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Military Sexual Trauma and Co-Occurring Posttraumatic Stress Disorder, Depressive Disorders, and Substance Use Disorders among Returning Afghanistan and Iraq Veterans

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Abstract

Purpose—Posttraumatic stress disorder (PTSD), depressive disorders (DD), and substance use disorders (SUD) are prevalent among Veterans. A positive military sexual trauma (MST) screen is associated with higher likelihood of each of these disorders. The current study examined the associations between MST, gender, and co-occurring PTSD, DD, and SUD among Veterans receiving services at the Veterans Affairs (VA) to inform assessment and treatment. We were specifically interested in the interactions between MST and gender on co-occurring disorders.

Methods—The sample included 494,822 VA service seeking Veterans (12.5% women) deployed to Iraq and Afghanistan who recently separated from the military and were screened for MST between 2004 and 2013.

Main Findings—Veterans with positive MST screens had higher odds than those with negative screens of individual and co-occurring PTSD, DD, and SUD. The association between positive MST screens and diagnostic outcomes including PTSD was stronger for women than for men, and the association between positive MST screens and some diagnostic outcomes, including DD, was stronger for men than for women.

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Conclusions—These results highlight the importance of assessing for and recognizing the potential MST and gender interactions in the clinical context among Veterans with co-occurring PTSD, DD, and/or SUD.

Posttraumatic stress disorder (PTSD), depressive disorders (DD), and substance use disorders (SUD) are prevalent among Veterans who were deployed to Iraq and Afghanistan and served in Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn (OEF/OIF/OND). PTSD is the most prevalent mental health disorder among OEF/OIF/OND Veterans receiving care at the Department of Veterans Affairs (VA); approximately 50% of those with a mental health disorder have been diagnosed with PTSD (Epidemiology Program, 2014). No consistent gender differences in rates of PTSD among Veterans have been identified (Maguen, Luxton, Skopp, & Madden, 2012; Street, Gradus, Giasson, Vogt, & Resick, 2013; Vogt et al., 2011), contrary to civilian populations where PTSD is more prevalent among women than men (Tolin & Foa, 2006). DD are the second most common mental health diagnoses among OEF/OIF/OND Veterans, with 43% of those with a mental health disorder being diagnosed with DD (Epidemiology Program, 2014). Similar to the civilian literature, DD are more prevalent among women than men Veterans (Seal et al., 2009; Street et al., 2013). SUD is also problematic among OEF/OIF/OND Veterans, with 22–40% screening positive for alcohol misuse (Calhoun, Elter, Kudler, & Straits-Troster, 2008; Hawkins, Lapham, Kivlahan, & Bradley, 2010). Also similar to the civilian literature, SUD is more prevalent among men than women Veterans (Hawkins et al., 2010; Seal et al., 2009; Street et al., 2013). Despite these gender differences in the major mental health diagnoses prevalent among Veterans, it is unclear if there is an interaction between gender and military sexual trauma (MST).

Rates of PTSD, DD, and SUD are higher for veterans with a positive MST screen than among the general veteran population (Kimerling, Gima, Smith, Street, & Frayne, 2007; Maguen et al., 2012; Suris, & Lind, 2008). In 2000, the VA instituted mandatory MST screening of sexual harassment or sexual assault while in the military (Hyun, Kimerling, Cronkite, McCutcheon, & Frayne, 2012) for all patients by mental health professionals and providers upon initiation of services. An estimated 25% of women and 1% of men have a positive MST screen (Veterans Health Administration, 2015). Among veteran outpatients in 2003, those with a positive compared to a negative MST screen had higher odds of having PTSD (adjusted odds ratio [AOR] = 8.8 for women; 3.0 for men), DD (AOR = 2.3 for women; 2.2 for men), alcohol use disorder (AOR = 2.3 for women; 1.8 for men), and drug abuse (AOR = 2.1 for women and men; Kimerling et al., 2007). A positive MST screen is indicative of a potentially very different military experience compared to those with negative MST screens. MST can be a pervasive experience and is not limited to the U.S. military, but is a global concern (Australian Human Rights Commission, 2014; Deschamps, 2015; Rutherford, Schneider, & Walmsley, 2006). In the U.S. military, a recent examination of 491,680 current active duty service members revealed that of those who had been sexually assaulted in the military in the past year 55% of women and 75% of men reported multiple assaults in the past year (Morral et al., 2015). Sexual harassment within the military is also a pervasive experience occurring at multiple time points. In combination, military sexual harassment and assault create a hostile work environment that can affect mental health beyond other stressful experiences the military endures. The systemic global violence

against women both within and external to the military may suggest differential impact of MST on men and women veterans. However, recent research on men with a positive MST status suggests that men experience mental health symptoms that are similar to women with positive MST screens (for a recent review, see Stander & Thomsen, 2016).

Co-Occurring PTSD, DD, and SUD among Veterans

PTSD, DD, and SUD frequently co-occur (Curry et al., 2014; Danielson et al., 2009) and this is especially true among OEF/OIF/OND Veterans receiving treatment within the VA (Maguen, Ren, Bosch, Marmar, & Seal, 2010; Seal, Bertenthal, Miner, Sen, & Marmar, 2007). For example, 12% of Veterans from this era with a mental health disorder are also diagnosed with alcohol dependence and 7% are diagnosed with drug dependence (Epidemiology Program, 2014). Individuals with co-occurring disorders report greater severity of symptoms than individuals with a single disorder (Heltemes, Clouser, MacGregor, Norman, & Galarneau, 2014; Read, Brown, Kahler, 2004). Thus, identifying Veterans at risk of developing co-occurring PTSD, DD, and/or SUD is of great importance to inform treatment planning and provision of services. Moreover, elucidating rates of particular combinations of common mental health disorders associated with a positive MST screen (i.e., PTSD + DD, PTSD + SUD, DD + SUD, or all three), and whether those rates differ by gender, would help the VA system calibrate training and cross clinic referral systems to meet the needs of those with co-occurring disorders.

To date, only one study has examined the association between MST and co-occurring disorders, but the analytic sample was restricted to Veterans with PTSD (Maguen, Cohen, et al., 2012). Positive MST screen was associated with higher likelihood of having PTSD co-occurring with DD among women. Additionally, positive MST screen was associated with higher likelihood of having PTSD co-occurring with SUD among men. Given that not all Veterans with a positive MST screen have PTSD, it is important to examine co-occurring diagnostic rates beyond this specific diagnosis. One study examined the interaction between MST status and gender on PTSD, depression, and alcohol use and did not find any significant MST by gender interactions in the context of also examining the effects of combat exposure on the same diagnostic outcomes (Maguen, Luxton et al., 2012). However, it may be possible that there are interactions when examining diagnostic outcomes separately and comparing to each possible diagnostic outcome rather than just focusing on if Veterans with histories of MST and combat exposure predict having or not having each disorder. To our knowledge, no studies have examined rates of co-occurring PTSD, DD, and SUD among men and women Veterans with a positive and negative MST screen.

Co-occurring disorders compared to single disorders have different treatment implications. For example, Veterans with co-occurring PTSD and depressive symptoms may be more likely to benefit from a combination of exposure therapy and cognitive restructuring (e.g., Bryant et al., 2008). Veterans with co-occurring PTSD and substance use disorders may be more likely to benefit from integrated treatment (for a review, see McCauley, Kileen, Gros, Brady, & Back, 2012). Therefore, it is imperative to understand differential outcomes of co-occurring and single disorders to inform treatment.

Current Study

The current study addresses a gap in the literature on MST screen and co-occurring disorders by assessing the pattern of combinations of co-occurring PTSD, DD, and SUD among OEF/OIF/OND Veterans with a positive and negative MST screen. In light of the higher rates of each disorder individually with a positive MST screen (Kimerling et al., 2007; Suris, & Lind, 2008), we hypothesized that Veterans with a positive MST screen would be more likely to have individual and co-occurring PTSD, DD, and SUD than those with a MST-negative screen. Consistent with previous research, it was expected for women to be more likely to have co-occurring diagnoses including DD (Seal et al., 2009; Street et al., 2013) and PTSD (Tolin & Foa, 2006) while men would be more likely to have co-occurring diagnoses including SUD (Hawkins et al., 2010; Seal et al., 2009; Street et al., 2013). An exploratory aim was to examine interactions between MST screen and gender on the likelihood of having individual and co-occurring PTSD, DD, and SUD diagnoses when compared to individual diagnostic categories or the absence of these diagnoses.

Methods

Participants and Procedure

Service personnel who separated from the military from the OIF/OEF/OND era between fiscal years (FY) 2001 and 2011 were identified from a VA/Department of Defense roster file. Demographic and military service data included in the roster file were linked to records in the nationwide VA research database of administrative and clinical data managed by VA Informatics and Computing Infrastructure (VINCI; VINCI Core Team, 2015). VA clinical data included MST screen results, clinical diagnoses, and housing status for FY 2004–2013.

To focus on the needs of returning service seeking OIF/OEF/OND Veterans during their first year of VA care after their last deployment, the sample was restricted to Veterans who had at least one year of administrative follow-up data available between date of first VA encounter after their last date of deployment ($n = 767,149$; 97.6% of Veterans in roster).

The sample was restricted to those with a valid MST screen on file within that period ($n = 496,307$; 67% of those with one-year data). A total of 494,861 (99.7%) Veterans had a “Yes” or “No” response (“Decline” responses were excluded). Further, 39 Veterans were excluded from the sample due to missing a “male” or “female” gender value, resulting in a final analytical sample of 494,822. Approval for this study was granted from the Institutional Review Board and the Research and Development committees.

Measures

Military Sexual Trauma—VA providers ask Veterans if they received “uninvited and unwanted sexual attention such as touching, cornering, pressure for sexual favors, or verbal remarks” or if “someone ever use[d] force or threat of force to have sexual contact with you against your will” during the military. Veterans were identified as having a positive MST screen if they endorsed either item or negative MST screen if they denied both items.

Mental Health Diagnoses—Diagnoses of PTSD, DD, and SUD were retrieved from VA clinical data using the following ICD-9 codes: PTSD, 309.81; DD, 294.83, 296.20–296.36, 300.40, 311; and SUD, 303.00–303.93, 304.00–304.93, 305.00–305.93. Two or more encounters indicating one of these specific ICD-9 codes was treated were required for a given category to increase the likelihood of diagnostic accuracy, consistent with other VA mental health studies using administrative data (Seal et al., 2007). Using the three diagnoses of interest, a variable was created to reflect the eight possible diagnostic outcomes: no diagnosis in any category, PTSD-only, DD-only, SUD-only, PTSD+DD, PTSD+SUD, DD+SUD, and PTSD+DD+SUD.

Covariates—Covariates were included in the model if there was an established association between the predictors and the outcome. The following covariates available in VA administrative data were included in the model: age, race/ethnicity, education, marital status, housing status, military rank, military component, and branch of service.

Data Analysis

Preliminary analyses included examining descriptive statistics for all demographic, military service-related, and diagnostic group variables, stratified by MST screen and gender. Distributions of demographics and diagnostic outcome variables were compared between positive and negative MST screen, separately for men and women, using a series of chi-square tests; age was compared using independent-samples *t*-tests.

A multinomial logistic regression analysis was conducted to compute risk for each of the eight diagnostic outcomes. Primary predictor variables included MST screen gender, and the interaction between MST screen and gender. In the interest of obtaining independent estimates for the primary predictor variables, covariates were included for age, education, marital status, race, housing status, branch of service, rank, and military component. Multicollinearity among predictors was evaluated using variable variance inflation factors. These tests indicated that variables had sufficiently low correlations. In order to compare each of the eight diagnostic outcomes, the model was rerun with a different reference group for the outcome variable seven times. In order to reduce risk for inflated Type I error due to multiple comparisons, $\alpha = 0.01$ was used to evaluate statistical significance. All analyses were conducted using R (R Core Team, 2015).

Results

Of 494,822 Veterans who received medical care in the VA, the rate of positive MST screen was 2.9%. Overall, 19.6% had a diagnosis of PTSD, 9.3% had a diagnosis of DD, and 3.5% had a diagnosis of SUD. For the variable describing the possible combinations of diagnostic outcomes, “No PTSD, DD, or SUD” was found most frequently, comprising 72.8% of the sample. The most common diagnosis was PTSD-only (15.2%). DD-only included 5.6% of the sample, and DD+PTSD included 2.8% of the sample. The remaining categories, SUD-only, SUD+PTSD, DD+PTSD, and PTSD+DD+SUD made up 1.5%, 1.1%, 0.4%, and .04%, respectively.

Demographic and Military Service Characteristics

Table 1 presents descriptive statistics for demographic and military service characteristics, stratified by both MST screen and gender. Positive MST screens were more likely among women (16.9%) than men (0.7%). For both men and women, positive MST screen was associated with elevated rates of homelessness, active duty service, and service in the Navy or Coast Guard. The proportion of Black women was slightly lower among those with positive MST screen compared to those with a negative MST screen, but slightly higher among Black men with a positive MST screen compared to those with a negative MST screen. A significantly higher percentage of women with positive MST screens were married or divorced compared to those with negative MST screens while there were no differences in marital status among men based on MST screen. Demographic and military service characteristic covariates were also found to relate to diagnostic outcomes. A history of homelessness, lower levels of education, white race, enlisted rank, and service in the Army were all associated with significantly higher risk having at least one diagnosis ($p < 0.01$, results not included in tables).

MST Screen and Diagnostic Categories

Table 2 presents the unadjusted rates for each of the eight diagnostic categories and the overall rates of PTSD, DD, and SUD, stratified by both MST screen and gender. There were significant differences on several diagnostic outcomes based on MST screen and gender (see Table 2). The designation of “No PTSD, DD, or SUD” was much more common among men and women with a negative MST screen than among those with a positive MST screen. Relatedly, frequencies of every diagnosis and combination of diagnoses were elevated among Veterans with a positive relative to a negative MST screen. The overall rates of PTSD, DD, and SUD were also significantly greater for those with a positive relative to a negative MST screen as was the rate of having any one of the single disorders or any comorbidity combination. Notably, among Veterans with a positive MST screen, rates of having any single disorder or any co-occurring disorder were very similar for women and men. For example, the rate of any co-occurring disorder combination for women with a positive MST screen was 11.9% (vs. 3.4% for those with a negative MST screen) and for men with a positive MST screen was 12.3% (vs. 4.8% for those with a negative MST screen).

We also examined the rate of positive MST screens among those with *any* of the three single disorders and those with *any* of the comorbidity combinations. Among women with a single disorder, 29.1% had a positive MST screen; among women with a co-occurring disorder combination, 41.8% had a positive MST screen. Among men with a single disorder, 1.2% had a positive MST screen; among men with a co-occurring disorder combination 1.9% had a positive MST screen. (Note: these results were derived from the information in Table 2 but are not shown).

Association between Diagnostic Categories and both MST Screen and Gender

Table 3 presents the results of the multinomial logistic regression analysis (adjusted odds ratios [AOR] and 99% confidence intervals) where diagnostic categories served as the outcome variable, and predictors included MST screen, gender, and their interaction, as well

as demographic and military service-related covariates. For the MST variable, the reference category was “negative screen”. For the gender variable, the reference category was “women”. Thus, a significant interaction with a value greater than 1 indicates that the risk conferred by MST for a given outcome was differentially greater among men, while a significant interaction with a value less than one indicates that the risk conferred by MST for a given outcome was differentially greater among women.

There were consistent main effects of MST screen when all diagnostic categories were compared with the no diagnoses group. Those with a positive MST screen had higher odds for all diagnoses, with an AOR ranging from 2.10 to 4.21 for individual diagnoses (PTSD-only, DD-only, and SUD-only), from 3.76 to 6.18 for co-occurring dual diagnoses (PTSD+DD, PTSD+SUD, DD+SUD), and an AOR of 7.31 for all three co-occurring disorders (PTSD+DD+SUD). There were also main effects of gender such that men had greater odds of having PTSD-only, SUD-only, PTSD+SUD, DD+SUD, and PTSD+DD+SUD, while women had greater odds of having DD-only. Men and women did not differ with regard to the odds of having PTSD+DD. There were several significant MST screen by gender interactions. With the “No Diagnoses” group as the referent, the association between positive MST screen and diagnostic categories that included PTSD (i.e., PTSD-only, PTSD+DD, PTSD+SUD, and PTSD+DD+SUD) was stronger for women than for men.

When PTSD-only was the referent, positive MST screen was associated with lower odds of DD-only and SUD-only but with higher odds for the co-occurring diagnoses that included PTSD (PTSD+DD, PTSD+SUD, and PTSD+DD+SUD). With respect to gender main effects where the referent was PTSD-only, the overall pattern of results was similar to what was described above, with men having greater odds of SUD-only, PTSD+SUD, and PTSD+DD+SUD (with SUD diagnosis as the common factor), and women having greater odds of DD-only and PTSD+DD. However, two of these main effects were superseded by significant interactions such that the association between MST screen and DD-only, and the association between positive MST screen and PTSD+DD, was stronger for men than for women.

When DD-only was the referent, there were significant main effects of MST screen such that those with a positive MST screen had greater odds of PTSD+DD, PTSD+SUD, DD+SUD, and PTSD+DD+SUD. There were also significant gender main effects such that men had greater odds of SUD-only, PTSD+DD, PTSD+SUD, DD+SUD, and PTSD+DD+SUD. When the SUD-only group was the referent, there was a significant interaction between gender and MST such that the association between MST and PTSD+SUD was stronger for women than for men.

Discussion

The results of the current study indicate that OIF/OEF/OND Veterans with a positive compared to negative MST screen were at elevated risk of being diagnosed with individual and co-occurring PTSD, DD, and/or SUD, consistent with our hypotheses. Indeed, nearly half of women and men with positive MST screens had one or more of these three mental health conditions, compared with approximately a fifth (women) to just over a quarter (men) with negative MST screens. Regardless of the MST screen, Veterans were more likely to

have single disorders than co-occurring disorders. Nonetheless, Veterans with co-occurring disorders were more likely to have a positive MST screen. This was particularly striking for women; among those with any co-occurring diagnostic combination, nearly 42% had a positive MST screen whereas among women with any single disorder, the rate of a positive MST screen was about 29%. For men, this same pattern was much less pronounced in that only about 2% of men Veterans with any co-occurring diagnostic combination had a positive MST screen and only about 1% of men with any single disorder had a positive MST screen. These results suggest that providers working with women Veterans with co-occurring conditions need to assess for MST so that the potential contributions of MST to the clinical context can be factored into treatment planning. It also suggests that positive MST status may not be a significant driver of mental health problems for men the way it is for women. For men with these diagnoses, it appears that there may be other important risk factors to consider.

Additionally, gender differences were detected in the strength of the association between MST screen and diagnostic outcomes. Although women were overall more likely than men to have DD as hypothesized, when compared to the no PTSD, DD, or SUD diagnostic group, the association between positive MST screen and PTSD+DD was stronger among women than men. However, when compared to the PTSD-only diagnostic group, the association between positive MST screen and DD-only and PTSD+DD was stronger among men than women. This interaction is inconsistent with previous literature regarding gender differences in DD (Seal et al., 2009; Street et al., 2013), perhaps because diagnostic categories are not typically examined in this way. It seems that this unique pattern arises for Veterans who do not have PTSD-only, which is typically the examined diagnostic category when discussing MST. On the other hand, although men were overall more likely to have PTSD than women, the strength of the association between positive MST screen and PTSD diagnostic combinations was stronger among women than men. In general, these interactions indicate that gender differences in overall rates of diagnoses were *less* pronounced when women and men had a positive compared to a negative MST screen.

A positive MST screen may be an important factor to consider when examining gender differences in individual and co-occurring PTSD, DD, and SUD. Unlike several prior studies that have found no gender differences in PTSD diagnoses in Veteran populations (Maguen, Luxton, et al., 2012; Street et al., 2013; Vogt et al., 2011), the current study found that men had higher rates of PTSD than women similar to one study (Haskell et al., 2010). This finding remained true even among those with a positive MST screen (37.2% men, 32.4% women). Nonetheless, the association between positive MST screen and PTSD diagnoses was stronger among women than men. Thus, this suggests that a positive MST screen may be a particularly salient risk factor for OIF/OEF/OND women with respect to PTSD and a positive MST screen may reduce the gender gap in PTSD diagnoses putting men and women at a similar risk for PTSD.

These findings extend a previous study (Maguen, Luxton, et al., 2012) that did not find a significant interaction between MST status and gender on PTSD, depression, and alcohol use screens among active duty soldiers. The previous study did not examine SUD, instead it focused on alcohol use. Further, the previous study only examined associations within active

duty personnel, and the current study extends this by examining the longer-term associations of MST on Veteran populations. Therefore, these findings should be interpreted in the context of this previous research.

One important factor to consider when examining gender differences among VA users is that women Veterans remain underrepresented in treatment and research (Rohrer et al., 2011) despite the recent emphasis on providing gender-specific care (Kimerling, Pavao, & Wong, 2015; Yano et al., 2009; Yano & Frayne, 2011). For example, women are currently underrepresented in SUD treatments studies (Cucciare, Simpson, Hoggatt, Gifford, & Timko, 2013) and intervention studies overall. There has been only one clinical trial evaluating an evidence-based PTSD treatment specifically among women Veterans (Schnurr et al., 2007). The current findings suggest it is imperative to provide access to evidence-based treatments for these disorders for women with a positive MST screen.

The rates of DD were higher among women, and this was true also among women and men with a positive MST screen (24.4% and 18.7%, respectively). However, the strength of the association between positive MST screen and DD-only and PTSD+DD compared to PTSD-only was stronger for men. This finding adds to the emerging understanding of the effects of MST on men. In general, less research has focused on men with a positive MST screen compared to women. One qualitative study suggested that men report unique barriers to care related to stigma and gender (Turchik et al., 2013) and they prefer receiving gender-targeted information about sexual trauma compared to gender-neutral information (Turchik, Rafie, Rosen, & Kimerling, 2014). It is possible that the heightened feeling of stigma contributes to the stronger association between positive MST screen and DD for men compared to women. The data suggest that it may be especially important for clinicians working men with a positive MST screen to assess for DD. These results should be replicated by future studies.

The current manuscript also presents information regarding other factors that are associated with individual and co-occurring disorders beyond the associations with MST and gender. It was found that a history of homelessness, lower levels of education, white race, enlisted rank, and service in the Army were all associated with higher risk of having at least one diagnosis. Future studies should examine these covariates more carefully to determine if there are any potential interactions between these other factors and MST status on individual and co-occurring PTSD, DD, and SUD.

Implications for Practice and Policy

Given the universal screening for MST within VA, individuals with positive MST screens can be identified, assessed thoroughly for co-occurring disorders, and provided evidence-based treatments for co-occurring disorders in a timely manner. Evidence-based treatments for PTSD, DD, and SUD are available for Veterans seen within VA. Despite their similar diagnostic profiles, men and women with a positive MST screen may have different treatment needs as unique barriers associated with co-occurring disorders and gender have been identified. For example, patients with co-occurring PTSD and SUD are at high risk for treatment noncompliance, and risk of noncompliance is higher for men with low distress tolerance compared to women (Tull, Gratz, Coffey, Weiss, & McDermott, 2013). Given the complexity of providing care for multiple conditions, an integrative approach to care is

emerging, providing targeted interventions for common mechanisms underlying multiple disorders (Jakupcak, Wagner, Paulson, Varra, & McFall, 2010). To our knowledge, no study has tested the efficacy of such integrated care approaches in Veterans with a positive MST screen and co-occurring disorders, suggesting an important next step in addressing treatment needs and appropriate care for those with a positive MST screen.

Given the gender differences in the likelihood of having a positive MST status within each of these diagnostic categories, it appears that a positive MST status is a significant driver of mental health symptoms for women but not for men receiving VA services. This is not to say that MST is not an impactful experience for men; however, a positive MST status is more likely for women with these disorders compared to men. It is also possible that men with these symptoms are not receiving VA services. Nonetheless, this finding highlights the continued need to dedicate women-specific services for Veterans. This could include offering telemedicine for women with positive MST status (Gilmore et al., 2016) if there are not separate waiting rooms available for women within VA while larger anti-harassment policies are developed and implemented in the military.

Limitations and Future Directions

The strengths of the current study include the large cohort and the examination of Veterans recently entering the VA to increase the understanding of the mental health diagnoses of recently returning Veterans on a national scale. Further, this is the first study to examine the interactions between MST screen and gender on individual and co-occurring PTSD, DD, and SUD among recently returning Veterans. However, the results should be interpreted in the context of certain limitations. The positive MST screen rates in the current sample are lower than nationally reported prevalence rates (Veterans Health Administration, 2015). This could be because it can take several years for an individual to label a sexual assault victimization experience as such (Wilson & Miller, 2016). The stigma associated with MST among men could also contribute to the low rate of positive MST screens. There was also a sizeable proportion of Veterans on the OIF/OEF/OND Roster that did not have valid MST screens on file (35.3%), which could have affected the response rate as well. In addition, positive MST screen rates may vary depending upon the cohort examined and it is possible that prevalence rates could be lower for this cohort, or alternatively they may be less comfortable reporting MST experiences to a medical provider. The MST screen includes both sexual harassment and assault during military service, and these findings may differ based on the experience of the Veteran and severity of the experience.

Although the use of VA data is a strength, the diagnostic categories of PTSD, DD, and SUD are not standardized due to the use of VA clinical data. For example, some providers may consistently use a structured diagnostic interview for clinical diagnoses, while others may not. Given the overlapping diagnostic features of these disorders, it is essential that providers conduct diagnostic interviews to ensure careful assessment of differential diagnoses. Although the lack of standardized diagnostic assessments is a limitation of the study, it is reflective of the current diagnoses labeled in medical records of Veterans.

The current study did not examine the potential role of poly-victimization within individual and co-occurring PTSD, DD, and SUD. There are other types of trauma that are common

among Veteran populations including combat exposure, civilian sexual assault, childhood sexual abuse, and intimate partner violence (e.g., Zinzow et al., 2007), all of which should be considered in future examinations of individual and co-occurring PTSD, DD, and SUD among this population.

The prevalence rates of PTSD, DD, and SUD are also lower among the current study than the reported national samples (Epidemiology Program, 2014). This difference is likely also attributable to the sample, which included all OEF/OIF/OND Veterans within the VA healthcare system who had been screened for MST. This sample also does not include Veterans who do not receive treatment in VA. Future research should replicate these findings using a population-based sample. Another limitation is that only PTSD, DD, and SUD were examined. These diagnoses are some of the most prevalent mental health disorders within the VA system, but a positive MST screen may suggest a variety of other psychological and physical health issues that we did not address.

Future studies should examine treatment utilization patterns among Veterans with a positive MST screen and co-occurring disorders to identify gaps in treatment needs for this population and inform treatment implementation and dissemination efforts. For example, it is possible that within those with MST, individuals with certain diagnostic combinations are less likely to initiate and complete evidence-based treatments. Further, future studies should examine if these findings hold true within non-VA service seeking Veterans.

Conclusions

This study indicates that those with a positive compared to negative MST screen are more likely to have single and co-occurring disorders when considering PTSD, DD, and SUD. Among women Veterans with co-occurring disorders, the large proportion with a positive MST screen (63%) was particularly striking. Moreover, the strength of the association between MST screen and diagnosis differed by gender, with the association between positive MST screen and PTSD-associated diagnoses being stronger for women and the association between positive MST screen and some DD diagnostic outcomes being stronger for men. These interactions suggested that a positive MST screen mitigated gender differences in these diagnoses. Therefore, providers treating individuals with co-occurring PTSD, DD, and SUD may want to assess the potential role of MST in the development and maintenance of these co-occurring disorders to ensure Veterans are receiving adequate assessment and treatment when receiving care.

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Table 1

Demographic and Military Service Characteristics by Gender and MST Screen.

	Women 12.5%, n=61,954		Men 87.5%, n=432,868		
	MST+ Screen (16.9%, n=10,469)	MST- Screen (83.1%, n=51,485)	MST+ Screen (0.7%, n=3,177)	MST- Screen (99.3%, n=429,691)	P
Demographics					
Age (M, SD)	37.8 (8.5)	38.0 (8.8)	39.2 (9.5)	38.8 (9.5)	.010
Race					<.001
White	43.9% (4,594)	41.1% (21,146)	47.2% (1,501)	54.9% (235,742)	
Black	17.1% (1,787)	21.9% (11,287)	13.1% (415)	10.1% (43,220)	
Hispanic	10.6% (1,112)	10.9% (5,601)	10.9% (347)	10.4% (44,528)	
Other	5.9% (620)	5.9% (3,023)	5.0% (158)	4.4% (18,804)	
Unknown	22.5% (2,346)	20.3% (10,428)	23.8% (756)	20.3% (87,397)	
Education					.297
HS or Equivalent	76.4% (7,893)	74.2% (37,715)	81.8% (2,553)	81.0% (343,858)	
Beyond HS	23.6% (2,437)	25.8% (13,099)	18.2% (569)	19.0% (80,537)	
Marital Status					.813
Never Married	55.3% (5,785)	58.9% (30,322)	52.0% (1,652)	52.5% (225,556)	
Married	34.2% (3,582)	31.9% (16,423)	43.5% (1,382)	43.3% (186,099)	
Divorced	9.9% (1,036)	8.7% (4,465)	4.3% (136)	4.0% (17,242)	
Other	0.6% (66)	0.5% (275)	0.2% (7)	0.2% (794)	
Housing Status					<.001
Housed	95.6% (10,008)	98.1% (50,488)	93.0% (2,953)	98.0% (421,064)	
Homeless	4.4% (461)	1.9% (997)	7.0% (224)	2.0% (8,627)	
Military Service Characteristics					
Rank					.190
Enlisted	92.3% (9,668)	91.7% (47,209)	94.3% (2,996)	93.5% (401,799)	
Officer	7.1% (741)	7.7% (3,988)	4.9% (157)	5.6% (24,035)	
Warrant	0.6% (60)	0.6% (288)	0.8% (24)	0.9% (3,857)	
Component					<.001
Active duty	64.4% (6,740)	53.7% (27,654)	66.1% (2,101)	55.0% (236,398)	

	Women 12.5%, n=61,954			Men 87.5%, n=432,868		
	MST+ Screen (16.9%, n=10,469)	MST- Screen (83.1%, n=51,485)	P	MST+ Screen (0.7%, n=3,177)	MST- Screen (99.3%, n=429,691)	P
Reserve	18.2% (1,904)	22.0% (11,333)		13.7% (436)	15.4% (66,209)	
Guard	17.4% (1,825)	24.2% (12,498)		20.1% (640)	29.6% (127,084)	
Branch of Service			<.001			<.001
Army	62.1% (6,504)	65.0% (33,443)		60.5% (1,923)	64.1% (275,499)	
Navy/Coast Guard	18.6% (1,951)	16.3% (8,409)		19.6% (624)	11.8% (50,940)	
Air Force	14.0% (1,463)	14.7% (7,592)		8.7% (277)	8.6% (36,751)	
Marines	5.3% (551)	4.0% (2,041)		11.1% (352)	15.5% (66,501)	

Table 2

Rates of Diagnoses by Gender and MST Screen

Diagnoses	Women (12.5%, n=61,954)			Men (87.5%, n=432,868)		
	MST+ Screen (16.9%, n=10,469)	MST- Screen (83.1%, n=51,485)	P	MST+ Screen (0.7%, n=3,177)	MST- Screen (99.3%, n=429,691)	P
No PTSD, DD, or SUD	52.5% (5,498)	79.0% (40,694)	<.001	50.7% (1,611)	72.7% (312,534)	<.001
PTSD-only	21.2% (2,220)	7.6% (3,927)		25.7% (817)	15.9% (68,292)	
DD-only	13.5% (1,417)	9.4% (4,845)		9.1% (290)	4.9% (21,177)	
SUD-only	0.8% (83)	0.5% (279)		2.1% (67)	1.7% (7,180)	
PTSD+DD	9.5% (993)	2.7% (1,409)		7.4% (235)	2.7% (11,733)	
PTSD+SUD	1.0% (106)	0.2% (122)		2.7% (87)	1.2% (5,144)	
DD+SUD	0.7% (75)	0.3% (136)		0.8% (27)	0.4% (1,856)	
PTSD+DD+SUD	0.7% (77)	0.1% (73)		1.4% (43)	0.4% (1,775)	
<u>Overall Rates</u>						
PTSD	32.4% (3,396)	10.7% (5,531)	<.001	37.2% (1,182)	20.2% (86,944)	<.001
DD	24.4% (2,562)	12.6% (6,463)		18.7% (595)	8.4% (36,541)	
SUD	3.2% (341)	1.2% (610)		7.1% (224)	3.7% (15,955)	
Rate of Any Single Disorder	35.5% (3,720)	17.6% (9,051)	<.001	37.0% (1,174)	22.5% (96,649)	<.001
Rate of Any Comorbidity	11.9% (1,251)	3.4% (1,740)	<.001	12.3% (392)	4.8% (20,508)	<.001

Table 3

Odds of Individual and Co-occurring PTSD, DD, and SUD by Gender and MST Screen: Multinomial Logistic Regression Analysis

	PTSD-only AOR (99% CI)	DD-only AOR (99% CI)	SUD-only AOR (99% CI)	PTSD+DD AOR (99% CI)	PTSD+SUD AOR (99% CI)	DD+SUD AOR (99% CI)	PTSD+DD+SUD AOR (99% CI)
Likelihood Ratio $\chi^2 = 40,241.36$, Prob > $\chi^2 < 0.0000$.							
Comparison 1: No Diagnoses Comparison Group							
MST Screen	4.21 (3.89,4.57)	2.10 (1.93,2.29)	2.13 (1.53,2.96)	5.19 (4.62,5.82)	6.18 (4.37,8.74)	3.76 (2.58,5.48)	7.31 (4.77,11.21)
Gender	2.02 (1.93,2.12)	0.58 (0.55,0.60)	3.47 (2.95,4.08)	1.02 (0.95,1.11)	5.07 (3.99,6.43)	1.88 (1.48,2.38)	3.17 (2.32,4.34)
MST by Gender	0.57 (0.50,0.66)	1.18 (0.98,1.43)	0.76 (0.48,1.21)	0.73 (0.59,0.91)	0.47 (0.30,0.74)	0.56 (0.30,1.07)	0.51 (0.28,0.93)
Comparison 2: PTSD-only Comparison Group							
MST Screen	0.50 (0.45,0.55)	0.51 (0.36,0.71)	1.23 (1.08,1.40)	1.46 (1.03,2.08)	0.90 (0.61,1.31)	1.73 (1.13,2.67)	
Gender	0.28 (0.27,0.30)	1.71 (1.45,2.02)	0.51 (0.46,0.55)	2.50 (1.96,3.19)	0.93 (0.73,1.18)	1.56 (1.14,2.15)	
MST by Gender	2.06 (1.67,2.53)	1.33 (0.83,2.13)	1.27 (1.01,1.61)	0.82 (0.52,1.30)	0.98 (0.51,1.86)	0.90 (0.49,1.63)	
Comparison 3: DD-only Comparison Group							
MST Screen		1.01 (0.72,1.42)	2.47 (2.16,2.82)	2.93 (2.06,4.18)	1.79 (1.22,2.63)	3.47 (2.25,5.34)	
Gender		6.03 (5.11,7.12)	1.78 (1.63,1.94)	8.80 (6.91,11.21)	3.26 (2.57,4.14)	5.50 (4.01,7.54)	
MST by Gender		0.65 (0.40,1.05)	0.62 (0.47,0.81)	0.40 (0.25,0.64)	0.47 (0.25,0.92)	0.44 (0.24,0.81)	
Comparison 4: SUD-only Comparison Group							
MST Screen			2.44 (1.97,3.02)	2.90 (2.03,4.14)	1.77 (1.22,2.58)	3.42 (2.28,5.14)	
Gender			0.30 (0.25,0.35)	1.46 (1.12,1.91)	0.54 (0.42,0.71)	0.91 (0.65,1.26)	
MST by Gender			0.96 (0.73,1.26)	0.62 (0.40,0.95)	0.74 (0.42,1.31)	0.68 (0.40,1.14)	
Comparison 5: PTSD+DD Comparison Group							
MST Screen				1.19 (0.83,1.70)	0.73 (0.49,1.07)	1.41 (0.91,2.18)	

	PTSD-only AOR (99% CI)	DD-only AOR (99% CI)	SUD-only AOR (99% CI)	PTSD+DD AOR (99% CI)	PTSD+SUD AOR (99% CI)	DD+SUD AOR (99% CI)	PTSD+DD+SUD AOR (99% CI)
Gender					4.94 (3.85,6.34)	1.83 (1.43,2.35)	3.09 (2.24,4.27)
MST by Gender					0.64 (0.39,1.05)	0.77 (0.42,1.31)	0.71 (0.38,1.31)
Comparison 6: PTSD+SUD Comparison Group							
MST Screen						0.61 (0.42,0.89)	1.18 (0.79,1.77)
Gender						0.37 (0.28,0.49)	0.62 (0.45,0.87)
MST by Gender						1.19 (0.65,2.19)	1.10 (0.63,1.90)
Comparison 7: DD+SUD Comparison Group							
MST Screen							1.94 (1.23,3.06)
Gender							1.69 (1.18,2.42)
MST by Gender							0.92 (0.55,1.54)

Notes) Coding of MST variable: 0 = Negative Screen, 1 = Positive Screen. Coding of sex variable: 0 = Female, 1 = Male. Bold indicates statistical significance, $p < .01$. Odds ratios adjusted for age, education (high school, post-high school), marital status (married, never married, divorced, other), race/ethnicity (White, Black, Hispanic, other, unknown), rank (enlisted, officer, warrant), military component (Active Duty, Reserve, Guard), and branch of service (Army, Navy/Coast Guard, Marines, Air Force).