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The Prevalence of Military Sexual Trauma: A Meta-Analysis

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Abstract

Due to methodological heterogeneity, the exact prevalence of military sexual trauma (MST) is unknown. To elucidate our understanding of the pervasiveness of this important social issue, a meta-analysis was conducted. A computerized database search in PsycINFO, PubMed, and PILOTS revealed 584 unique citations for review. Of these identified studies, 69 met the inclusion criteria for the meta-analysis. The results revealed that 15.7% of military personnel and veterans report MST (3.9% of men, 38.4% of women) when the measure includes both harassment and assault. Additionally, 13.9% report MST (1.9% of men, 23.6% of women) when the measure assesses only assault and 31.2% report MST (8.9% of men, 52.5% of women) when the measure assesses only harassment. Regardless of the type of victimization incident (i.e., harassment or assault), women evidenced significantly larger prevalence rates compared to men. Self-report measure and interviews were associated with higher prevalence rates than the review of veterans affair (VA) medical records when measuring both harassment and assault and only harassment. No significant differences were observed among prevalence rates based on VA, non-VA, or both VA and non-VA recruitment. Ultimately, the findings suggest that MST is a pervasive problem, among both men and women in the military, highlighting the importance of this line of research.

Keywords

sexual assault, rape, sexual harassment, military, veterans

Military sexual trauma (MST) is any incident of sexual harassment or sexual assault during the course of military service (Department of Defense Sexual Assault Prevention and Response, 2012). According to large-scale data collected by the Department of Veterans Affairs (VA), MST impacts 1 in 4 female service members and 1 in 100 male service members (Military Sexual Trauma Support Team, 2012). MST is of high concern within the Department of Defense (DoD) and VA because survivors are at increased risk of short- and long-term psychological, physical, social, and occupational difficulties (Goldzweig, Balekian, Rolón, Yano, & Shekelle, 2006; Kimerling, Gima, Smith, Street, & Frayne, 2007). In addition, military personnel have been found to be at greater risk of sexual victimization and subsequent difficulties when compared to the general population (Zinzow, Grubaugh, Monnier, Suffoletta-Maierle, & Frueh, 2007).

Several literature reviews have been conducted (Allard, Nunnik, Gregory, Klest, & Platt, 2011; Goldzweig et al., 2006; Suris & Lind, 2008; Zinzow et al., 2007) and largely support that the prevalence of MST ranges from 20% to 45%. However, the rate varies greatly based on participant gender, population (e.g., active duty, veterans), methodology (e.g., in-person interview, mailed questionnaire), MST definition, and setting (e.g., in the context of seeking psychological services; Allard et al., 2011; Suris & Lind, 2008). Even large-scale data collected through the VA is arguably flawed because these rates only reflect VA-enrolled veterans who elected to disclose their victimization experiences to their provider through responses to two verbal questions ("When you were in the military, did you ever receive uninvited or unwanted sexual attention (i.e., touching, cornering, pressure for sexual favors or inappropriate verbal remarks, etc.)?" and "When you were in the military, did anyone ever use force or threat of force to have sex against your will?"). Although this prior research provides insight into the frequency of this type of sexual victimization, the precise prevalence of MST is unknown (Allard et al., 2011; Suris & Smith, 2011). Ultimately, our ability to accurately detect and appropriately respond to MST hinges on our understanding of the pervasiveness of this important social issue.

The appropriate methodology to address this gap in the literature is a meta-analytic review. By conducting a systematic literature review and statistically aggregating the findings of all studies in the literature base, the present meta-analysis obtained

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a single estimate of the prevalence of MST across methodologies and participant characteristics. To examine the impact of the definition of MST, separate analyses were conducted for prevalence rates that represented (1) both harassment and assault, (2) only assault, or (3) only harassment. Finally, the gender of the participants, recruitment source, and measurement type were examined as moderator variables. In light of the difficulties many survivors of MST experience, it should be of high priority to better understand the frequency of this type of trauma to advance our conceptualization of MST, improve assessment and prevention strategies, and inform treatment methods.

Method

A computerized database search was conducted with PsycINFO, PubMed, and PILOTS. The key words were "military" AND "sexual trauma" OR "veteran" AND "sexual trauma" OR "military" AND "sexual assault" OR "veteran" AND "sexual assault." The search terms of sexual trauma (Allard et al., 2011; Morris, Smith, Farooqui & Suris, 2014; O'Brien & Sher, 2013) and sexual assault (Suris & Lind, 2008; Zinzow et al., 2007) were chosen because they are two of the most commonly used key words in the MST literature. This systematic database search resulted in 584 unique citations. If a thesis or dissertation abstract was identified in the literature search, then the full-text document was reviewed. To be included in the meta-analysis, the study was required to be available for review, published in English, include empirical data (e.g., not a case study, book review, literature review), use a veteran or military sample, measure MST as defined (to be discussed below), not selectively sample participants who were sexual abuse or assault survivors, and include enough information to calculate a prevalence rate separately for men and/or women.

Many studies relied on the same sample. The researcher identified samples that were exact or majority duplicates based on the descriptions of the methodology, demographic characteristics, and authorship. When there were duplicates, one of the studies was randomly selected for inclusion. A list of the duplicate samples can be obtained from the author.

To be included, the studies had to provide enough information that it could be determined whether or not it satisfied the MST definition used in the present meta-analysis. MST was defined as any incident of sexual harassment or sexual assault during military service (Department of Defense Sexual Assault Prevention and Response, 2012). Sexual assault was defined as an act that involved unwanted, nonconsensual, forced, or coerced touching of sexual body parts or sexual intercourse (Allard et al., 2011). Sexual harassment was defined as an act of unwanted, nonconsensual verbal or physical contact that was sexual in nature, such as sexual comments or sexual touching of nonsexual body parts (Allard et al., 2011). The key characteristics to differentiate sexual assault from harassment were either the presence of force or the involvement of sexual body parts. If a study did not specify how they defined or measured MST, such as vaguely stating that they measured sexual harassment, then the study was not included. This decision was made because one of the goals of this meta-analysis was to examine the impact of definitional differences on the mean prevalence rate. Additionally, some studies placed a time restriction on the assessment of MST, such as in the past 6 or 12 months. Those studies were not included because they would attenuate the estimated mean prevalence rate due to the restricted time period.

Of the 584 identified studies, 69 studies met the inclusion criteria for the meta-analysis (see Figure 1 for a flow diagram of the search procedures and review process).

Data Analysis

Comprehensive Meta-Analysis Version 2 (Borenstein, Hedges, Higgins, & Rothstein, 2011) was used for the analysis and followed the methodology recommended by Borenstein, Hedges, Higgins, and Rothstein (2009). The analyses were conducted as two-tailed tests, with a statistical significance threshold of .05. A random effects model was used because it is the recommended approach when studies use varying methodologies (e.g., different measures; Schmidt, Oh, & Hayes, 2009). The results presented here include the prevalence rates and 95% confidence intervals (CIs) for each input study, the weighted mean prevalence and mean 95% CI across studies, I^2 (i.e., measure of inconsistency among the input studies; Higgins, Thompson, Deeks, & Altman, 2003) and Cochran's Q (i.e., degree of homogeneity among input studies). The impact of publication bias was assessed using the rank correlation test (Begg & Mazumdar, 1994).

To obtain a single estimate of the overall prevalence of MST, the researcher followed the recommendation of Borenstein et al. (2009) to use the study as the unit of analysis rather than any subgroups (e.g., men, women), thereby ignoring the influence of any methodological or participant characteristics for the purpose of that specific analysis. For example, when a study included both men and women, a single prevalence rate was calculated that combined both genders for the calculation of the overall mean prevalence rate. To examine the impact of the MST definition, separate analyses were conducted to calculate prevalence rates representing both harassment and assault, only assault, or only harassment (see Table 1). Finally, moderator analyses were conducted to examine the impact of participant gender, recruitment source, and measurement type on the prevalence rate of MST. Participant gender was coded to compare men and women. Recruitment source was coded to compare VA (e.g., enrolled at VA, received services at VA, applied for VA disability benefits), non-VA (e.g., newspaper advertisements, online), and studies that used both VA and non-VA recruitment. Measurement type was coded to compare self-report measures, interviews, and VA medical records. It should be noted that measurement type represents the manner through which the data were collected, rather than the content of the measure, which is better represented by the analysis that examined the MST definition. This is important because there is some overlap among the measurement type subgroups in

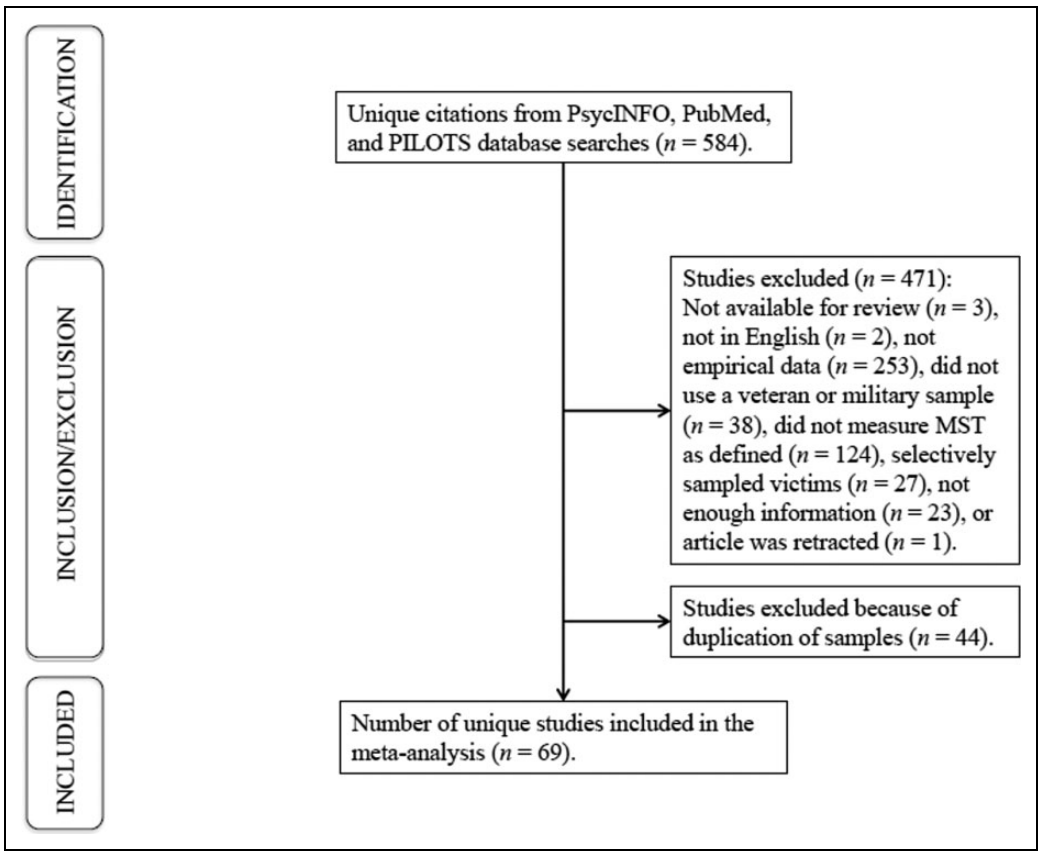

Figure 1. Flow diagram of the review and input study selection process.

terms of questions and content. For example, some studies used the 2-item VA screener as a self-report measure or interview. Others used VA medical records which would include the 2-item VA screener in addition to other information, such as clinician notes. This should be kept in mind when interpreting the results.

Results

Studies That Measured Harassment and Assault

The prevalence rate of MST among the 33 studies that measured both harassment and assault ranged from 1.4% to 70.3% (see Figure 2). The mean prevalence of MST was 15.7% (95% CI [12.6, 19.4]). There was significant heterogeneity, $Q(32) = 112{,}288.84$, $p < .001$, and a large amount of inconsistency, $I^2 = 99.97\%$, among the included studies. Sensitivity analysis tested what the pooled effect size would be excluding each input study in the analysis. The exclusion of any input study resulted in a small change in the mean prevalence rate (mean prevalence ranging from 14.7% to 16.8%); therefore, it was determined that no single study was the primary determinant of the mean prevalence rate. The rank correlation ($\tau = -.12$, $p = .32$) test suggested that publication bias did not significantly impact the analysis. The between-class effect for participant gender was statistically significant, $Q_b(1) = 336.72$, $p < .001$, with a mean prevalence rate of 3.9% ($k = 22$) for men and 38.4% ($k = 31$) for women. The between-class effect for recruitment source was not statistically significant, $Q_b(2) = 0.16$, $p = .92$, with a mean prevalence rate of 15.4% ($k = 25$) for VA recruitment, 16.3% ($k = 6$) for non-VA recruitment, and 18.1% ($k = 2$) for studies that used both VA and non-VA recruitment. The between-class effect for measurement type was statistically significant, $Q_b(2) = 350.46$, $p < .001$, with a mean prevalence rate of 25.3% ($k = 20$) for self-report measures, 59.8% ($k = 1$) for interviews, and 5.8% ($k = 12$) for VA medical records. It should be noted that for the recruitment source and measurement type moderator analyses, several of the subgroups were uneven in size or had a small number of studies.

Studies That Measured Assault Only

The prevalence rate of MST among the 43 studies that measured only assault ranged from 0.1% to 90.0% (see Figure 3). The mean prevalence of MST was 13.9% (95% CI [10.3, 18.6]). There was significant heterogeneity, $Q(42) = 6{,}432.30$, $p < .001$, and a large amount of inconsistency, $I^2 = 99.35\%$, among the included studies. Sensitivity analysis tested what the pooled effect size would be excluding each input study in the analysis. The exclusion of any input study resulted in a small change in the mean prevalence rate (mean prevalence ranging from 13.2% to 14.9%); therefore, it was determined that no single study was the primary determinant of the mean

Table 1. The Definition or Measure Used to Assess Military Sexual Trauma (MST) in the 69 Studies.

Study	MST Definition/Measure
Afari et al. (2015)	"Did you ever receive uninvited and unwanted sexual attention (i.e., touching, cornering, pressure for sexual favors, verbal remarks, etc.?)" or "Did anyone ever use force or the threat of force to have sex with you against your will?"[a]
Barth et al. (2016)	"Did you ever receive uninvited and unwanted sexual attention (e.g., touching, cornering, pressure for sexual favors, inappropriate verbal remarks)?"[b] "Did anyone ever use force or the threat of force to have sex with you against your will?"[c] If they responded affirmatively to either, then it was considered MST.[a]
Booth, Mengeling, Torner, and Sadler (2011)	"Any sexual act that occurred without a woman's consent involving the use or threat of force or against the woman's wishes and includes attempted or completed sexual penetration of the vagina, mouth, or rectum."[c]
Bryan, Bryan, and Clemans (2015)	"Sexual assault (e.g., rape, attempted rape, made to perform any type of sexual act through force or threat of harm)."[c] "Other unwanted or uncomfortable sexual experiences."[b] If they responded affirmatively to either, then it was considered MST.[a]
Burns, Grindlay, Holt, Manski, and Grossman (2014)	"Sexual assault or rape during military service including any type of sexual contact that is achieved or attempted without consent."[c]
Chang, Skinner, and Boehmer (2001)	"Did you ever have an experience where someone used forced or the threat of force to have sexual relations with you against your will?"[c]
Clancy et al. (2006)	"Touched/fondled against your will."[b]
Coyle, Van Horn, and Wolan (1996)	"Has anyone ever pressured you into doing something sexual? This could include someone trying or succeeding in feeling you, grabbing you, touching your private parts, touching your breasts, getting you to touch their private parts, or kissing you in a way that made you feel threatened or uncomfortable."[a] "Have you ever been forced into unwanted sexual intercourse?"[c]
Decker, Rosenheck, Tsai, Hoff, and Harpaz-Roten (2013)	"Has anyone ever made you have intercourse, oral, or anal sex against your will?" or "Has anyone ever touched private parts of your body or made you touch theirs, under force or threat?"[c]
DeRoma, Root, and Smith (2003)	"Any unwanted or uninvited pressure for dates or sex, touching, sexual gesture or body language, sexual teasing, jokes, remarks, whistles, hoots, or yells of a sexual nature."[b] "Sexual intercourse that was against the women's will or that a veteran felt she had to comply with because she feared for her life or safety."[c]
Dutra et al. (2011)	"Sexual harassment or abuse," with items ranging from "gossiped about my sex life or spread rumors about my sexual activities" to "forced me to have sex."[a]
Fang et al. (2015)	"I experienced unwanted sexual activity as a result of force, threat of harm, or manipulation."[c]
Freeman and Ryan (1997)	Sexual harassment which was "unwelcome sexual advances, verbal comments, and/or gestures, requests for sexual favors, and other conduct of a sexual nature which interferes with work performance and/or creates a hostile work environment."[b] Rape which was "forcible sexual penetration."[c]
Gibson, Gray, Katon, Simpson, and Lehavot (2016)	"Someone had oral, vaginal, or anal sex with them without their consent."[c] "Were you ever subjected to uninvited or unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?"[b]
Gobin, Green, and Iverson (2015)	"Did you receive uninvited and unwanted sexual attention, such as touching or cornering, pressure for sexual favors, or verbal remarks?" or "Did someone ever use force or the threat of force to have sexual contact with you?"[a]
Gothro (2013)	Sexual assault, such as "forced intercourse or anal sex, insertion of objects, threats of forced sex, or fondling."[c]
Goyal et al. (2014)	"Did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors or verbal remarks" or "Did someone ever use force or threat of force to have sexual contact with you against your will?"[a]
Gradus, Street, Kelly, and Stafford (2008)	24-Item Sexual Experiences Survey (SEQ-DoD) which includes gender harassment (e.g., "made offensive sexist remarks"), unwanted sexual attention (e.g., "touched you in a way that made you feel uncomfortable"), and sexual coercion (e.g., "made you afraid you would be treated poorly if you didn't cooperate sexually"), as well as 2 items assessing attempted rape and rape[a]
Hahn, Tirabassi, Simons, and Simons (2015)	"Sexual coercion, harassment, and assault experience" including "made crude and offensive sexual remarks directed at me, either publicly or privately," "threatened me with some sort of retaliation for not being sexually cooperative (for example, the threat of a negative review, physical violence, or to ruin my reputation)," and "forced me to have sex."[a]

(continued)

Table 1. (continued)

Study	MST Definition/Measure
Haskell, Papas, Heapy, Reid, and Kerns (2008)	"Did anyone ever use force or threat of force to have sex with you against your will?"[c] "Did you ever receive uninvited or unwanted sexual attention (i.e., touching, cornering, pressure for sexual favors, or inappropriate verbal remarks, etc.)?[b]
Haskell et al. (2010)	"Did you ever receive uninvited or unwanted sexual attention (i.e., touching, cornering, pressure for sexual favors, or verbal remarks)?" or "Did someone ever use force or threat of force to have sexual contact with you against your will?"[a]
Iverson, Mercardo, Carpenter, and Street (2013)	"Did you receive uninvited and unwanted sexual attention, such as touching or cornering, pressure for sexual favors, or verbal remarks?" or "Did someone ever use force or the threat of force to have sexual contact with you?"[a]
Jenkins et al. (2015)	2-Item VA MST screen items assessing "uninvited or unwanted sexual attention and sexual contact against one's will."[a]
Kang, Dalager, Mahan, and Ishii (2005)	"Suffered forced sexual relations or a sexual assault."[c] Also measured "sexual harassment" but did not define that construct.
Katz, Bloor, Cojucar, and Draper (2007)	"Did you experience unwanted verbal comments of a sexual nature (e.g., cat calls, pressure for dates, comments about your body, verbal threats)?"[b] "Were you sexually assaulted, attempted or completed rape? (e.g., being hit, choked, burned, forced sex, threatened, attempted, or did you agree to sex out of fear of consequences?)."[c] Reported either of the above or reported "yes" to "Did you experience unwanted physical sexual advances (e.g., unwanted touching, grabbing, cornering)?"[a]
Katz, Cojucar, Davenport, Pedram, and Lindl (2010)	"Did you experience unwanted verbal comments of a sexual nature (pressure for dates, threats, cat-calls)" or "Did you experience unwanted physical sexual advances (unwanted touching, grabbing, cornering)?[b] "Were you sexually assaulted, attempted, or completed rape (forced sex, or agreed to have sex out of fear)?"[c] If they responded affirmatively to any of these, then it was considered MST.[a]
Katz, Cojucar, Beheshti, Nakamura, and Murray (2012)	"Were you sexually assaulted, attempted, or completed rape (forced sex, or agreed to have sex out of fear)?"[c] "Did you experience unwanted verbal comments of a sexual nature (pressure for dates, threats, catcalls)?"[b] Reported either of the above or reported "yes" to "Did you experience unwanted physical sexual advances (e.g., unwanted touching, grabbing, cornering)?"[a]
Kelly et al. (2008)	"Did you have any experience where someone tried to use force or the threat of force to make you have sexual relations against your will?"[c]
Kimerling, Gima, Smith, Street, and Frayne (2007)	"Did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?" or "Did someone ever use force or threat of force to have sexual contact with you against your will?"[a]
Kimerling, Street, Gima, and Smith (2008)	"Did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?" or "Did someone ever use force or threat of force to have sexual contact with you against your will?"[a]
Kimerling et al. (2011)	"Did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?" or "Did someone ever use force or threat of force to have sexual contact with you against your will?"[a]
Kimerling, Makin-Byrd, Louzon, Ignacio, and McCarthy (2016)	"Did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?" or "Did someone ever use force or threat of force to have sexual contact with you against your will?[a]
Kintzle et al. (2015)	"Did someone ever use force or threat of force to have sexual contact with you against your will?"[c]
Klingensmith, Tsai, Mota, Soutwick, and Pietrzak (2014)	"Did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?"[b] "Did someone ever use force or threat of force to have sexual contact with you against your will?[c] If they responded affirmatively to any of these, then it was considered MST.[a]
Lee et al. (2013)	"Have you ever received uninvited and unwanted sexual attention (e.g., touching or cornering, pressure for sexual favors, verbal remarks)?" or "Has anyone ever used force or the threat of force to have sex with you against your will?"[a]
Lehavot, Der-Martiorsian, Simpson, Sadler, and Washington (2013)	"Forced to have sexual relations against one's will while in the military or had sexual contact with a superior while in the military to avoid negative consequences."[c]

(continued)

Table 1. (continued)

Study	MST Definition/Measure
Luterek, Bittinger, and Simpson (2011)	"Did anyone touch sexual parts of your body or make you touch sexual parts of their body—against your will or without your consent?"[c]
Maguen, Cohen, et al. (2012)	"Did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?" or "Did someone ever use force or threat of force to have sexual contact with you against your will?"[a]
Maguen, Luxton, Skopp, and Madden (2012)	"Did you experience any unwanted sexual attention, like verbal remarks, touching, or pressure for sexual favors?" or "Did anyone use force, threat of force, or coerce you to have sex against your will?"[a]
Marcolongo (2014)	"Have you experienced sexual harassment (made to feel inferior, ridiculed for your gender, denied job opportunities) in your life in the military?"[b] Also measured "sexual assault (rape, attempted rape)" but did not define.
McCallum, Murdoch, Erbes, Arbisi, and Polusny (2015)	"Crude remarks."[b] "Forced sex."[c]
Mengeling, Booth, Torner, and Sadler (2015)	"Has anyone, male or female, using force or threat of harm, ever attempted to sexually assault you? By attempted sexual assault (SA), I mean that an attempt was made but penetration did not occur." Or "Has a man or boy, using force or threat of harm, ever made you have sex by putting his penis in your vagina or has a male or female put their tongue, fingers, or objects in your vagina or anus? By completed SA, I mean that penetration did occur during the assault."[c]
Milonas (2004)	"Were you ever subjected to uninvited or unwanted sexual attention (e.g., touching, verbal remarks, pressure for sexual favors, cornering, trapping an individual through the use of or threat of force)?"[b] "Did you ever have an experience where someone used force or the threat of force to have sexual relations with you against your will?"[c]
Mondragon et al. (2015)	"Made crude and offensive sexual remarks directed at me."[b] "Forced to have sex."[c] "Sexual harassment (i.e., gossip/rumors regarding sexual behavior, crude sexual remarks, quid-pro-quo), threats for not engaging in sexual activities, and/or sexual assault (i.e., unwanted sexual touching, attempted touching/rape, and/or rape)."[a]
Murdoch and Nichol (1995)	Sexual harassment (e.g., "made sexual jokes that made respondent feel uncomfortable") and rape or attempted rape (e.g., "forced respondent to have sex without her consent").[a]
Murdoch et al. (2003)	Sexual trauma "was conceptualized to include sexual harassment ("hostile work environment and quid pro quo sexual harassment") and sexual assault."[a] Sexual assault which was "forced to have sex against their will or if someone attempted to force them to have sex against their will."[c]
Murdoch, Pryor, Griffin, Ripley, and Gackstetter (2011)	12-Item Sexual Harassment Core Measure (SHCore) that includes items such as "Told sexual stories or jokes that were offensive to you" and "Treated you badly for refusing sex."[b]
Murdoch et al. (2014)	"Attempted or successfully forced them to have sex against their will."[c]
Nugent (2014)	"Someone obtained anal or oral intercourse with you when you didn't want to by using threat or physical force."[c]
Pavao et al. (2013)	"Did you ever receive uninvited or unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?" or "Did someone ever use force or the threat of force to have sex against your will?"[a]
Rose (2001)	"Gender harassment" (e.g., "habitually told suggestive stories or offensive jokes), "unwanted sexual attention" (e.g., "touched you in a way that made you feel uncomfortable"), or "sexual coercion" (e.g., "made unwanted attempts to have sex with you that resulted in you pleading or physically struggling").[a]
Rowe, Gradus, Pineles, Batten, and Davison (2009)	"Did you ever receive uninvited or unwanted sexual attention?" or "Did anyone ever use force or the threat of force to have sex against your will?"[a]
Sadler, Booth, Nielson, and Doebbeling (2000)	"Any act without an individual's consent that involved the use or threat of force and included attempted or completed sexual penetration of the victim's vagina, mouth, or rectum."[c]
Sandberg, Murdoch, Polusny, and Grill (2012)	"A co-worker ord co-workers attempted to have sex with me without my consent," "My supervisor or superior officer attempted to have sex with me without my consent," "I was forced by a co-worker or supervisor to have sex without my consent," "I was forced by someone other than a co-worker or supervisor to have sex without my consent," "A co-worker or supervisor . . . 1) tried to have sex with you against your will, but didn't succeed; 2) made you have sex with him/her even though it was against your will."[c]
Schry et al. (2015)	"Sexual assault" defined as "unwanted touching of sexual parts that may or may not have involved threat, force, or consequent injury."[c]

(continued)

Table 1. (continued)

Study	MST Definition/Measure
Seng et al. (2013)	"Did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or sexual remarks?"[b]
	"Did someone ever use force or threat of force to have sexual contact with you against your will?"[c]
Smith et al. (2011)	"Gossiped about my sex life or spread rumors about my sexual activities," "made crude and offensive sexual remarks directed at me, either publicly or privately," "threatened me with some sort of retaliation for not being sexually cooperative (for example, the threat of a negative review, physical violence, or to ruin my reputation, etc.)," and "offered me some sort of reward or special treatment to take part in sexual behavior."[b]
	"Made unwanted attempts to stroke or fondle me," "made unwanted attempts to have sex with me," and "forced me to have sex."[c]
Stahlman et al. (2015)	"Has anyone ever made or pressured you into having some type of unwanted sexual contact? By sexual contact we mean any contact between someone else and your private parts or between you and someone else's private parts."[c]
Strauss, Marx, Weitlauf, Stechuchak, and Straits-Troster (2011)	"Did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?" or "Did someone ever use force or threat of force to have sexual contact with you against your will?"[a]
Street, Stafford, Mahan, and Hendricks (2008)	"Four separate potentially harassing experiences or at least one experience presumed to be more severe (e.g., extortion of sexual cooperation in return for job-related considerations)."[b]
	"At least one experience of coerced genital fondling, attempted rape, or completed rape."[c]
Suris, Lind, Kashner, Borman, and Petty (2004)	"Any type of sexual conduct including vaginal, anal, or oral sex, achieved or attempted without the person's consent and with the use of threat or force."[c]
Turchik et al. (2012)	"Did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?" or "Did someone ever use force or threat of force to have sexual contact with you against your will?"[a]
Valdez et al. (2011)	"Did you receive uninvited and unwanted sexual attention, such as touching, cornering, pressure for sexual favors, or verbal remarks?" or "Did someone ever use force or threat of force to have sexual contact with you against your will?"[a]
Walsh et al. (2014)	"Sexual harassment (e.g., leaders/unit members "made crude and offensive sexual remarks to you")."[b]
	"Assault (e.g., leaders/unit members "forced you to have sex")."[c]
Weinrich et al. (2016)	"Did you ever receive uninvited or unwanted sexual attention (i.e., touching, cornering, pressure for sexual favors, or inappropriate verbal remarks, etc.)?"[b]
	"Did anyone ever use force or the threat of force to have sex against your will?"[c]
White et al. (2010)	"Has anyone ever used force or threat of force to have sex with you against your will?"[c]
Wilson et al. (2015)	Examples of items include "threatened me with some sort of retaliation for not being sexually cooperative," "made unwanted attempts to have sex with me," and "forced me to have sex."[a]
Wolfe et al. (1998)	"Verbal sexual harassment (e.g., sexual remarks; sexually suggestive looks, gestures, or body language; pressure for sexual favors")" or "physical sexual harassment (e.g., unwanted sexual touching, fondling, cornering, or brushing against you)."[b]
	"A sexual experience that was unwanted and involved the use or threat of force (e.g., attempted rape or completed rape)."[c]
Yaeger, Himmelfarb, Cammack, and Mintz (2006)	"Forced intercourse or anal sex, forced oral sex, forced insertion of objects, or threats of forced sex."[c]

Note. VA = veterans affair.
MST definition/measure coded as: [a]Both sexual assault and harassment. [b]Sexual harassment. [c]Sexual assault.

prevalence rate. The rank correlation ($\tau = -.11$, $p = .32$) test suggested that publication bias did not significantly impact the meta-analysis. The between-class effect for participant gender was statistically significant, $Q_b(1) = 49.78$, $p < .001$, with a mean prevalence rate of 1.9% ($k = 19$) for men and 23.6% ($k = 40$) for women. The between-class effect for recruitment source was not statistically significant, $Q_b(2) = 2.60$, $p = .27$, with a mean prevalence rate of 17.3% ($k = 22$) for VA recruitment, 11.2% ($k = 19$) for non-VA recruitment, and 10.4% ($k = 2$) for studies that used both VA and non-VA recruitment. The between-class effect for measurement type was not statistically significant, $Q_b(1) = 1.11$, $p = .29$, with a mean prevalence rate of 12.8% ($k = 33$) for self-report measures, 17.4% ($k = 10$) for interviews, and no studies used VA medical records. It should be noted that for the recruitment source and measurement type moderator analyses, several of the subgroups were uneven in size, had a small number of studies, or included no studies.

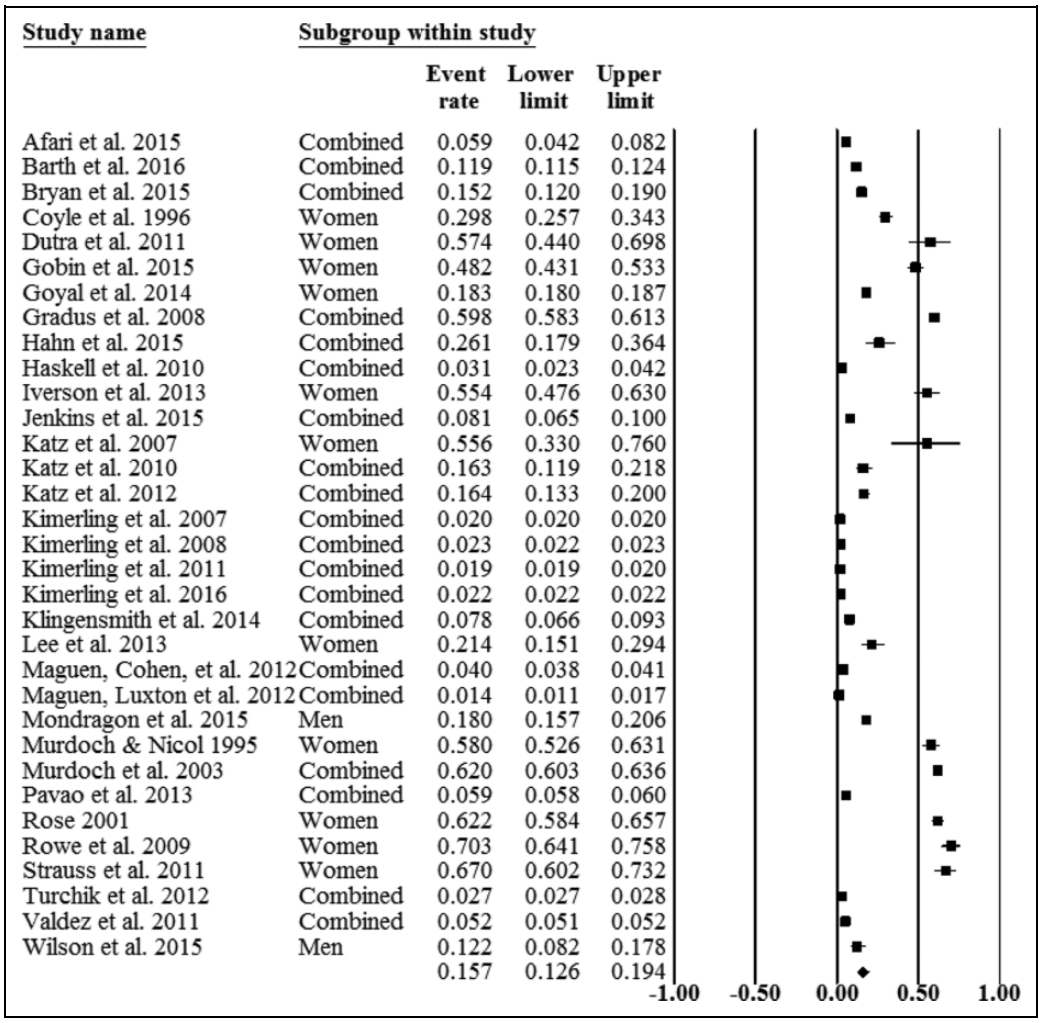

Figure 2. Forest plot of prevalence rates (event rate) and 95% confidence intervals for the input studies that assessed both harassment and assault. "Subgroup within study" is the participant gender, grouped as men, women, or combination of men and women.

Studies That Measured Harassment Only

The prevalence rate of MST among the 21 studies that measured only harassment ranged from 2.6% to 90.0% (see Figure 4). The mean prevalence of MST was 31.2% (95% CI [21.2, 43.4]). There was significant heterogeneity, $Q(20) = 4{,}216.41$, $p < .001$, and a large amount of inconsistency, $I^2 = 99.53\%$, among the included studies. Sensitivity analysis tested what the pooled effect size would be excluding each input study in the analysis. The exclusion of any input study resulted in a small change in the mean prevalence rate (mean prevalence ranging from 29.0% to 34.3%); therefore, it was determined that no single study was the primary determinant of the mean prevalence rate. The rank correlation ($\tau = .07$, $p = .65$) test suggested that publication bias did not significantly impact the meta-analysis. The between-class effect for participant gender was statistically significant, $Q_b(1) = 50.17$, $p < .001$, with a mean prevalence rate of 8.9% ($k = 12$) for men and 52.5% ($k = 19$) for women. The between-class effect for recruitment source was not statistically significant, $Q_b(1) = 0.50$, $p = .48$, with a mean prevalence rate of 27.3% ($k = 10$) for VA recruitment, 35.3% ($k = 1$) for non-VA recruitment, and no studies used both VA and non-VA recruitment. The between-class effect for measurement type was statistically significant, $Q_b(2) = 50.72$, $p < .001$, with a mean prevalence rate of 35.0% ($k = 18$) for self-report measures, 29.1% ($k = 2$) for interviews, and 2.6% ($k = 1$) for studies that used VA medical records. It should be noted that for the recruitment source and measurement type moderator analyses, several of the subgroups were uneven in size, had a small number of studies, or included no studies.

Discussion

Although it is well documented that MST is a disturbingly common experience for service members, prior research has failed to provide a precise estimate of the prevalence of this social issue (Allard et al., 2011; Suris & Smith, 2011). To inform the field on this gap in the literature, the present meta-analysis located 584 unique citations for review and 69 met the inclusion criteria. The results revealed that 15.7% of military personnel and veterans report MST (3.9% of men,

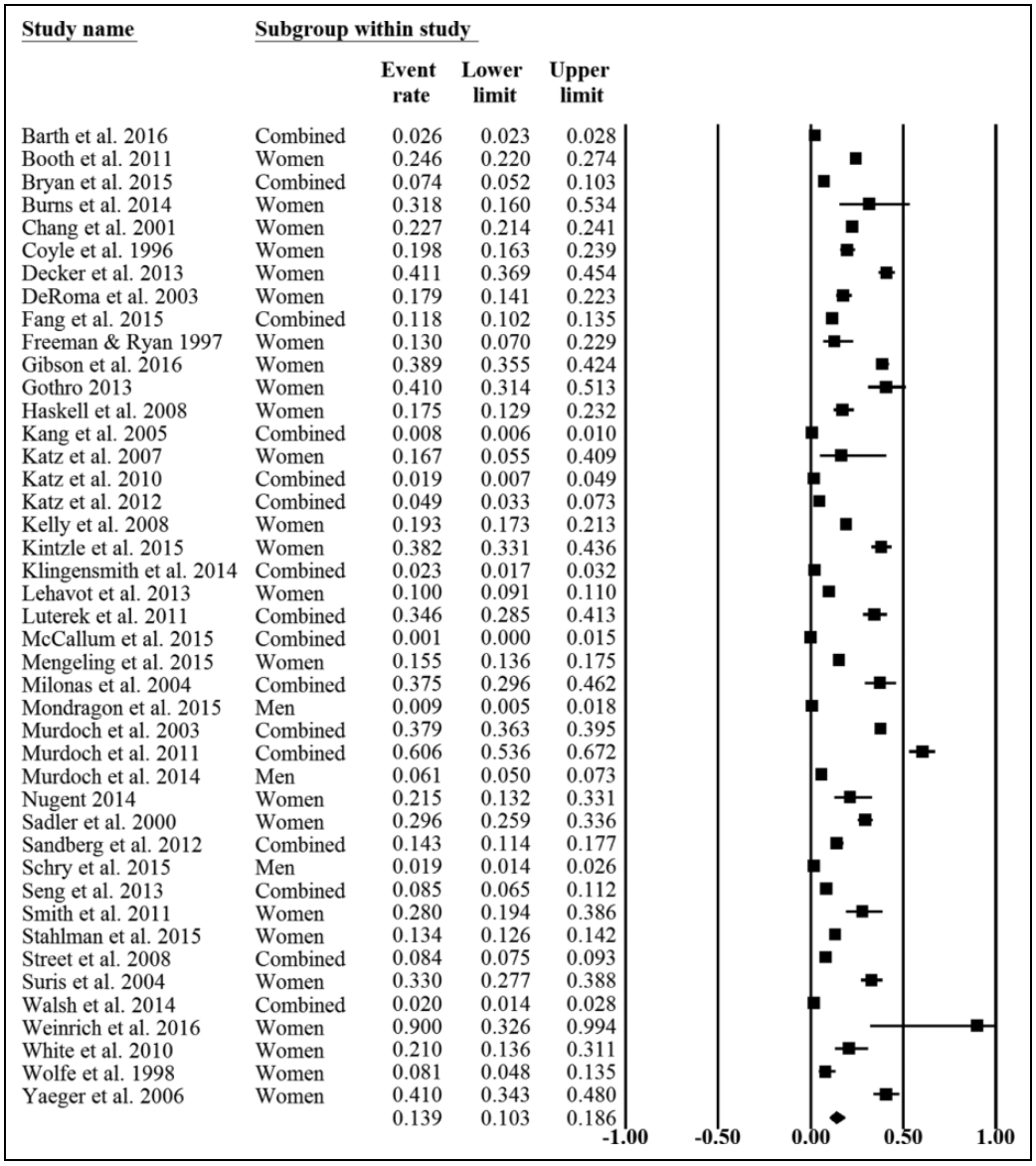

Figure 3. Forest plot of prevalence rates (event rate) and 95% confidence intervals for the input studies that assessed assault. "Subgroup within study" is the participant gender, grouped as men, women, or combination of men and women.

38.4% of women) when the measure includes both harassment and assault. Additionally, 13.9% report MST (1.9% of men, 23.6% of women) when the measure assesses only assault and 31.2% report MST (8.9% of men, 52.5% of women) when the measure assesses only harassment.

The findings presented here suggest that the rate of MST in both men and women may be higher than the 1 in 4 women and 1 in 100 men suggested by large-scale data collected through the VA (Military Sexual Trauma Support Team, 2012). The MST data collected in the VA assess both harassment and assault and therefore are most comparable to the findings in the present meta-analysis that support that 38.4% of women and 3.9% of men report MST. This is further supported by the moderator analyses that found that studies that used self-report measures or interviews found significantly higher prevalence rates than studies that reviewed VA medical records when measuring assault and harassment and harassment only. Because the recruitment source moderator analyses were not statistically significant, regardless of the type of sexual victimization, this suggests that the lower prevalence rates found in the VA are not a result of the recruitment source but perhaps stem from the manner in which MST is detected in the VA. That is, the rate of MST appears to be just as high in veterans enrolled in the VA as other recruitment sources, but the phenomenon may be underreported.

The VA system has made MST one of its areas of highest priority by implementing mandatory screening processes and increasing treatment options. Therefore, it is concerning that the rates of MST documented in VA medical records were lower than the prevalence rates obtained through self-report measures and interviews. The findings presented here could mean that veterans are less likely to disclose their sexual

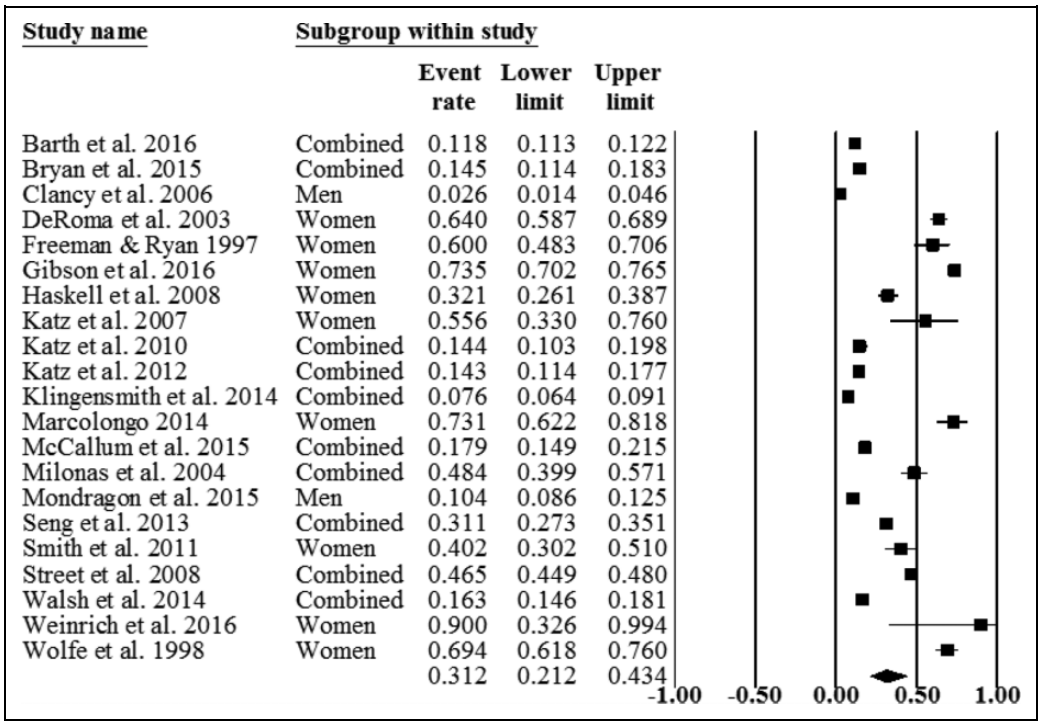

Figure 4. Forest plot of prevalence rates (event rate) and 95% confidence intervals for the input studies that assessed harassment. "Subgroup within study" is the participant gender, grouped as men, women, or combination of men and women.

victimization experiences during contact with VA providers, particularly if the services are not related to MST. It could also mean that the 2-item screener used to measure MST in the VA is not detecting all cases. Regardless of what is driving this finding, it suggests that the prevalence of MST based on VA data may not reflect the true rate of MST among military service members and veterans. Future research should follow-up to determine how to improve the detection of MST among our veterans enrolled in the VA to inform our ability to support them and provide adequate services.

The findings discussed here also provide important information on the state of the literature and should inform researchers in their future empirical endeavors. As can be seen in Table 1, the present study revealed a large amount of heterogeneity in the definitions of MST used. The results also supported that the prevalence rate of MST varies greatly depending on the definition of MST used. Therefore, the wide range of prevalence rates demonstrated in the literature is, in part, due to this issue. The lack of uniformity among the definitions makes it difficult to compare results across studies and therefore impedes our ability to make definite conclusions about the phenomenon. This points to the need for precision and standardization in methodology, as the field works to build a robust knowledge base about this important issue. Additionally, the moderator analyses revealed that the most common methodology used in the 69 studies was a self-report measure administered to veterans recruited from the VA. Therefore, more research is urgently needed using diverse methodologies (e.g., clinician interview, active duty service members) to build a more empirically rich knowledge base of how methodological choices impact the prevalence rate. Our ability to provide adequate MST services to our military personnel and veterans hinges on accurate detection of the phenomenon.

Previous research has suggested that the rates of sexual victimization are significantly higher among service members and veterans when compared to the general population (Allard et al., 2011). This is particularly concerning when interpreted in the context that MST occurs within the restricted time period of one's service (e.g., often 2–6 years), whereas many surveys conducted with civilians assess lifetime victimization. Additionally, although assault experiences are underreported in the general population, underreporting is likely an even more significant issue in military populations (Allard et al., 2011). The Centers of Disease Control (2012) reported that 1 in 5 (18.3%) women and 1 in 71 men (1.4%) experience rape during their lifetime. Over a 12-month period, 5.6% of women and 5.3% of men reported experiencing sexual violence other than rape (e.g., unwanted sexual contact, noncontact unwanted sexual experiences). Therefore, the results of the present meta-analysis are consistent with prior literature, suggesting that military service members are at particularly high risk of sexual victimization when compared to their civilian counterparts. This further heightens the importance of this line of research.

Consistent with considerable evidence documenting a gender difference in MST (Allard et al., 2011; Suris & Lind, 2008; Suris & Smith, 2011), the present meta-analysis found that women had significantly higher rates than men regardless of

the definition of MST (i.e., harassment and/or assault). Although women are consistently found to have a higher rate of MST, because men significantly outnumber women in the military and VA system (e.g., 20 times more men than women in the VA), it is likely that there are as many male survivors of MST as female survivors (Department of VAs, 2004). Despite this, the present meta-analysis revealed that more studies focused on this issue in women than men. Therefore, the present study should serve as a call for a more intensive investigation of sexual victimization among male military personnel. This is even more important because, borrowing from the civilian sexual victimization literature, MST may have unique consequences for male survivors compared to their female counterparts, particularly in the areas of gender identity, sexual orientation, and anger (Allard et al., 2011; Leskela, Diepernik, & Kok, 2001). Future research should aim to further our understanding of this issue to allow us to make more definite conclusions about differences in the rate, experience, and consequences of MST based on gender.

The findings presented here should be interpreted within the context of several limitations. First, all of the studies included in the analysis used retrospective data collection and therefore recall bias or errors could have impacted the findings. Second, all of the studies used self-reported MST status obtained through self-report measure, interview, or the review of VA medical records. Self-report of sexual trauma is problematic because this methodology depends on participants recognizing and reporting that they have been sexually victimized. Third, many of the subgroups in the recruitment source and measurement type moderator analyses were uneven, small, or contained zero studies. This, again, highlights the need for methodologically diverse approaches in future studies. It also somewhat limits the strength of the conclusions based on the moderator analyses and should be kept in mind when interpreting the results.

Despite these limitations, the findings of the present meta-analysis have important and far-reaching implications. This meta-analysis examined a large number of studies that used a wide range of MST definitions, and the results indicate that the findings were not likely impacted by publication bias. Therefore, there is strong evidence that the mean prevalence rates demonstrated here are a good representation of the event rate of MST in military personnel and veterans as a whole. Overall, the findings suggest that MST is a more common experience for both male and female service members than previously recognized and therefore should be of high priority as an area of research. The military and VA have made significant gains in addressing the issue of MST, including universal screening, increasing treatment options, and the use of victims' advocates. However, the study of MST is still in its infancy in terms of empirical knowledge. The VA, military, and researchers should work to create standardization and rigor in their empirical investigations because the current heterogeneity is leading to difficulties in the generation of conclusions across studies. Clinicians should be encouraged to continue to develop and assess empirically based treatment programs for MST survivors that address the complexities of comorbidity and high rates of treatment dropout. Lastly, the military should put more resources toward the prevention MST. There is some promising preliminary evidence for programs, such as the Navy Sexual Assault Intervention Training (see Rau et al., 2010, 2011). However, the empirical data regarding the effectiveness of prevention programs are overwhelmingly sparse. The present meta-analysis in the context of the larger literature strongly supports that substantially more work needs to be done, with particular emphasis on the prevention, assessment, and treatment of MST.

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