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Mental Health and Health Risk Behaviors of Active Duty Sexual Minority and Transgender Service Members in the United States Military

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Abstract

Purpose: The aim of this study was to examine health risk behaviors and mental health outcomes among sexual minority and transgender active duty military service members and their heterosexual and cisgender counterparts.
Methods: Participants ($N = 544$) were recruited by using respondent-driven sampling between August 2017 and March 2018 and completed an online survey by using validated measures of cigarette smoking, alcohol use, anxiety, depression, post-traumatic stress disorder (PTSD), and suicidality. Bayesian random intercept multiple logistic regressions were used to understand differences between sexual minority participants and heterosexual participants as well as between transgender participants and both their cisgender sexual minority and cisgender heterosexual peers.
Results: Cisgender sexual minority women service members were more likely to meet criteria for problematic alcohol use (adjusted odds ratio [aOR] = 10.11) and cigarette smoking (aOR = 7.12) than cisgender heterosexual women. Cisgender sexual minority men had greater odds of suicidality (aOR = 4.73) than their cisgender heterosexual counterparts. Transgender service members had greater odds of anxiety, PTSD, depression, and suicidality than their cisgender peers.
Conclusion: Military researchers and policymakers who seek to improve the overall health and well-being of sexual minority and transgender service members should consider programs and policies that are tailored to specific health outcomes and unique sexual minority and transgender subgroups.

Keywords: health disparities, health risk behaviors, mental health, military

Introduction

Health disparities among sexual and gender minority individuals are well documented. For example, both cisgender sexual minority individuals and transgender individuals experience high rates of depression, anxiety,[1,2] and post-traumatic stress disorder (PTSD).[3,4] Transgender and gender nonconforming individuals have more experiences of suicidality, as do lesbian, gay, and bisexual (LGB) populations,[5,6] and ''homosexually experienced'' individuals report greater substance use[7] compared with their heterosexual and cisgender peers. Health disparities among sexual minority individuals have also been reported by sex and gender as well as age and race/ethnicity. Sexual minority women (including those who identified as homosexual, gay/lesbian, bisexual, or something else) have been found to have a higher prevalence of alcohol and cigarette use compared with heterosexual women.[8] Sexual minority men report worse overall mental health[8] and higher rates of lifetime suicide attempts compared with heterosexual men,[9] whereas transgender individuals report higher rates of mental distress, depression,[10] and anxiety[11] compared with their cisgender peers. In addition, older LGB individuals report higher rates of physiological distress compared with their heterosexual peers[12] and African American sexual minority individuals report higher rates of poor mental health compared with their heterosexual

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counterparts.[13] These disparities are explained by the presence of unique and chronic stressors, including experiences of heterosexism and transphobia because of an individual's sexual orientation or gender identity, as described by the Minority Stress Theory.[14,15]

To date, the majority of sexual and gender minority health research has been conducted by using U.S. civilian populations whose access to health services is highly variable. Research on the presence and prevalence of health disparities among sexual and gender minority active duty military personnel is novel given universal access to TRICARE, a military sponsored health insurance program that covers both on-base and civilian medical care. One study found that a majority of military health care providers have cared for an LGB patient and feel comfortable discussing LGB-related issues, which shows a willingness to care for and confidence in caring for these patients.[16] Despite equal access to services within the military health system, it remains unclear whether health disparities observed in civilian populations persist among sexual minority and transgender active duty service members and to what extent military characteristics, including service branch, rank, and years of service, impact disparities as observed among the veteran population.[17–19] In fact, no research to date has explored health disparities in U.S. active duty military service members.

Although no data on health disparities among sexual minority and transgender active duty service members are currently available, findings on disparities among sexual minority and transgender veterans provide justification for the need for research among sexual minority and transgender active duty service members. Research suggests that LGB veterans have higher rates of PTSD, depression, and problematic alcohol use relative to a Veterans Affairs comparison sample,[20] whereas veterans with a Gender Identity Disorder diagnosis or other gender identity-related diagnoses as defined in previous studies[21–23] have high rates of suicide-related events[21] and suicidal ideation and mental health challenges.[22,23] Further investigation into health disparities among active duty service members will be beneficial, as the results may provide support for tailored services for health concerns, which may reduce health disparities as sexual minority and transgender active duty service members transition to veteran status. In response to this gap in the literature, our study examined similarities and differences in the prevalence of health risk behaviors (cigarette smoking and alcohol use) and mental health (depression, anxiety, PTSD, and suicidality) among sexual minority and transgender active duty military service members and their heterosexual and cisgender counterparts.

Methods

Participants and procedures

Data for this analysis came from the Department of Defense-funded study *Improving Acceptance, Integration and Health among LGBT Service Members.* Between August 2017 and March 2018, participants were recruited by using a modified respondent-driven sampling (RDS) approach, where known members of the population of interest (seeds) were asked to leverage their social ties by engaging in peer-to-peer recruitment. A complete description of the RDS strategy is described elsewhere.[24] Briefly, initial seeds were recruited by members of an Expert Advisory Panel consisting of sexual minority and transgender-identified former military personnel. When referral chains slowed, we expanded seed recruitment by promoting the study through popular military-related blogs, newspapers, and Facebook groups. Seeds who completed the survey were provided with a unique code to share with members of their social network.

Participants were eligible for the survey if they were current, active duty members of one of the four main branches of the military (Army, Navy, Marines, or Air Force). Once participants screened eligible, they were directed to a secure online survey by using the Qualtrics platform (Qualtrics, Provo, UT). Before beginning the survey, a page presented information about the study, including funder, researchers, a summary of topics, expected time to complete, and incentives. If they consented to participate, they would then proceed to the survey. If they did not consent, the survey ended without collecting any information. In total, 544 participants completed the survey, 248 of whom identified as sexual or gender minority individuals. Participants were provided with a $25 electronic gift card for completion of the survey (if off duty). The study procedures were approved by the Institutional Review Boards of the University of California, Los Angeles and the University of Southern California. The study protocol was also approved by the Human Research Protection Office of the U.S. military.

Measures

Descriptive characteristics. Sexual orientation was measured by using one item: ''What is your sexual identity?'' (heterosexual or straight, gay or lesbian, bisexual, and sexual orientation not listed here—please specify). Sex assigned at birth was reported by using one item: ''What sex were you assigned at birth, (i.e., what sex is on your birth certificate)?'' (male or female). Gender identity was assessed by using a single item: ''What is your gender identity?'' (male, female, transgender male/trans man, transgender female/trans woman, genderqueer/gender nonconforming [GNC], and gender identity not listed—please specify). For analysis, cisgender, non-heterosexual individuals that identified with sexual orientations other than lesbian, gay, or bisexual were included as part of the sexual minority category. Further, gender identity was coded as a binary variable, with respondents separated into either the cisgender category or the transgender category. Participants in the transgender group were those whose sex assigned at birth differed from their gender identity.

Respondents also reported their age in years (continuous) and their racial/ethnic identity (Black or African American, Latino or Hispanic, White or Caucasian, Native American or Alaskan Native, Asian or Pacific Islander, Multiracial, and other) and their highest level of education (high school diploma/general education development, some college, associate's degree, bachelor's degree, master's degree, doctorate).

Military characteristics. All four active duty military service branches were represented. Service members provided their current pay grade, which was used to determine respondent rank in a binary officer variable (reference group: enlisted). Respondents also reported the number of years of military service (count).

Health outcomes. Health risk behaviors and mental health outcomes were based on self-reported responses

to previously validated measures. Two self-rated health questions were used to assess overall physical and mental health on a five-point scale. The responses were then dichotomized, where Excellent and Very Good were coded as 1, and Good, Fair, or Poor were coded as 0. Anxiety was measured by using the Generalized Anxiety Disorder Screener (GAD-7), a seven-item scale ranging from 0 to 21 assessing anxiety severity. Scores of 5, 10, and 15 are cut-off points for mild, moderate, and severe anxiety, respectively.[25] Depressive symptomatology was measured by using the Patient Health Questionnaire depression scale (PHQ-8), an eight-item scale ranging from 0 to 24. A cut-off score of ≥10 was used to indicate high depressive symptomatology.[26] The PTSD Checklist for DSM-5 (PCL-5), a self-report scale consisting of 20 items, was used to measure PTSD symptomatology.[27] A total score of 33 or higher suggests that the patient may benefit from PTSD treatment. Suicidality was measured by using the four-item Suicidal Behaviors Questionnaire-Revised (SBQ-R). Scores of seven and above indicate risk for suicide.[28]

Alcohol use was measured by using the Alcohol Use Disorders Identification Test (AUDIT-C), a 12-point scale used to identify hazardous drinking behaviors. A score of 4 or more in men and a score of 3 or more in women are considered problematic use.[29] Use and frequency of current cigarette smoking, as well as use of smokeless tobacco and e-cigarettes was measured by using a subset of nine questions from the National Adult Tobacco Survey.[30]

Data analysis

Consistent with the literature on health disparities, we compared cisgender sexual minority and cisgender heterosexual people while stratifying by male and female gender identity; we compared transgender individuals with cisgender sexual minority and cisgender heterosexual people, respectively.

Bayesian bivariate tests of association were used to identify health risk behaviors and mental health variables that had significant associations when comparing identity groups by using random intercept logistic regression models. These bivariate models included no adjustment covariates, but they did include the random intercepts for the RDS recruitment-branch cluster membership. In contrast, our Bayesian random intercept multiple logistic regression models provide adjusted odds ratios (OR) for each primary outcome variable of interest, adjusted for gender, age, race, officer status, military branch, length of service, and RDS cluster membership. The relevant covariates, taken from the bivariate models and used for adjustments in the multivariable models, are respective to their reference groups.

The framework for all of the Bayesian models combined information from the sample data and our prior information. This approach reduces computational challenges when several adjustment covariates may lead to problematic separation in logistic regression.[31] Moreover, using weak Bayesian priors allows the incorporation of information that rules out unrealistic parameter values. With this strategy in mind, we placed Cauchy priors with mean 0 and standard deviation (SD) 10 on the intercept terms; Cauchy priors with mean 0 and SD 2.5 on the slope parameters; and half-*t* distributed priors with mean 0, variance 100, and three degrees of freedom on the SD parameters as suggested by scholars.[31] We summarized our unadjusted bivariate and adjusted multiple regression results by using posterior means in the form of ORs for point estimates and 95% posterior credible intervals (CI) to highlight ORs that exclude 1. All Bayesian models were fit by using the ''brms''[32] and ''Stan'' packages in R.[33] Overall, proportions of missing data across variables of interest were very low (<3%). To use the complete set of data ($n = 544$), we assumed that the missing values were missing at random and used multiple imputation by chained equations via the R package ''mice'' for all six models.[34]

Results

Sociodemographic characteristics

Table 1 displays the sociodemographic characteristics of the sample, which was 59.6% male, 29.8% female, and 10.7% transgender. The majority of the sample was White (58.1%), followed by Black/African American (16.7%). Latino/Hispanic individuals comprised 13.4% of the sample, and Asian/Pacific Islander individuals comprised 6.1% of the sample. All other racial/ethnic groups were less than 5% of the sample each. The majority was serving in the Army (41.5%) whereas 33.5%, 15.4%, and 9.6% were serving in the Air Force, Navy, and Marine Corps, respectively. The sample was approximately one-third officers (34.0%) and two-thirds enlisted service members (66.0%). The mean age was 27.7 (SD = 6.1), and the mean years of military service was 6.2 (SD = 5.4).

Health risk behaviors and health outcomes and bivariate logistic regression analysis

Frequencies of health risk behaviors and health outcomes for the sample are provided in Table 1. Alcohol use was high, with nearly half of all participants (46.1%) scoring above the cut-off for problematic drinking on the AUDIT-C. More than one-fifth (21.7%) of participants scored 7 or above on the SBQ-R, indicating high suicidality. Small percentages expressed moderate (4.6%) or severe (6.3%) anxiety, and larger percentages endorsed high depressive symptomatology (13.2%). Approximately one-third reported poor overall mental health (37.7%) or poor overall physical health (34.7%). Less than one-fifth of participants were current smokers (17.1%); ~10% met criteria for PTSD.

There were several notable health disparities between cisgender sexual minority and cisgender heterosexual participants when stratified by gender (Table 2). The odds of cisgender sexual minority women service members having elevated alcohol use was about 6.6 times that of the odds for cisgender heterosexual service members when only adjusting for cluster membership. In addition, the odds of smoking cigarettes was about six times higher for cisgender sexual minority women in the military compared with the odds for cisgender heterosexual women (OR: 5.72; 95% CI: 1.44–30.38). Lastly, cisgender sexual minority men were three times more likely to meet criteria for suicidality than their cisgender heterosexual counterparts (OR = 3.16; 95% CI: 1.64–6.10).

Table 3 displays several more prominent health disparities regarding transgender participants compared with both their cisgender heterosexual and cisgender sexual minority peers. First, the odds of suicidality among transgender service members was about seven times that of cisgender heterosexual

TABLE 1. SAMPLE DEMOGRAPHIC CHARACTERISTICS AND HEALTH RISK BEHAVIORS AND HEALTH OUTCOMES (N=544)

Variable	*Cisgender heterosexual*[a] *(*n=*295) (%)*	*Cisgender sexual minority*[a] *(*n=*187) (%)*	*Transgender*[a] *(*n=*58) (%)*	*Total (%)*
Gender				
Cisgender Male	208 (70.5)	115 (61.5)		324 (59.6)
Cisgender Female	87 (29.5)	72 (38.5)		162 (29.8)
Transgender			58 (10.7)	58 (10.7)
Age				
Mean, SD	26.7 (5.6)	29.1 (6.6)	28.7 (6.2)	27.7 (6.1)
Categories				
18–27	216 (73.2)	101 (54.0)	34 (58.6)	351 (64.5)
28–37	67 (22.7)	66 (35.3)	18 (31.0)	151 (27.8)
38+	12 (4.1)	20 (10.7)	5 (8.6)	37 (6.8)
Race/ethnicity				
Asian or Pacific Islander	20 (6.8)	10 (5.3)	2 (3.4)	33 (6.1)
Black/African American	71 (24.1)	15 (8.0)	5 (8.6)	91 (16.7)
Latino/Hispanic	40 (13.6)	29 (15.5)	4 (6.9)	73 (13.4)
Multiracial	6 (2.0)	5 (2.7)	7 (12.1)	19 (3.5)
Native American/Alaskan Native	2 (0.7)	2 (1.1)	1 (1.7)	5 (0.9)
Other	3 (1.0)	1 (0.5)	0 (0.0)	4 (0.7)
White/Caucasian	151 (51.2)	124 (66.3)	39 (67.2)	316 (58.1)
Education				
High school diploma/GED	53 (18.0)	14 (7.5)	8 (13.8)	75 (13.8)
Some college	47 (15.9)	25 (13.4)	25 (43.1)	97 (17.8)
Associate's degree	59 (20.0)	18 (9.6)	10 (17.2)	89 (16.4)
Bachelor's degree	75 (25.4)	57 (30.5)	10 (17.2)	144 (26.5)
Master's degree	27 (9.2)	33 (17.6)	3 (5.2)	63 (11.6)
Doctorate	18 (6.1)	23 (12.3)	0 (0.0)	41 (7.5)
Military background				
Branch				
Air Force	110 (37.3)	60 (32.1)	11 (19.0)	182 (33.5)
Army	121 (41.0)	79 (42.2)	25 (43.1)	226 (41.5)
Marines	30 (10.2)	15 (8.0)	7 (12.1)	52 (9.6)
Navy	34 (11.5)	33 (17.6)	15 (25.9)	84 (15.4)
Soldier type				
Enlisted	211 (71.5)	95 (50.8)	51 (87.9)	359 (66.0)
Officer	84 (28.5)	92 (49.2)	7 (12.1)	185 (34.0)
Years of service (mean, SD)	5.1 (4.9)	7.6 (5.8)	7.5 (5.3)	6.2 (5.4)
Alcohol use[b]				
High	127 (43.1)	94 (50.3)	28 (48.3)	251 (46.1)
Low	119 (40.3)	56 (29.9)	21 (36.2)	197 (36.2)
Smoke cigarettes				
None	224 (75.9)	141 (75.4)	44 (75.9)	412 (75.7)
Some/all of the time	54 (18.3)	27 (14.4)	11 (19.0)	93 (17.1)
Anxiety[c]				
Minimal	227 (76.9)	122 (65.2)	28 (48.3)	379 (69.7)
Mild	33 (11.2)	25 (13.4)	9 (15.5)	68 (12.5)
Moderate	9 (3.1)	8 (4.3)	8 (13.8)	25 (4.6)
Severe	9 (3.1)	14 (7.5)	11 (3.5)	34 (6.3)
Depression[d]				
High	23 (7.8)	27 (14.4)	22 (37.9)	72 (13.2)
Low	272 (92.2)	160 (85.6)	35 (60.3)	471 (86.6)
PTSD[e]				
High	18 (6.1)	20 (10.7)	18 (31.0)	56 (10.3)
Low	277 (93.9)	165 (88.2)	38 (65.5)	484 (89.0)

(*continued*)

Table 1. (Continued)

Variable	*Cisgender heterosexual*[a] *(n = 295) (%)*	*Cisgender sexual minority*[a] *(n = 187) (%)*	*Transgender*[a] *(n = 58) (%)*	*Total (%)*
Suicidality[f]				
High	36 (12.2)	50 (26.7)	32 (55.2)	118 (21.7)
Low	258 (87.5)	136 (72.7)	26 (44.8)	424 (77.9)
Overall mental health[g]				
High	211 (71.5)	107 (57.2)	16 (27.6)	337 (61.9)
Low	84 (28.5)	79 (42.2)	41 (70.7)	205 (37.7)
Overall physical health[g]				
High	211 (71.5)	114 (61.0)	27 (46.6)	355 (65.3)
Low	84 (28.5)	73 (39.0)	31 (53.4)	189 (34.7)

[a]Sexual orientation/gender identity (missing $n = 4$); sexual minority participants included those who identified as gay/lesbian (163), bisexual (21), asexual (1), polysexual (1), and queer (1).
[b]Based on the AUDIT-C score (range: 0–12): high: 4+ for men, 3+ for women.
[c]Based on the GAD-7 (range: 0–21): minimal: <5, mild: 5–9, moderate: 10–14, severe: 15+.
[d]Based on the PHQ-8: high: 10+.
[e]Based on the PTSD Checklist associated with the DSM-5 and PCL-5: high: 33+.
[f]Based on the four-item SBQ-R: high: 7+.
[g]Range: 0–1.
AUDIT-C, Alcohol Use Disorders Identification Test; DSM-5, Diagnostic and Statistical Manual of Mental Disorders, 5th ed.; GAD-7, Generalized Anxiety Disorder Screener; GED, General Education Development; PHQ-8, eight-item Patient Health Questionnaire depression scale; PCL-5, Post-traumatic Stress Disorder Checklist, 5th ed.; PTSD, Post-traumatic Stress Disorder; SBQ-R, Suicidal Behaviors Questionnaire-Revised; SD, standard deviation.

service members (OR: 6.82; 95% CI: 3.38–13.67), and about three times that of cisgender sexual minority service members (OR: 3.30; 95% CI: 1.75–6.22). The odds of elevated anxiety among transgender service members was about three times that of cisgender heterosexual service members (OR: 3.16; 95% CI: 1.58–6.31), and about three times that of cisgender sexual minority service members as well (OR: 3.04; 95% CI: 1.47–6.39).

There were no statistically significant differences in depression for cisgender sexual minority service members compared with cisgender heterosexual service members (Table 2). However, transgender service members were five times as likely to report high depressive symptoms as cisgender heterosexual service members (OR: 5.28; 95% CI: 2.382–12.014), and nearly four times as likely to report high depressive symptoms as sexual minority service members (OR: 3.84; 95% CI: 1.735–8.584). Further, the odds of transgender service members' overall mental health being reported as Excellent or Very Good was lower than that of cisgender heterosexual service members (OR = 0.18; 95% CI: 0.09–0.36), and that of cisgender sexual minority service members (OR = 0.30; 95% CI: 0.15–0.58). Similarly, the odds of transgender service members' overall physical health being reported as Excellent or Very Good was lower than that of cisgender heterosexual service members (OR = 0.40; 95% CI: 0.21–0.75).

Table 2. Bayesian Analysis Comparing Health Outcomes Between Cisgender Sexual Minority and Cisgender Heterosexual Participants

	Female			*Male*		
Categorical variable	*OR*	*aOR*	*95% CI*	*OR*	*aOR*	*95% CI*
Alcohol use[a]	6.570	10.111	3.915–30.410	0.873	0.956	0.513–1.788
Smoke cigarettes	5.722	7.122	1.723–42.787	0.520	0.851	0.371–1.854
Anxiety, <5 ref.[b]	1.465	1.182	0.416–3.264	1.297	1.067	0.476–2.288
Depression, <10 ref.[c]	1.905	2.275	0.541–10.168	0.988	0.983	0.313–2.944
PTSD, <33 ref.[d]	1.761	1.295	0.265–6.320	0.974	0.683	0.141–2.469
Suicidality[e]	1.400	1.261	0.420–3.514	3.163	4.730	2.185–10.600
Overall mental health[f]	0.540	0.609	0.288–1.320	0.659	0.759	0.391–1.500
Overall physical health[f]	0.505	0.527	0.249–1.141	0.892	1.081	0.539–2.196

ORs adjusted for RDS clustering. aORs adjusted for race, gender, military branch, officer status, age, length of service, RDS cluster, AND with imputation (aOR). Education was not included as a covariate, because it was highly correlated with officer status.
[a]Based on the AUDIT-C score (range: 0–12): high: 4+ for men, 3+ for women.
[b]Based on the GAD-7 (range: 0–21): minimal: <5, mild: 5–9, moderate: 10–14, severe: 15+.
[c]Based on the PHQ-8: high: 10+.
[d]Based on the PTSD Checklist associated with the DSM-5 and PCL-5: high: 33+.
[e]Based on the four-item SBQ-R: high: 7+.
[f]Range: 0–1.
aOR, adjusted odds ratio; CI, credible interval; OR, odds ratio; RDS, respondent-driven sampling.

Table 3. Bayesian Analysis Comparing Health Outcomes Among Transgender Versus Cisgender Sexual Minority and Transgender Versus Cisgender Heterosexual Participants

	Transgender vs. cisgender sexual minority			*Transgender vs. cisgender heterosexual*		
Categorical variable	*OR*	*aOR*	*95% CI*	*OR*	*aOR*	*95% CI*
Alcohol use[a]	0.773	0.930	0.427–2.011	1.354	1.481	0.730–3.042
Smoke cigarettes	1.311	0.748	0.305–1.799	1.215	0.780	0.316–1.846
Anxiety, <5 ref.[b]	3.041	2.952	1.231–7.266	3.155	2.666	1.210–5.866
Depression, <10 ref.[c]	3.842	3.575	1.428–9.209	5.276	4.974	1.953–12.996
PTSD, <33 ref.[d]	5.195	5.839	2.119–17.562	5.014	5.415	1.976–14.850
Suicidality[e]	3.303	2.983	1.444–6.210	6.819	8.996	4.022–20.467
Overall mental health[f]	0.295	0.303	0.139–0.641	0.183	0.173	0.078–0.375
Overall physical health[f]	0.560	0.816	0.386–1.732	0.396	0.478	0.228–1.005

ORs adjusted for RDS clustering. aORs adjusted for race, gender, military branch, officer status, age, length of service, RDS cluster, AND with imputation (aOR). Education was not included as a covariate, because it was highly correlated with officer status.

[a]Based on the AUDIT-C score (range: 0–12): high: 4+ for men, 3+ for women.

[b]Based on the GAD-7 (range: 0–21): minimal: <5, mild: 5–9, moderate: 10–14, severe: 15+.

[c]Based on the PHQ-8: high: 10+.

[d]Based on the PTSD Checklist associated with the DSM-5 and PCL-5: high: 33+.

[e]Based on the four-item SBQ-R: high: 7+.

[f]Range: 0–1.

Multivariable logistic regression analysis

When adjusting for gender, age, race, military branch, officer status, and length of service as well as RDS cluster, some disparities remained (Tables 2 and 3). We found elevated adjusted odds of alcohol use and cigarette smoking among cisgender sexual minority women compared with their cisgender heterosexual counterparts and elevated odds of suicidality among cisgender sexual minority men compared with their cisgender heterosexual counterparts. Transgender service members reported elevated adjusted odds of suicidality, anxiety, depression, and PTSD compared with both cisgender heterosexual and cisgender sexual minority service members. In addition, transgender service members were less likely to report ''Excellent/Very Good'' mental health compared with both cisgender heterosexual service members and cisgender sexual minority service members in adjusted analysis. Finally, the adjusted odds of alcohol use for cisgender sexual minority service members was about 2.03 times that of cisgender heterosexual service members (95% CI: 1.28–3.17), and the adjusted odds of elevated suicidality among cisgender sexual minority individuals was about 2.37 times that of cisgender heterosexual individuals (95% CI: 1.43–3.93) (data not shown).

Discussion

We sought to determine whether health disparities that are well documented among sexual minority and transgender civilian populations persist among active duty military service members. Our findings varied by gender among cisgender sexual minority service members. For cisgender sexual minority female service members, disparities were found in health risk behavior outcomes: alcohol use and smoking. For cisgender sexual minority male service members, there was only one health outcome where we found disparities: suicidality. For transgender service members, disparities were found in mental health outcomes: anxiety, depression, suicidality, PTSD, and overall mental health. These findings have implications for sexual minority and transgender health disparities research and intervention development both within and outside the military context.

Health disparities among cisgender sexual minority women

Cisgender sexual minority women reported elevated rates of problematic alcohol use and cigarette smoking compared with their heterosexual counterparts. These findings are consistent with both veteran[35,36] and civilian literature among this population.[37,38] Higher tobacco use has been associated with ''butch'' self-presentation among lesbian women, because smoking and other types of substance use are typically considered more masculine behaviors.[39] Interestingly, no disparities emerged for any of the other health outcomes. These findings contradict those of previous studies among veteran and civilian sexual minority women, which document higher rates of mental health problems among lesbian and bisexual women compared with their heterosexual counterparts.[35]

There may be many reasons for differences between our findings and those of previous studies among veteran and civilian sexual minority women. First, in the military, service members undergo rigorous physical training and mental health evaluations on enlistment and on an ongoing basis. As a prerequisite for service, the military focuses on physical fitness and maintaining height/weight requirements, which may also have beneficial effects on mental health. Second, all military service members have access to TRICARE. Because TRICARE benefits are available to all military service members, access issues that have been highlighted in previous research as a major factor impacting health disparities may hold less importance in this context.[40] Interestingly, issues in access to health services cannot explain differences between active duty service members and veterans, as veterans also have access to dedicated health services via the Veterans Affairs health care system.

Health disparities among cisgender sexual minority men

Cisgender sexual minority men were nearly five times as likely to report high suicidality compared with heterosexual male service members. This finding is supported by the

Minority Stress Theory and is consistent with results from studies of civilian populations, where gay and bisexual men are at elevated risk for suicide.[14] This may be particularly relevant in the military context, where suicide prevention among active duty[41] and veteran populations[42] has been highlighted as a priority. Despite access to mental health professionals, service members may be reluctant to disclose suicidal thoughts or behaviors because some consider such thoughts as shameful and a sign of weakness, or they may lead to unwanted hospitalization or medication recommendations.[43] Gay service members have reported high levels of stigma and discrimination in military settings after coming out post–''Don't Ask, Don't Tell'' (DADT), which may exacerbate feelings of isolation and loneliness.[44]

It is important to reiterate that there were no differences in health outcomes among sexual minority male service members and heterosexual male service members on alcohol use, anxiety, depression, mental health, physical health, cigarette smoking, or PTSD. The absence of health disparities related to alcohol use and cigarette smoking may result from high base rates of these behaviors, which tend to be higher among men in general.[45] In our study, 46.1% of sexual minority men and 51.0% of heterosexual men scored in the problematic drinking range; and 14.8% of sexual minority men and 24.5% of heterosexual men were cigarette smokers. The normalization of these behaviors among men in the military context may mask disparities that emerge in civilian populations. In addition, it is seen as more socially acceptable for men to drink alcohol and smoke cigarettes than women,[46,47] which could explain why we see differences by gender in these behaviors.

Health disparities among transgender service members

The most notable health disparities in our study emerged when comparing transgender service members with both cisgender heterosexual and cisgender sexual minority service members. Transgender service members reported higher anxiety, depression, suicidality, overall mental health problems, and PTSD than both cisgender heterosexual and cisgender sexual minority service members, highlighting the vulnerabilities of transgender people in the armed forces. These results are similar to findings among transgender veterans who have reported higher rates of depression, PTSD, serious mental illness, and suicidality compared with nontransgender veterans.[22] Reasons for these findings may include the relative lack of acceptance of transgender people in contemporary society[48] as well as specific military policies that discriminate against transgender people serving openly.[49,50]

The policies that dictate whether transgender people can serve openly in the U.S. military have been in flux for several years. This rapidly shifting policy environment makes the military context particularly stressful for transgender people and may contribute to disparities in mental health between transgender people and cisgender sexual minority people, who have been permitted to serve openly since the repeal of DADT in 2010.[51] Scholars have demonstrated the link between structural factors, such as policy environments, and mental health among LGBT people.[52,53] Hostile policies toward transgender people serving in the U.S. military may be contributing to mental health disparities in this population.

Compared with existing health disparities research conducted among civilian populations, we see fewer health disparities among cisgender sexual minority people compared with their heterosexual counterparts. This is likely due to a combination of factors, including the physical fitness requirements in the military, universal access to health care, and growing social acceptance of sexual minority people, in general. For transgender people, health disparities observed in our sample look much more similar to those observed in civilian populations.[54] This is also likely due to a number of factors, including persistent social stigma directed at transgender people[2] in general and specific military policies that discriminate against transgender people serving openly.[50,55]

Limitations

Our findings should be interpreted in light of some limitations. The data were collected online via self-report, which may impact the veracity of our results, especially those related to sensitive topics, such as mental health. We assured participants that responses were voluntary and would not be linked with any personal identifying information, which may have curtailed social desirability bias. Due to budget and time constraints, we had to modify our RDS approach, which resulted in a large number of index participants and relatively short referral chains in our final dataset.[24] Our analysis adjusted for clustering by referral chain, but results cannot be generalized to the larger population of sexual minority and transgender active duty military personnel.[56] Subgroup analysis was not possible; incomplete disaggregation of the study sample by sex assigned at birth, gender identity, and sexual orientation is a limitation. For example, other studies have shown health disparities for bisexual people that exceed those of their lesbian and gay-identified counterparts.[57,58] Future work with larger samples of bisexual military personnel is warranted.[59] Our data were also collected when the Trump administration was publicly disseminating information about the ability of transgender people to serve in the U.S. military, in addition to reversing previously established policy promoting transgender acceptance.[60] These events may have contributed to a particularly stressful social environment for transgender service members and may have influenced their responses to our survey. Finally, all data are cross-sectional, which prevents us from making any causal claims regarding the drivers of health disparities observed in our sample.

Conclusion

Despite its limitations, our findings have implications for sexual minority and transgender health disparities research both broadly and in the military context. For military researchers and policymakers who seek to improve the overall health and well-being of all service members as an avenue toward increasing military readiness, our results point to possible programs and policies that may be beneficial. First, although health disparities were less pronounced for sexual minority service members, there remain some areas for intervention. For cisgender sexual minority women, programs that promote healthy norms regarding alcohol use and cigarette smoking, especially opportunities for harm reduction, may be of interest. Alcohol reduction and smoking cessation programs that are tailored for women and for sexual or gender minority people are limited[61] but may be offered through military programs. For cisgender sexual minority men, resources for

suicide prevention are warranted. Potential buffers against suicide, such as affiliation with other sexual minority male service members and structural interventions that reduce discrimination and harassment, both of which have been linked to mental health challenges, are warranted.[62]

The greatest potential area for intervention lies with improving military climate for transgender people as a means to improve mental health. The current policy environment regarding transgender military service is volatile, with the legality of transgender service directly challenged by the current administration. Military leaders may wish to consider programs that offer support to transgender troops in the form of affiliation groups and/or specialized mental health counseling. The goals of military readiness and unit cohesion are paramount, and protecting the health and mental health of transgender service members stands to advance those goals.

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Disclaimer

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Authors' Contributions

Drs. Holloway, Goldbach, and Castro conceptualized and designed the study and approved the final article as submitted. Dr. Holloway and Mr. Green drafted the initial article and approved the final article as submitted. Mr. Pickering and Mr. Tzen carried out the analyses, reviewed and revised the article, and approved the final article as submitted. Ms. Wu reviewed and approved the initial proposed analyses, reviewed and revised the article, and approved the final article as submitted.

Author Disclosure Statement

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