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Does Deployment-Related Military Sexual Assault Interact with Combat Exposure to Predict Posttraumatic Stress Disorder in Female Veterans?

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Abstract

The objective of the present research was to expand upon previous findings indicating that military sexual trauma interacts with combat exposure to predict PTSD among female Iraq/Afghanistan-era veterans. Three hundred and thirty female veterans completed self-report measures of combat experiences, military sexual assault (MSA) experiences, and PTSD symptoms as well as structured diagnostic interviews for PTSD. A significant strength of the present research was the use of PTSD diagnosis as an outcome measure. Consistent with prior research, both combat exposure and MSA were significant predictors of PTSD symptoms (linear regression) and PTSD diagnoses (logistic regression). Specifically, participants who experienced deployment-related MSA had approximately six times the odds of developing PTSD compared to those who had not experienced deployment-related MSA, over and above the effects of combat exposure. Contrary to expectations, the hypothesized interaction between MSA and combat exposure was not significant in any of the models. The low base rate of MSA may have limited power to find a significant interaction; however, these findings are also consistent with other recent studies that have failed to find support for the hypothesized interaction. Thus, whereas the majority of available evidence indicates that MSA increases risk for PTSD among veterans over and above the effects of combat, there is presently only limited support for the hypothesized MSA x combat interaction. These findings highlight the continued need for prevention and treatment of MSA in order to improve veterans' long-term mental health and well-being.

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Keywords

military sexual trauma; veterans; sexual assault; combat exposure; women's health

Although women have played integral roles in U.S. combat operations since the Revolutionary War (Goldstein, 2001), the roles for women in the military have changed significantly in recent conflicts, with an increasingly large percentage of women being exposed to traumatic combat experiences (Street, Vogt, & Dutra, 2009). Combat experiences are known to substantially increase risk for a broad array of adverse mental health outcomes (e.g., Kimbrel et al., 2015), particularly the development of posttraumatic stress disorder (PTSD; Keane, Fairbank, Caddell, Zimering, Taylor & Mora, 1989; Kimbrel et al., 2014a).

Military sexual trauma (MST), defined by the Veterans Administration (VA) as “sexual harassment that is threatening in character or physical assault of a sexual nature that occurred while the victim was in the military, regardless of geographic location of the trauma, gender of the victim, or the relationship to the perpetrator” (Department of Veterans Affairs, 2004, p.1) is also experienced by many female service members (Katz et al., 2012; Maguen et al., 2012; Street et al., 2013). While prevalence estimates vary by sample, studies suggest that 20–43% of women who serve in the military experience MST (Surís & Lind, 2008). Estimated rates of MST specifically amongst female Iraq/Afghanistan-era veterans using VA healthcare range from 14% to 49% (Haskell et al., 2010; Kimerling et al., 2010; Scott et al., 2014). Like combat exposure, MST is associated with increased risk for a variety of physical and mental health disorders (Kang et al., 2005; Schry et al., 2015; Surís et al., 2007). Furthermore, there is evidence indicating that sexual trauma experienced in the military may be more detrimental than civilian sexual trauma (Surís et al., 2007).

Combined Impact of Military Sexual Trauma and Combat Exposure

As noted by Allard and colleagues (2011), there is a significant need for new research to identify contextual moderators of the impact of MST on service members' mental health. One factor that may affect the association between MST and mental health outcomes is the amount of exposure to combat, as MST often occurs within the context of warzone deployments (e.g., 12.5% of men and 42% of women reported experiencing MST while deployed; Katz et al., 2012). Further, some evidence suggests an interactive effect between previous trauma history and warzone stressors in the prediction of symptoms of PTSD (King, King, Foy, & Gudanowski, 1996). Likewise, evidence has suggested a synergistic effect between MST and combat exposure. Specifically, Scott et al. (2014) reported that in a sample of 365 Iraq and Afghanistan era female veterans, MST interacted with combat exposure to predict PTSD symptoms among female veterans, such that participants who were exposed to both MST and high levels of combat reported more severe PTSD symptoms than those who were exposed to high levels of combat only.

However, two subsequent studies failed to find this synergistic effect for combat and MST in predominantly male samples of veterans. Wilson et al. (2015) attempted to replicate Scott and colleagues' (2014) finding in a sample of male Iraq/Afghanistan-era veterans and found no evidence for the hypothesized MST by combat interaction on PTSD symptoms,

depression symptoms, or anxiety symptoms. Similarly, Godfrey and colleagues (2015) tested the MST by combat interaction in a predominantly male (84%) sample of 1,294 veterans and failed to find evidence for significant MST by combat interactions in the prediction of PTSD or depression.

While the latter two studies found no support for the hypothesized MST x combat interaction among males, it should be noted that MST is substantially more common among female veterans. For example, 25.0% of female veterans who utilized services at the Department of Veterans Affairs in 2014 screened positive for MST compared to 1.3% of male veterans (Military Sexual Trauma Support Team, 2015). Further, recent surveys of active-duty military estimated that 1% of active-duty men and 5% of active-duty women experienced one or more sexual assaults in a one-year period (Morral, 2014). Therefore, Calhoun et al. (2016) tested for the hypothesized MST by combat interaction in a sample of 185 female Iraq/Afghanistan-era veterans; however, they also failed to find evidence for an interactive association between combat exposure and MST on severity of PTSD or depressive symptoms. They did, however, report that MST was uniquely related to severity of both PTSD and depressive symptoms after controlling for demographic variables, military history, service-connected injuries, and combat exposure.

Thus, of the four studies that have examined this issue to date, only one has found support for the hypothesized MST by combat interaction. The current study sought to expand upon this literature by investigating a similar interaction to Scott and colleagues' (2014), but narrowing the definition of MST to military sexual assault (MSA). This was done to test whether previous failures to find the moderation effect were due in part to the lack of intensity in the experiences of MST being captured. MSA is defined as intentional sexual contact characterized by the use of force, threats, intimidation, or abuse of authority or when the victim does not or cannot consent that has occurred at any point during active duty military service (Department of Defense, 2013). Although both harassment and assault are associated with deleterious mental health outcomes (as discussed above), MSA likely represents a more severe/violent traumatic experience than harassment. Not surprisingly, MSA is also more prevalent amongst women and is associated with adverse mental health consequences for both male and female veterans (e.g., Kearns et al., 2016; Rock, Lipari, Cook, & Hale 2010; Schry et al., 2015). To our knowledge, prior studies have investigated MSA and combat in the same models (e.g., Kearns et al., 2016), but none have tested for MSA x combat interactions.

Study Objective and Hypothesis

The objective of the present research was to expand upon the findings of Scott and colleagues (2014) by examining a potential MSA by combat interaction in a large sample of female veterans who participated in the VA Mid-Atlantic Mental Illness Research, Education and Clinical Center (MIRECC) Post-Deployment Mental Health (PDMH) study. Consistent with the previous findings of Scott et al. (2014), we hypothesized that the presence of deployment-related MSA would moderate the effect of combat exposure on PTSD symptoms, such that female veterans who were exposed to both MSA and high levels of combat would report more severe PTSD symptoms than those who were exposed to high

levels of combat without additional MSA exposure. We also extended prior research in this area by testing to see if the hypothesized interaction effect might impact female veterans' likelihood of meeting criteria for a diagnosis of PTSD

Methods

Procedures

Data were collected as part of the VA Mid-Atlantic MIRECC's ongoing Post-Deployment Mental Health (PDMH) Study, which includes data from four sites in North Carolina and Virginia. Procedures for this study are described in detail elsewhere Brancu et al., 2017; Kimbrel et al., 2014b. Participants were recruited using flyers, invitation letters, and VA clinician referrals. After providing written consent, participants completed structured diagnostic interviews and a battery of self-report measures. All procedures were approved by the Durham VAMC Institutional Review Board (IRB) and subsequently approved by local review boards of each participating site, including McGuire (Richmond, Virginia), Hampton (Virginia), and W.G. (Bill) Hefner (Salisbury, North Carolina) VA Medical Centers.

Participants

The present analyses were restricted to the 330 female Iraq/Afghanistan-era veterans who participated in the PDMH study and had completed the MSA assessment at the time of analysis. Most participants identified as either African American (61.5%; $n = 203$) or White (38.5%; $n = 127$), which is a higher minority proportion than the men (44.0% African American) in the PDMH study (Brancu et al., 2017). On average, participants had 13.93 ($SD = 4.01$) years of education. Approximately 55% ($n = 182$) of participants endorsed one or more combat experience(s), whereas 12.7% ($n = 42$) reported experiencing MSA during a deployment. Participants' mean score on the Davidson Trauma Scale (Davidson et al., 1997) was 37.44 ($SD = 38.98$). In addition, 42.7% ($n = 141$) of the sample met criteria for lifetime PTSD, whereas 26.4% ($n = 87$) met criteria for current PTSD. The rate of PTSD was elevated compared to other estimates of PTSD for OEF/OIF veterans (e.g., 23%; Fulton et al., 2015), which perhaps reflects clinician referrals and advertising at VA hospitals during recruitment.

Measures

The Structured Clinical Interview for DSM-IV Disorders (SCID-IV; First et al., 1994) was used to diagnose lifetime and current PTSD based on DSM-IV criteria. Note that data collection began in 2005, before the introduction of the DSM-5, and DSM-IV criteria were used throughout to ensure consistency across participants. Interviewers underwent extensive training as well as ongoing supervision. Interviewers also demonstrated excellent reliability (Fleiss' kappa = 0.94 for any Axis I diagnosis and 1.0 specifically for current PTSD) when scoring a series of seven SCID-based training videos. The Davidson Trauma Scale (DTS; Davidson et al., 1997) was used to assess current frequency and severity of DSM-IV PTSD symptoms. The DTS contains 17 self-report items rated on a 5-point scale (frequency scale: 0 = not at all to 4 = every day; severity scale: 0 = not at all distressing to 4 = extremely distressing) and has good reliability and validity (McDonald et al., 2009). The Combat Exposure Scale (CES; Keane et al., 1989) was used to assess combat exposure. The CES is a

7-item, self-report measure that has demonstrated good reliability and validity in prior research with veterans (Keane et al., 1989). Deployment-related MSA was assessed via self-report. Specifically, participants were asked if they had ever experienced “*unwanted sexual activity as a result of force, threat of harm, or manipulation*” as part of their authorized duties while they were deployed. A yes/no response format was used. Participants who endorsed this item with a “yes” response were categorized as having experienced deployment-related MSA.

Plan of Analysis

All analyses were conducted in SPSS 24, including assessing for normality, linearity, homoscedasticity, and multicollinearity (e.g., through examination of residual distributions and variance inflation factor values). This examination revealed elevated skewness (1.551) and kurtosis (1.717) values for the CES total score. Accordingly, the CES score was transformed with a square root transformation, which reduced both skewness (.876) and kurtosis (−.387). Linear regression was used to test the main hypothesis in relation to PTSD symptom severity. DTS scores served as the dependent variable in this model. The main effects for combat exposure and MSA were included in the model along with the interaction term. Both combat exposure and MSA were centered prior to calculation of the interaction term to protect against multicollinearity and improve interpretation of findings (Aiken & West, 1991; Kraemer & Blasey, 2004). Combat exposure was centered by subtracting the mean from each participant’s total score. Absence of a history of MSA was coded as −0.5, whereas presence of a history of MSA was coded as 0.5. The logistic regression models were constructed similarly, with main effects for combat and MSA included in the first step and the interaction term in the second; however, lifetime and current PTSD diagnosis (coded 0 = absent; 1 = present) served as the dependent variables in these models. Significant interactions were plotted and probed using Dawson’s (2014) methodology.

Results

Both combat exposure, $\beta = 0.42$, $p < 0.001$, and MSA, $\beta = 0.28$, $p < 0.001$, had significant main effects on PTSD symptom severity in the linear regression model predicting DTS scores; however, the hypothesized MSA x combat interaction was not a significant predictor of PTSD symptom severity, $\beta = -0.02$, $p = 0.71$. Similar results were obtained when logistic regression was used to examine the impact of the MSA x combat interaction on lifetime and current PTSD diagnosis on the SCID-IV (Table 1). As expected, both combat exposure and MSA had significant main effects on lifetime and current PTSD diagnosis; however, the hypothesized MSA x combat interaction term was not associated with lifetime PTSD diagnosis, OR = 1.38, 95% CI: 0.65 – 2.93, or current PTSD diagnosis, OR = 0.94, 95% CI: 0.57 – 1.56. Notably, even after adjusting for the effects of combat exposure, MSA was found to have a substantial direct impact on both lifetime, OR = 6.48, 95% CI: 2.57 – 16.32, and current PTSD, OR = 6.46, 95% CI: 3.01 – 13.86 (Table 1).

Discussion

Consistent with prior research, both combat exposure and MSA were significant predictors of PTSD symptoms and PTSD diagnoses within this sample of female veterans. Specifically,

we found that participants who experienced deployment-related MSA had approximately six times the odds of developing PTSD compared to those who had not experienced deployment-related MSA, over and above the effects of combat exposure. Clinically, these findings alert providers to the critical need to assess for different types of traumatic experiences and their contributions to PTSD symptomatology. For example, the Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5; Blevins et al., 2015) is widely used to assess military trauma and often, in both clinical and research settings, does not ask the respondent to report the traumatic event(s). This is especially problematic given the documented under-reporting of MST (e.g., Wolff & Mills, 2016). In addition to reluctance to disclose to loved ones and healthcare providers, women who have experienced sexual trauma in the military may have unique struggles, such as believing their experiences are less legitimate, poorer perceptions of VHA care, and more problems with VHA doctors and staff (Kelly et al., 2008). In terms of policy, these findings should inform MST programs both within and outside of the VA system regarding the strong association between MSA and PTSD. A potential future direction is investigation of whether MST is related to specific types/clusters of PTSD symptoms, as this study was limited to examining symptoms as a group.

Also consistent with prior research (with the exception of Scott et al., 2014), the interaction of MSA and combat was not significant in any of the models examined. A potential explanation may be the relatively low base rate of MSA observed in the present sample (12.7%, $n = 42$); therefore, we cannot rule out the possibility that the lack of significant interactions may reflect Type II error. Of note, the rate of sexual assault observed in the present study was quite similar to the rate of sexual assault observed by Scott et al. (2014; 14.7%); however, Scott et al. also included sexual harassment (34.8%) in their operational definition, resulting in a much higher overall rate of MST (49.5%) in their sample. The definition of MSA in the current study was also limited to assault that occurred during authorized duties on deployment, which likely increased the probability that assaults were perpetrated by other members of the military. Therefore, the potential role of institutional betrayal in promoting symptoms of PTSD should also be considered (e.g., Monteith et al., 2016).

Study Limitations and Conclusions

The present study had several strengths and limitations that should be noted when interpreting these findings. Significant strengths include the large, diverse sample of female Iraq/Afghanistan-era veterans, as well as the use of structured interviews to assess current and lifetime PTSD diagnosis. The use of MSA (vs. MST more broadly) was an addition to the literature; however, limitations with this variable should be noted. First, the MSA measure was limited to experiences that occurred during deployment, as opposed to sexual assault occurring throughout one's military experience (e.g., during training). Therefore, information is lacking regarding non-deployment MSA for all participants, and particularly for those in the "no-MSA" group, which may have muddied findings. Further, a one-item measure is likely limited when compared to more detailed/expansive assessments of MST, such as the Deployment Risk and Resilience Inventory-2 (DRRI-2; Vogt et al., 2013) Sexual

Harassment Scale, which includes several different experiences of military sexual assault (although this measure is also limited to MST during deployment).

Additional limitations included the cross-sectional design, which precludes conclusions about the casual nature between MSA and/or combat, and PTSD. Likewise, lifetime PTSD diagnosis relies on retrospective assessments and may have been attributed to any experience of trauma; however, this variable was included in an attempt to detect PTSD diagnoses that may have occurred following deployment and remitted by the time of the study. Finally, the relatively small number of participants who endorsed MSA limited power to detect the interaction.

Despite these limitations, the present findings add to the growing body of research (e.g., Breland et al., 2017; Fontana & Rosenheck, 1998; Goldstein et al., 2017) demonstrating the prevalence of deployment-related MST among female veterans and its significant impact on risk for PTSD. Future research aimed at improving ongoing efforts to prevent deployment-related MST among female veterans and treat its consequences is clearly warranted.

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Table 1

Summary of Logistic Regression Models Predicting Current and Lifetime PTSD Diagnosis

	Lifetime PTSD		Current PTSD	
	OR	95% CI	OR	95% CI
Combat Exposure	1.68 ^{**}	1.15 – 2.44	1.51 ^{**}	1.18–1.95
Military Sexual Trauma (MST)	6.46 ^{***}	2.57 – 6.32	6.46 ^{***}	3.01 – 13.86
Combat Exposure x MST	1.38	0.65 – 2.93	0.94	0.57 – 1.56

Note:

* $p < 0.05$;** $p < 0.01$;*** $p < 0.001$.