Evaluating the Association of Military Unit Cohesion with Depressive Symptoms, Suicidal Ideation, and Alcohol Use Among U.S. Military Members Meeting Diagnostic Criteria for PTSD

Anna Lee Howard

A thesis

submitted in partial fulfillment of the

requirements for the degree of

Master of Public Health

University of Washington

2022

Committee:

Isaac Rhew

Jack Goldberg

Denise Walker

Program Authorized to Offer Degree:

Epidemiology

University of Washington

Abstract

Evaluating the Association of Military Unit Cohesion with Depressive Symptoms, Suicidal Ideation, and Alcohol Use Among U.S. Military Members Meeting Diagnostic Criteria for PTSD

Anna Lee Howard

Chair of the Supervisory Committee:

Isaac Rhew

Department of Epidemiology

Mental health issues such as depression, suicidal ideation, and hazardous alcohol use have become increasingly common among military populations in the United States. Current research into the potential protective influences of unit cohesion for these mental health outcomes has yielded mixed results and primarily focused on post-deployment samples despite a relatively high burden of mental health issues among non-deployed service members. The aim of this study is to evaluate the association between unit cohesion and depressive symptoms, suicidal ideation, and alcohol use among military service members that met criteria for post-traumatic stress disorder (PTSD) (n = 153) and whether the association differs based on combat exposure or gender. Linear regression and negative binomial models were used to assess the association between unit cohesion and the mental health outcomes, and stratified analyses were used to

explore the differences in associations based on combat exposure and gender. Results indicated a significant negative association between unit cohesion and depression symptoms and that the association may be stronger in men and those with combat exposure. These findings imply that efforts to improve mental health outcomes in United States service members with PTSD could have varying effects based on gender and index trauma and that additional research into these relationships is needed.

Introduction

Following the terrorist attacks of September 11, 2001, and the United States' subsequent launch of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), the prevalence of post-traumatic stress disorder (PTSD) has increased among military personnel by an annual average of 43% (Cameron, 2019). PTSD, which is a psychiatric disorder that can occur after the witness or experience of a traumatic event, commonly co-occurs with depression, suicide, and substance misuse (Grinage, 2003). Along with PTSD, suicide rates have increased since OEF/OIF, with a rate of 28.7 per 100,000 active duty service members per year in 2020 (Department of Defense, 2020). Research has also found that service members are also more likely to experience depression and hazardous drinking than their civilian counterparts (Gadermann et al., 2012). Additionally, literature has shown that treatment interest and initiation is low among service members with mental health and/or substance use disorders, potentially exacerbating the emotional, physical, and social burdens they have on individuals (Naifeh et al., 2016; Britt et al., 2019).

The concerning rates of depression, suicide, and alcohol use among service members make it necessary to identify both risk and protective factors for these conditions to inform prevention and treatment strategies. Peer social support, for one, is a protective factor for mental health conditions in military members as well as non-military populations (McLean et al., 2017). Peer and leadership support among service members have also been identified as facilitators of mental health treatment seeking (Zinzow et al., 2013). Unit cohesion is a construct related to social support, but may be more indicative of social environments specifically within the military specifically. A military unit can vary widely in size from 6-10 in a squad to 2,000 to 5,000 in a

brigade or regiment, though perceived unit cohesion typically refers to the strength of bond and trust among members and leaders of a smaller level unit. Strong unit cohesion has positive implications on morale, resilience, and performance (Oliver et al., 1999).

However, existing research on the association of unit cohesion with depression, suicide risk, and alcohol use is both mixed and deployment focused. Several studies have identified unit cohesion as a protective factor against depression (Bryan & Heron, 2015; Pietrzak et al., 2009) and suicidal ideation (Griffith, 2015; Mitchell et al., 2012) among deployed, active duty, and Veteran service members in various branches. Alternatively, some studies have found that unit cohesion is not associated with PTSD or depressive symptoms (Breslau et al., 2016; Kanesarajah et al., 2016) in previously deployed Marines and non-deployed National Guard Service members (Rugo et al., 2020). Findings on the association between unit cohesion and alcohol use are also contradicting with some showing no association (Orr et al., 2014) and others showing positive associations (Browne et al., 2008) in deployed service members.

Non-deployed service members still share a burden of PTSD, depression, and substance misuse, albeit with lower odds, and should be included in related studies (Dursa et al., 2014; Shen et al., 2012). In one study among OEF/OIF era veterans, those who were deployed had a lower risk of suicide (Kang et al., 2015). Along with lack of representation of non-deployed service members, much prior research has only focused on members of a singular branch, veterans, and/or excluded alcohol use in their samples. Further research that represents members of multiple military branches of various service status and assessing several mental health-related outcomes in the same study would be helpful.

Research would also be aided by exploring whether associations between unit cohesion and mental health differ by exposure to combat. Prior studies have found differences in the relationship between unit cohesion and PTSD symptoms depending on whether combat or warzone exposure was present and evaluated. For example, several of the studies that found an inverse relationship between unit cohesion and mental health outcomes only involved combat deployed samples or did not adjust for combat stress exposure. In contrast, studies that found no relationship between unit cohesion and mental health adjusted for combat exposure or included non-combat deployed samples, suggesting that results may be different when stratified by combat exposure (Breslau et al., 2016; Pietrzak et al., 2009; Rugo et al., 2020). Additionally, one study found that higher unit cohesion was associated with higher levels of PTSD and psychopathology among those with higher levels of combat stress exposure, but not among those with lower levels of combat exposure (Fontana et al., 1997).

Exploring whether associations between unit cohesion and mental health differ by gender would also be important because several studies evaluating the relationship between unit cohesion and mental health outcomes have failed to find statistically significant differences by gender, while some research has found that unit cohesion levels are lower in females than males (Laws et al., 2016). Thus, examining potential differences in the relationships between unit cohesion and mental health outcomes by combat exposure and gender would be important.

The primary aim of this study is to assess the association between unit cohesion and depressive symptoms, suicidal ideation, and alcohol use among military service members that meet criteria

for PTSD. As a secondary aim, this study explores whether the association between unit cohesion and the mental health outcomes differs based on combat exposure or gender.

Methods

Study Design & Subjects

This project used data from the Stress Check Study, an ongoing randomized controlled trial that began in 2016 to test an intervention designed to provide support to active duty service members experiencing symptoms of PTSD and encourage treatment engagement. The study was based in Washington State, with recruitment both at a local base, Joint Base Lewis-McChord (JBLM), and on a national level through research recruitment services including TrialFacts and StudyPages. Initially, recruitment began with active duty service members in Army and Air Force branches that met criteria for a PTSD diagnosis using the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5). However, recruitment was later expanded to include members of the Navy and members of National Guard and Reserve status with a diagnosis of PTSD. Individuals were excluded from the study if they were engaging in PTSD treatment at the time of enrollment, pending a combat-deployment, or experiencing psychosis. Out of 474 individuals examined and assessed for eligibility, 163 were enrolled in the study. Data were collected from participants at baseline and at 6-week, 3-month, and 6-month follow-up. However, this study only uses baseline data for secondary analyses. This research was approved by the University of Washington Institutional Review Board (IRB).

Measures

Unit cohesion. The exposure evaluated was perceived unit cohesion, measured using the Small Unit Identification (SUI) questionnaire. The SUI questionnaire was created to assess soldiers' feelings about and trust in their group members, or sense of cohesiveness, in their unit. The measure includes two subscales, one assessing trust among participants' fellow soldiers and another assessing their trust with their leaders, with four Likert-type items ranging from strongly disagree (1) to strongly agree (5). For example, some items in the first scale include "In this unit, [soldiers/airmen] really look out for each other" and "[Soldiers/airmen] in my unit feel close to each other." Items in the second scale include "I would go for help with a personal problem to my unit leaders." and "Unit leaders are interested in my personal welfare." The questionnaire has strong internal consistency and a Cronbach's alpha of .89 in the sample (Griffith, 2009). The two subscales were combined resulting in a single, continuous score.

Depressive symptoms. The first outcome to be evaluated was depressive symptoms, measured using the Patient Health Questionnaire-9 (PHQ-9). Participants are asked how often they have experienced nine different depressive symptoms from not at all (0) to nearly every day (3) during the prior 2 weeks (Manea, Gilbody, & McMillan, 2015). Each item's score was added together to create a total PHQ-9 score. This scale has been well established as a valid measure of depression severity when compared against clinician diagnoses of major depressive disorder (Kroenke, Spitzer, & Williams, 2001). In the sample, the PHQ-9 showed good internal consistency (Cronbach's $\alpha = 0.70$).

Suicidal ideation. The second continuous outcome was suicidal ideation, measured using the 10-item Suicidal Ideation Scale (SIS) that assesses the frequency of suicidal thoughts or behaviors

experienced by participants on a 5 point Likert-type scale of never (0) to always (4) within the past month (Ghasemi, Shaghaghi, & Allahverdipour, 2015). The score of each item was added to create a total SIS score. The SIS has good construct validity and internal reliability among military samples and the study sample ($\alpha = .92$) (Luxton, 2011).

Alcohol use. Hazardous alcohol use was measured using the Alcohol Use Disorder Identification Test (AUDIT). The AUDIT is a 10-item scale that was designed to measure an individual's level of alcohol consumption and indicators of problematic use (Shields, 2003). Each item on the AUDIT is scored on a scale ranging from 0 to 4, with three questions measuring the frequency of alcohol assumption, three assessing alcohol dependence, and the final four assessing problems associated with drinking. The time frame for the AUDIT is during the past six months. The score of each item was added together to comprise a total score ranging from 0 to 40. The measure has strong internal reliability within the sample ($\alpha = .87$) and the validity has been confirmed in several studies (Meneses-Gaya et al., 2009).

Analytic Plan

Initial descriptive analyses and data visualizations were performed to understand the distribution of the exposure and outcome measures and to identify trends and/or anomalies in the sample. All outcomes were treated as continuous variables with higher scores being indicative of greater severity of depression symptoms, suicidal ideation, or hazardous alcohol use. Distributions of the exposure and outcomes were assessed across multiple covariates including gender, race (White, non-white), ethnicity (Hispanic or Latino/a, not Hispanic or Latino/a), branch (Army, Air Force/Navy), rank (E1-E4, E5-E9/W1-W5/O1-O10), education (less than an AA degree, AA

degree or higher), and marital status (married, non-married) to inform the inclusion of covariates into statistical models as confounders.

For the primary analyses, linear regression models adjusted for covariates were fit to examine the association of perceived unit cohesion with PHQ-9 and AUDIT total scores. To aid in interpretability, SUI scores were standardized such that one unit represented the Inter-Quartile Range (IQR) of 12.0. For the SIS outcome, initial evaluation showed violation of OLS assumptions due to positive skewness. Further, there was evidence of over-dispersion where the variance far exceeded the mean. Thus, a negative binomial regression model was used for the SIS outcome. Additional exploratory analyses were performed to evaluate whether associations between unit cohesion and the outcome variables differed by gender or combat exposure. Models were re-run stratified by gender and combat exposure, separately, and examined qualitatively for interpretation. All analyses were conducted using R statistical software version 4.0.2.

Results

After removing eight participants with missing data, a total of 153 were included in the analysis. Of the 153 participants, the majority were male (69.9%), white (75.2%), non-Hispanic or Latino/a (88.9%), married (60.8%), had obtained less than an AA degree (52.9%), were enlisted in the Army (81%), had a rank above E4 (57.5%), and had previous war or combat exposure (69.3%) (Table 1). Among the sample, SUI scores ranged from 0 to 32 with a median of 13 and mean of 13.5 (standard deviation 7.66). Table 2 presents the means and standard deviations of the PHQ-9, AUDIT, and SIS scores as well as the correlations among them.

Prior to adjusting for covariates, a statistically significant inverse association between SUI score and PHQ score was observed (b = -1.45; 95% CI: -2.60, -0.30, p = 0.014). After adjusting for covariates, a similar magnitude association was found. The adjusted findings showed that an increase in IQR (12.0 points) of the SUI score was associated with a 1.40 point decrease in PHQ-9 score (95% CI: -2.58, -0.21, p = 0.022) (Table 3). The unadjusted analysis of the association between SUI score and AUDIT score was not statistically significant (b = -0.47, 95% CI: -2.28, 1.33, p = 0.605). Results were similar when adjusting for covariates (b = -0.60, 95% CI: -2.44, 1.24) (Table 3). Lastly, there did not appear to be an association between SUI and SIS score in either the unadjusted (Count Ratio [CR] = 1.05, 95% CI: 0.63, 1.77, p = 0.857) or adjusted models (Count Ratio [CR] = 0.97, 95% CI: 0.54, 1.73, p = 0.907) (Table 3).

Stratified models suggest that there may be some differences in associations between SUI score and the outcomes by gender. A two sample t-test indicated a statistically significant difference in the means of the SUI scores by gender with a mean of 22.28 in men and 19.70 in women (t = 1.99, p = 0.049). In the stratified regression models, the inverse association between SUI score and PHQ-9 score was statistically significant among men, but not women (Table 4). Additionally, the association between SUI score and AUDIT score appeared to be in opposite directions among men and women, with the association being negative among men and positive among women. There was less evidence for differences in associations between SUI score and AUDIT and SIS scores based on gender (Table 4).

Similar results were found in the regression models stratified by previous combat exposure. The inverse association between SUI score and PHQ-9 was statistically significant among participants with combat exposure, but not those without combat exposure (Table 5). However,

there were no obvious differences in associations of SUI score with AUDIT and SIS scores according to previous combat exposure (Table 5).

Discussion

The primary results of this study show that perceived unit cohesion is associated with depressive symptoms in this sample of U.S. military members meeting diagnostic criteria for PTSD and that this association may be stronger in men compared to women and among individuals who had previous combat exposure compared to those without. Additionally, it was notable that the direction of associations of unit cohesion with hazardous alcohol use varied between men and women, such that a negative association was found among men and a positive association among women, although neither was statistically significant.

The negative association between depressive symptoms and unit cohesion is consistent with previous findings (Bryan & Heron, 2015; Pietrzak et al., 2010; Rugo et al., 2020). However, most of the current research on PTSD and unit cohesion has focused only on assessing this relationship among combat deployed service members. The sample used in this study included those with various index traumas and allows for insight into the difference in the association in service members without combat exposure. The weaker association between unit cohesion and depression symptoms in those without combat exposure could suggest that unit support for mental health symptoms is more specific towards combat-related trauma. This aligns with previous research which reported that service members felt that the mental health support and care available to them only addressed combat-specific PTSD rather than PTSD associated with pre-military trauma or non-combat trauma, such as military sexual trauma (Silvestrini & Chen,

2021). Index trauma type impacts PTSD symptomology and presentation as well, which may result in varying impacts of potential protective factors like unit cohesion (Kelley et al., 2009; Smith et al., 2016).

Similar patterns were seen in the gender-stratified models with the strength of the relationships between depressive symptoms and unit cohesion being stronger in men than women. Additionally, unit cohesion appeared to have a positive relationship with hazardous alcohol use in women, but not men, although neither association was statistically significant. Levels of unit cohesion in women were found to be lower in this sample, which is consistent with previous research (Laws, 2016; Welsh, 2018). The reasons for lower unit cohesion and weaker associations among women in the sample are unclear; however, military sexual trauma among women is associated with lower levels of unit cohesion (Laws, 2016). Within the sample, only 3.9% of women reported combat as their index trauma whereas sexual assault and other unwanted sexual experiences accounted for 16.3%, making it the most common index trauma among women. Unit cohesion is both a facilitator and barrier to reporting military sexual trauma, with the closeness of the unit either encouraging individuals to confide in their peers and leaders or discouraging reporting out of fear of compromising cohesion (Burns et al., 2014). It is possible that this complicated relationship between unit cohesion and reporting of trauma in women may contribute to the disparities in the associations between unit cohesion, depression symptoms, and alcohol use by gender.

Limitations

Limitations of this study include the use of a sample of individuals that met full criteria for a PTSD diagnosis. Therefore, the impact of unit cohesion on depression, suicidal ideation, and alcohol use is generalizable only to those already experiencing symptoms of PTSD. This may also introduce bias to the outcomes given that they are comorbidities to PTSD. Additionally, the data used was cross-sectional and outcomes assessed were measured in reference to the participants' feelings within the past two weeks to six months, whereas the measure of the exposure of unit cohesion had no temporality. Further, unit cohesion is a subjective measure which could be more negatively perceived in individuals experiencing the mental health outcomes measured in the study, potentially introducing same-source bias. Lastly, the small sample size and power posed an obstacle to assessing effect modification by gender and combat exposure.

Conclusion

The aim of this study was to define the associations between unit cohesion and depressive symptoms, suicidal ideation, and hazardous alcohol use among military service members that met criteria for PTSD and explore how the relationships differed based on gender or combat exposure. A significant negative association between unit cohesion and depression symptoms was found and stratified analyses showed that the association may be stronger in men and those with combat exposure. If these results were replicated in future research, it could suggest that unit cohesion has a greater impact on those whose mental health symptoms are related to combat rather than pre-military or non-combat military trauma. The discrepancy in these associations warrants additional research into the relationship between non-combat trauma, gender, and unit cohesion and suggest that enhancing unit cohesion in efforts to improve mental health outcomes

in military service members with PTSD could have varying effects based on gender and index trauma.

References

Armistead-Jehle, P., Johnston, S. L., Wade, N. G., & Ecklund, C. J. (2011). Posttraumatic Stress in U.S. Marines: The Role of Unit Cohesion and Combat Exposure. *Journal of Counseling & Development*, *89*(1), 81–88. https://doi.org/10.1002/j.1556-6678.2011.tb00063.x

Breslau, J., Setodji, C. M., & Vaughan, C. A. (2016). Is cohesion within military units associated with post-deployment behavioral and mental health outcomes? *Journal of Affective Disorders*, *198*, 102–107. https://doi.org/10.1016/j.jad.2016.03.053

Britt, T. W., Sipos, M. L., Klinefelter, Z., & Adler, A. B. (2019). Determinants of mental and physical health treatment-seeking among military personnel. *The British Journal of Psychiatry*, 1–7. https://doi.org/10.1192/bjp.2019.155

Browne, T., Iversen, A., Hull, L., Workman, L., Barker, C., Horn, O., Jones, M., Murphy, D., Greenberg, N., Rona, R., Hotopf, M., Wessely, S., & Fear, N. T. (2008). How do experiences in Iraq affect alcohol use among male UK armed forces personnel? *Occupational and Environmental Medicine*, *65*(9), 628–633. https://doi.org/10.1136/oem.2007.036830

Bryan, C. J., & Heron, E. A. (2015). BELONGING PROTECTS AGAINST POSTDEPLOYMENT DEPRESSION IN MILITARY PERSONNEL. *Depression and Anxiety*, *32*(5), 349–355. https://doi.org/10.1002/da.22372

Burns, B., Grindlay, K., Holt, K., Manski, R., & Grossman, D. (2013). Military sexual trauma among U.S. servicewomen during deployment: a qualitative study. *Contraception*, *88*(3), 468–469. https://doi.org/10.1016/j.contraception.2013.05.144

Cameron, K. L., Sturdivant, R. X., & Baker, S. P. (2019). Trends in the incidence of physician-diagnosed posttraumatic stress disorder among active-duty U.S. military personnel between 1999 and 2008. *Military Medical Research*, *6*(1). https://doi.org/10.1186/s40779-019-0198-5

Department of Defense. (2020, September). Annual Suicide Report Calendar Year 2020. https://www.dspo.mil/Portals/113/Documents/CY20%20Suicide%20Report/CY%202020%20Annual%20Suicide%20Report.pdf?ver=0OwlvDd-PJuA-igow5fBFA%3D%3D

Dursa, E. K., Reinhard, M. J., Barth, S. K., & Schneiderman, A. I. (2014). Prevalence of a Positive Screen for PTSD Among OEF/OIF and OEF/OIF-Era Veterans in a Large Population-Based Cohort. *Journal of Traumatic Stress*, *27*(5), 542–549. https://doi.org/10.1002/jts.21956

Fontana, A., Rosenheck, R., & Horvatch, T. (1997). Social Support and Psychopathology in the War Zone. *The Journal of Nervous & Mental Disease*, *185*(11), 675–681. https://doi.org/10.1097/00005053-199711000-00004

Gadermann, A. M., Engel, C. C., Naifeh, J. A., Nock, M. K., Petukhova, M., Santiago, P. N., Wu, B., Zaslavsky, A. M., & Kessler, R. C. (2012). Prevalence of DSM-IV Major Depression Among U.S. Military Personnel: Meta-Analysis and Simulation. *Military Medicine*, *177*(8S), 47–59. https://doi.org/10.7205/milmed-d-12-00103

Ghasemi, P., Shaghaghi, A., & Allahverdipour, H. (2015). Measurement Scales of Suicidal Ideation and Attitudes: A Systematic Review Article. *Health Promotion Perspectives*, *5*(3), 156–168. https://doi.org/10.15171/hpp.2015.019

Gray, M. J., Litz, B. T., Hsu, J. L., & Lombardo, T. W. (2004). Psychometric Properties of the Life Events Checklist. *Assessment*, *11*(4), 330–341. https://doi.org/10.1177/1073191104269954

Griffith, J. (2009). Being a Reserve Soldier. *Armed Forces & Society*, *36*(1), 38–64. https://doi.org/10.1177/0095327x08327819

Griffith, J. (2015). Cross (Unit)-Level Effects of Cohesion on Relationships of Suicide Thoughts to Combat Exposure, Postdeployment Stressors, and Postdeployment Social Support. *Behavioral Medicine*, *41*(3), 98–106. https://doi.org/10.1080/08964289.2014.987719

Grinage B. D. (2003). Diagnosis and management of post-traumatic stress disorder. American family physician, 68(12), 2401–2408.

Kanesarajah, J., Waller, M., Zheng, W. Y., & Dobson, A. J. (2016). Unit cohesion, traumatic exposure and mental health of military personnel. *Occupational Medicine*, *66*(4), 308–315. https://doi.org/10.1093/occmed/kqw009

Kang, H. K., Bullman, T. A., Smolenski, D. J., Skopp, N. A., Gahm, G. A., & Reger, M. A. (2015). Suicide risk among 1.3 million veterans who were on active duty during the Iraq and Afghanistan wars. *Annals of Epidemiology*, *25*(2), 96–100. https://doi.org/10.1016/j.annepidem.2014.11.020

Kelley, L. P., Weathers, F. W., McDevitt-Murphy, M. E., Eakin, D. E., & Flood, A. M. (2009). A comparison of PTSD symptom patterns in three types of civilian trauma. *Journal of Traumatic Stress*, *22*(3), 227–235. https://doi.org/10.1002/jts.20406

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Laws, H., Mazure, C. M., McKee, S. A., Park, C. L., & Hoff, R. (2016). Within-unit relationship quality mediates the association between military sexual trauma and posttraumatic stress symptoms in veterans separating from military service. *Psychological Trauma: Theory, Research, Practice, and Policy*, *8*(5), 649–656. https://doi.org/10.1037/tra0000118

Luxton, D. D., Rudd, M. D., Reger, M. A., & Gahm, G. A. (2011). A Psychometric Study of the Suicide Ideation Scale. *Archives of Suicide Research*, *15*(3), 250–258. https://doi.org/10.1080/13811118.2011.589720

Manea, L., Gilbody, S., & McMillan, D. (2015). A diagnostic meta-analysis of the Patient Health Questionnaire-9 (PHQ-9) algorithm scoring method as a screen for depression. *General Hospital Psychiatry*, *37*(1), 67–75. https://doi.org/10.1016/j.genhosppsych.2014.09.009

McLean, C. P., Zang, Y., Zandberg, L., Bryan, C. J., Gay, N., Yarvis, J. S., & Foa, E. B. (2017). Predictors of suicidal ideation among active duty military personnel with posttraumatic stress disorder. *Journal of Affective Disorders*, *208*, 392–398. https://doi.org/10.1016/j.jad.2016.08.061

Meneses-Gaya, C. de, Zuardi, A. W., Loureiro, S. R., & Crippa, J. A. S. (2009). Alcohol Use Disorders Identification Test (AUDIT): an updated systematic review of psychometric properties. *Psicologia: Teoria E Pesquisa*, *2*(1). https://doi.org/10.1590/s1983-32882009000100012

Mitchell, M. M., Gallaway, M. S., Millikan, A. M., & Bell, M. (2012). Interaction of Combat Exposure and Unit Cohesion in Predicting Suicide-Related Ideation Among Post-Deployment Soldiers. *Suicide and Life-Threatening Behavior*, *42*(5), 486–494. https://doi.org/10.1111/j.1943-278x.2012.00106.x

Naifeh, J. A., Colpe, L. J., Aliaga, P. A., Sampson, N. A., Heeringa, S. G., Stein, M. B., Ursano, R. J., Fullerton, C. S., Nock, M. K., Schoenbaum, M., Zaslavsky, A. M., & Kessler, R. C. (2016). Barriers to Initiating and Continuing Mental Health Treatment Among Soldiers in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Military Medicine*, *181*(9), 1021–1032. https://doi.org/10.7205/milmed-d-15-00211

Oliver, L. W., Harman, J., Hoover, E., Hayes, S. M., & Pandhi, N. A. (1999). A Quantitative Integration of the Military Cohesion Literature. *Military Psychology*, *11*(1), 57–83. https://doi.org/10.1207/s15327876mp1101_4

Orr, M. G., Prescott, M. R., Cohen, G. H., Calabrese, J. R., Tamburrino, M. B., Liberzon, I., & Galea, S. (2014). Potentially modifiable deployment characteristics and new-onset alcohol abuse or dependence in the US National Guard. *Drug and Alcohol Dependence*, *142*, 325–332. https://doi.org/10.1016/j.drugalcdep.2014.07.005

Pietrzak, R. H., Johnson, D. C., Goldstein, M. B., Malley, J. C., & Southwick, S. M. (2009). Posttraumatic Stress Disorder Mediates the Relationship Between Mild Traumatic Brain Injury and Health and Psychosocial Functioning in Veterans of Operations Enduring Freedom and Iraqi Freedom. *The Journal of Nervous and Mental Disease*, *197*(10), 748–753. https://doi.org/10.1097/nmd.0b013e3181b97a75

Rugo, K. F., Leifker, F. R., Drake-Brooks, M. M., Snell, M. B., Bryan, C. J., & Bryan, A. O. (2020). Unit Cohesion and Social Support as Protective Factors Against Suicide Risk and

Depression Among National Guard Service Members. *Journal of Social and Clinical Psychology*, *39*(3), 214–228. https://doi.org/10.1521/jscp.2020.39.3.214

Shen, Y.-C., Arkes, J., & Williams, T. V. (2012). Effects of Iraq/Afghanistan Deployments on Major Depression and Substance Use Disorder: Analysis of Active Duty Personnel in the US Military. *American Journal of Public Health*, *102*(S1), S80–S87. https://doi.org/10.2105/ajph.2011.300425

Shields, A. L., & Caruso, J. C. (2003). Reliability Generalization of the Alcohol Use Disorders Identification Test. *Educational and Psychological Measurement*, *63*(3), 404–413. https://doi.org/10.1177/0013164403063003004

Silvestrini, M., & Chen, J. A. (2021). *"It's a sign of weakness:" Masculinity, Help-Seeking Behaviors, and Gender-Specific Experiences Accessing VA PTSD Care*. https://doi.org/10.21203/rs.3.rs-1092195/v1

Smith, H. L., Summers, B. J., Dillon, K. H., & Cougle, J. R. (2016). Is worst-event trauma type related to PTSD symptom presentation and associated features? *Journal of Anxiety Disorders*, *38*, 55–61. https://doi.org/10.1016/j.janxdis.2016.01.007

Suvak, M. K., Vogt, D. S., Savarese, V. W., King, L. A., & King, D. W. (2002). Relationship of War-Zone Coping Strategies to Long-Term General Life Adjustment Among Vietnam Veterans: Combat Exposure as a Moderator Variable. *Personality and Social Psychology Bulletin*, *28*(7), 974–985. https://doi.org/10.1177/014616720202800710

Welsh, J. A., Olson, J. R., & Perkins, D. F. (2018). Gender Differences in Post-deployment Adjustment of Air Force Personnel: The Role of Wartime Experiences, Unit Cohesion, and Self-efficacy. *Military Medicine*, *184*(1-2), e229–e234. https://doi.org/10.1093/milmed/usy261

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment*, *52*(1), 30–41. https://doi.org/10.1207/s15327752jpa5201_2

Zinzow, H. M., Britt, T. W., Pury, C. L. S., Raymond, M. A., McFadden, A. C., & Burnette, C. M. (2013). Barriers and Facilitators of Mental Health Treatment Seeking Among Active-Duty Army Personnel. *Military Psychology*, *25*(5), 514–535. https://doi.org/10.1037/mil0000015

Table 1. *Sample Characteristics*

Characteristics	Participants (n=153) no. (*%*)
Gender	
Male	107 (*69.9*)
Female	46 (*30.1*)
Race	
White	115 (75.2)
Non-White	38 (24.8)
Ethnicity	
Hispanic or Latino/a	17 (11.1)
Not Hispanic or Latino/a	136 (*88.9*)
Education Status	
Less than AA degree	81 (*52.9*)
AA degree or higher	72 (*47.1*)
Marital status	
Married	93 (60.8)
Single	60 (39.2)
Branch	
Army	128 (*81.0*)
Air Force or Navy	29 (*19.0)*

Rank	
E1-E4	65 (*42.5*)
E5-E9, O1-O4, or W1-W4	88 (*57.5*)
Previous Combat Exposure	
Yes	106 (69.3)
No	47 (30.7)

Table 2. *Means, standard deviations, and correlations*

Variable	*M*	*SD*	PHQ-9 score	AUDIT score
1. PHQ-9 score	13.31	4.67		
2. AUDIT score	8.07	7.17	.14	
3. SIS score	2.61	5.19	.29	.17

Table 3. *Regression models representing the association between unit cohesion and PHQ-9 score and AUDIT scores, adjusted for covariates. * SIS results were populated using a negative binomial regression model and exponentiated.*

	PHQ-9		**AUDIT**		**SIS**	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Intercept	14.73	12.63, 16.84	7.43	4.18, 10.69	3.56	1.14, 12.64
Unit Cohesion	-1.40	-2.58, -0.21	-0.60	-2.44, 1.24	0.97	0.54, 1.73
Female gender	0.89	-0.83, 2.61	-2.28	-4.94, 0.39	1.63	0.69, 4.1
Non-white race	1.01	-0.80, 2.82	-0.91	-3.72, 1.89	0.88	0.35, 2.41
Hispanic or Latino/a	-1.57	-4.01, 0.88	0.96	-2.82, 4.75	0.66	0.18, 2.9
Branch	-0.43	-2.34, 1.48	1.42	-1.55, 4.38	0.70	0.25, 2.26
Rank	-0.59	-2.56, 1.39	3.41	0.35, 6.47	1.20	0.46, 3.32
Education	-0.85	-2.56, 0.86	0.55	-2.09, 3.19	0.61	-1.32, 0.31
Marital Status	0.80	-0.75, 2.34	1.60	-0.80, 4.00	0.83	0.38, 1.87
Combat Exposure	0.45	-1.48, 2.38	-1.92	-4.91, 1.07	0.71	0.25, 2.11

*Models were adjusted for the following covariates: female gender, non-white race, Hispanic or Latino/a ethnicity, military branch, military rank, education level, marital status, and combat exposure.

Table 4. *Regression models stratified by gender representing the association between one IQR unit (12.0) increase of unit cohesion and PHQ-9 and AUDIT scores adjusted for covariates. * SIS results were populated using a negative binomial regression model and exponentiated.*

	Male		**Female**	
	PHQ-9			
	Estimate	95% CI	Estimate	95% CI
Intercept	15.1	12.72, 17.46	13.8	8.42, 19.2
Unit Cohesion	-1.84	-3.29, -0.39	-0.22	-2.59, 2.15
	AUDIT			
Intercept	8.14	4.37, 11.92	4.74	-1.91, 11.38
Unit Cohesion	-1.65	-3.95, 0.66	1.51	-1.41, 4.43
	SIS			
Intercept	3.86	1.09, 13.62	3.52	0.46, 26.78
Unit Cohesion	1.10	0.50, 2.39	1.87	0.77, 4.55

*Models were adjusted for the following covariates: female gender, non-white race, Hispanic or Latino/a ethnicity, military branch, military rank, education level, marital status, and combat exposure.

Table 5. *Regression models stratified by combat exposure representing the association between one IQR unit (12.0) increase of unit cohesion and PHQ-9 and AUDIT scores adjusted for covariates. * SIS results were populated using a negative binomial regression model and exponentiated.*

	Combat Exposure		**No Combat Exposure**	
	PHQ			
	Estimate	95% CI	Estimate	95% CI
Intercept	15.4	13.03, 17.80	13.4	7.80, 18.93
Unit Cohesion	-1.78	-3.19, -0.38	-0.53	-2.94, 1.88
	AUDIT			
Intercept	6.82	2.96, 10.68	6.96	-1.51, 15.43
Unit Cohesion	-0.063	-2.33, 2.20	-1.25	-4.9, 2.41
	SIS			
Intercept	2.59	0.78, 8.62	5.20	0.61, 44.33
Unit Cohesion	1.23	0.60, 2.49	1.01	0.41, 2.50

*Models were adjusted for the following covariates: female gender, non-white race, Hispanic or Latino/a ethnicity, military branch, military rank, education level, marital status, and combat exposure.