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Residual Sleep Disturbances Following PTSD Treatment in Active Duty Military Personnel

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Objective: Sleep disturbances, including nightmares and insomnia, are frequently reported symptoms of posttraumatic stress disorder (PTSD). Insomnia is one of the most common symptoms to persist after evidence-based PTSD treatment. The purpose of this study was to examine the prevalence of sleep disturbances in a sample of active duty military personnel before and after receiving therapy for PTSD in a clinical trial and to explore the associations of insomnia and nightmares with PTSD diagnosis after treatment. ***Method:*** Sleep parameters were evaluated with the PTSD Checklist in 108 active duty U.S. Army soldiers who had completed at least one deployment in support of the wars in Iraq and Afghanistan and who participated in a randomized clinical trial comparing Group Cognitive Processing Therapy–Cognitive Only Version with Group Present-Centered Therapy. ***Results:*** Insomnia was the most fre-

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quently reported symptom before and after treatment, with 92% reporting insomnia at baseline and 74%–80% reporting insomnia at follow-up. Nightmares were reported by 69% at baseline and by 49%–55% at follow-up. Among participants who no longer met criteria for PTSD following treatment, 57% continued to report insomnia, but only 13% continued to report nightmares. At baseline, 54% were taking sleep medications, but sleep medication use did not affect the overall results. ***Conclusions:*** Insomnia was found to be one of the most prevalent and persistent problems among service members receiving PTSD treatment. Nightmares were relatively more positively responsive to treatment. For some service members with PTSD, the addition of specific treatments targeting insomnia and/or nightmares may be indicated.

Keywords: insomnia, nightmares, posttraumatic stress disorder, cognitive processing therapy, military

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Sleep disturbances are some of the most commonly reported problems in patients with posttraumatic stress disorder (PTSD; e.g., McLay, Klam, & Volkert, 2010; Ohayon & Shapiro, 2000), appear to affect the development and maintenance of the disorder (e.g., Babson & Feldner, 2010; Gehrman et al., 2013; Germain, 2013), and may be important modifiable and separate targets for treatment. Insomnia is one of the most common symptoms to persist after evidence-based treatment for PTSD (Belleville, Guay, & Marchand, 2011; Galovski, Monson, Bruce, & Resick, 2009; Zayfert & DeViva, 2004), suggesting it is more than just a symptom. Insomnia is likely affected by factors such as irregular sleep schedules, excessive time in bed, poor stimulus control, and dysfunctional beliefs about sleep, which are not typically addressed in PTSD treatment (e.g., Spoormaker & Montgomery, 2008).

To date, no studies have examined sleep outcomes in a PTSD treatment study among active duty service members. This population may be at increased risk for sleep disturbances compared to civilians and veterans due to deployment-related stress, early morning duty times, and frequent shift work associated with active military service. The purpose of this study was to examine the course of sleep disturbances in service members who received Group Cognitive Processing Therapy–Cognitive Only Version (CPT-C), without written accounts, and Group Present-Centered Therapy (PCT) as part of a parent study on the treatment of PTSD (Resick et al., 2015). We hypothesized that insomnia and nightmares would be two of the most prevalent problems at baseline and that, although sleep disturbances would show some improvement as a result of PTSD treatment, they would persist even among patients whose PTSD remitted after treatment, suggesting some degree of independence.

Method

Participants

Data for the current study were drawn from a randomized controlled trial (RCT) comparing Group CPT-C with Group PCT for PTSD in U.S. Army soldiers conducted at the Fort Hood Army post in Killeen, Texas (Resick et al., 2015). A total of 108 active duty, activated Reservists, or activated National Guard members who had deployed to or around Iraq or Afghanistan and who met criteria for PTSD were randomized to treatment (CPT-C = 56, PCT = 52). There were no demographic differences between the treatment groups. See online supplemental materials Table S1 for demographic characteristics and Resick et al. (2015) for the participant flowchart.

Procedures

The recruitment, assessment, and intervention procedures are described elsewhere (Resick et al., 2015). Briefly, participants provided informed consent and then completed a comprehensive baseline assessment. Eligible participants were randomized into CPT-C or PCT groups with 8–10 participants per group. Both treatments consisted of 12 group sessions twice weekly for 6 weeks. Participants completed follow-up assessments 2 weeks, 6 months, and 12 months after treatment. Assessments were administered by trained independent evaluators.

Self-reported medication use was also examined. Medications were categorized as sleep medications if the specific purpose was to improve sleep (e.g., zolpidem, eszopiclone) or if the medications have known sedative properties that may be prescribed to aid sleep (e.g., clonazepam, trazadone).

Measures

The PTSD Symptom Scale–Interview (PSS-I; Foa, Riggs, Dancu, & Rothbaum, 1993). The PSS-I is a standard diagnostic assessment for PTSD and was used to determine PTSD diagnosis at baseline and each follow-up assessment.

PTSD Checklist–Stressor-Specific Version (PCL-S; Weathers, Litz, Herman, Huska, & Keane, 1993). The PCL-S is a frequently used, 17-item self-report measure of PTSD. The PCL-S items assessing "repeated, disturbing dreams of a stressful experience from the past" (Item 2) and "trouble falling or staying asleep" (Item 13) were used as the primary measures of nightmares and insomnia because the PCL-S response options have greater range than the PSS-I (i.e., 1–5 rather than 0–3). Presence of a symptom was defined as a score of 3 ("moderately") or more (Keen, Kutter, Niles, & Krinsley, 2008).

Treatments

CPT-C (Chard, Resick, Monson, & Kattar, 2009). CPT-C is a trauma-focused cognitive therapy for PTSD that focuses on patients' beliefs about why a traumatic event occurred and the effects of their beliefs and emotions in their life. Patients are taught to challenge and replace unhelpful thinking. CPT-C is one of two first-line evidence-based treatments for PTSD recommended by

the Department of Veterans Affairs and Department of Defense (Department of Veterans Affairs & Department of Defense, 2010).

PCT (Schnurr et al., 2003; Schnurr et al., 2007). PCT is a problem-solving therapy for PTSD that focuses on helping patients develop coping skills to manage present-day PTSD symptoms based on topics that patients bring to each session. PCT *does not* focus on trauma-related material. PCT is also classified as an evidence-based treatment (e.g., Frost, Laska, & Wampold, 2014; Schnurr et al., 2003; Schnurr et al., 2007).

Results

At baseline, insomnia was reported more frequently and with higher severity than any other symptom on the PCL-S, with almost all of the participants (n = 99, 92%) reporting the presence of insomnia (Table 1 and online supplemental materials Figure S1; see online supplemental materials Table S2 for severity of insomnia and nightmares). At baseline, nightmares were reported by 69% of the sample (see Table 1). To determine if the treatment groups differed in sleep outcomes, mixed-effects regression models with repeated measures (SAS MIXED v9.3) were examined. There were no between-groups differences (ps = .3–.7) or treatment-by-time interactions (ps = .2–.8) for insomnia and nightmares. There was, however, a significant within-subjects time effect, with both symptoms improving from baseline through follow-up in both treatments (all ps < .001; Table 1 and online supplemental materials Table S2). Both insomnia and nightmares proved to be treatment resistant for many participants, with rates of insomnia remaining at 77% and nightmares at 52% of the total sample throughout the follow-up, regardless of type of treatment (see Table 1).

Insomnia was an intractable problem even when the response to PTSD treatment was good. In the subsample of treatment completers who no longer met criteria for PTSD on the PSS-I at follow-up, generalized linear mixed-effects regression models (SAS GLIMMIX v9.3) indicated that the average estimated prevalence of insomnia was still 57% (66% for CPT-C and 50% for PCT, t = 1.06, df = 34, p = .30), whereas the average posttreatment prevalence of nightmares among posttreatment and follow-up assessments that did not meet PTSD criteria was only 13% (CPT-C 17%, PCT 10%, t = .83, df = 34, p = .41; see online supplemental materials Figure S1).

At baseline, 54% of the sample was taking one or more sleep medications (e.g., zolpidem, trazadone, cyclobenzaprine, eszopiclone, quetiapine). There were no significant changes in sleep medication use across time, McNemar's $\chi^2(1) = .62$, p = .47, with 52% reporting sleep medication use at posttreatment and 62% at 6-month follow-up. When included in the above mixed-effects regression analyses, the results remained essentially the same for posttreatment prevalence of insomnia (on medications = 76%, not on medication = 72%, Δp = .95) and nightmares (on medications = 49%, not on medication = 45%, Δp = .88).

Discussion

This study examined sleep outcomes among active duty military personnel who received Group CPT-C or Group PCT for PTSD in an RCT. Insomnia and nightmares were very significant problems at baseline (92% and 69%, respectively) and continued to be so at posttreatment (77% and 52%, respectively). Insomnia was the most frequent and most severe symptom at baseline and after treatment. This pattern was consistent, albeit reduced, among participants who did not meet criteria for PTSD after treatment, with 57% still reporting insomnia at posttreatment. However, only 13% still reported nightmares. Interestingly, over half of the sample was taking medications to address sleep, but medication usage did not affect overall results. The high prevalence of residual insomnia following successful PTSD treatment is consistent with a study conducted in civilians (Zayfert & DeViva, 2004), where 48% continued to report insomnia and 11% continued to report nightmares. The divergent impact of PTSD treatment on insomnia and nightmares highlights the fact that sleep disturbances are complex and multifaceted.

Sleep disturbances in the context of trauma exposure have generally been considered secondary to PTSD, and it is often presumed that treatment of PTSD will ameliorate sleep problems (e.g., Spoormaker & Montgomery, 2008). To some extent, these results indicate that this assumption is true with respect to nightmares, but the persistence of insomnia is problematic. Treatments for PTSD may address some factors that perpetuate sleep difficul-

Table 1
Proportions Reporting Insomnia and Nightmares

	Insomnia (PCL-S Item 13)			Nightmares (PCL-S Item 2)		
Assessment point	CPT-C	PCT	Total	CPT-C	PCT	Total
Baseline, % (n)	95 (56)	88 (52)	92 (108)	63 (56)	75 (52)	69 (108)
Posttreatment, % (n)	73 (45)**	74 (49)*	74 (94)**	50 (45)	52 (49)**	51 (94)**
6-month follow-up, % (n)	80 (34)*	80 (37)	80 (71)*	54 (34)	57 (37)*	55 (71)*
12-month follow-up, % (n)	78 (26)*	75 (28)	77 (54)**	42 (26)*	55 (28)*	49 (54)**
Average post, %	77	77	77	49	55	52
Within-group significance tests						
Among post	F = .37, p = .69	F = .35, p = .70	F = .69, p = .50	F = .55, p = .58	F = .22, p = .80	F = .44, p = .64
Baseline vs. average post	t = 2.60, p = .010	t = 1.74, p = .084	t = 3.13, p = .002	t = 2.07, p = .041	t = 3.09, p = .003	t = 3.68, p = .004

Note. Symptoms rated ≥ 3 on the PCL-S were considered present. Entries are estimates from mixed-effects regression models. Asterisks indicate significant change from baseline at * p < .05 or ** p < .01 based on regression models. F ratios, df = 2, 106; t tests, df = 106. Average post includes posttreatment, 6-month follow-up, and 12-month follow-up assessments for all participants in both treatment groups. PCL-S = PTSD Checklist–Stressor-Specific Version; CPT-C = Cognitive Processing Therapy–Cognitive Only Version; PCT = Present-Centered Therapy.

ties (e.g., feeling unsafe, hypervigilance, tension), but other behavioral components (e.g., irregular sleep schedules, excessive time awake in bed, poor stimulus control, dysfunctional beliefs about sleep) are not directly addressed. This may be why insomnia persists in some cases.

The finding that nightmares are reduced in patients who lose a PTSD diagnosis with PTSD treatments that do not target nightmares directly makes sense for trauma-focused therapy because nightmares have putative trauma-related content. The substantial change in PCT, which is not a trauma-focused treatment, requires an alternative explanation. It may be that nightmares are reduced when individuals with PTSD are actively engaged in any bona-fide process of change that produces hope and reduces daily conflicts (see Casement & Swanson, 2012).

This study was limited by use of single items to assess insomnia and nightmares that are not sufficient to adequately assess sleep. However, our results were consistent with those of previous studies, strengthening confidence in the findings (Belleville et al., 2011; Galovski et al., 2009; Zayfert & DeViva, 2004). Future studies should include validated self-report measures of insomnia and nightmares (e.g., sleep diaries), objective assessment of sleep (e.g., actigraphy, polysomnography), and measures designed to identify trauma-related thoughts and behaviors that are likely to interfere with sleep (e.g., Pruiksma et al., 2014). Studies should also evaluate the impact of other sleep disorders (e.g., sleep-disordered breathing, periodic limb movement disorder, and circadian rhythm sleep disorders) on PTSD and treatment outcomes. Patients in this study received group therapy for PTSD, and the outcomes reported here may not generalize to active duty military personnel treated in an individual format. Finally, this sample comprised U.S. Army soldiers at a single military installation and included only eight women, preventing gender comparisons in this sample. Replication studies are needed before the results can be generalized to other branches of the military in other settings.

In summary, both insomnia and nightmares were highly prevalent symptoms in active duty service members seeking treatment for PTSD. Insomnia remained a persistent complaint regardless of the outcome of PTSD treatment and may represent an independent disorder. Nightmares remained a problem for 52% of the participants, but among those who lost a PTSD diagnosis, the prevalence fell to 13%. For some individuals with PTSD, specific treatments targeting insomnia and/or nightmares may be indicated. Given the results indicating that sleep medication use did not seem to affect either insomnia or nightmares, it is probable that cognitive–behavioral approaches to both insomnia and nightmares may be more effective (e.g., Ho, Chan, & Tang, 2016; Taylor & Pruiksma, 2014). Additional clinical research is needed to address the intricate relationship between PTSD and sleep disorders as well as the potential benefits of treating sleep disorders before or after the treatment of PTSD.

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