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Sleep disturbances and suicidal ideation in a sample of treatment-seeking Canadian Forces members and veterans



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ABSTRACT

This study examines the association between suicidal ideation and sleep disturbances in a sample of treatment-seeking Canadian Forces members and veterans, after controlling for probable posttraumatic stress disorder (PTSD), major depressive disorder (MDD), generalised anxiety disorder (GAD), and alcohol use disorder (AUD). Subjects included members and veterans of Canadian Forces seeking treatment at a hospital-based Operational Stress Injury Clinic ($n=404$). Sleep disturbances and nightmares were measured using individual items on the PTSD Checklist – Military Version (PCL – M), while the suicidality item of the Patient Health Questionnaire (PHQ-9) was used as a stand-alone item to assess presence or absence of suicidal ideation. Regression analyses were used to determine the respective impact of (1) insomnia and (2) nightmares on suicidal ideation, while controlling for presence of probable PTSD, MDD, GAD, and AUD. We found that 86.9% of patients reported having problems falling or staying asleep and 67.9% of patients reported being bothered by nightmares related to military-specific traumatic events. Neither sleep disturbances nor nightmares significantly predicted suicidal ideation; instead, probable MDD emerged as the most significant predictor. The clinical implications of these findings and their potential impact on treatment guidelines are discussed.

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1. Introduction

Combat exposure and peacekeeping operations increase the risk of developing a psychiatric disorder such as posttraumatic stress disorder (PTSD), major depressive disorder (MDD) and other anxiety disorders (Hoge et al., 2007; Lapierre et al., 2007; Seal et al., 2007). PTSD and other psychiatric disorders often present with sleep disturbances and are frequently the primary reasons to seek medical treatment (Shochat et al., 1999; Maher et al., 2006; C. Rosen et al., 2013).

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The association between depression and suicidal ideation has been well-documented (Kessler et al., 1999; Pirkis et al., 2000; Oquendo et al., 2004) and previous research also suggests a similar association with anxiety disorders (Weissman et al., 1989; Sareen et al., 2005; Norton et al., 2008). Fawcett et al. (1990) were instrumental in identifying insomnia as a significant predictor of suicide. Their results demonstrated that depressed patients who reported greater global insomnia were more likely to have committed suicide within a 13 month period. Similar results showing a link between sleep disturbances and suicidality were reported by Agargun et al. (1997a,b) Since then, there is also mounting evidence in both civilian and military samples supporting that sleep disturbances are associated with suicidal ideation, as well as suicide attempts and completers (Bernert et al., 2005; Bernert and Joiner, 2007; Pigeon et al., 2012b; Ribeiro et al., 2012; Nock et al., 2013). Researchers have also demonstrated a similar link between nightmares and suicidality. Bernert et al. (2005)

reported that nightmares predicted suicide ideations and Agargun et al. (2007) reported association between nightmares and suicide attempts. With the reported increased rates of suicide in veterans deployed to Iraq and Afghanistan (Harrell and Berglass, 2011; Bryan et al., 2013; Nock et al., 2013; Ursano, 2013), understanding suicidal behaviour in military members and veterans has become critically important to clinicians as it might provide an opportunity for early intervention.

Numerous studies have examined sleep disturbances among various cohorts of military and veteran samples. A recent, large American study found that a significant number of US Army members reported experiencing sleep difficulties both during and following deployment (Seelig et al., 2010); similar findings of insufficient sleep were reported among US Army soldiers during (MHAT, 2008) and following (Luxton et al., 2011) deployment in support of Operation Iraqi Freedom. Sleep-related difficulties amongst military personnel are certainly not limited to short sleep duration. Another study found that veterans with a diagnosis of PTSD reported significantly more difficulty falling and/or staying asleep than their peers without PTSD; but that veterans without PTSD still reported slightly more difficulty falling and/or staying asleep than a civilian comparison group (Neylan et al., 1998). Nightmares or disturbing dreams that may cause awakening are also commonly reported among veterans with PTSD (Mellman et al., 1995; Esposito et al., 1999; Woodward et al., 2000).

Nightmares and difficulty in falling and staying asleep are identified as symptoms in both the DSM-IV and DSM-5 diagnostic criteria for PTSD (American Psychiatric Association, 1994, 2013). Sleep-related complaints such as insufficient sleep, nightmares, and difficulty falling or staying asleep are associated with increased risk of suicidal ideation, suicide attempts, and completed suicide, particularly among individuals with a history of trauma or psychiatric illness (Agargun et al., 1997a; Krakow et al., 2000; Tanskanen et al., 2001; Sjostrom et al., 2009). Chronic sleep problems such as insomnia and inadequate sleep have also been associated with a number of adverse physical and mental health outcomes, such as obesity (Gangwisch et al., 2005), vascular disease (Wolk et al., 2005; Elwood et al., 2006), diabetes (Gangwisch et al., 2007; Cappuccio et al., 2010), affective disorders (Benca et al., 1992), and decreased health-related quality of life (HR-QoL; Manocchia et al., 2001; Strine and Chapman, 2005) across an array of populations. Insufficient sleep has also been related to increased mortality (Ferrie et al., 2007). Previous research also indicates that individuals with chronic psychiatric disorders may be at increased risk of sleep-related problems and that sleep disturbances may aggravate symptoms of psychiatric disorders such as anxiety (Sandor and Shapiro, 1994) and PTSD (Woodward et al., 1996).

However, because of the cross-sectional design of much of the existing research pertaining to sleep and suicidal thoughts and behaviours, the association between the two may be heavily influenced by a third variable correlated with sleep and suicide – i.e., depressive symptoms. A study by Bernert et al. (2005) and another by Liu (2004) aimed to address this limitation; both found that after controlling for depression, the association between nightmares and suicidality remained statistically significant, though the association between insomnia and suicidality did not. However, in another study in military members, Ribeiro et al. (2012) reported that sleep problems predicted suicide even after controlling for depression. These conflicted findings indicate that further investigation into the relationship between sleep and suicidal thoughts and behaviours are warranted; especially in the veteran population where sleep disturbances are very common, and where the association between sleep disturbances, nightmares, and suicidal ideation has not been widely studied.

While the relationship between sleep problems and suicidal thoughts and behaviours among military personnel and veterans has not been widely studied to date, there is some evidence to suggest that short sleep duration significantly predicts suicide risk among veterans (Luxton et al., 2011). Another study of military veterans who completed suicide found that sleep disturbances were associated with time to suicide (i.e., individuals with sleep disturbances died sooner after their last visit to a Veterans Health Administration clinic than those without sleep disturbances) (Pigeon et al., 2012a).

The relationship between sleep disturbances and suicidal thoughts and behaviours among members and veterans of Canadian Forces (CF) with a known psychiatric disorder is not well understood. In this study, we assessed the frequency of self-reported sleep disturbances (specifically nightmares and trouble falling or staying asleep) among a sample of treatment-seeking CF members and veterans; and evaluated the impact of self-reported sleep disturbances on suicidal ideation after controlling for common psychiatric conditions among military personnel and veterans.

2. Methods

2.1. Participants and procedure

The current study used previously collected data from 404 treatment-seeking CF members and veterans who were referred by their primary care physician (for currently serving members) or Veterans Affairs Canada case manager (for veterans) to the Parkwood Hospital Operational Stress Injury (OSI) clinic between January 2002 and May 2012. The Parkwood Operational Stress Injury (OSI) Clinic is one of the ten specialized outpatient mental health clinics funded by Veterans Affairs Canada to assess and treat CF members and veterans with military-related psychiatric disorders, such as PTSD.

A standardized intake screening protocol, which includes the Patient Health Questionnaire (PHQ) (Spitzer et al., 1999), the PTSD Checklist – Military Version (PCL – M) (Weathers et al., 1993), the Alcohol Use Disorder Identification Test (AUDIT) (Babor et al., 2001), the Short-Form Health Survey-36 (SF-36) (Ware et al., 1993, 2000) and the Brief Traumatic Brain Injury Screen (BTBIS) (Schwab et al., 2006), is administered to each member and veteran referred to the clinic. At intake to the OSI clinic, participants provided informed consent for information collected from the aforementioned psychological measures to be used for research, clinical review, education, and outcome measurement. The data from these intake assessments are de-identified and stored in an electronic dataset. The current study obtained its data from this previously-collected dataset and received approval for its use from both the Office of Research Ethics of the University of Western Ontario and the relevant hospital ethics review board.

2.2. Measures

The Patient Health Questionnaire (PHQ) is a self-administered version of the Primary Care Evaluation of Mental Disorders (PRIME-MD). The PHQ is composed of several brief measures which assess for threshold and sub-threshold mood, anxiety, and somatoform disorders (Spitzer et al., 1999). The current study used the PHQ's PHQ-9 to assess depressive symptom severity, and the PHQ-15 to assess somatic symptom severity. The PHQ-9 is based on DSM-IV diagnostic criteria, and uses a 4-point scale to assess depressive symptom severity, where 0 = "Not at all" and 3 = "Nearly every day". Scores of individual items are summed to provide a total score ranging from 0 to 27; scores of 5, 10, 15, and 20 represent cut-off scores for mild, moderate, moderately severe and severe depression, respectively. In the current study, the PHQ-9 suicidality item was used as a stand-alone item to assess suicidal ideation. Suicidality on the PHQ-9 was defined as an endorsement of "several days" or more to the PHQ-9 item ("Thoughts that you would be better off dead or of hurting yourself in some way"). When used alone, the suicidality item from the PHQ-9, as defined as an endorsement of "several days" or more to the item, has a demonstrated sensitivity of 0.84 and specificity of 0.69, when compared to the mood module of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) (Uebelacker et al., 2011). Internal consistency estimates in the original scale development samples were good (Cronbach's alpha = 0.86 and 0.89; Kroenke et al., 2002); in the current study, the internal consistency estimate of the PHQ-9 without the suicidality and sleep items was good (Cronbach's alpha = 0.88). The PHQ-9 has demonstrated good internal reliability (Cronbach's alpha of 0.89) and test-retest reliability ($r = 0.84$; Kroenke et al., 2001).

The Alcohol Use Disorders Identification Test (AUDIT) (Babor et al., 2001) is a self-administered, 10-item measure of alcohol use; and is used to identify harmful alcohol consumption behaviours, including alcohol dependence. The first eight items assess the frequency of alcohol use and quantity of alcohol consumed using a 5-point scale where 0="Never" or "1 standard drink" and 4="Daily or almost daily" or "7 or more standard drinks". The final two items assess the alcohol-related problems using a 3-point scale, where 0="Never" and 2="Yes, in the past year". Items are summed to derive a total score (range=0–40); a score of eight or higher is indicative of hazardous alcohol use (Babor et al., 2001). In the current study, the internal consistency of the AUDIT was good (Cronbach's alpha=0.87). For the analysis, a score of eight or higher was considered an endorsement of harmful alcohol use behaviours.

The PTSD Checklist – Military version (PCL – M) (Weathers et al., 1993) is a self-administered, 17-item scale which provides an estimate of PTSD symptom severity related to an identified military-specific traumatic experience. Respondents rank how affected they have been by each of 17 symptoms over the past month using a 5-point scale, where 1="Not at all" and 5="Extremely". A total score is tabulated by summing all 17 item responses (range=17–85); higher scores indicate greater symptom severity (Weathers et al., 1993; Bliese et al., 2008). A score of 50 or greater is typically considered a positive screen for PTSD amongst military populations (Weathers and Ford, 1996; Bliese et al., 2008; McDonald and Calhoun, 2010; Wilkins et al., 2011). The current study isolated the sleep disturbance item ("trouble falling or staying asleep") from the PTSD Checklist – Military Version (PCL – M) and used it as a stand-alone measure of sleep disturbances; the item assessing frequency of nightmares ("repeated, disturbing dreams of a stressful military experience") was also isolated and used as a stand-alone measure. For the purpose of this study, participants who reported at least a "3" (suggesting being moderately bothered) on the sleep-related items of the PCL – M (problems falling or staying asleep and repeated unwanted dreams) were considered to have endorsed these items. In the current study, the internal consistency of the PTSD Checklist – Military Version (PCL – M) both with and without the sleep-related items was excellent (Cronbach's alpha=0.93 and 0.92).

2.3. Statistical analysis

SPSS Statistics v. 21.0 (Chicago, IL) was used for all the analyses. Descriptive analyses were conducted to determine the frequency and severity of self-reported sleep disturbances as measured by the PTSD Checklist – Military Version (PCL – M) among the study sample. Additional analyses were conducted to assess the frequency of self-reported PTSD, MDD, GAD, AUD, and suicidal ideation. Probable PTSD was assessed using the PTSD Checklist – Military Version (PCL – M). Probable MDD and suicidal ideation were assessed using the PHQ-9, while presence of probable GAD was assessed using the anxiety disorder sub-section from the PHQ. Finally, probable AUD was assessed using the AUDIT.

Correlation analyses were conducted to ensure that assumptions of collinearity were not violated; and to identify statistically significant associations between the proposed independent variables and suicidal ideation. Logistic regression analyses were used to evaluate the impact of sleep disturbances on suicidal ideation. The first model assessed the influence of the absence or presence of probable GAD, the absence or presence of harmful alcohol use behaviours, the absence or presence of probable PTSD, the absence or presence of probable depression, and the absence or presence of problems falling or staying asleep on suicidal ideation. A second logistic regression analysis using the absence or presence of nightmares as an independent variable in place of trouble falling or staying asleep was conducted. Missing data was handled using pairwise deletion so as not to reduce power.

3. Results

Of the 404 participants, the majority were veterans released from the CF or RCMP, while the remaining participants were actively serving members of the CF (see Table 1). Participants served an average of 14.5 years in the CF or RCMP (S.D.=9.22), and had been deployed, on average, 3 times (S.D.=5.79). The vast majority of the sample was male (92.4%; $N=375$), and the mean age of participants at intake to the clinic was 45.6 years (S.D.=14.60). Primary deployment locales are presented in Table 1.

The frequency of self-reported PTSD, MDD, GAD, AUD, sleep disturbances, and suicidal ideation is reported in Fig. 1; and the mean scores and standard deviations of these measures are presented in Table 1. Of those who completed the screening questionnaires with no missing data, almost three-quarters of the sample met PTSD Checklist – Military Version (PCL – M) criteria for probable PTSD (72.8%; $N=278$), while 78.2% met PHQ-9 criteria for probable MDD ($N=273$). The vast majority of participants reported being bothered

Table 1
Subject characteristics.

Categorical variables	N	%
Military status		
Veteran	324	80.2
Currently serving member	80	19.8
Primary deployment locale		
Afghanistan	79	17.6
Balkan States (former Yugoslavia, Kosovo, etc.)	93	23.0
Africa (Somalia, Rwanda, Eritrea, Sierra Leone, etc.)	30	7.4
Domestic deployment	93	23.0
Trouble falling/staying asleep		
Not at all/a little bit		
Moderately/quite a bit/extremely	351	86.9
Nightmares		
Not at all/a little bit		
Moderately/quite a bit/extremely	274	68.2
Suicidal ideation ($N=345$)		
Not at all	187	54.2
Some days	90	26.1
More than half the days/nearly every day	68	19.7
Measure	Mean	S.D.
PCL – M	57.79	14.841
PHQ-9	15.84	6.816
AUDIT	7.64	7.883

"moderately to extremely" by problems falling or staying asleep; and over two-thirds reported being bothered "moderately to extremely" by nightmares related to a military-specific traumatic event.

Correlation analyses revealed statistically significant associations between suicidal ideation and probable GAD, PTSD, and MDD; and a significant association between insomnia and suicidal ideation ($p < 0.05$ for all). Neither harmful alcohol use behaviours nor nightmares were significantly correlated with suicidal ideation ($p=0.094$ and 0.288).

In the regression analysis examining the influence of sleep disturbances on suicidal ideation, trouble falling or staying asleep was not a statistically significant predictor of suicidal ideation ($B=0.836$, $p=0.447$). Instead, presence of probable MDD emerged as the most significant predictor of suicidal ideation ($B=2.094$, $p < 0.001$; see Table 2).

In the regression analysis assessing the influence of nightmares on suicidal ideation, endorsement of nightmares was not significantly associated with suicidal ideation ($B = -0.654$, $p=0.130$). In this model presence of probable PTSD was significantly associated with suicidal ideation ($B=1.402$, $p=0.035$; see Table 3), but probable depression emerged once again as the most significant predictor of suicidal ideation ($B=2.120$, $p < 0.001$).

4. Discussion

The current study found that nightmares and difficulty falling or staying asleep were reported by the majority of participants in this sample of treatment-seeking CF members and veterans. This finding is consistent with previous research pertaining to sleep-related difficulties among military personnel and veterans with PTSD (Mellman et al., 1995; Neylan et al., 1998; Peterson et al., 2008). Clinically relevant and consistent with previous studies in both military and civilian of populations (Malone et al., 1995; Druss and Pincus, 2000; Goodwin et al., 2003; Oquendo et al., 2005; Nelson et al., 2011), we found that depressive symptom severity emerged as the most significant predictor of suicidal ideation. Major depressive disorder is a significant suicidal risk

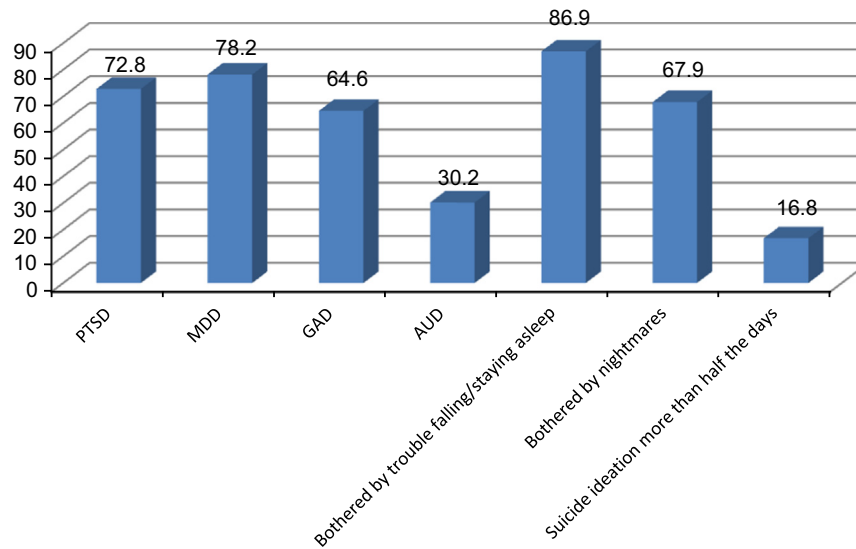


Fig. 1. Frequency (%) of self-reported probable PTSD, MDD, GAD, AUD, sleep disturbances, and suicidal ideation.

Table 2
Logistic regression assessing influence of sleep disturbances on suicidal ideation.

Variable	B	Std error	d.f.	p
Presence of probable GAD	0.502	0.388	1	0.196
Presence of harmful alcohol use behaviours	0.241	0.325	1	0.458
Presence of probable PTSD	0.841	0.585	1	0.171
Presence of probable MDD	2.094	0.636	1	0.001
Presence of sleep disturbances	0.836	1.100	1	0.447

Table 3
Logistic regression assessing influence of nightmares on suicidal ideation.

Variable	B	Std error	d.f.	p
Presence of probable GAD	0.479	0.390	1	0.220
Presence of harmful alcohol use behaviours	0.284	0.326	1	0.384
Presence of probable PTSD	1.402	0.666	1	0.035
Presence of probable MDD	2.120	0.635	1	0.001
Presence of nightmares	-0.654	0.431	1	0.130

factor for which there are effective interventions available that may mitigate against this risk (Lam et al., 2009; Parikh et al., 2009). Since military related-PTSD has generally demonstrated poorer treatment response when compared to civilian PTSD (Schoenfeld et al., 2004; Bradley et al., 2005; Frueh, 2013; C.S. Rosen et al., 2013b), treating comorbidity, especially major depressive disorder, may improve treatment outcomes (Davidson and Van Der Kolk, 1996; Van Der Kolk Bessel et al., 1996; Friedman, 2006).

The results of the current study showed that presence of probable depression is a stronger predictor of suicidal ideation than either nightmares or trouble falling or staying asleep. We also found that nightmares were inversely associated with suicidal ideation, although this finding was not statistically significant. These findings are somewhat contradictory to previous research pertaining to sleep disturbances as a predictor of suicidal ideation in military populations (Pigeon et al., 2012a; Ribeiro et al., 2012). It is possible that the disparities are the result of methodological differences or unique sample characteristics between the studies. The inverse relationship between nightmares and suicidal ideation could also be the result of a suppressor variable, as one would not expect nightmares and suicidal ideation to be inversely related. However, given the number of participants who endorsed

sleep-related difficulties, screening for sleep disturbances and nightmares in military personnel and veterans at risk for PTSD may nevertheless prove to be beneficial. The inclusion of psychoeducation related to sleep disturbances and PTSD, as well as psychotherapy to target nightmares, such as nightmare rescripting or imagery rehearsal therapy (Long et al., 2011; Thunker and Pietrowsky, 2012) and pharmacotherapy such as prazosin (Raskind et al., 2007; Miller, 2008) for sleep disturbances may be valuable additions to the treatment plan for combat-related PTSD. Specifically targeting sleep disturbances may also facilitate PTSD recovery by enhancing PTSD specific treatment, especially cognitive behavioural psychotherapy which are affected by sleep disturbances (Germain, 2013).

The current study did have several limitations worth noting. First, the study relied on data that was collected at a single specialized tertiary care clinic from treatment-seeking CF members and veterans. It therefore cannot be generalised to other psychiatric or military populations. The cross-sectional design of the study limits our ability to evaluate causal relationships between sleep disturbances and suicidal ideation. Additionally, the current study used self-report measures to assess sleep disturbances, PTSD, MDD, GAD, and AUD symptomatology, as well as suicidal ideation. It is possible that some participants under- or over-reported symptoms, which may artificially inflate or decrease the statistical significance of the findings reported. However, it bears noting that convergent validity studies on suicidal ideation have found 80% agreement among self-report measures and clinician ratings of suicidality (Yigletu et al., 2004). Further, the current study relied on the use of single item measures of suicidality, sleep disturbances, and nightmares. In addition, the current study did not include data on previous suicidal behaviour, which has been identified as a clinical predictor of future suicidal behaviour. Lastly, because the individual sleep and suicidal ideation items were removed from the PHQ-9 data used in the analyses, we were, to an extent, examining a form of depression that presents without any sleep disturbances or suicidal thoughts and behaviours; which may not be a truly accurate representation of military-related depressive disorders.

However, the current study does provide some important information pertaining to the association between sleep disturbances and suicidal ideation among military members and veterans, but further research is needed to delineate the effect of sleep disturbances on suicidal thoughts and behaviours within this population. It is possible that the inclusion of specific treatment

targeting sleep disturbances to the treatment plan may improve treatment trajectories of military members and veterans with PTSD and decrease the frequency of suicidal ideation among this population, but it is important to consider whether the benefit of screening for sleep disturbances is worth the additional clinical time required to do so. The findings of the current study indicate that screening for sleep disturbances and major depression as potentially modifiable conditions related to suicidal ideation among military members and veterans may be beneficial in terms of promoting a path to recovery. For those individuals who report significant impairment as a result of their PTSD-related sleep disturbances, clinicians may consider including specific interventions for sleep disturbances or nightmares in the treatment plan in hopes of improving long-term treatment outcomes and reducing the frequency and intensity of suicidal ideation.

Future studies assessing the prevalence of sleep disturbances and nightmares in other military samples may help clarify the role of sleep in the relationship between depression, PTSD, and suicidal ideation. These studies may benefit from including such variables as previous suicidal behaviours, and using more intricate sleep-related measures. Longitudinal clinical research may also provide insight into the impact of targeted treatment for sleep disturbances on treatment outcomes and suicidal thoughts and behaviours.

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