BIOLOGICAL SEX AS A MODERATOR OF THE ASSOCIATION OF MILITARY SEXUAL TRAUMA AND POSTTRAUMATIC STRESS DISORDER TOTAL AND SYMPTOM CLUSTER SEVERITY

by

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ABSTRACT

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by

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Utah State University, 2020

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Posttraumatic stress disorder (PTSD) is a multifaceted disorder comprised of distinct symptom clusters and is commonly diagnosed in military service members/veterans (SM/Vs), particularly in those with history of military sexual trauma (MST). Evidence and theory suggest that females and males may have different traumatic responses following MST, though research investigating this association has limitations, such as modeling the sexes separately or not covarying for MST severity. The current study examined the moderating role of sex on the association of MST severity and PTSD total and symptom cluster severity. Participants were 1,161 SM/Vs (female: n = 782, 67.36%) who completed online self-report questionnaires. Due to the substantial portion of zeros on the outcome measure (n = 210, 18.07%), two-part hurdle models were utilized to assess the moderating role of sex on the association of MST severity and the *presence* or *severity* of overall PTSD symptoms and symptom clusters. Results showed that among those who experienced *assault* MST, females were at higher risk for the *presence* of intrusive, avoidance, anhedonia, and dysphoric arousal symptom clusters.

Among those who experienced *harassment-only* MST, males were at higher risk of *more severe* symptoms overall and in the intrusive, avoidance, negative alterations in cognitions and mood, and dysphoric arousal symptom clusters. No other significant differences were observed. Results from this study suggest that male and female SM/Vs have unique responses to the different severities of MST. Sex-specific interventions may be warranted in targeting posttraumatic responses that are specific to males and females.

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PUBLIC ABSTRACT

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Hallie S. Tannahill

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have unique responses to the different severities of MST. Sex-specific interventions may be warranted in targeting posttraumatic responses that are specific to males and females.

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Hallie S. Tannahill

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CHAPTER I

INTRODUCTION

Military service members and veterans (SM/Vs) are at an increased risk for poor mental health relative to the civilian population (e.g., Fulton et al., 2015; Kang et al., 2015; Kessler, Chiu, Demler, Merikangas, & Walters, 2005; Seal et al., 2009). Indeed, in a study of 289,328 veterans enrolled in Department of Veterans Affairs (VA) services who served in Operations Enduring Freedom (OEF), Iraqi Freedom (OIF), and/or New Dawn (OND), 36.9% (n = 106,726) received a mental health diagnosis (Seal et al., 2009). Within an active duty sample of 303,905 service members completing their Post-Deployment Health Assessments, the prevalence rate of a probable mental health diagnosis was between 11.3-19.1% (Hoge, Auchterlonie, & Milliken, 2006). The discrepant rates of mental health diagnoses observed between veterans and active duty service members may reflect the concealment of symptoms that may otherwise deter the active duty service members from returning home in a timely manner. Nonetheless, the rates of mental health diagnoses seen in SM/Vs are higher than the 18.3% rate observed in the general civilian population (National Institute of Mental Health, 2017). Of all mental health disorders diagnosed in VA-enrolled veterans, posttraumatic stress disorder (PTSD) is the most common, with a prevalence rate of 55.5% among those with a probable mental health diagnosis (Department of VA Epidemiology Program, 2014).

PTSD

According to the *Diagnostic and Statistical Manual of Mental Disorders - 5th edition* (*DSM-5*), PTSD is a disorder that can develop after an individual is exposed to a Criterion A traumatic event, which is defined as an actual or threatened event leading to

death, serious injury, or sexual violation (American Psychiatric Association [APA], 2013). Following this traumatic event, individuals must experience symptoms within several domains or symptom clusters, making PTSD a multifaceted disorder. The symptom clusters include (1) re-experiencing symptoms, (2) cognitive, emotional or behavioral avoidance symptoms, (3) negative alterations in cognitions and mood (NACM), and (4) increased arousal/reactivity responses for at least one month following the traumatic event (APA, 2013). Experiencing a traumatic event is a relatively common occurrence for military service members, especially among those who have deployed. In a sample of 3,671 deployed, active duty infantry soldiers and Marines, 84-97% experienced combat trauma, and only 11.5-19.9% of the sample met criteria for probable PTSD (Hoge et al., 2004). More broadly, epidemiological estimates of PTSD prevalence rates within the military are between 13.8-23% (Fulton et al., 2015; Tanielian & Jaycox, 2008), compared to a 3.5% prevalence rate in the civilian population (APA, 2013; Kessler et al., 2005). PTSD is associated with several negative outcomes among those who have served in the military, including poor quality of life (see review, Schnurr, Lunney, Bovin, & Marx, 2009), homelessness (e.g., Tsai & Rosenheck, 2015), functional impairment in social, occupational, and financial domains (see review, Rodriguez, Holowka, & Marx, 2012), and increased risk for suicide (APA, 2013; Arenson et al., 2018; Jakupcak et al., 2009; Ramchand, Rudavsky, Grant, Tanielian, & Jaycox, 2015; Wisco et al., 2014).

Research on PTSD shows that specific symptom clusters are differentially associated with poorer outcomes; however, these symptoms rarely conform to the 4-factor structure suggested by DSM-5 (APA, 2013). Instead, alternate models have been

suggested, such as the 5-Factor Dysphoric Arousal Model (Elhai et al., 2011), 6-Factor Anhedonia Model (Blais, Geiser, & Cruz, 2018; Frankfurt, Amour, Contractor, & Elhai, 2016; Liu et al., 2014), 6-Factor Externalizing Behavior Model (Tsai et al., 2015), and 7-Factor Hybrid Model (Armour et al., 2015, Frankfurt et al., 2016). Overall, higher NACM and anhedonia/dysphoric arousal symptom cluster severities are consistently correlated with worsened depressive symptoms across multiple models (Contractor, Armour, Forbes, & Elhai, 2015; Contractor et al., 2014; Elhai et al., 2015; Miller, Wolf, Martin, Kalopek, & Keane, 2008; Pietrzak, Goldstein, Malley, Rivers, & Southwick, 2010; Pietrzak et al., 2015; Price & van Stolk-Cooke, 2015; Tsai et al., 2015). Other symptom clusters are also shown to be related to poor outcomes, though there are fewer studies showing support for these associations. Nonetheless, one study found re-experiencing symptoms were associated with tendencies toward alcohol abuse (Pietrzak et al., 2010) and avoidance symptoms were associated with decreased perceptions of social support (Pietrzak et al., 2010). Another study showed externalizing behavior symptoms were associated with hostility and suicidal ideation (Contractor et al., 2015; Pietrzak et al., 2015). These findings suggest it may be prudent to consider specific PTSD symptom clusters when assessing an individual's level of impairment.

In addition to the different outcomes observed when examining specific PTSD symptom clusters, it is possible that there are discrepancies in how males and females experience PTSD in the context of its symptom clusters. In a study of 24,690 active duty service members, researchers observed that males and females who experienced the same type of trauma reported different expressions of PTSD symptoms (Hourani, Williams, Bray, & Kandel, 2015). Specifically, when examining the "violence" component of

combat exposure, which included witnessing or experiencing injury or cruelty during military service, females had significantly higher symptoms in every PTSD symptom cluster relative to males. Conversely, when examining sexual traumas that occurred during military service, males had significantly higher PTSD symptoms in the re-experiencing, emotional numbing, and hyperarousal symptom clusters relative to females (Hourani et al., 2015). Other studies corroborate the finding of sex differences in symptom severities within the PTSD clusters, but did not account for the type of trauma experienced (Carragher et al., 2016; Scoglio et al., 2017). Given the negative outcomes and differential experience of PTSD symptoms between sexes, it is urgent that we better understand how such differences in symptoms develop between sexes. One possible explanation for differences in PTSD symptoms among male and female SM/Vs may involve the risk factors for developing PTSD.

PTSD and Biological Sex

Several risk factors for PTSD are established and include minority race (see reviews, Brewin, Andrews, & Valentine, 2000; Xue et al., 2015), more frequent deployments (e.g., Maguen, Ren, Bosch, Marmar, & Seal, 2010; Reger, Gahm, Swanson, & Duma, 2009), combat exposure (e.g., Armenta et al., 2018; Polusny et al., 2014; Seal et al., 2009) and biological sex (e.g., Hourani et al., 2015; Lehavot, Katon, Chen, Fortney, & Simpson, 2018; Macera, Aralis, Highfill-McRoy, & Rauh, 2014; Maguen et al., 2010). Of these factors, sex may be particularly important due to the rapid growth of females in the military. Since 1973, females in enlisted ranks increased by seven-fold, and females in officer ranks by four-fold (Patten & Parker, 2011). Additionally, as of January 2016, females are now able to serve in all combat roles that were once restricted to them

(Department of Defense, 2015), therefore potentially increasing their exposure to Criterion A traumatic events.

Civilian research shows that females are at a heightened risk for PTSD as evidenced by their higher prevalence rate of the disorder compared to males (see reviews, Brewin et al., 2000; Ditlevsen & Elklit, 2012; Greene, Neria, & Gross, 2016; McLean & Anderson, 2009; Tolin & Foa, 2006) and a biological disposition in females toward a heightened PTSD risk via estrogenic influences on fear conditioning (see review, Ramikie & Ressler, 2018). Further, while males have quantitatively more or equal number of traumatic experiences (Frans, Rimmo, Aberg, & Fredrikson, 2005; Perrin et al., 2014), female civilians experience significantly more sexual assaults (Frans et al., 2005; Perrin et al., 2014). It is likely that the heightened risk for sexual assault in females contributes to the disparity in PTSD prevalence between the sexes, as traumas that involve interpersonal violence are associated with more severe PTSD symptoms than non-interpersonal traumas (Hetzel-Riggin & Roby, 2013; Shakespeare-Finch & Armstrong, 2010; Suris & Lind, 2008).

While the direction of PTSD risk among civilians is clearly higher in females, research conducted in military samples yield mixed results. For instance, in a nationally representative sample of 329,049 veterans seeking care at VA medical centers between 2002 and 2008, males were more frequently diagnosed with PTSD than females (Maguen et al., 2010). However, other studies using different samples found that females had higher rates of PTSD than males. For instance, in a national survey of 3,119 veterans, 13.4% of females had a diagnosis of PTSD compared to only 7.7% of males having a diagnosis (Lehavot et al.,2018). Other studies of active duty service members (Hourani et

al., 2015), branch specific studies conducted in the Navy and Marine samples (Macera et al., 2014), and a prospective study of 922 National Guard soldiers deployed to Iraq (Kline et al., 2013) corroborate the finding that females may be at higher risk for PTSD. At the same time, other studies observed no significant differences in PTSD diagnoses between males and females in the military (see review, Crum-Cianflone & Jacobson, 2013). These null findings have also been supported in studies with veterans (Katz, Cojucar, Beheshti, Nakamura, & Murray, 2012) and active duty service members (Maguen, Luxton, Skopp, & Madden, 2012).

Military Sexual Trauma (MST)

One possible explanation for the mixed findings is the effect of trauma type on PTSD symptoms. For instance, among those who served in the military, multiple deployments (e.g., Maguen et al., 2010; Reger et al., 2009), combat exposure (e.g., Armenta et al., 2018; Hoge et al., 2004; Jacobson et al., 2012; Seal et al., 2009) and sexual trauma (e.g., Gilmore et al., 2016) are risk factors for PTSD. Sexual trauma that occurred during military service, however, is shown to be a stronger predictor of PTSD symptoms than other military-related risk factors, including combat exposure (Calhoun et al., 2016; Dutra et al., 2010), pre- and post-military sexual trauma (Himmelfarb, Yaeger, & Mintz, 2006; Suris & Lind, 2008), and non-military sexual traumas, life-threatening illnesses, and accidents (Yaeger, Himmelfarb, Cammack, & Mintz, 2006). Sexual trauma that occurred during military service is referred to as MST by the VA (Veterans Benefits 38 U.S.C., 2011), and is specifically defined as "psychological trauma which…resulted from a physical assault of a sexual nature, battery of a sexual nature, or sexual

harassment which occurred while the veteran was serving on active duty, active duty for training, or inactive duty training" (U.S. Government, 2014, p. 285).

MST is associated with several negative outcomes, including increased risk for depressive disorders (Kimerling et al., 2010), eating disorders (Blais et al., 2017), homelessness (Brignone et al., 2016), substance use (Goldberg et al., 2019), suicidal ideation (Blais & Monteith, 2018; Bryan, Bryan, & Clemans, 2015; Monteith, Brownstone, Gerber, Soberay, & Bahraini, 2019), suicide attempt (Bryan et al., 2015), suicide mortality (Kimerling, Makin-Byrd, Louzon, Ignacio, & McCarthy, 2016), and PTSD (Kimerling, Gima, Smith, Street, & Frayne, 2007; Suris & Lind, 2008). According to VA screening data, 29.1% of females and 1.6% of males screened positive for MST (Department of VA Office of Mental Health & Suicide Prevention, 2018). However, a recent meta-analysis of MST prevalence rates among service members and veterans not necessarily enrolled in VA-care showed that 38.4% of females and 3.9% of males experienced sexual assault and/or harassment during their military service (Wilson, 2018), suggesting that VA screening data may underestimate this public health concern. Although the rates of MST vary between males and females, the actual number of those who have experienced MST is relatively equal, due to the disproportionate amount of males in the armed forces (U.S. Department of Defense, 2016).

MST and Sex Differences

Of the available studies on sex differences among veterans with a history of MST, there is evidence that females have worsened psychological outcomes compared to males. For instance, in an epidemiological study of 4,325,768 veterans who had at least one outpatient visit to a VA health care facility during fiscal year 2003, females who screened

positive for MST were over 8 times more likely to have a PTSD diagnosis relative to females who screened negative for MST, and males who screened positive for MST were 3 times more likely to have a PTSD diagnosis relative to males who screened negative for MST (Kimerling et al., 2007). In a follow-up study of 124,729 veterans who received care at a VA mental health or primary care clinic between fiscal years 2001-2007, results were consistent: females who screened positive for MST were over 3.5 times more likely to have a PTSD diagnosis than females who screened negative for MST, and males who screened positive for MST were over 2.5 times more likely to have a PTSD diagnosis relative to males who screened negative for PTSD (Kimerling et al., 2010). Finally, emerging research using VA administrative data shows that females who screened positive for MST had a larger increased risk for a PTSD diagnosis relative to males who screened positive for MST (Tannahill et al., 2019).

Conversely, research directly comparing the sexes supports the notion that PTSD related to MST may be worse in males compared to females. For instance, in a study of 175 veterans with histories of MST who were enrolled in a PTSD residential program, males reported more severe PTSD symptoms than females (O'Brien, Gaher, Pope, & Smiley, 2008). In another study of 24,690 active duty service members, males who were sexually abused during military service had more severe PTSD symptoms compared to females (Hourani et al., 2015). Together, there appears to be evidence for both sexes that MST is associated with worse PTSD in either males or females. These findings provide preliminary evidence that the existing literature may be missing important characteristics of MST experiences that may account for these mixed findings.

One of the primary limitations of the aforementioned studies using VA administrative data (i.e., Kimerling et al., 2007, 2010; Tannahill et al., 2019) is that the VA MST screening tool, which served as the indicator of a history of MST, does not distinguish between harassment-only and assault MST (Blais, Brignone, Fargo, Andresen, & Livingston, 2019). Previous research conducted in female veterans shows that assault MST is associated with higher PTSD symptoms compared to harassment-only MST (Blais et al., 2018, 2019), demonstrating the importance of studying these severities separately. Other research on veterans deployed in service of OEF/OIF/OND missions shows that only assault MST, compared to harassment-only MST, was related to increased risk for suicidal ideation (Monteith, Menefee, Forster, & Bahraini, 2016). Therefore, a possible explanation for the mixed findings on sex differences in PTSD following MST may be due to the lack of distinction of MST severity when assessing this trauma. Further, existing theories support the possibility that assault MST may lead to worsened outcomes in males compared to females (e.g., Castro, Kintzle, Schuyler, Lucas, & Warner, 2015; Levant & Richmond, 2007).

One such theory that may explain worsened PTSD severity following assault MST in males is the theory of *rape myth* (Burt, 1980). This theory suggests that people hold false beliefs about sexual assault, such that only females are raped, or that someone who was sexually assaulted instigated or deserved the assault (Castro et al., 2015). Further, Castro et al. (2015) theorized that these myths are engrained in our society and in military culture more specifically, due to the heavy emphasis on traditional masculine roles. As such, a survivor of sexual assault not only has to process their traumatic experience, but they must also process potential cognitive dissonance between previously

held myths and their experience. For example, before a sexual assault, a heterosexual male may have held the belief that only gay males could get raped. Now, he must process his previously held schema with the conflicting experience of being a heterosexual who was raped. This type of myth poses an opposition to one's masculine identity, which may lead to further distress (Eisler & Skidmore, 1987; Eisler, Skidmore, & Ward, 1988; Juan, Nunnink, Butler, & Allard, 2017).

Another factor that may explain worsened PTSD in males following MST is the influence of the unique military culture. The U.S. military perpetuates a culture of expected masculine norms, such as mental/physical toughness and self-reliance (Levant & Richmond, 2007). For instance, the U.S. Army Soldier's Creed includes statements that impose a cultural belief that any emotional, physical, or mental weakness is never an option (e.g., "I will never accept defeat"; "I am…physically and mentally tough"; "I will never quit"; *Soldier's Creed*, n.d.). In a study of 382 military and civilian undergraduate students, data showed that military students scored significantly higher in beliefs of traditional masculine norms than did the civilian students (Robinson Kurpius & Lucart, 2000). A component of traditional masculine gender norms is the expectation for emotional toughness, such as hiding one's stress, not discussing one's worries, fears, or problems, and one's over self-reliance in dealing with these problems (Levant & Richmond, 2007). Emotional toughness is associated with avoidance, a central symptom of PTSD (e.g., Badour, Blonigen, Boden, Feldner, & Bonn-Miller, 2012; Naifeh, Tull, & Gratz, 2012; Parker-Guilbert, 2015). Indeed, studies using veteran samples support this notion of emotional toughness being positively correlated with more severe PTSD symptoms (e.g, Jakupcak, Blais, Grossbard, Garcia, & Okiishi, 2014; Morrison, 2012).

Therefore, these theories support the hypothesis that male SM/V's may be at a particularly higher risk for worsened PTSD symptoms following MST relative to females.

In summary, previous research using VA administrative data shows that females with MST are more likely to have a diagnosis of PTSD relative to males with MST (; Kimerling 2007, 2010; Tannahill et al., 2019). However, there is preliminary evidence using non-VA data that suggests that males with MST may be at higher risk for PTSD than females with MST (Hourani et al., 2015, O'Brien et al., 2008), suggesting that additional information may be helpful in clarifying these findings. Prior research in this area is limited by not directly comparing the sexes (Kimerling et al., 2007, 2010), combining sexual trauma types and/or severities (Kimerling et al., 2007, 2010; Hourani et al., 2015; O'Brien et al., 2008; Tannahill et al., 2019), and the absence of measures focusing specifically on overall PTSD and/or symptom cluster severities (Kimerling et al., 2007, 2010; Hourani et al., 2015; O'Brien et al., 2008; Tannahill et al., 2019).

The Current Study

The current study was designed to address these limitations in a sample of military SM/Vs using an anonymous, online survey. The primary aim of this study is to explore the potential interaction of biological sex and MST severity on PTSD symptoms. Based on previous research using VA samples (Tannahill et al., 2019), we hypothesized that females with a positive screen for assault or harassment-only MST would have a larger increased risk for more severe PTSD symptoms relative to males with a positive screen for assault or harassment-only MST. Given that PTSD is a multifaceted disorder, a secondary aim of this study was to investigate the interaction of biological sex and MST

in each of the symptom clusters of PTSD, using the 6-factor Anhedonia Model. Emerging research suggests that females with MST have a larger increased risk for depression relative to males with MST (Tannahill et al., 2019). As such, we hypothesized that females with a positive screen for assault or harassment-only MST would have a larger increased risk for more severe NACM, dysphoric arousal, and anhedonia symptom clusters, as these clusters highly map onto to the symptoms of a depression diagnosis (APA, 2013), and are also found to be significantly associated with depressive symptoms (Contractor et al., 2014, 2015; Elhai et al., 2015; Miller et al., 2008; Pietrzak et al., 2010, 2015; Price & van Stolk-Cooke, 2015; Tsai et al., 2015). As previous research shows that higher PTSD severity/diagnoses are associated with older age (e.g., Armenta et al., 2018), Black race (Roberts et al., 2011), enlisted rank (Xue et al., 2015), service in the Army or Marine military branch (e.g., Baker et al., 2009; Xue et al., 2015), and Veteran status (Fulton et al., 2015; Hoge et al., 2004), the current study covaried for these demographic characteristics.

CHAPTER II

METHOD

Participants

Participants were 489 male (M_{age} = 38.95, SD_{age} = 11.19) and 832 female (M_{age} = 32.02, SD_{age} = 7.34) SM/Vs. The current study utilized data from the merging of two sex-specific studies designed to assess the association of MST, sexual health, and relationship function among partnered SM/Vs (Blais, 2019). Participants from both studies were recruited through convenience sampling via online advertisements on Facebook and electronic listservs. Advertisements were targeted toward SM/Vs aged 18-65 who spoke English and identified as partnered. As partnered status was not a primary variable of interest, participants who identified as single were included in the current study. Upon meeting inclusion criteria, participants were provided with an electronic Letter of Information regarding study details via Qualtrics, a secure online survey platform. A consent form was not utilized, as it would have been the only link between participant-identifying information and survey responses. If interested in completing the study, participants continued with the online survey and completed self-report questionnaires. As compensation for participation, participants had the opportunity to enter their personal information to receive a $15 credit via a separate webpage. No identifying information collected for payment purposes was linked to individual survey responses. This study was approved by the Institutional Review Board at Utah State University.

Measures

Demographics. A demographic inventory was used to collect information on participants' biological sex, age, race (Caucasian/White, African American/Black,

American Indian/Alaska Native, Latino-a/Hispanic, Bi-racial/Multi-racial, other, declined to answer), military branch (Air Force, Army, Coast Guard, Marines, Navy), rank (junior enlisted: E1-E4, senior enlisted: E5-E8, officer class, other), and discharge status (active duty, veteran).

MST. Information on MST history and severity was collected using an adapted form of the VA MST screening tool (Kimerling et al., 2007). To assess for harassment MST, participants indicated via electronic checkmark if he/she experienced touching, cornering, pressure for sexual favors, verbal remarks, or a different form of attention with a write-in option during their military service. An affirmative response to any of these options was coded as a positive screen for harassment MST. To assess for assault MST, participants responded to the question, "Did someone ever use force or threat of force to have sexual contact with you against your will?" by electronically selecting the options, "yes" or "no". An affirmative response to this item was coded as a positive screen for assault MST. This differs from the VA MST screening tool which offers the options "yes", "no", or "declined" to harassment and assault MST screening questions, and codes an affirmative response to either question as positive for MST (Kimerling et al., 2007).

PTSD. Presence of a Criterion A traumatic event (APA, 2013) could not be confirmed in the existing dataset therefore precluding accurate identification of a PTSD diagnosis. Instead, the current study measured *symptoms* of PTSD using the PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013). The PCL-5 is a 20-item self-report measure that assesses posttraumatic stress symptoms in the past month. A sample item includes, "Feeling very upset when something reminded you of the stressful experience". Items were rated on a 5-point Likert-type scale from 0 (*not at all*) to 4 (*extremely*) in

terms of how much the symptoms have been bothering the participant in the past month, with a total score range of 0-80. Higher scores indicate greater distress. The suggested cutoff score for a probable PTSD diagnosis is ≥31 (Bovin et al., 2015). The PCL-5 has been validated in both active duty (Wortmann et al., 2016) and veteran samples (Bovin et al., 2015), and shows good internal consistency (α = .96) and test-retest reliability (*r* = .84; Bovin et al., 2015). Cronbach's alpha for the current study was .97.

PTSD symptom cluster scores can be derived from the PCL-5. Prior research conducted in a subset of this sample examined multiple factor structure models for best fit (Blais et al., 2018). Results showed that the Anhedonia model was a superior fit compared to other models. The Anhedonia model consists of six factors: re-experiencing (items 1-5; Cronbach's α = .95), avoidance (items 6-7; Cronbach's α = .94), NACM (items 8-11; Cronbach's α = .89), anhedonia (items 12-14; Cronbach's α = .92), dysphoric arousal (items 15-16, 19-20; Cronbach's α = .85), and anxious arousal (items 17-18; Cronbach's α = .89).

Analytic Plan

Sample characteristics were calculated using descriptive statistics. Bivariate associations between biological sex, MST severity, and PTSD total and symptom cluster severity, as well as covariates, were assessed using analysis of variance, correlations, and chi-square tests where appropriate. MST severity was captured by two dichotomous variables: harassment-only and assault. The harassment-only MST variable was created by including those who endorsed a history of harassment MST but did not endorse assault MST (dummy code = 1) versus those who either did not endorse any MST exposure or those who endorsed assault MST (dummy code = 0). The assault MST variable was

created by including those who endorsed assault MST (dummy code = 1) versus those who either did not endorse any MST exposure or endorsed harassment-only MST (dummy code = 0).

A review of the data revelated that 18.07% (n = 210) of participants reported no PTSD symptoms. To address the proportion of zeros in the sample, two-part hurdle models assessing the moderating role of sex on the relationship of MST severity and the *presence* (i.e., any PTSD symptoms versus none) or *severity* of overall PTSD symptoms and symptom clusters were utilized. In the first step of the hurdle models, the PCL-5 total score and each of the PTSD symptom clusters (i.e., re-experiencing, avoidance, NAMC, anhedonia, dysphoric arousal, anxious arousal) were transformed into dichotomous measures of "no symptoms" (dummy code = 0) versus "at least some symptoms" (dummy code = 1). To assess moderation, interaction terms were created by multiplying both MST severity variables (i.e., "harassment-only MST versus all else" and "assault MST versus all else") by the biological sex variable, resulting in two interactions terms: (1) harassment-only MST × sex; (2) assault × sex. Then, binary logistic regressions assessed for the *presence* of PTSD symptoms using a backward elimination strategy. In this strategy, if both interactions in the model were not statistically significant, a second regression excluding the interaction terms was conducted. In this instance, only the main effects model is reported. If either interaction term was significant, the model including both interaction terms is reported. Overall PTSD symptoms and each of the PTSD symptom clusters were regressed on biological sex, harassment-only MST, assault MST, age, race, military branch, rank, discharge status, and the interaction between biological sex and MST severity (i.e., harassment-only MST, assault MST) in seven separate

models, one for overall PTSD symptoms and one for each PTSD symptom cluster (i.e., re-experiencing, avoidance, NAMC, anhedonia, dysphoric arousal, anxious arousal).

The second step of the hurdle models assessed PTSD symptom *severity* among those reporting at least some PTSD symptoms. PCL-5 total score and each of the PTSD symptom clusters were transformed such that zero responses were coded as missing data and only responses with at least some PTSD symptoms were included in analyses (n = 951, 81.91%). Then, generalized linear models with a gamma distribution and log link function assessed PTSD symptom total and symptom cluster *severity*. Similar to the first step of the hurdle models, overall PTSD symptoms and PTSD symptom clusters were regressed on biological sex, harassment-only MST, assault MST, age, race, military branch, rank, discharge status and the interaction between biological sex and MST severity (i.e., harassment-only MST and assault MST) in seven separate models for each PTSD outcome (i.e., total symptoms, re-experiencing, avoidance, NAMC, anhedonia, dysphoric arousal, anxious arousal). Consistent with the backward elimination strategy, if both interactions in the model were not statistically significant, a second regression without the interaction variables was conducted to analyze the main effects of variables on that PTSD outcome. If either interaction term was significant, the model including both interaction terms is reported. Missing data were excluded using listwise deletion. Statistical analyses were conducted using SPSS Version 25 (IBM Corp, 2017) and the R environment (R Core Team, 2018).

CHAPTER III

RESULTS

Sample Characteristics

Of the 1,321 participants in the parent sample, 160 (12.11%) were missing data on study variables, resulting in a final sample of 1,161 (87.89%) participants. Tables 1 and 2 show the demographic characteristics for the sample, stratified by biological sex and MST severity. Of the 782 (67.36%) females in the sample, 142 (18.16%) reported no history of MST, 378 (48.34%) experienced harassment-only MST, and 262 (33.50%) experienced assault MST. Of the 379 (32.70%) males in the sample, 323 (85.22%) reported no history of MST, 47 (12.40%) experienced harassment-only MST, and 9 (2.37%) experienced assault MST.

Bivariate Associations

Of those who experienced assault MST, a binomial test indicated that the proportion of female White SM/Vs of .76 was significantly higher than the proportion of .22 observed in White SM/V males ($p = .001$) (see Table 2). No significant differences in other demographics or PTSD symptoms were observed among the assault MST group (see Tables 1-2). Among the harassment-only MST subgroup, males were significantly older than females and had significantly higher PTSD symptoms in every symptom cluster, including the total overall PTSD symptoms (see Table 1). No significant differences in race, branch, rank, or discharge status between males and females were observed among the harassment-only MST subgroup (see Table 2). Lastly, among those who have not experienced MST, males were significantly older than females and had higher PTSD symptom severities in all PTSD symptom clusters, including total overall PTSD symptoms (see Table 1).

Table 1

Continuous Demographic Characteristics and PTSD Severities, Stratified by MST Severity and Biological Sex (N = 1,161)

	No MST			Harassment Only			Assault		
	Male *n* = 323 (85.00%)	Female *n* = 142 (18.16%)		Male *n* = 47 (12.37%)	Female *n* = 378 (48.34%)		Male *n* = 9 (2.43%)	Female *n* = 262 (33.50%)	
Characteristic	*M (SD)*		*t*-Test	*M (SD)*		*t*-Test	*M (SD)*		*t*-Test
Age	38.68 (10.82)	31.43 (8.07)	*t*(355) = -8.00***	41.79 (12.25)	31.92 (7.24)	*t*(50) = -5.40***	37.56 (12.84)	32.49 (7.06)	*t*(8.17) = -1.18
PTSD Total	20.93 (19.85)	14.39 (19.84)	*t*(463) = -3.28***	34.19 (24.09)	20.00 (19.93)	*t*(423) = -4.49***	30.22 (20.86)	38.35 (23.64)	*t*(269) = 1.02
PTSD Clusters									
Intrusive	4.60 (5.05)	3.18 (5.44)	*t*(463) = -2.74**	7.53 (6.47)	4.28 (5.19)	*t*(54) = -3.31**	7.22 (6.10)	9.02 (6.30)	*t*(269) = 0.84
Avoidance	2.04 (2.37)	1.53 (2.43)	*t*(463) = -2.15*	3.51 (2.94)	2.12 (2.54)	*t*(423) = -3.48***	2.898 (2.67)	4.55 (2.91)	*t*(269) = 1.68
NACM	3.43 (4.03)	2.44 (4.06)	*t*(463) = -2.43*	6.04 (5.00)	3.85 (4.40)	*t*(423) = -3.17**	5.00 (3.74)	7.81 (5.37)	*t*(9.17) = 2.17
Anhedonia	3.56 (3.62)	2.56 (3.69)	*t*(463) = -2.75**	5.57 (3.94)	3.33 (3.76)	*t*(423) = -3.85***	4.89 (4.40)	5.78 (4.26)	*t*(269) = 0.62
Dys. Arousal	4.83 (4.23)	3.32 (4.25)	*t*(463) = -3.56***	7.38 (4.88)	4.31 (4.21)	*t*(423) = -4.64***	6.67 (5.00)	7.21 (4.75)	*t*(269) = 0.34
Anx. Arousal	2.46 (2.49)	1.37 (2.21)	*t*(301) = -4.52***	4.15 (2.96)	2.11 (2.61)	*t*(423) = -4.97***	3.56 (2.60)	3.99 (2.81)	*t*(269) = 0.46

Note. MST = military sexual trauma; PTSD = posttraumatic stress disorder; NACM = negative alterations in cognitions and mood; Dys. = dysphoric; Anx. = anxious. *$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

Table 2

Dichotomous Demographic Characteristics, Stratified by MST Severity and Biological Sex (N = 1,161)

	No MST			Harassment Only			Assault		
	Male *n* = 323 (85.00%)	Female *n* = 142 (18.16%)		Male *n* = 47 (12.37%)	Female *n* = 378 (48.34%)		Male *n* = 9 (2.43%)	Female *n* = 262 (33.50%)	
Characteristic	*n (%)*		$\chi^2(1, n = 465)$	*n (%)*		$\chi^2(1, n = 425)$	*n (%)*		$\chi^2(1, n = 271)$
Race			1.24			1.09			12.81***
White	279 (86.92%)	117 (19.12%)		40 (12.46%)	297 (48.53%)		2 (0.62%)	198 (32.35%)	
Other	44 (75.86%)	25 (14.70%)		7 (12.07%)	81 (47.65%)		7 (12.07%)	64 (37.65%)	
Branch			0.54			0.12			0.36
Army	187 (85.78%)	77 (18.03%)		27 (12.39%)	207 (48.48%)		4 (1.83%)	143 (33.49%)	
Other	136 (84.47%)	65 (18.31%)		20 (12.42%)	171 (48.17%)		5 (3.11%)	119 (33.52%)	
Rank			15.57***			0.20			0.12
Jr. Enlisted	110 (81.48%)	76 (20.0%)		20 (14.81%)	174 (45.79%)		5 (3.70%)	130 (34.21%)	
Sr. Enlisted/ Officer	213 (87.30%)	66 (16.42%)		27 (11.07%)	204 (50.75%)		4 (1.64%)	132 (32.84%)	
Discharge Status			4.64*			0.20			0.79
Veteran	247 (85.47%)	95 (16.38%)		36 (12.57%)	278 (47.93%)		6 (2.08%)	207 (35.69%)	
Active	76 (84.44%)	47 (23.27%)		11 (12.22%)	100 (49.50%)		3 (3.33%)	55 (27.23%)	

Note. Percentages calculated within gender and demographic characteristic across MST severity. MST = military sexual trauma; Jr. = Junior; Sr. = Senior. *$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

Additionally, among those who reported no MST history, a binomial test indicated that the proportion of senior ranked males of .66 was significantly higher than the .46 proportion of senior ranks observed in females ($p < .001$). Further, a binomial test indicated that the proportion of veteran males of .76 was significantly higher than the .67 proportion of veterans observed in females ($p < .001$) (see Table 2). No significant differences in race or branch between males and females were observed among the no MST subgroup (see Table 2).

Presence of Any PTSD Symptoms

Of the seven binary logistic regressions adjusting for age, race, branch, rank, and discharge status that examined the moderating role of biological sex on the association of MST severity and any symptoms in PTSD total or symptom cluster scores, four regressions observed interaction effects. In all seven models, male sex, harassment-only MST and assault MST were significantly associated with the presence of PTSD symptoms (see Table 3). Significant interaction effects were observed for intrusions, avoidance, anhedonia, and dysphoric arousal such that females reporting assault MST were more likely to report at least some symptoms relative to males (see Table 3, Figure 1A-D). In all seven regressions, the interaction of sex and harassment-only MST was non-significant (see Table 3). Above and beyond the influence of biological sex and MST history, there were several instances where covariates were significantly associated with the presence of overall PTSD symptoms and PTSD symptom clusters. Veteran status, relative to active duty status, had an increased risk for the presence of symptoms within all PTSD symptom clusters, as well as any PTSD symptoms overall (see Table 3). Additionally, non-White SM/Vs were more likely to have the presence of avoidance and

Table 3

Binary Logistic Regressions Assessing Influence of Biological Sex, MST Severity, and Their Interaction, on the Presence of Overall PTSD Symptoms and PTSD Cluster Symptoms

Variable	PTSD Total AOR [95% CI]	Intrusive AOR [95% CI]	Avoidance AOR [95% CI]	NACM AOR [95% CI]	Anhedonia AOR [95% CI]	Dysphoric Arousal AOR [95% CI]	Anxious Arousal AOR [95% CI]
Age	0.98 [0.96,1.00]*	0.98 [0.97, 1.00]*	0.98 [0.97, 1.00]*	0.97 [0.96, 0.99]***	0.99 [0.97, 1.00]	0.98 [0.96, 1.00]*	0.98 [0.96, 0.99]**
Race [ref=Non-White]	0.70 [0.46, 1.07]	0.77 [0.55, 1.09]	0.69 [0.50, 0.96]*	0.69 [0.48, 0.97]*	0.74 [0.53, 1.03]	0.80 [0.56,1.15]	0.73 [0.53, 1.02]
Branch [ref=Non-Army]	1.07 [0.78, 1.47]	1.09 [0.84, 1.42]	1.19 [0.92, 1.53]	1.17 [0.90, 1.52]	1.14 [0.89, 1.48]	1.28 [0.97, 1.69]	1.12 [0.86, 1.44]
Rank [ref = Sr. Enlisted/Officer]	1.20 [0.86, 1.68]	0.98 [0.74, 1.29]	1.00 [0.76, 1.30]	1.25 [0.94, 1.65]	1.10 [0.84, 1.44]	1.20 [0.89, 1.61]	1.23 [0.94, 1.62]
Discharge Status [ref = Non-veteran]	1.65 [1.14, 2.38]**	1.71 [1.25, 2.33]***	1.83 [1.35, 2.48]***	2.05 [1.50, 2.81]***	1.56 [1.15, 2.12]**	1.63 [1.17, 2.27]**	2.04 [1.50, 2.77]***
Sex [ref= Female]	3.69 [2.37, 5.74]***	3.25 [2.12, 4.98]***	2.17 [1.43, 3.31]***	2.96 [2.02,4.33]***	2.80 [1.83, 4.28]***	3.39 [2.17, 5.29]***	3.79 [2.59, 5.53]***
Harassment-only MST [ref = all else]	2.31 [1.56, 3.42]***	2.20 [1.48, 3.27]***	1.89 [1.27, 2.82]**	2.74 [1.92, 3.91]***	1.71 [1.15, 2.53]**	2.05 [1.37, 3.06]***	1.87 [1.32, 2.66]***
Assault MST [ref=all else]	7.40 [4.23, 12.96]***	9.10 [5.56, 14.89]***	7.32 [4.57, 11.72]***	8.79 [5.54, 13.95]***	4.03 [2.58, 6.29]***	5.43 [3.33, 8.85]***	6.79 [4.39, 10.49]***
Sex*Harassment-only MST	-	0.78 [0.34, 1.77]	1.05 [0.48, 2.28]	-	1.28 [0.52, 3.12]	1.02 [0.38, 2.73]	-
Sex*Assault MST	-	0.17 [0.03, 0.91]*	0.18 [0.04, 0.83]*	-	0.19 [0.04, 0.84]*	0.17 [0.03, 0.92]*	-

Note. Main effects are presented in models with insignificant interactions. AOR = adjusted odds ratio; CI = confidence interval; MST = military sexual trauma; NACM = negative alterations in cognitions and mood; PTSD = posttraumatic stress disorder; ref = reference group; Sr. = senior. *$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

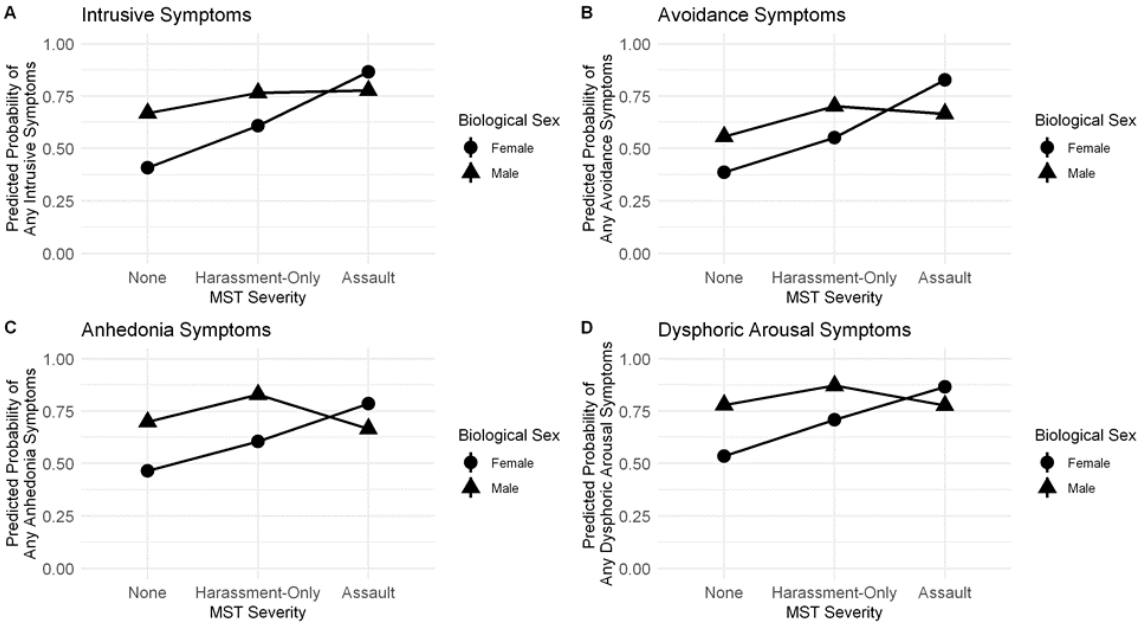

Figure 1. Binary logistic regression results. Females with history of assault MST are at increased risk for presence of intrusive, avoidance, anhedonia, and dysphoric arousal symptoms compared to males with assault MST. MST = military sexual trauma.

NACM symptoms relative to White SM/Vs (see Table 3), and younger SM/Vs were more likely to have the presence of intrusive, avoidance, NACM, dysphoric arousal, and anxious arousal symptoms, as well as any PTSD symptoms overall (see Table 3).

Severity of PTSD Symptoms

Of the seven linear regressions with gamma distributions adjusting for age, race, branch, rank, and discharge status assessing for the moderating role of biological sex on the association of MST severity and *severity* of PTSD symptoms, five regressions observed interaction effects. In all seven models, assault MST was significantly associated with higher symptom severity (see Table 4). Additionally, harassment-only MST was associated with higher anxious arousal symptoms. Biological sex was unrelated to PTSD total severity or symptom cluster severity (see Table 4). Significant interactions were observed for overall PTSD symptoms, as well as intrusive, avoidance, NACM, and dysphoric arousal symptoms, such that males reporting harassment-only MST were at larger risk for higher symptom severity relative to females (see Table 4, Figure 2A-E). In all seven regressions, the interaction of biological sex and assault MST was non-significant (see Table 4). Above and beyond the influence of sex and MST history, there were multiple instances where covariates significantly contributed to change in overall PTSD symptoms and PTSD symptom clusters. Veteran status (vs. active duty status) had an increased risk for higher symptoms within all PTSD symptom clusters, as well as total overall PTSD symptoms (see Table 4). Additionally, senior ranks (vs. junior enlisted ranks) were associated with higher overall PTSD symptoms, as well as intrusive, NACM, anhedonia, and anxious arousal symptoms. Lastly, older age was significantly related to more severe anhedonia symptoms (see Table 4).

Table 4

Linear Regressions Assessing Influence of Biological Sex, MST Severity, and Their Interaction, on the Severity of Overall PTSD Symptoms and PTSD Cluster Symptoms

Variable	PTSD Total exp(B) [95% CI]	Intrusive exp(B) [95% CI]	Avoidance exp(B) [95% CI]	NACM exp(B) [95% CI]	Anhedonia exp(B) [95% CI]	Dysphoric Arousal exp(B) [95% CI]	Anxious Arousal exp(B) [95% CI]
Age	1.00 [1.00, 1.01]	1.00 [0.99, 1.01]	1.00 [1.00, 1.01]	1.00 [1.00, 1.01]	1.01 [1.00, 1.01]*	1.00 [1.00, 1.01]	1.00 [1.00, 1.01]
Race [ref=Non-White]	0.93 [0.83, 1.04]	0.95 [0.85, 1.07]	0.93 [0.85, 1.02]	0.95 [0.85, 1.07]	0.98 [0.88, 1.08]	0.94 [0.85, 1.04]	1.04 [0.94, 1.14]
Branch [ref=Non-Army]	1.05 [0.96, 1.16]	1.01 [0.92, 1.11]	1.02 [0.94, 1.10]	1.00 [0.92, 1.10]	1.04 [0.95, 1.13]	1.03 [0.95, 1.11]	1.03 [0.95, 1.12]
Rank [ref = Senior]	0.90 [0.82, 0.99]*	0.88 [0.80, 0.98]*	0.94 [0.87, 1.03]	0.85 [0.77, 0.93]***	0.85 [0.78, 0.93]***	0.92 [0.85, 1.01]	0.89 [0.82, 0.97]**
Discharge Status [ref = Non-veteran]	1.28 [1.14, 1.43]***	1.16 [1.03, 1.31]*	1.19 [1.08, 1.31]***	1.13 [1.01, 1.27]*	1.15 [1.04, 1.28]**	1.19 [1.08, 1.31]***	1.18 [1.07, 1.31]***
Sex [ref= Female]	1.04 [0.87, 1.24]	0.89 [0.73, 1.08]	0.92 [0.78, 1.08]	0.86 [0.71, 1.04]	0.99 [0.87, 1.12]	0.99 [0.85, 1.15]	1.06 [0.93, 1.19]
Harassment-only MST [ref = all else]	1.06 [0.89, 1.26]	0.90 [0.75, 1.09]	0.97 [0.83, 1.13]	0.95 [0.79, 1.15]	1.10 [0.97, 1.24]	0.98 [0.84, 1.14]	1.18 [1.04, 1.33]**
Assault MST [ref = all else]	1.68 [1.41, 2.01]***	1.30 [1.08, 1.57]**	1.37 [1.17, 1.59]***	1.41 [1.17, 1.70]***	1.40 [1.22, 1.61]***	1.31 [1.12, 1.52]***	1.38 [1.21, 1.58]***
Sex*Harassment-only MST	1.40 [1.05, 1.87]*	1.56 [1.16, 2.11]**	1.38 [1.08, 1.77]**	1.34 [1.00, 1.78]*	-	1.37 [1.08, 1.76]**	-
Sex*Assault MST	0.77 [0.45, 1.32]	0.99 [0.58, 1.69]	0.84 [0.53, 1.33]	0.78 [0.47, 1.32]	-	0.98 [0.61, 1.56]	-

Note. Main effects are presented in models with insignificant interactions. CI = confidence interval; exp(B) = exponentiated beta; MST = military sexual trauma; NACM = negative alterations in cognitions and mood; PTSD = posttraumatic stress disorder; ref = reference group. *$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

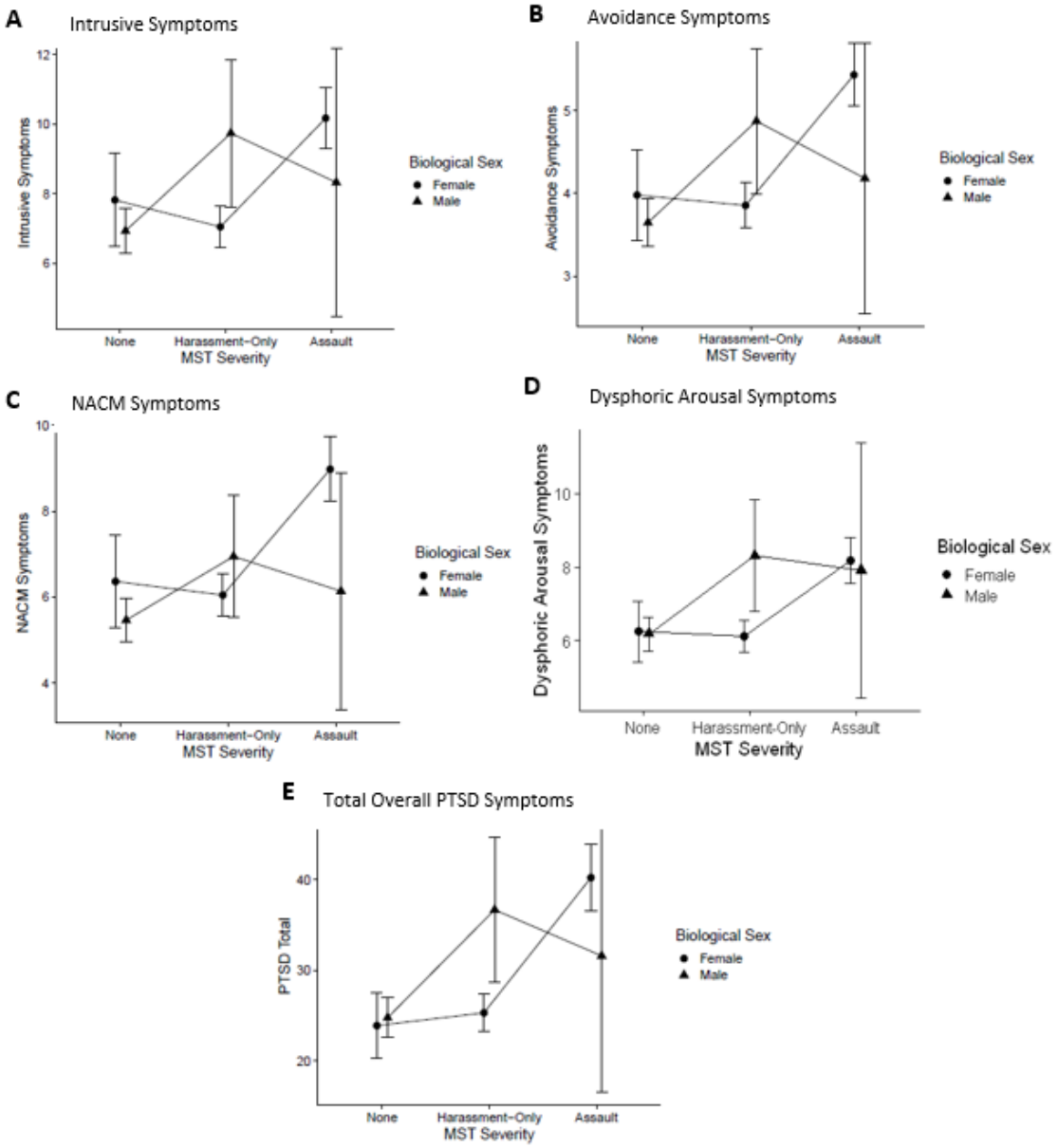

Figure 2. Linear regression result. Males with history of harassment-only MST are at increased risk for presence of intrusive, avoidance, NACM, dysphoric arousal, and overall PTSD symptoms compared to females with history of harassment-only MST. MST = military sexual trauma; NACM = negative alterations in cognitions and mood; PTSD = posttraumatic stress disorder.

CHAPTER IV

DISCUSSION

The aim of the current study was to determine if male and female SM/Vs differ in their expression of PTSD symptoms (i.e., presence and severity of symptoms) following MST exposure. Analyses showed that among those who have experienced *assault* MST, females were at a higher risk to have the *presence* of at least some PTSD symptoms within the intrusive, avoidance, anhedonia, and dysphoric arousal symptom clusters. However, no significant differences were found in symptom *severity* between sexes in those who have experienced assault MST. Further, among those who have experienced *harassment-only* MST, males had a larger risk of *more severe* PTSD symptoms overall, as well as in the intrusive, avoidance, NACM, and dysphoric arousal symptom clusters, though no significant differences were found between sexes in the *presence* of symptoms.

Results from the current study may provide an explanation for the mixed evidence base regarding gender differences in PTSD outcomes following MST. For example, some studies show that females who experienced MST are at heightened risk for worsened PTSD outcomes (Kimerling et al., 2007, 2010; Tannahill et al., 2019), and other studies suggest that males who experienced MST are at heightened risk for worsened PTSD outcomes (Hourani et al., 2015; O'Brien et al., 2008). It is possible that the current literature is mixed due to differences in studying either the *presence* of PTSD symptoms, such as by diagnosis, versus the *severity* of PTSD symptoms. For instance, in studies examining sex differences in the association between MST and the presence PTSD diagnoses (e.g., Kimerling et al., 2007, 2010; Tannahill et al., 2019), results showed that females were at higher risk for a PTSD diagnosis compared to males. This is consistent

with the results from the current study, such that females were more likely to have the *presence* of PTSD symptoms in various clusters relative to males. Further, in studies examining sex differences in the association between MST and PTSD symptom *severity* (e.g., Hourani et al., 2015; O'Brien et al., 2008), results showed that males were at higher risk for more severe symptoms. This is also consistent with the current study's results. Therefore, the current study may support the reconciliation of mixed literature by studying the *presence* and *severity* of PTSD symptoms separately.

Results from the current study have meaningful research implications. First, future research may consider the utility of directly comparing males and females when assessing outcomes of PTSD after MST. Second, results show the importance of distinguishing between harassment-only and assault MST. Future research collapsing MST severities may obscure results. Third, our results revealed a distinct difference between the sexes with regard to the *presence* of PTSD symptoms compared to the *severity* of PTSD symptoms. That is, among those with assault MST, females were at higher risk for the *presence* of symptoms, while among those with harassment-only MST, males were at higher risk for greater *severit*y of symptoms. It is possible that there is a higher threshold in males for developing PTSD symptoms following MST, but once they cross that threshold, their predicted symptom severity trajectories are more severe than that of females. Such findings suggest that distinguishing between the presence of symptoms versus the severity of symptoms may reveal important information about functioning among males and females post-MST.

Study findings also have implications for clinical practice, which is timely given the recent request for proposals for MST-specific treatments (Defense Health Agency,

2019). Specifically, it is important for clinicians to recognize that males and females may have different responses following MST and should therefore be sensitive to sex-specific treatment needs. Though there are several evidence-based treatments for PTSD that are strongly recommended by the APA, such as Prolonged Exposure (Foa, Hembree, & Rothbaum, 2007), Cognitive Behavioral Therapy (Monson & Shnaider, 2014), Cognitive Processing Therapy (Resick, Monson, & Chard, 2016), and Cognitive Therapy (Beck, 1967; Ehlers & Clark, 2000), other treatments that target specific symptom cluster of PTSD may be warranted. For instance, results showed that females with history of assault MST are at greater risk for the presence of intrusive, anhedonia, avoidance, and dysphoric arousal symptoms. Clinicians may consider treatments that directly target these each of these symptom clusters. To treat symptoms in the intrusive symptom cluster, clinicians may consider utilizing Nightmare Deconstruction and Reprocessing Therapy (Spangler & West, 2018) for nightmares and Dialectical Behavior Therapy (DBT; Linehan, 2014) emotion regulation and distress tolerance skills targeting emotional/psychological reactivity and flashbacks (Becker & Zayfert, 2001; Harned, Korslund, & Linehan, 2014). To target symptoms in the anhedonia symptom cluster following assault MST exposure, clinicians may consider including behavioral activation techniques in their treatment to target anhedonia symptoms (Jacobson, Martell, & Dimidjian, 2001; Jakupcak et al., 2006, 2010). Avoidance symptoms may be addressed using value-based approaches, such as Acceptance and Commitment Therapy (ACT; Hayes, Pistorello, & Levin, 2012), to reorient the individual towards their values and away from avoidant behaviors that may perpetuate their symptoms (Badour et al., 2012; Thompson, Luoma, & LeJeune, 2013; Tull, Gratz, Salters, & Roemer, 2004; Twohig,

2009). Last, dysphoric arousal symptoms may be treated using DBT emotion regulation (Frazier & Vela, 2014; Linehan, 2014) or mindfulness skills (King et al., 2013; Lang, 2017; Linehan, 2014; see review, Wright, Day, & Howells, 2009).

Further, results showed males with harassment-only MST were at increased risk for higher severity in intrusive, avoidance, dysphoric arousal, and NACM symptom clusters, as well as total overall PTSD symptoms. Similar to the suggestions above, clinicians may consider utilizing Nightmare Deconstruction and Reprocessing Therapy (Spangler & West, 2018), DBT emotion regulation and distress tolerance (Linehan, 2014) for intrusive symptoms (Becker & Zavfert, 2001; Harned et al., 2014), ACT for avoidance symptoms (Hayes et al., 2012; Twohig, 2009), and mindfulness skills (King et al., 2013; Lang, 2014; Linehan, 2014; Wright et al., 2009) for dysphoric arousal symptoms. Further, it is possible that males' increased risk for higher NACM symptom severity is related to false beliefs they may hold about rape (i.e., rape myth; Burt 1980), such as the belief that only females are sexually assaulted, and the attack this may subsequently have on their identities after experiencing assault MST. Such negative cognitions about oneself and the possible self-blame that may accompany these thoughts are two symptoms in the NACM cluster. Clinicians may consider using cognitive restructuring to target negative posttraumatic cognitions (Bryant, Moulds, Guthrie, Dang, & Nixon, 2003; Marks et al., 1998).

The finding that harassment-only MST was associated with higher symptom severity in males whereas assault MST was associated with higher odds of symptom presence in females suggests the importance of distinguishing between severities of MST during clinical screening. Literature shows that assault MST, relative to harassment

MST, is associated with more severe PTSD symptom severity (Blais et al., 2018, 2019). However, these studies were conducted with female-only samples and therefore may not generalize to males. As demonstrated in the current study, harassment MST may be particularly detrimental to males, whereas assault MST may have a larger impact on females.

There were multiple covariates in the current study that were significantly associated with PTSD symptoms. First, veteran status, relative to active duty status, was associated with increased risk for both the *presence* and *severity* of PTSD symptoms in all symptom clusters, as well as overall PTSD symptoms. Although the current study did not assess for time since the MST experience, it is possible that for veterans, there has been a longer duration of time since their MST event, suggesting their symptoms may be more chronic and severe in nature. Studies show that symptom chronicity, as opposed to shorter duration of symptoms, is related to worsened outcomes and increased symptom severity (e.g., Bukh, Bock, Vinberg, & Kessing, 2013; Gilsanz et al., 2017; Kisley, Scott, Denney, & Simon, 2006). Next, younger age was associated with greater risk for the presence of PTSD symptoms. While contrary to previous literature showing older age was associated with increased risk of PTSD symptoms (e.g., Armenta et al., 2018), the current findings may be due to a restriction in age range in the current sample. With only eight participants being ≥65 years old and 50% of the sample's ages falling between 28 and 39 years old, it is possible the current sample does not have enough participants in the older demographic to reflect previous research findings. Lastly, senior rank was associated with more severe symptoms in several PTSD clusters. This is contrary to

extant literature suggesting junior ranks are at higher risk for worse PTSD symptoms (see review, Xue et al., 2015).

The current study is not without its limitations. First, this study does not account for the specific traumatic event the SM/Vs were responding to when they completed the PCL-5. Although studies show that MST has a stronger association with worsened PTSD symptoms relative to other trauma types (Calhoun et al., 2016; Dutra et al., 2010; Himmelfarb et al., 2006; Suris & Lind, 2008), it is unknown if the participants in this study reported symptoms related to MST or to another trauma. Nonetheless, even if SM/Vs responded to the PCL-5 in relation to a non-MST trauma, it is likely that their previous MST experience has compounded their PTSD symptoms, as multiple traumas increase risk for PTSD symptoms (Scott, 2007; Reger et al., 2009; Xue et al., 2015). Second, the current study is limited to information collected via self-report rather than clinician-administered interviews. Future research should utilize clinician-administered interviews to identify SM/Vs with MST as their index trauma and assess the severity of their distress. Third, the data used for this study were cross-sectional, thereby limiting inference of causality. As some of the participants were still in the military, it is possible MST exposures might be more proximal or ongoing issues. Future research should consider studying the association of biological sex with MST severity and PTSD symptoms using a longitudinal design.

In conclusion, male and female SM/Vs have different PTSD responses following different severities of MST. Among those who experienced assault MST, female SM/Vs were significantly more likely to have *presence* of PTSD symptoms and among those who experienced harassment-only MST, male SM/Vs were at higher risk for *more severe*

PTSD symptoms. Such findings suggest that the threshold and symptom trajectory for ensuing PTSD symptoms is different for males and females depending on the MST severity. Results further suggest that gathering information on MST severity may be helpful in treatment planning and that sex-specific intervention may be needed.

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