Behaviour Research and Therapy 97 (2017) 75–85

Contents lists available at ScienceDirect

Behaviour Research and Therapy

journal homepage: www.elsevier.com/locate/brat

Effects of psychotherapies for posttraumatic stress disorder on sleep disturbances: Results from a randomized clinical trial

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ARTICLE INFO

Article history:
Received 13 June 2016
Received in revised form
16 May 2017
Accepted 5 July 2017
Available online 8 July 2017

Keywords:
Posttraumatic stress disorder
Sleep disturbances
Randomized controlled trial
Cognitive behavioural therapy

ABSTRACT

The effectiveness and mechanisms of psychotherapies for posttraumatic stress disorder (PTSD) in treating sleep problems is of interest. This study compared the effects of a trauma-focused and a non-trauma-focused psychotherapy on sleep, to investigate whether 1) sleep improves with psychotherapy for PTSD; 2) the degree of sleep improvement depends on whether the intervention is trauma or non-trauma-focused; 3) the memory-updating procedure in cognitive therapy for PTSD (CT-PTSD) is associated with sleep improvements; 4) initial sleep duration affects PTSD treatment outcome; and 5) which symptom changes are associated with sleep duration improvements. Self-reported sleep was assessed during a randomized controlled trial (Ehlers et al., 2014) comparing CT-PTSD (delivered weekly or intensively over 7-days) with emotion-focused supportive therapy, and a waitlist. Sleep duration was reported daily in sleep diaries during intensive CT-PTSD. CT-PTSD led to greater increases in sleep duration (55.2 min) and reductions in insomnia symptoms and nightmares than supportive therapy and the waitlist. In intensive CT-PTSD, sleep duration improved within 7 days, and sleep diaries indicated a 40-min sleep duration increase after updating trauma memories. Initial sleep duration was not related to CT-PTSD treatment outcome when initial PTSD symptom severity was controlled. The results suggest that trauma-focused psychotherapy for PTSD is more effective than nontrauma-focused therapy in improving self-reported sleep, and that CT-PTSD can still be effective in the presence of reduced sleep duration.

1. Introduction

Sleep disturbances, such as difficulty falling and staying asleep and nightmares are two of the diagnostic symptoms of posttraumatic stress disorder (PTSD) (American Psychiatric Association, 2013). Sleep problems in PTSD include reduced self-reported and objective sleep duration and lower reported sleep quality (for review see Cox & Olatunji, 2016) and up to 60% of people with PTSD and insomnia complaints also meet criteria for an insomnia disorder (Ohayon & Shapiro, 2000).

Trauma-focused psychological therapies are the first-line recommended treatments for individuals suffering from PTSD, including when comorbid insomnia is present. It is therefore important to understand the effects of trauma-focused PTSD treatments on sleep outcomes in order to maximize PTSD treatment efficacy. Only a small number of studies have investigated the effects of trauma-focused PTSD therapies on sleep outcomes (e.g., Belleville, Guay, & Marchand, 2011; Brownlow et al., 2016; Galovski, Monson, Bruce, & Resick, 2009; Galovski et al., 2016; Gutner, Casement, Gilbert, & Resick, 2013; Levrier, Marchand, Belleville, Dominic, & Guay, 2016; Lommen et al., 2015; Nishith et al., 2003; Raboni, Tufik, & Suchecki, 2006; Zayfert & DeViva, 2004). Improvement in sleep has been found for prolonged exposure (PE) and cognitive processing therapy (CPT) for PTSD (Brownlow et al., 2016; Galovski et al., 2016, 2009; Gutner et al.,

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http://dx.doi.org/10.1016/j.brat.2017.07.001

2013), eye-movement desensitization and reprocessing therapy (Raboni et al., 2006), other cognitive behavioural therapies (Belleville et al., 2011; Levrier et al., 2016; Nishith et al., 2003; Zayfert & DeViva, 2004), and cognitive therapy for PTSD (CT-PTSD) (Lommen et al., 2015). Direct comparisons of two evidence-based, trauma-focused PTSD therapies, CPT and PE, found no differences in sleep improvement between treatments (Galovski et al., 2009; Gutner et al., 2013).

However, studies have also found that despite improvements in self-reported sleep duration and/or quality (Belleville et al., 2011; Galovski et al., 2009; Gutner et al., 2013; Lommen et al., 2015), nightmares (e.g., Gutner et al., 2013; Levrier et al., 2016), and insomnia symptoms (e.g., Gutner et al., 2013), sleep difficulties are commonly residual after PTSD therapy (Belleville et al., 2011; Galovski et al., 2016, 2009; Gutner et al., 2013), including in those who have recovered from PTSD (Zayfert & DeViva, 2004).

It would therefore be important to investigate further which PTSD therapies, and which aspects of PTSD therapy, best promote sleep improvements, and whether sleep problems are residual to the same extent across different psychotherapies for PTSD. To our knowledge, no study has yet compared the effects of trauma and nontrauma-focused psychotherapy for PTSD on sleep, in adults. If trauma-focused therapy has superior effects on sleep compared to nontrauma-focused therapy, this may suggest that the focus on trauma memories and their meaning in these treatments may contribute to sleep improvements. It is also of interest to explore whether sleep improvement coincides with certain procedures in treatment that aim to change the "here and now" quality of trauma memories, such as the *updating memories procedure* in CT-PTSD (Ehlers & Clark, 2000). In this procedure, the individually most upsetting moments in memory are linked to less threatening meanings that the patient and therapist have identified from the course of events (e.g., "I did not die") or through cognitive restructuring (e.g., "I could not have prevented the trauma even if I had acted differently").

Furthermore, few studies have investigated which symptom changes are associated with sleep improvements with trauma-focused PTSD therapy (e.g., Lommen et al., 2015). Understanding whether treatment changes symptoms that have been associated with sleep disturbances in PTSD, such as arousal (see Sinha, 2016) and trauma-related nightmares (e.g., Woodward, Arsenault, Murray, & Bliwise, 2000), would be informative.

Finally, research demonstrating the importance of sleep in learning and memory, emotional processing (Diekelmann, Biggel, Rasch, & Born, 2012; Wagner, Hallschmid, Rasch, & Born, 2006; Walker & van der Helm, 2009; Yoo, Hu, Gujar, Jolesz, & Walker, 2007), and retention and generalization of fear extinction learning (Kleim et al., 2013; Pace-Schott, Verga, Bennett, & Spencer, 2012) has contributed to concerns that reduced sleep duration may have a detrimental effect on response to psychological PTSD treatments. Many of the trauma-focused treatments for PTSD involve some form of exposure to trauma memories and reminders (Schnyder et al., 2017), and it is possible that reduced sleep duration may interfere with the effects of exposure through impairing retention of fear extinction learning. Poor sleep may also interfere by impacting an individual's ability to retain learning from the treatment session through reducing concentration and attention in therapy, or interfering with consolidation of new information from the session, such as updated information and meanings in the trauma memory. There is also some evidence that poor sleep quality predicts a slower response to PTSD treatment, in people with PTSD and comorbid major depression (Lommen et al., 2015). However, recent studies have also found that nightmares did not impact the efficiency of CBT for PTSD (Levrier et al., 2016), and that while sleep-directed hypnosis before CPT for PTSD improved sleep more than a control condition, it did not lead to greater improvements in PTSD symptoms after CPT (Galovski et al., 2016), and thus initial evidence is so far inconclusive. Further research is needed into the effects of reduced sleep duration on PTSD treatment outcomes.

1.1. Study aims

The primary aim of this study was to compare the effects of a trauma-focused and a nontrauma-focused psychotherapy for PTSD on self-reported sleep, in a randomised controlled trial design, in a secondary analysis of a clinical trial by Ehlers and colleagues (2014). This trial compared trauma-focused CT-PTSD (Ehlers & Clark, 2000; Ehlers, Clark, Hackmann, McManus, & Fennell, 2005) to emotion-focused supportive therapy, an active nontrauma-focused treatment, and a waitlist control. Both psychotherapies (cognitive and supportive therapy) led to greater changes in PTSD symptoms than the waitlist, and CT-PTSD lead to greater improvements in PTSD symptoms than supportive therapy (see Ehlers et al., 2014 for full results). For the sleep study presented here, sleep duration was the primary outcome measure as it was the most regularly available sleep outcome. Additional analyses included sleep quality and insomnia symptoms that were assessed before and after treatment.

Specifically, the present study investigated whether 1) trauma-focused (CT-PTSD) and nontrauma-focused psychological treatment (supportive therapy) lead to greater improvement in sleep than the waitlist control, and 2) the degree of sleep improvement depends on whether the intervention is trauma or nontrauma-focused. If psychotherapy generally improves sleep, both CT-PTSD and supportive therapy would be expected to lead to greater improvement in sleep than a waitlist. If trauma-focused therapy is important for improving sleep with PTSD treatment, then CT-PTSD would be expected to lead to greater improvements in sleep than supportive therapy, which focuses on present feelings and problems, rather than trauma memories and their meanings.

The study further investigated 3) whether the memory-updating procedure in CT-PTSD was associated with sleep improvements. To do this, the study compared two versions of CT-PTSD, a standard weekly version and an intensive version, in which the interventions which promote memory-updating were delivered over five to seven working days, compared to three months for standard CT-PTSD. This enabled investigation of whether sleep improvements coincided with interventions that facilitate memory-updating: First, by comparing standard and intensive treatment at a time point when memory-updating had taken place for the intensive, but not the standard weekly CT-PTSD group; and second, by analysing daily sleep diaries completed by the intensive CT-PTSD group, to compare sleep directly before and after memory-updating. If linking the worst moments in trauma memories with less threatening meanings promotes sleep improvements with CT-PTSD, then it would be expected that sleep would significantly improve after the memory-updating procedure in therapy.

Next, 4) the effect of sleep duration on PTSD treatment outcome was also investigated. If reduced initial sleep duration interferes with treatment outcome, it would be expected that lower sleep duration at pre-treatment would predict more severe PTSD symptoms at post-treatment.

Finally, 5) in patients who received CT-PTSD, associations between improvement in sleep duration and symptoms hypothesised to be related to sleep improvements were explored. These were reductions in nightmares, hyperarousal and anxiety about going to bed.