7.06 ± 3.29
Days of poor mental health	6.15 ± 2.43	8.46 ± 3.30
Days of activity limitation	7.96 ± 1.45	12.84 ± 4.56
Number of comorbid conditions	4.23 ± 0.56	4.18 ± 0.45

* Respondents may have been assigned sex by the interviewer based on vocal timbre.

attributable to factors other than lack of employment. The high proportion of transgender individuals with an annual household income of less than $25,000 relative to cisgender individuals in this sample suggests that the transgender individuals may have been more likely to be underemployed, although this variable was not assessed in our study. Several other studies have found high rates of unemployment and underemployment in the transgender population [3,42,43]. Pervasive employment discrimination can produce underemployment for transgender individuals [6,7]. Consequently, despite high educational attainment overall, transgender individuals may be more likely to work in low-paying jobs.

Several limitations of this study warrant careful attention. First, although probability-based sampling methods are considered the gold standard for survey research, the sample of transgender individuals in BRFSS may not be representative of the larger transgender population. For example, people who are homeless or who do not have access to a landline or cell phone, likely those who are the most marginalized, are excluded from BRFSS. Past studies have shown disproportionately high rates of homelessness [3,44] and widespread housing discrimination [3,6,7] in the transgender population, so caution should be taken when generalizing beyond this limited sample of transgender individuals. In addition, the states that participated in both modules, and were therefore included in our study, have relatively high levels of food security overall [27] and therefore may not be representative of the general U.S. or of other states or regions. Given the differences in the sociodemographic profile of transgender respondents in this study compared with other studies using BRFSS data, further caution should be taken when generalizing the results of this study to other states in the United States.

Second, before 2016, phone-based interviewers for the BRFSS surveys indicated respondent sex based on the sound of the respondent's voice and were instructed to ask the participant directly for their sex “only if necessary” [45]. As a consequence, in the 2014 and 2015 surveys, it is unclear whether the sex of transgender respondents refers to their sex assigned at birth or current gender identity.

Finally, the sensitivity analyses revealed that significance of the results were dependent on the categorization of response options, particularly for food-related stress. Specifically, differences emerged between transgender and cisgender individuals and indicated that transgender individuals had higher odds of endorsing food-related stress (when defined as always, usually, or sometimes). We initially elected to use the more conservative definition of food-related stress because “worry or stress about not having enough money to pay rent/mortgage or buy food” is already a broader and more subjective concept than actual housing or food insecurity.

It is possible that differences between the transgender and cisgender populations may have surfaced if BRFSS had assessed housing or food insecurity using a multi-item measure of actually experiencing loss of housing or scarcity of food rather than only the respondents' psychological state. The Household Food Security Survey Module used in the U.S. Census Bureau's Current Population Survey measures more severe states of food insecurity, including the inability to afford a balanced diet, running out of food, and experiencing hunger because of a lack of food and money for food [46]. The American Housing Survey captures a broader range of housing insecurity, including the inability to pay one's mortgage or rent, threat or receipt of an eviction notice, and eviction [47]. Similarly, the Michigan Recession and Recovery Study included additional measures of housing insecurity such as moving due to cost [48]. The discrepancies in measurement point to the need for more precise assessments of housing and food insecurity in national surveys.

Despite these limitations, our results call attention to the health inequities experienced by transgender individuals with multiple minority statuses, particularly individuals who are both racial and gender minorities. Intervention development to reduce housing and food instability should address underemployment in the transgender population, which may include employment discrimination and hostile work environments. Finally, our results highlight the need to increase the number of nationally representative surveys that include questions regarding gender identity, particularly in housing- and food-related national surveys (e.g., US Census, USDA surveys). Until gender minority individuals can be identified in such surveys, public health officials have no way to assess how many transgender people experience housing and food inequities and cannot develop prevention and intervention strategies to address them.

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