

## EDITORIAL

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# PTSD: Posttraumatic Sleep Disorder?

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Krakow et al.'s study on sleep disorder profiles in trauma survivors addresses highly relevant questions for the understanding of posttraumatic stress disorder (PTSD) and its treatment: are sleep-related disturbances just one indicator of posttraumatic stress amongst a myriad of others? How do they interact with other psychopathological symptoms? And do they deserve a special diagnostic status and treatment? After a short introduction into the diagnosis and nosology of PTSD, Krakow et al.'s contribution to this issue will be linked to current concerns in research and treatment of traumatized individuals.

### Posttraumatic Stress Disorder

Survivors of traumatic events frequently report mental health problems including symptoms of anxiety or depression, re-experiencing of the trauma, emotional numbing or disturbed sleep. In many of these individuals, initial symptoms remit within days or weeks of the trauma. However, other individuals go on to suffer from psychiatric disturbances, among them most prominently posttraumatic stress disorder. The symptoms of posttraumatic stress disorder are grouped into the three clusters of re-experiencing the traumatic event, avoidance, and hyperarousal. For a detailed list of the 17 typical PTSD-symptoms see the DSM-IV definition (1, pp. 427-9). With lifetime prevalence estimated at up to 9%, posttraumatic stress disorder (PTSD) is one of the most common psychiatric disorders. The time course of

posttraumatic stress can be characterized by a high rate of spontaneous remission during the initial months following the traumatic event. The majority of individuals who do not recover during this period, and who do not receive appropriate treatment, are apt to suffer from chronic PTSD for many years (2). PTSD is a condition that typically co-occurs with other psychiatric and psycho-social problems. Lifetime comorbidity in population-based surveys of PTSD ranges from 62% to 92% (2). Typical examples of comorbid diagnoses are affective, anxiety, or substance use disorders. The efficacy of psychotherapeutic and pharmacotherapeutic treatments for PTSD have been demonstrated (e.g., 3). Currently, exposure therapy is seen as the treatment modality with the strongest evidence for its efficacy (4). However, too many individuals still fail sufficiently to benefit from existing therapeutic interventions (5).

### The Krakow et al. study

Krakow et al. re-analyzed data from three previously published studies (6-8). In these studies, a total of 437 predominantly female trauma survivors seeking treatment for nightmares and insomnia had been screened with an extensive battery of sleep and mental health questionnaires. Individuals were classified into the sleep disorder profiles of psychophysiological insomnia (PPI), chronic nightmare disorder (CND), and sleep-disordered breathing (SDB). The authors predicted that subjects qualifying for one of

these disorders would show worse sleep symptoms (self-reported sleep indices and sleepiness-related impairment, hypothesis 1) and more severe symptoms of posttraumatic stress, depression, and anxiety (hypothesis 2) than subjects without a diagnosis. With the exception of CND and SDB being only marginally related to standard sleep indices (sleep onset latency, total sleep time, sleep efficiency), both hypotheses were confirmed by the reported data. Below, each sleep disorder profile and the related results will be discussed.

### **PTSD and insomnia**

With 76% of their participants subjectively reporting psychophysiological insomnia, Krakow et al. replicated the finding that sleep complaints are quite common in trauma survivors (for a review see 9). Surprisingly, sleep laboratory studies revealed only minimal effect sizes for differences in objective polysomnographic measures of sleep architecture between traumatized subjects and controls (10). However, polysomnographic recordings in the home setting (11) indicated that this absence of disturbed sleep in polysomnographic studies may be an artefact of the safe laboratory environment (cf., 12). Here, many traumatized subjects may fail to develop the high levels of stress and anxiety impairing their sleep in the home setting. The experience of one of my patients - a 50 year old former prisoner of war - illustrates the effects of a safe environment. As confirmed by his wife, he awakened every night for 20 years shouting and struggling out of a recurring nightmare of a massacre he had survived. As he was afraid to fall asleep again out of fear that his nightmare would return, he got only 3-5 hours of sleep a night. When he was referred to a hospital due to somatic health problems, the nightmare stopped. Actually, I was already asking myself if the nightmare was related to his health

problems. However, as soon as he returned home, he started to experience the nightmare again. As noted by Krakow et al., processes such as psychophysiological conditioning may add to or even replace the role of posttraumatic stress in the causation of sleep-related disorders. Currently, several research groups are completing ecologically valid studies on sleep in trauma survivors. Thus, we can soon hope to uncover whether the results of laboratory-based polysomnographic studies in trauma samples will need to be revised. Ecologically valid studies on representative samples will finally let us know more about the frequency and severity of various types of sleep disturbances in trauma survivors using objective measures. Although the close association found by Krakow et al. between PPI and symptoms of PTSD, depression, and anxiety does not allow for a causal interpretation, it supports the viewpoint that sleep related problems deserve special attention by clinicians as well as scientists dealing with PTSD.

### **PTSD and nightmares**

With four of five participants suffering from chronic nightmares, Krakow et al. found a somewhat elevated proportion of chronic nightmare sufferers as compared to the 50-60% reported in other studies (13,14). Generally, the time course of posttraumatic nightmares seems to parallel that of PTSD: in a large disaster study, posttraumatic nightmares ceased within one year in two thirds of participants, whereas the remaining participants experienced nightmares for at least three years (15). Whereas idiopathic nightmares occur only out of REMS, posttraumatic nightmares also occur out of NREMS, although REMS parameters (as measured in the sleep laboratory!) appear not to be affected by PTSD (16). As suggested by Schreuder, Igreja, van Dijk, and Kleijn (17), posttraumatic dreams can be classified according to their level of similarity to the

traumatic event as replicative (posttraumatic re-enactments), mixed, or non-replicative (symbolic). A review of studies reporting on types of posttraumatic nightmares showed that about one half of posttraumatic nightmares are exact replications of the trauma (16). Krakow et al. found that CND was rather weakly related to sleep onset latency, total sleep time, and sleep efficiency. A substantial effect size was found for sleepiness-related impairment. Although the presented data do not allow for causal conclusions, they can at least partially be interpreted as support for the assumption that posttraumatic nightmares cause posttraumatic sleep disturbance (1). Replicating findings from other studies (e.g., 15, 18, 19), CND proved to be strongly associated with measures of PTSD and comorbidity. Yet, the question remains as to whether the nightmares experienced by traumatized individuals reflect their waking condition (continuity-hypothesis, cf. 20) or if they are responsible for an exacerbation of daytime symptoms themselves. A detailed description of the interaction of nightmares/dreams and mental health after trauma would help us to gain a better understanding of the function(s) of dreaming (21).

### **PTSD and sleep disordered breathing**

Krakow et al. openly discussed the disadvantages of applying self-rating instruments without including additional objective measures. On the one hand, it remains unclear to what extent shared method variance is responsible for the associations between different measures. On the other hand, the reliability and validity of self-ratings related to sleep perception is limited (22). However, the requirement of large samples is often incompatible with the logistics of extensive polysomnographic recording. Here, Krakow et al. have come up with a most elegant solution. Applying self-ratings in the assessment of SDB and

validating the subjective reports in a (possibly randomly selected) economically-sized subsample by means of objective measures is a wonderful way of combining the demands of large samples and objective measurement.

68% of Krakow et al.'s subjects were diagnosed with SDB. The high incidence of DB diagnoses might well have been due to the related inclusion criteria. The relation between PTSD and SDB is less obvious as compared to that between PTSD and PPI/CND. A direct pathway between both disorders is less plausible. Given that more than every second individual in their study reported overweight or obesity (23), the high incidence of SDB could be related to this risk factor. Are subjects suffering from PPI in the context of PTSD more likely to perceive pre-existing SDB, as discussed by Krakow et al. (8) in the context of complex insomnia? Hopefully, Krakow and his co-workers will soon develop more detailed models of the interaction of different sleep disorder profiles based on their extensive research and treatment of trauma survivors experiencing sleep disturbances.

### **Treatment of posttraumatic stress and sleep disorder**

As noted by Krakow et al., it is rather uncommon for mental health practitioners dealing with PTSD to consider sleep problems as markers of a distinct nosological entity. Accordingly, sleep-related disturbances only rarely receive independent therapeutic attention. Generally, treatment guidelines advance the rule "PTSD first" as long as no serious contra-indication is present which would hinder a trauma focused approach (24). This advice is based on the experience that a comorbid condition will often improve with successful treatment of PTSD (25). Krakow et al. make a strong case for an improved collaboration of mental health and sleep clinicians. Based on

subjective reports, an accurate sleep diagnostic work up remains illusive for mental health professionals. Krakow et al. have vividly demonstrated the close association between sleep disturbances/nightmares and psychopathology. Even if we do not yet understand their complex interactions following trauma very well, this research group has complemented the assumption that sleep disturbances improve following PTSD treatment with the finding that PTSD symptoms were alleviated after treatment for nightmares (26-29). A randomized clinical trial testing exposure therapy (alone) vs. treatment for sleep related problems (alone) vs. both together might produce results which would help further the liaison between both disciplines.

### Research on PTSD, sleep and dreams

Increased attention to the interactions between posttraumatic stress, sleep and dreams is crucial not only for designing and implementing clinical interventions. Several researchers have advanced the view that disturbed sleep and dreaming are not merely some vaguely clinically important PTSD symptoms amongst others. Rather, they assign them a leading role at the core of the pathological mechanism of the disorder

itself. Ross et al. (30) consider sleep disturbance as the hallmark of PTSD. Kramer et al. (31, p. 93) assume that the “dream experience (...) may well lie at the heart of PTSD”. In the context of theories that recognise PTSD as a disturbance of memory elaboration (e.g., 32), a recent model links PTSD to supposed sleep dependent memory consolidation processes. Stickgold (33, p. 69) assumes that posttraumatic stress related changes in adrenergic and cholinergic neurotransmitter systems lead to a “breakdown of the normal blockade of hippocampal outflow to the cortex, which, we propose, prevents the normal integration and subsequent weakening of the episodic memory. It is this sequence of events that we believe leads to PTSD”. Thus, posttraumatic re-enactments are understood as a psychological correlate of pathological changes to normal brain functioning during (REM) sleep. However, a general consensus about possible contributions of sleep and dreaming to the understanding of posttraumatic symptoms is still missing. The fascinating question of whether PTSD is basically a disorder of sleep and dreaming can only be answered once the scientific and clinical significance of sleep and dreaming following trauma is furthered by studies such as that by Krakow et al.

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