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Prevalence rates and correlates of insomnia disorder in post-9/11 veterans enrolling in VA healthcare

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Abstract

Study Objectives: Post-9/11 veterans are particularly vulnerable to insomnia disorder. Having accurate prevalence rates of insomnia disorder in this relatively young, diverse population, is vital to determine the resources needed to identify and treat insomnia disorder. However, there are no accurate prevalence rates for insomnia disorder in post-9/11 veterans enrolling in the VA Healthcare System (VHA). We present accurate prevalence of insomnia disorder, and correlates, in a large sample of post-9/11 veterans enrolling in a VHA.

Methods: This was an observational study of 5,552 post-9/11 veterans newly enrolling for health care in a VHA. Data were collected using VA eScreening. Insomnia diagnosis was determined using a clinical cutoff score of 11 on the Insomnia Severity Index. Measures also included sociodemographic, service history, posttraumatic stress disorder (PTSD), depression, suicidal ideation, alcohol misuse, military sexual trauma, traumatic brain injury (TBI), and pain intensity.

Results: About 57.2% of the sample population had insomnia disorder. Our sample was nationally representative for age, sex, ethnicity, branch of the military, and race. The sample also was at high-risk for a host of clinical disorders, including PTSD, TBI, and pain; all of which showed higher rates of insomnia disorder (93.3%, 77.7%, and 69.6%, respectively).

Conclusions: The findings suggest alarmingly high rates of insomnia disorder in this population. Examining and treating insomnia disorder, especially in the context of co-occurring disorders (e.g. PTSD), will be a necessity in the future.

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Keywords

insomnia; prevalence rates; co-occurring disorders

Introduction

Chronic insomnia disorder is a behavioral sleep disorder characterized as dissatisfaction with sleep quantity or quality, marked by complaints of difficulty falling or staying asleep, waking up earlier than desired, and significant sleep-related daytime impairment [1]. Insomnia is linked to reduced quality of life [2], increased risk for morbidity [3–7], premature mortality [8, 9], and elevations in health care utilization [10, 11]. Insomnia is associated with impaired functioning across multiple life areas, including cognitive, emotional, social, and physical domains [12–15], with societal cost estimated at $100 billion per year [16].

Veterans are particularly vulnerable to insomnia [17–21], with rates double and even triple those of civilian populations [22], due to the irregularity of their sleep/wake schedules during active duty, harsh living conditions, combat stress, higher rates of physical and psychological injury, and issues associated with post-deployment reintegration [22–26]. Insomnia disorder among veterans Health Administration (VHA) users is expected to continue rising as post-9/11 troops leave military service and begin accessing VHA healthcare [25, 27]. Having accurate prevalence rates of insomnia disorder in this relatively young, diverse set of veterans, along with a better understanding of the demographic and clinical correlates, is vital for VHA to determine the resources needed to identify and treat insomnia disorder using evidence-based care. Unfortunately, there are no accurate prevalence rates of insomnia disorder in post-9/11 veterans seeking services.

A confounding issue of estimating insomnia prevalence is the inconsistent use of insomnia terminology throughout the literature. The gold standard for diagnosing insomnia *disorder* is a weekly sleep diary and an in-depth clinician interview [28]. However, due to the assessment being time consuming, diagnostic criteria for insomnia *disorder* are rarely assessed outside of research trials [29]. Therefore, most prior studies only examined insomnia *symptoms*. To ensure clarity, we use "insomnia disorder" herein when diagnosis was established, "insomnia symptoms" when diagnosis was not established, and "insomnia" when the prior literature is unclear on this point.

Rates of insomnia for veterans range from 3.4% based on medical records [30] to 90% of veterans with posttraumatic stress disorder (PTSD) reporting "sleep difficulties" [18]. These rates depend on the definition of insomnia (e.g. "trouble sleeping," insomnia disorder), data source (e.g. chart review, self-report questionnaire), sample characteristics (e.g. treatment seeking, community), objective/subjective measurement (e.g. self-report questionnaire, sleep diary), measure (e.g. sleep items from mental health [MH] questionnaires, validated sleep questionnaire), co-occurring disorders (e.g. depression, PTSD), gender, and age.

Several studies have reported prevalence rates of insomnia *symptoms* using "trouble falling or staying sleep" assessed from other MH questionnaires. They found rates of insomnia

symptoms of 24.7%–30.5% [31, 32] in a general military/veteran population to upwards of 100% in Vietnam veterans with PTSD [33]. However, a single item about sleep is not a validated measure of insomnia diagnosis, may be anchored to other items in the questionnaire, and may be overly influenced by external factors [34].

Two studies used ICD-9 diagnostic codes from large national VHA databases to estimate prevalence rates of insomnia disorder and found 2.5% of 9,786,778 US veterans seeking VA healthcare from 2000 to 2010 had an insomnia diagnosis recorded in their medical record [23]; the one-year (2010) prevalence rate of insomnia diagnosis was 3.4% in veterans [30]. PTSD was associated with the highest prevalence of insomnia (16%) [23] and deployments to Iraq or Afghanistan conflicts along with anxiety and depressive disorders were also strongly related to insomnia [30]. Unfortunately, using medical records does not provide accurate prevalence of insomnia disorder. Only 53% of VA primary care providers indicated routinely documenting insomnia disorder and 39% routinely included it in the problem list [35–37]. Given the community insomnia rates of 6%–10%, reports of shorter sleep durations, longer sleep onset latencies, more wake after sleep onset, and lower sleep efficiencies in veterans [38–40], along with the well-known problems with obtaining prevalence rates from medical records [29, 35], the rates suggested by these large studies severely underrepresent the true prevalence of insomnia disorder in veterans.

There are three generalizable insomnia *disorder* prevalence studies that used validated measures of insomnia with clinical cutoff scores on a general sample of post-9/11 veterans. They found rates of insomnia disorder of 59.1% in 375 post-9/11 veterans [41], 53.1% of veterans without military sexual trauma (MST) and 60.8% of veterans with MST (using a subset of the current study sample) [36], and 52.3% of veterans in 660 female veterans receiving services at VA primary care facilities [42]. While these studies used validated measures of insomnia, the samples were relatively small and need follow-up with larger samples.

The existing literature on the prevalence of insomnia *disorder* is limited by assessing insomnia using non-validated questionnaires or single items, using medical record chart review, small sample sizes, and non-generalizable samples. Accurate estimates of the insomnia disorder rates in post-9/11 veterans is critical to better target and prioritize healthcare resources. This study aimed to addresses these gaps by including an independent sleep questionnaire validated against insomnia diagnostic criteria [43] to (1) obtain prevalence estimates of insomnia disorder in a large sample of post-9/11 veterans enrolling in a VHA and (2) examine the relationship between insomnia disorder and sociodemographics and other clinical symptoms.

Methods

Participants and procedures

The data examined was obtained through standard clinical screening processes of newly enrolling post-9/11 veterans at the VA San Diego Healthcare System between March 2012 and April 2019. Self-reported data was collected electronically using the VA eScreening program or using paper-and-pencil assessment. eScreening is a computer-based,

self-screening program that efficiently and effectively collects mental and physical health information [44]. Screening was conducted in the Transition Care Management program, which coordinates healthcare for newly enrolling post-9/11 veterans. Veterans with complete data from the insomnia severity index (ISI; N = 5,552) were included in the study; 768 veterans in the database did not have an ISI. There were no differences between those with and without an ISI by gender, race/ethnicity, combat exposure, PTSD, depression, suicidal ideation, education level, marital status, or pain (p > 0.05); individuals with ISI data had higher rates of alcohol misuse. All research was approved by the Institutional Review Board and the Research and Development Committee.

Measures

Sociodemographic and service history—Age, gender, ethnicity, race, highest level of education, and relationship status was captured by an investigator-created self-report questionnaire. History related to service era, branch of service, number of deployments, and combat exposure was also assessed.

Insomnia—Insomnia severity over the past 2 weeks was measured using the ISI [45]. The ISI consists of seven items, assessing severity of insomnia as well as satisfaction with sleep, effect of sleep on daytime and social functioning, and concern about current sleep. The ISI ranges from 0 to 28, with higher scores indicating more severe insomnia symptoms. Research compared insomnia *symptoms* assessed with the ISI to weekly sleep diaries and overnight polysomnography for insomnia *disorder* and found a total score of 11 on the ISI indicates insomnia *disorder* in clinical samples with 97.2% sensitivity and 100% specificity [43]. Internal consistency was excellent for community and clinical sample [43] and for the current sample (α = 0.94).

Posttraumatic stress disorder—The 17-item PTSD Checklist—Civilian Version (PCL-C) [46] measured the degree to which respondents were bothered by PTSD symptoms within the past month. Scores range from 17 to 85, with higher scores indicating greater severity. Cutoff scores of >44 for presumed PTSD diagnosis were chosen based on research involving military and veteran samples [47]. The PCL-C showed strong internal consistency in a military population [46] and for the current sample (α = 0.96).

The 20-item PCL-5 (PTSD Checklist–DSM-5) was subsequently used following the release of the DSM-5 [47]. Items correspond to the DSM-5 diagnostic criteria, and respondents rate how much they are bothered by PTSD symptoms over the past month. Scores range from 0 to 80; cutoff scores of >33 for presumed PTSD diagnosis on the PCL-5 were used based on research involving military and veteran samples [47]. Internal consistency for the current sample was strong (α = 0.98).

Depression—The Patient Health Questionnaire 9-Item Depression Module (PHQ-9) [48] measured depression symptoms occurring within the past 2 weeks; with scores ranging from 0 to 27. Higher scores indicate greater severity. The PHQ-9 is a reliable and valid measure of depression with a cutoff score of 15 indicates moderate to severe depression [48]. Internal consistency for the current sample was strong (α = 0.93).

Suicidal ideation—To assess suicidal ideation, we used the PHQ-9 suicide/self-harm item, "Thoughts that you would be better off dead, or thoughts of hurting yourself in some way?," to indicate presence/absence of suicidal ideation. "0 = Not at all" was coded as negative suicidal ideation and "1 = Several days" or greater was coded as positive.

Alcohol misuse—The Alcohol Use Disorders Identification Test (AUDIT-C) [49] was used to screen hazardous alcohol consumption. Scores range from 0 to 12; scores of 4 and 3 suggest alcohol misuse in men and women, respectively [50]. This instrument has high internal consistency in the literature [51] and in the current sample (α = 0.80).

Traumatic brain injury (TBI)—History of TBI with concurrent related symptoms was assessed using the four-item VA TBI screen. A positive TBI screen required one or more positive responses in each of the following categories: a list of events in which an injury could have occurred, immediate symptoms following the event, new or worsening symptoms, and current symptoms. The VA TBI screen has high-internal consistency and test–retest reliability, high sensitivity, and moderate specificity [52].

Military sexual trauma—MST was assessed by two VA created questions: "When you were in the military, did you ever receive uninvited and unwanted sexual attention (i.e. touching, pressure for sexual favors, verbal remarks)?" and "When you were in the military, did anyone ever use force or the threat of force to have sex with you against your will?" A positive screen required an affirmative answer to either of these questions [53].

Pain—Pain intensity over the past four weeks was assessed using a numerical rating scale from 0 to 10, anchored at "no pain at all" and "worst pain ever," respectively. A rating of 4 was considered to be clinically significant pain [54].

Statistical analyses

Data were analyzed using descriptive statistics and frequencies. Chi-squares examined insomnia by grouped categories; follow-up 2×2 chi-squares examined significant omnibus results with the largest group being the comparison group. Cramer's V examined effect sizes of all chi-squares, (.1 is a small effect, .3 is a medium effect, and .5 or larger is considered a large effect) and Cohen's d for t-tests (.2 is a small effect, .5 is a medium effect, and .8 is a large effect size) [55]. Data were analyzed using Statistical Package for Social Sciences 26 (IBM, Inc.). $p < 0.05$ level was used to indicate significance.

Results

Sociodemographic and service history

Table 1 presents the means and standard deviations of the sociodemographic and service history variables for the entire sample ($N = 5,552$). Consistent with national cohorts of veterans' demographics, our sample was approximately 35 years old ($M = 34.8$, $SD = 9.10$), primarily male (82.8%), with nearly a quarter (24.2%) Hispanic, and more than half (53.6%) White [56]. There was an average of 1.93 deployments ($SD = 1.23$) and most (52.4%) deployed to the operations in Iraq and Afghanistan. Consistent with the characteristics of

the region, the sample had proportionally more veterans of the Navy (51.2%) and Marines (30.5%) compared to the Active Duty Personnel Data (Army: 36.6%; Navy: 24.8%; Air Force: 24.3%; Marines: 14.2%) [56].

Prevalence of insomnia disorder and clinical characteristics

Table 2 shows the sample sizes and percentages of veterans screening positive for insomnia disorder, PTSD, depression, suicidal ideation, alcohol misuse, TBI, MST, and clinically significant pain. We found 57.2% of the sample had insomnia disorder using clinical cutoff scores (ISI ≥ 11) versus 40.5% who screened positive when using a more conservative cutoff ISI ≥ 15; 31.5% of the sample showed no insomnia (ISI ≤ 9). The rates in women and men were 59.6% and 56.6%, respectively. Up to 69.6% of the sample were above the cutoff for other clinically significant conditions including PTSD, depression, alcohol misuse, TBI, MST, and clinically significant pain.

Demographic correlates

Table 3 shows the percentages and statistics of insomnia disorder by demographic categories. The percentages of veterans screening positive for insomnia disorder did not differ by sex or ethnicity. However, there were differences by marital status, race, and branch of service. While older age showed statistically higher insomnia, the effect size was very small. Married or separated veterans had higher rates of insomnia disorder than individuals who were single, although effect sizes were small. Veterans of all other races showed higher rates of insomnia disorder compared to White veterans, with small effect sizes. Veterans of the Air Force endorsed lower levels of insomnia disorder compared with veterans of the Navy, with a very small effect size.

Clinical correlates

Figure 1 shows percentages of insomnia disorder by clinical correlates and Table 4 shows percentages and statistics. Neither the number of deployments, nor screening positive for alcohol misuse showed differences in screening positive for insomnia disorder. Veterans who screened positive for PTSD, depression, suicidal ideation, TBI, MST, clinically significant pain, or having exposure to combat showed higher rates of insomnia disorder. Screening positive for PTSD or MST showed large effect sizes, depression, suicidal ideation, and pain showed medium effects, while TBI and combat exposure showed small effect sizes. PTSD and depression scores were highly correlated ($r(5,481) = .85$, $p < 0.001$) suggesting they may be overlapping constructs or disorders.

Discussion

We found that 57.2% of a large sample of post-9/11 veterans entering the VHA screened positive for insomnia *disorder*, which suggests insomnia disorder is alarmingly common in this population. Given the size of our sample, its sociodemographic representativeness, and the use of an independent, validated, standardized measure of insomnia [43], the prevalence rates reported are the most accurate in post-9/11 veterans using VHA care. Confidence in our findings is further supported with comparison to previous generalizable research that

found between 52.3% and 59.1% of veterans seeking care had insomnia disorder [36, 41, 42].

Insomnia is predictive of the development and recurrence of mood disorders [57, 58] and suicidality [59, 60], and is associated with the severity of psychiatric conditions (e.g. PTSD) [36]. Collectively, insomnia disorder is a risk factor for the most common medical and MH conditions seen in veterans, yet, insomnia disorder often goes unscreened and untreated in the VHA. The need to increase insomnia screening using independent measures for *all* veterans and offer evidence-based treatment is critical and is consistent with recommendations made by VA clinical practice guidelines [61].

The discrepancy between actual prevalence rates of insomnia disorder and what providers are documenting is larger than previously thought. Medical record codes have found rates 2.5% and 3.4% [23, 30], while we found 57.2% using an independent measure of insomnia. This confirms and expands on the finding that fewer than half of VHA providers routinely include insomnia in the encounter problem list [35]. Grandner and Chakravorty [29] suggest that many providers consider insomnia a symptom or secondary condition of a "primary disorder" rather than a comorbid diagnosis. Providers often focus on treating the "root cause" of insomnia (e.g. PTSD, pain) instead of targeting perpetuating factors (e.g. conditioned arousal), which is necessary for effective insomnia treatment.

The prevalence rates in this study were also markedly different than studies that used a single questionnaire item of "trouble falling or staying asleep" [18, 31–33]. The differences could be based on different samples (e.g. military vs. veteran or Vietnam era vs. post-9/11), co-occurring disorders, and age. However, a single item about sleep is not a validated measure, misses the chronic relationship between sleep and dissatisfaction, interference with daily life, and cognitive shift or anxiety involved with insomnia *disorder* [34]. As such, the use of *insomnia* or even *insomnia symptoms* when using a single sleep item can be misleading when trying to assess prevalence rates in various populations. We suggest regular use of validated insomnia questionnaires, as well as clearer guidelines on insomnia language in peer-reviewed publications.

Veterans who screened positive for MH disorders, increased combat exposure, positive for TBI and MST, and higher pain had considerably higher rates of insomnia disorder, consistent with previous literature [19, 41, 62, 63]. Interestingly, neither the number of deployments, nor screening positive for alcohol misuse, showed differences in screening positive for insomnia disorder. Our study also found that screening positive for suicidal ideation was strongly associated with insomnia disorder. Further, screening positive for PTSD and depression was associated with incredibly high rates of insomnia disorder. There are several possibilities for this finding. First, the higher prevalence of insomnia reported here, as compared to previous papers, may reflect high rates of combat exposure (53.7%) in our sample. Second, the co-occurrence of high PTSD *and* depression may have an additive effect in insomnia prevalence. Third, it is possible that while the ISI ≥ 11 is a reliable cutoff for a clinical sample, the cutoff for a more complex PTSD veteran sample needs to be higher (e.g. ≥ 15).

Our study suggests a critical need to increase evidence-based treatments for insomnia, especially in individuals with co-occurring disorders; this may be especially pertinent to help combat suicidal ideation in veterans [64, 65]. Cognitive behavioral therapy for insomnia (CBT-I) is considered the front-line treatment for insomnia [66] and is better than pharmacological interventions [67] with longer lasting positive outcomes [68]. Despite clear recommendations in the Department of Veterans Affairs/Department of Defense (VA/DOD) Clinical Practice guidelines [61], access to CBT-I as the standard of care for insomnia disorder is limited [69]. There is even increasing evidence in support of integrated treatment, providing CBT-I plus evidence-based treatment for the primary presenting disorder [70]. Together examining and treating insomnia disorder in the context of co-occurring disorders, especially PTSD, depression, and suicidal ideation in the VHA system is a necessity.

This study has several limitations. First, this sample of post-9/11 veterans may not be representative of veterans of all ages and eras using the VHA, or veterans who choose to receive their healthcare outside the VHA. Second, data were collected at time of registration for VA healthcare and not in specific clinics, limiting knowledge of what type of care veterans sought or our ability to address differences in veterans seeking mental versus physical health care. It is possible that not everyone presenting for enrollment was screened, meaning our findings may be impacted by self-selection bias. Finally, we were unable to screen for obstructive sleep apnea (OSA), which is highly co-occurring with insomnia as well as physical and MH correlates we examined, even in younger healthier veterans [71]. As such, the presence of OSA may influence insomnia prevalence rates, especially with co-occurring disorders [34].

While our sample was comprised only of post-9/11 veterans, the relevance of our cohort characteristics will only increase as they increasingly represent the veteran population using the VHA system in the future. The prevalence rates suggest that a considerable proportion of veterans enrolling in VA healthcare have clinically significant levels of insomnia. Despite clear recommendations in the VA/DOD Clinical Practice guidelines [61], access to CBT-I as the standard of care for insomnia disorder alone or with co-occurring disorders is limited [69]. Our findings, suggest heightened need for insomnia screening, documentation, and access to independent and direct interventions for insomnia in veterans entering the VHA system. Targeted efforts to increase veteran access to CBT-I, and behavioral sleep medicine, are essential in forestalling the array of adverse health consequences of chronic insomnia disorder.

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Statement of Significance

In an observational study of 5,552 post-9/11 veterans enrolling in the VA Healthcare System (VHA), 57.2% of the veterans were at high risk for insomnia disorder. Veterans with posttraumatic stress disorder, traumatic brain injury, and pain showed highest rates of insomnia disorder (93.3%, 77.7%, and 69.6%, respectively). Given the size of our sample, its sociodemographic representativeness, and the use of an independent, validated, standardized measure of insomnia, the prevalence rates reported are the most accurate in post-9/11 veterans using VHA care. Rates of insomnia disorder in post-9/11 veterans is alarmingly high and requires increased attention and direct treatment, especially in the context of co-occurring disorders.
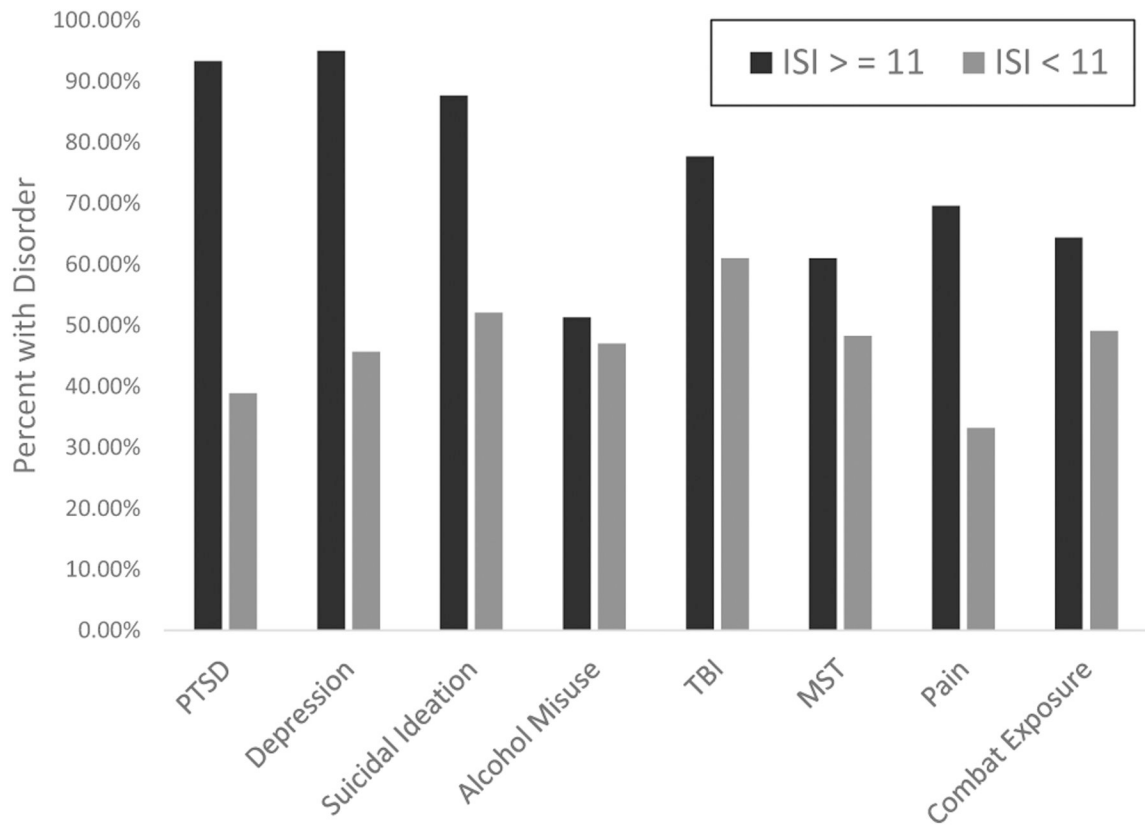
Figure 1.
Percentage of clinical correlates by insomnia disorder.

Table 1.

Demographic characteristics of post-9/11 veterans (*N* = 5,552)

Demographic variable	Total %/M (SD)	Demographic variable	Total %/M (SD)
Age	34.8 (9.10)	Service/branch	
Sex		Army	13.2%
Men	82.8%	Air Force	3.8%
Women	17.2%	Marines	30.5%
Marital status		National Guard	0.9%
Single	31.8%	Navy	51.2%
Married	50.9%	Coast Guard	0.5%
Divorced/Separated	17.3%		
Education		Service operation	
High school/GED	21.4%	Bosnia	<1%
Some college	43.9%	Djbouti	2.8%
College graduate	22.8%	Gulf War	3.1%
Associates Degree	11.9%	Global War on Terror	11.0%
Ethnicity		Kosovo	1.1%
Hispanic	24.2%	Latin America	1.6%
Non-Hispanic	69.2%	Libya	<1%
Declined Answer	6.7%	Somalia	1.8%
Race		OEF	24.6%
White	53.6%	OIF	25.4%
Black	14.7%	OND	2.4%
Pacific Islander/Asian	13.3%	Other	3.7%
Bi/Multi-Racial	6.9%	None	21.5%
American Indian/Alaskan	1.5%	Combat exposure	53.7%
Other	2.9%	Number of Deployments	1.93 (1.23)
Declined to Answer	7.1%		

OEF, operation enduring freedom; OIF, operation Iraqi freedom; OND: operation new dawn.

Table 2.

Prevalence of insomnia disorder and clinical characteristics (*N* = 5,552)

Variable (*n* = sample size)	Total %[*]/M (SD)
ISI ≥ 11 (*N* = 5,552)	57.2%
ISI ≥ 15—Moderate to Severe	40.5%
PCL-C (*n* = 3,918)	36.57 (19.29)
PCL-C ≥ 44	32.2%
PCL-5 (*n* = 1,480)	25.44 (22.62)
PCL-5 ≥ 33	35.8%
Combined PCL above cutoff	33.2%
PHQ-9 ≥ 15 *(N* = 5,552)	23.3%
Suicidal ideation > 0 (*n* = 5,532)	14.6%
Audit C	
Male (*n* = 3,982)	3.53 (2.71)
% ≥ 4	44.9%
Female (*n* = 827)	2.47 (2.34)
% ≥ 3	39.4%
TBI positive (*n* = 5,366)	25.14%
MST positive (*n* = 3,423)	11.7%
Pain ≥ 4	69.6%

ISI, insomnia severity index; MST, military sexual trauma; PTSD, posttraumatic stress disorder; PCL, PTSD clinician checklist; TBI, traumatic brain injury; PHQ9, patient health questionnaire 9-Item depression module; Audit, alcohol use disorders identification test.

[*] Percentages based on the clinical cutoffs for each of the measures.

Table 3.

Demographic characteristics by insomnia disorder

Characteristics	ISI < 11	ISI 11	Stats	Effect size Cohen's d/Cramer's V
Age	34.32 (9.35)	35.17 (8.84)	$t = -3.43$ ($p < 0.001$)[*]	$r = 0.09$
Sex			$X^2 = 2.70$ ($p = 0.10$)	$V = 0.02$
Men	43.4%	56.6%		
Women	40.4%	59.6%		
Marital status			$X^2 = 94.58$ ($p < 0.001$)[*]	$V = 0.14$
Single[†]	51.7%	48.3%		
Married	40.9%	59.1%	$X^2 = 48.65$ ($p < 0.001$)[*]	$V = 0.11$
Separated	32.8%	67.2%	$X^2 = 84.13$ ($p < 0.001$)[*]	$V = 0.18$
Ethnicity			$X^2 = 0.612$ ($p = 0.737$)	$V = 0.01$
Hispanic	41.7%	58.3%		
Non-Hispanic	43.0%	57%		
Race			$X^2 = 72.26$ ($p < 0.001$)[*]	$V = 0.12$
White[†]	47.3%	52.7%		
Black	34.2%	65.8%	$X^2 = 43.74$ ($p < 0.001$)[*]	$V = 0.11$
Pacific Islander	30.2%	69.8%	$X^2 = 6.11$ ($p = 0.01$)[*]	$V = 0.01$
Asian	42.2%	57.8%	$X^2 = 5.59$ ($p = 0.02$)[*]	$V = 0.04$
Bi/Multi-Racial	33.5%	66.5%	$X^2 = 25.30$ ($p < 0.001$)[*]	$V = 0.09$
American	32.9%	67.1%	$X^2 = 9.21$ ($p = 0.002$)[*]	$V = 0.06$
Indian/Alaskan				
Service/branch			$X^2 = 17.95$ ($p = 0.003$)[*]	$V = 0.06$
Navy[†]	43.4%	56.6%		
Army	41.3%	58.7%	$X^2 = 1.05$ ($p = 0.31$)	$V = 0.02$
Air Force	55.0%	45.0%	$X^2 = 10.63$ ($p < 0.001$)[*]	$V = 0.06$
Marines	40.9%	59.1%	$X^2 = 2.63$ ($p = 0.11$)	$V = 0.02$
National Guard	35.3%	64.7%	$X^2 = 1.35$ ($p = 0.25$)	$V = 0.02$

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Characteristics	ISI < 11	ISI ≥ 11	Stats	Effect size Cohen's d/Cramer's V
Coast Guard	50.0%	50.0%	$X^2 = 0.46$ ($p = 0.50$)	$V = 0.01$

*
Significant $p < .05$.

†
Comparison group for all analyses.

Table 4.

Clinical correlates by insomnia disorder

Characteristics	ISI < 11	ISI 11	Stats	Effect size Cohen's d/Cramer's V
# of Deployments	1.89 (1.21)	1.96 (1.24)	$t = -1.47$ ($p = 1.41$)	$r = 0.06$
Combat exposure			$X^2 = 132.06$ ($p < 0.001$)*	$V = 0.16$
Yes	35.6%	64.4%		
No	50.9%	49.1%		
PTSD			$X^2 = 1,445.16$ ($p < 0.001$)*	$V = 0.52$
PCL+	6.7%	93.3%		
PCL−	61.1%	38.9%		
Depression			$X^2 = 970.37$ ($p < 0.001$)*	$V = 0.42$
PHQ9+	5.0%	95.0%		
PHQ9−	54.3%	45.7%		
Suicidal ideation			$X^2 = 356.98$ ($p < 0.001$)*	$V = 0.25$
Ideation+	12.3%	87.7%		
Ideation−	47.9%	52.1%		
Alcohol misuse			$X^2 = 1.89$ ($p = 0.17$)	$V = 0.04$
Audit+	48.7%	51.3%		
Audit−	53.0%	47.0%		
TBI			$X^2 = 57.58$ ($p < 0.001$)*	$V = 0.16$
TBI+	22.3%	77.7%		
TBI−	39.0%	61.0%		
MST			$X^2 = 4.87$ ($p = 0.02$)*	$V = 0.70$
MST+	39.9%	61.0%		
MST−	51.7%	48.3%		
Pain			$X^2 = 489.70$ ($p < 0.001$)*	$V = 0.35$
Pain+	29.5%	69.6%		
Pain−	66.8%	33.2%		

*Significant $p < 0.05$.

ISI, insomnia severity index; MST, military sexual trauma; PTSD, posttraumatic stress disorder; PCL, PTSD checklist; TBI, traumatic brain injury; PHQ9, patient health questionnaire 9-Item depression module; Audit, alcohol use disorders identification test.